

ATTACHMENT A-1

Beaver Valley Power Station, Unit No. 1
Proposed Technical Specification Change No. 211

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(Proposed Wording)

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(Proposed Wording)

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ADD →

(Proposed Wording)

DEFINITIONS

CHANNEL FUNCTIONAL TEST

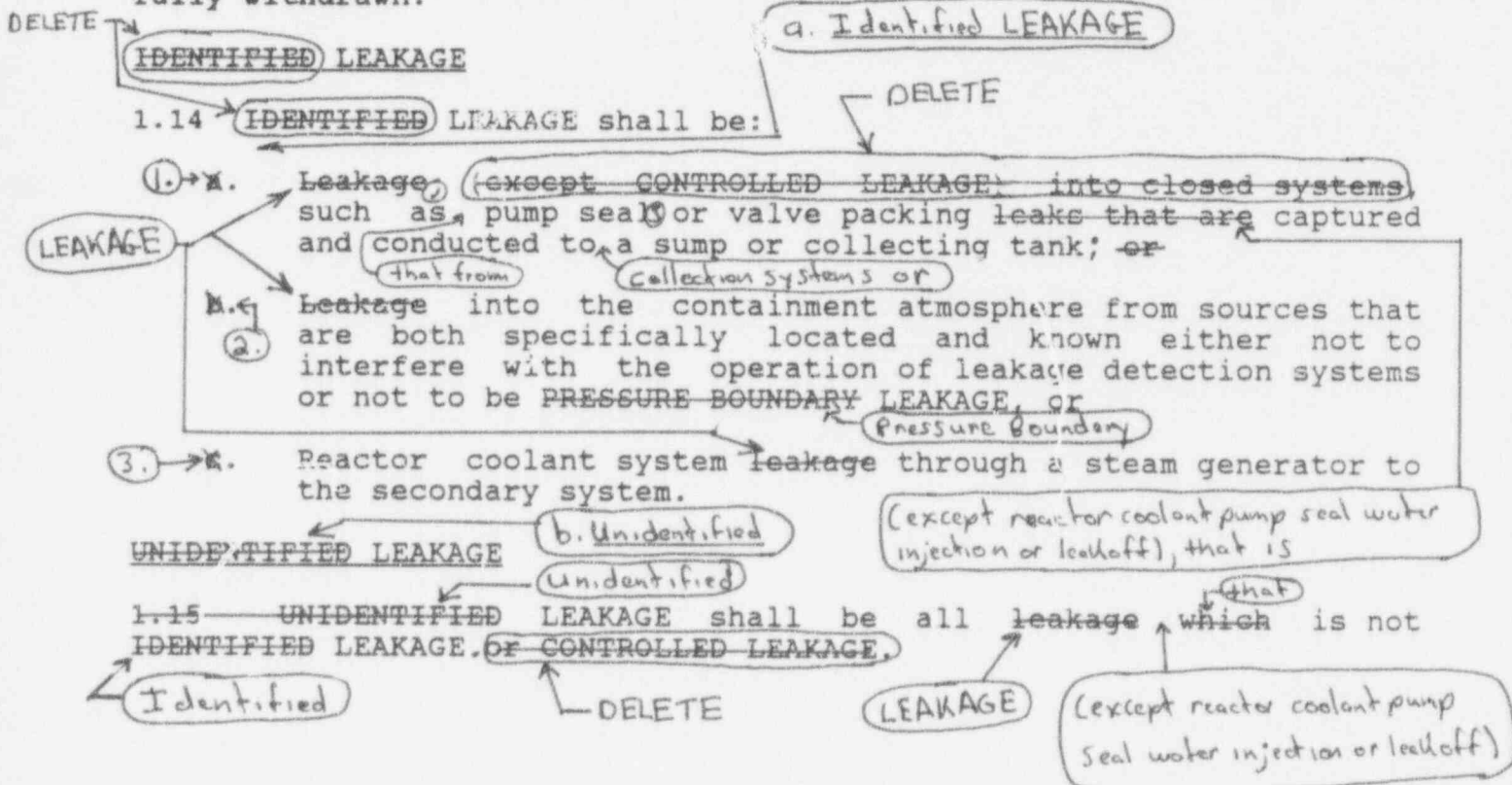
1.11 A CHANNEL FUNCTIONAL TEST shall be the injection of a simulated signal into the channel as close to the primary sensor as practicable to verify OPERABILITY including alarm and/or trip functions.

CORE ALTERATION

1.12 CORE ALTERATION shall be the movement or manipulation of any component within the reactor pressure vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe conservative position.

SHUTDOWN MARGIN

1.13 SHUTDOWN MARGIN shall be the instantaneous amount of reactivity by which the reactor is or would be subcritical from its present condition assuming all full length rod cluster assemblies (shutdown and control) are fully inserted except for the single rod cluster assembly of highest reactivity worth which is assumed to be fully withdrawn.



(Proposed wording)

C. Pressure Boundary

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DEFINITIONS

PRESSURE BOUNDARY LEAKAGE

1.16 PRESSURE BOUNDARY LEAKAGE shall be leakage (except steam generator tube leakage) through a non-isolable fault in a Reactor Coolant System component body, pipe wall or vessel wall.

CONTROLLED LEAKAGE

1.17 CONTROLLED LEAKAGE shall be that seal water flow supplied to the reactor coolant pump seals.

QUADRANT POWER TILT RATIO

1.18 QUADRANT POWER TILT RATIO shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater. With one (1) excore detector inoperable, the remaining three (3) detectors shall be used for computing the average.

DOSE EQUIVALENT I-131

1.19 DOSE EQUIVALENT I-131 shall be that concentration of I-131 (uCi/gram) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Regulatory Guide 1.109, 1977.

STAGGERED TEST BASIS

1.20 A STAGGERED TEST BASIS shall consist of:

- a. A test schedule for n systems, subsystems, trains or other designated components obtained by dividing the specified test interval into n equal subintervals;
- b. The testing of one (1) system, subsystem, train or other designated component at the beginning of each subinterval.

FREQUENCY NOTATION

1.21 The FREQUENCY NOTATION specified for the performance of Surveillance Requirements shall correspond to the intervals defined in Table 1.2.

(Proposed Wording)

REACTOR COOLANT SYSTEM

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION SYSTEMS ← INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

instrumentation

3.4.6.1 The following Reactor Coolant ~~system~~ ^{System} leakage detection systems shall be OPERABLE:

- a. ~~The containment atmosphere particulate radioactivity monitoring system,~~
- b. ~~The containment sump discharge flow measurement system or narrow range level instrument, and~~
- c. ~~Containment atmosphere gaseous radioactivity monitoring system (gaseous or particulate).~~

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION: the required containment sump monitor

a. With ~~one of the above required radioactivity monitoring leakage detection systems~~ inoperable, operations may continue for up to 30 days provided ⁽¹⁾

DELETE →

- 1. ~~The other two above required leakage detection systems are OPERABLE, and~~
- 2. ~~Appropriate grab samples are obtained and analyzed at least once per 24 hours;~~

Otherwise →

otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With ~~both of the above required radioactivity monitoring leakage detection systems~~ inoperable, operations may continue for up to ~~12~~ ¹² hours provided: ⁽¹⁾

30 days

- 1. ~~The containment sump discharge flow measurement system or narrow range level instrument is OPERABLE, and~~
- 2. A Reactor Coolant System water ^b inventory balance measurement (Specification 4.4.6.2.b) is performed within the next ~~four~~ ^{at least once per 24} hours.

Otherwise →

otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

that a Reactor Coolant System water inventory balance measurement (Specification 4.4.6.2.b) is performed at least once per 24 hours.

(1) The provisions of Specification 3.8.4 are not applicable. ← ADD

(Proposed wording)

REACTOR COOLANT SYSTEM

LIMITING CONDITION FOR OPERATION (Continued)

REPLACE WITH INSERT "A"

c. ~~With the containment sump discharge flow measurement system and narrow range level instrument inoperable, restore at least one inoperable system to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.~~

d. ~~The provisions of specification 3.0.4 are not applicable in Modes 1, 2 and 3.~~

SURVEILLANCE REQUIREMENTS

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

instrumentation

Performance

a. ~~Containment atmosphere particulate and gaseous monitoring system performance of @ CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST, at the frequencies specified in Table 4.3-3.~~

of the required containment atmosphere radioactivity monitor

b. ~~Containment sump discharge flow measurement system performance of CHANNEL CALIBRATION TEST at least once per 18 months.~~

c. ~~Logging the narrow range level indication every 12 hours.~~

Performance of a CHANNEL CALIBRATION of the required containment sump monitor at least once per 18 months.

(Proposed Wording)

Attachment to Leakage Detection Instrumentation
Insert "A"

With the required containment sump monitor and the containment atmosphere radioactivity monitor inoperable, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

REACTOR COOLANT SYSTEM

OPERATIONAL LEAKAGE

LIMITING CONDITION FOR OPERATION

operational LEAKAGE

3.4.6.2 Reactor Coolant System leakage shall be limited to:

- a. No PRESSURE BOUNDARY LEAKAGE, ^{pressure boundary}
- b. 1 GPM UNIDENTIFIED LEAKAGE, ^{gpm unidentified}
- c. 1 GPM total primary to secondary leakage through all steam generators, ~~not isolated from the Reactor Coolant System and 500 gallons per day through any one steam generator not isolated from the Reactor Coolant System~~ ^{DELETED LEAKAGE} ^{and}
- d. 10 GPM IDENTIFIED LEAKAGE, ^{gpm identified} ~~from the Reactor Coolant System~~ ^{DELETED} ^{and}
- e. 28 GPM CONTROLLED LEAKAGE at a Reactor Coolant System pressure of 2230 ±20 psig. ^{primary to secondary LEAKAGE}

APPLICABILITY: MODES 1, 2, 3 and 4.

MOVE TO LIMITING CONDITION FOR OPERATION 3.55

ACTION:

- a. With any PRESSURE BOUNDARY LEAKAGE, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the next 30 hours. ^{pressure boundary}
- b. With any Reactor Coolant System leakage greater than any one of the above limits, excluding PRESSURE BOUNDARY LEAKAGE, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. ^{LEAKAGE}

SURVEILLANCE REQUIREMENTS

4.4.6.2 Reactor Coolant System leakages shall be demonstrated to be within each of the above limits by:

- a. Monitoring the containment atmosphere particulate and gaseous radioactivity monitor at least once per 12 hours. ^{LEAKAGES}

REPLACE WITH INSERT "B"

(Proposed Wording)

REACTOR COOLANT SYSTEM

REPLACE WITH
INSERT "B"

SURVEILLANCE REQUIREMENTS (Continued)

DELETE

MODIFIED
MOVED TO
SURVEILLANCE
REQUIREMENT
4.5.5

x. Monitoring the containment sump discharge at least once per 12 hours.

x. Measurement of the CONTROLLED LEAKAGE to the reactor coolant pump seals when the Reactor Coolant System pressure is 2230 ± 20 psig at least once per 31 days with the modulating valve full open,

b. Performance of a Reactor Coolant System water inventory balance at least once per 72 hours during steady state operation. ~~and~~ (2) DELETE

~~e. Monitoring the reactor head flange leakage temperature at least once per 24 hours.~~

DELETE

(2) Not required to be performed in MODE 3 or 4 until 12 hours of steady state operation.

ADD

Attachment to Operational Leakage
Insert "E"

- a. Monitoring the following leakage detection instrumentation at least once per 12 hours: ⁽¹⁾
1. Containment atmosphere gaseous radioactivity monitor.
 2. Containment atmosphere particulate radioactivity monitor.
 3. Containment sump discharge flow monitor.
 4. Containment sump narrow range level monitor.

(1) Only on leakage detection instrumentation required by LCO 3.4.6.1.

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EMERGENCY CORE COOLING SYSTEMS3/4.5.5 SEAL INJECTION FLOWLIMITING CONDITION FOR OPERATION

3.5.5 Reactor coolant pump seal injection flow shall be less than or equal to 28 gpm with the charging pump discharge pressure greater than or equal to 2311 psig and the seal injection flow control valve full open.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

- a. With the seal injection flow not within the limit, adjust manual seal injection throttle valves to give a flow within the limit with the charging pump discharge pressure greater than or equal to 2311 psig and the seal injection flow control valve full open within 4 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.5 Verify at least once per 31 days that the valves are adjusted to give a flow within the limit with the charging pump discharge at greater than or equal to 2311 psig and the seal injection flow control valve full open. (1)

(1) Not required to be performed until 4 hours after the Reactor Coolant System pressure stabilizes at greater than or equal to 2210 psig and less than or equal to 2250 psig.

BASES

3/4.4.5 STEAM GENERATORS (Continued)

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~~ = 500 gallons per day per steam generator). 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 500 gallons per day per steam generator can readily be detected by radiation monitors of steam generator blowdown. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged.

Wastage-type defects are unlikely with the all volatile treatment (AVT) of secondary coolant. However, even if a defect of similar type should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging or repair will be required of all tubes with imperfections exceeding the plugging or repair limit. Degraded steam generator tubes may be repaired by the installation of sleeves which span the degraded tube section. A steam generator tube with a sleeve installed meets the structural requirements of tubes which are not degraded, therefore, the sleeve is considered a part of the tube. The surveillance requirements identify those sleeving methodologies approved for use. If an installed sleeve is found to have through wall penetration greater than or equal to the plugging limit, the tube must be plugged. The plugging limit for the sleeve is derived from R.G. 1.121 analysis which utilizes a 20 percent allowance for eddy current uncertainty in determining the depth of tube wall penetration and additional degradation growth. Steam generator tube inspections of operating plants have demonstrated the capability to reliably detect degradation that has penetrated 20 percent of the original tube wall thickness.

Whenever the results of any steam generator tubing inservice inspection fall into Category C-3, these results will be reported to the Commission pursuant to Specification 6.6 prior to resumption of plant operation. Such cases will be considered by the Commission on a case-by-case basis and may result in a requirement for analysis, laboratory examinations, tests, additional eddy-current inspection, and revision of the Technical Specifications, if necessary.

primary to secondary LEAKAGE

REACTOR COOLANT SYSTEMBASES3/4.4.6.1 LEAKAGE DETECTION SYSTEMS (INSTRUMENTATION)

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."

3/4.4.6.2 OPERATIONAL LEAKAGE

← REPLACE WITH INSERT "C"

Industry experience has shown that while a limited amount of leakage is expected from the RCS, the unidentified portion of this leakage can be reduced to a threshold value of less than 1 gpm. This threshold value is sufficiently low to ensure early detection of additional leakage.

The 10 gpm IDENTIFIED LEAKAGE limitation provides allowance for a limited amount of leakage from known sources whose presence will not interfere with the detection of UNIDENTIFIED LEAKAGE by the leakage detection systems.

The CONTROLLED LEAKAGE limitation restricts operation when the total flow supplied to the reactor coolant pump seals exceeds 28 gpm with the modulating valve in the supply line fully open at RCS pressures in excess of 2,000 psig. This limitation ensures that in the event of a LOCA, the safety injection flow will not be less than assumed in the accident analyses.

The total steam generator tube leakage limit of 1 gpm for all steam generators not isolated from the RCS ensures that the dosage contribution from the tube leakage will be limited to a small fraction of Part 100 limits in the event of either a steam generator tube rupture or steam line break. The 1 gpm limit is consistent with the assumptions used in the analysis of these accidents. The 500 gpd leakage limit per steam generator ensures that steam generator tube integrity is maintained in the event of a main steam line rupture or under LOCA conditions.

PRESSURE BOUNDARY LEAKAGE of any magnitude is unacceptable since it may be indicative of an impending gross failure of the pressure boundary. Should PRESSURE BOUNDARY LEAKAGE occur through a component which can be isolated from the balance of the Reactor Coolant System, plant operation may continue provided the leaking component is promptly isolated from the Reactor Coolant System since isolation removes the source of potential failure.

(Proposed Wording)

Attachment to Reactor Coolant System Leakage
Insert "C"

BACKGROUND

GDC 30 of Appendix A to 10 CFR 50 requires means for detecting and, to the extent practical, identifying the source of RCS LEAKAGE. Regulatory Guide 1.45 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 non-ECCS portion of the containment sump used to collect unidentified LEAKAGE is instrumented to alarm due to abnormal increases in the water inventory. The 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. 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.

Attachment to Reactor Coolant System Leakage
Insert "C" (Continued)

BACKGROUND (Continued)

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements 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. 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.

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, the containment sump monitor, in combination with a gaseous or particulate radioactivity monitor, provides an acceptable minimum. The containment sump monitor is comprised of the instruments associated with the non-ECCS portion of the containment sump which monitor narrow range level and sump pump discharge flow.

Attachment to Reactor Coolant System Leakage
Insert "C" (Continued)

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

ACTIONS

- a. With the required containment sump monitor inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 4.4.6.2.b, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage.

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

Required 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.

b.1. and b.2.

With both gaseous and particulate containment atmosphere radioactivity monitoring instrumentation channels inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or water inventory balances, in accordance with SR. 4.4.6.2.b, must be performed to provide alternate periodic information.

Attachment to Reactor Coolant System Leakage
Insert "C"

ACTIONS (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.

The 24 hour interval provides periodic information that is adequate to detect leakage. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

Required 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 channel is inoperable. This allowance is provided because other instrumentation is available to monitor for RCS LEAKAGE.

- c. With all required monitors inoperable, no automatic means of monitoring leakage are available, and immediate plant shutdown is required. 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 condition from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS (SR)

SR 4.4.6.1.a

SR 4.4.6.1.a requires the performance of a CHANNEL CHECK of the required containment atmosphere radioactivity monitor. The check gives reasonable confidence that the channel is operating properly. The Frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

SR 4.4.6.1.a requires the performance of a CHANNEL FUNCTIONAL TEST on the required containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The Frequency of 31 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.

Attachment to Reactor Coolant System Leakage
Insert "C"

SURVEILLANCE REQUIREMENTS (Continued)

SR 4.4.6.1.a also requires the performance of a CHANNEL CALIBRATION on the required containment atmosphere radioactivity monitor. 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.

SR 4.4.6.1.b

SR 4.4.6.1.b requires the performance of a CHANNEL CALIBRATION on the required containment sump monitor. 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.

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, 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.

Attachment to Reactor Coolant System Leakage
Insert "C"

BACKGROUND (Continued)

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 percent leaktight. 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).

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 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 conservatively assumes a 10 gpm primary to secondary LEAKAGE.

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 SLB is more limiting for site radiation releases. The safety analysis for the SLB accident conservatively assumes a 10 gpm primary to secondary LEAKAGE. The dose consequences resulting from the SLB accident are well within the limits defined in 10 CFR 100 or the staff approved licensing basis (i.e., a small fraction of these limits).

Attachment to Reactor Coolant System Leakage
Insert "C"

LCO

RCS 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 RCPB. LEAKAGE past seals and gaskets is not pressure boundary LEAKAGE. Should pressure boundary LEAKAGE occur through a component which can be isolated from the balance of the Reactor Coolant System, plant operation may continue provided the leaking component is promptly isolated from the Reactor Coolant System since isolation removes the source of potential failure.

b. Unidentified LEAKAGE

One gallon per minute (gpm) of unidentified 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 RCPB, if the LEAKAGE is from the pressure boundary.

c. Primary to Secondary LEAKAGE through All Steam Generators (SGs)

Total primary to secondary LEAKAGE amounting to 1 gpm through all SGs produces acceptable offsite doses in the SLB accident analysis. Violation of this LCO could exceed the offsite dose limits for this accident. Primary to secondary LEAKAGE must be included in the total allowable limit for identified LEAKAGE.

d. Primary to Secondary LEAKAGE through Any One SG

The 500 gallons per day limit on one SG is based on the assumption that a single crack leaking this amount would not propagate to a SGTR under the stress conditions of a LOCA or a main steam line rupture. If leaked through many cracks, the cracks are very small, and the above assumption is conservative.

Attachment to Reactor Coolant System Leakage
Insert "C"

LCO (Continued)

e. 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 identified LEAKAGE and is well within the capability of the RCS Makeup System. Identified LEAKAGE includes LEAKAGE to the containment from specifically known and located sources, but does not include pressure boundary LEAKAGE or controlled reactor coolant pump (RCP) seal leakoff (a normal function not considered LEAKAGE). Violation of this LCO could result in continued degradation of a component or system.

APPLICABILITY

In MODES 1, 2, 3, and 4, the potential for RCPB LEAKAGE is greatest when the RCS 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.

LCO 3.4.6.3, "RCS Pressure Isolation Valve (PIV)," measures leakage through each individual PIV and can impact this LCO. Of the two PIVs in series in each isolated line, leakage measured through one PIV does not result in RCS LEAKAGE when the other is leak tight. If both valves leak and result in a loss of mass from the RCS, the loss must be included in the allowable identified LEAKAGE.

ACTIONS

- a. If any pressure boundary LEAKAGE exists, the reactor must be brought to lower pressure conditions to reduce the severity of the LEAKAGE and its potential consequences. It should be noted that LEAKAGE past seals and gaskets is not pressure boundary LEAKAGE. The reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 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 RCPB are much lower, and further deterioration is much less likely.

Attachment to Reactor Coolant System Leakage
Insert "C"

ACTIONS (Continued)

- b. Unidentified LEAKAGE, identified LEAKAGE, or primary to secondary LEAKAGE in excess of the LCO limits must be reduced to within limits within 4 hours. This Completion Time 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 RCPB. If the unidentified LEAKAGE, identified LEAKAGE, or primary to secondary LEAKAGE cannot be reduced to within limits within 4 hours, the reactor must be brought to lower pressure conditions to reduce the severity of the LEAKAGE and its potential consequences. The reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 hours. This action reduces the LEAKAGE.

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 RCPB are much lower, and further deterioration is much less likely.

SURVEILLANCE REQUIREMENTS (SR)

SR 4.4.6.2

Verifying RCS LEAKAGE to be within the LCO limits ensures the integrity of the RCPB 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 an RCS water inventory balance. Primary to secondary

LEAKAGE is also measured by performance of an RCS water inventory balance in conjunction with effluent monitoring within the secondary steam and feedwater systems.

The RCS water inventory balance must be met with the reactor at steady state operating conditions and near operating pressure. Therefore, this SR is not required to be performed in MODES 3 and 4 until 12 hours of steady state operation near operating pressure have been established.

Attachment to Reactor Coolant System Leakage
Insert "C"

SURVEILLANCE REQUIREMENTS (SR) (Continued)

Steady state operation is required to perform a proper inventory balance; calculations during maneuvering are not useful and a Note requires the Surveillance to be met when steady state is established. 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 RCP seal injection and return flows.

An early warning of pressure boundary LEAKAGE or unidentified LEAKAGE is provided by the systems that monitor the containment atmosphere radioactivity and the containment sump level. The 12 hour monitoring of the leakage detection system is sufficient to provide an early warning of increased RCS LEAKAGE. These leakage detection systems are specified in LCO 3.4.6.1, "Leakage Detection Instrumentation."

The 72 hour Frequency is a reasonable interval to trend LEAKAGE and recognizes the importance of early leakage detection in the prevention of accidents. Note (1) states that the 12 hour surveillance is required only on leakage detection instrumentation required by LCO 3.4.6.1. This Note allows the 12 hour monitoring to be suspended on leakage detection instrumentation which are inoperable or not required to be operable per LCO 3.4.6.1. Note (2) states that this SR is required to be performed during steady state operation.

REACTIVITY CONTROL SYSTEMSBASES3/4.4.6.3 PRESSURE ISOLATION VALVE LEAKAGE

The leakage from any RCS pressure isolation valve is sufficiently low to ensure early detection of possible in-series valve failure. It is apparent that when pressure isolation is provided by two in-series valves and when failure of one valve in the pair can go undetected for a substantial length of time, verification of valve integrity is required. Since these valves are important in preventing overpressurization and rupture of the ECCS low pressure piping which could result in a LOCA, these valves should be tested periodically to ensure low probability of gross failure.

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 valve is IDENTIFIED LEAKAGE and will be considered as a portion of the allowed limit.

identified

3/4.4.7 CHEMISTRY

The limitations on Reactor Coolant System chemistry ensure that corrosion of the Reactor Coolant System is minimized and reduces the potential for Reactor Coolant System leakage or failure due to stress corrosion. Maintaining the chemistry within the Steady State Limits provides adequate corrosion protection to ensure the structural integrity of the Reactor Coolant system over the life of the plant. The associated effects of exceeding the oxygen, chloride and fluoride limits are time and temperature dependent. Corrosion studies show that operation may be continued with contaminant concentration levels in excess of the Steady State Limits, up to the Transient Limits, for the specified limited time intervals without having a significant effect on the structural integrity of the Reactor Coolant System. The time interval permitting continued operation within the restrictions of the Transient Limits provides time for taking corrective actions to restore the contaminant concentrations to within the Steady State Limits.

The surveillance requirements provide adequate assurance that concentrations in excess of the limits will be detected in sufficient time to take corrective action.

3/4.4.8 SPECIFIC ACTIVITY

The limitations on the specific activity of the primary coolant ensure that the resulting 2 hour doses at the site boundary will not exceed an appropriately small fraction of Part 100 limits following a steam generator tube rupture accident in conjunction with an assumed steady state primary-to-secondary steam generator leakage rate of 1.0 GPM.

EMERGENCY CORE COOLING SYSTEMSBASES

3/4.5.5 SEAL INJECTION FLOWBACKGROUND

The function of the seal injection throttle valves during an accident is similar to the function of the Emergency Core Cooling Systems (ECCS) throttle valves in that each restricts flow from the charging pump header to the Reactor Coolant Systems (RCS).

The restriction on reactor coolant pump (RCP) seal injection flow limits the amount of ECCS flow that would be diverted from the injection path following an accident. This limit is based on safety analysis assumptions that are required because RCP seal injection flow is not isolated during SI.

APPLICABLE SAFETY ANALYSES

All ECCS subsystems are taken credit for in the large break loss of coolant accident (LOCA) at full power. The LOCA analysis establishes the minimum flow for the ECCS pumps. The charging pumps are also credited in the small break LOCA analysis. This analysis establishes the flow and discharge head at the design point for the charging pumps. The steam generator tube rupture and main steam line break event analyses also credit the charging pumps, but are not limiting in their design. Reference to these analyses is made in assessing changes to the Seal Injection System for evaluation of their effects in relation to the acceptance limits in these analyses.

This LCO ensures that seal injection flow of less than or equal to 28 gpm, with charging pump discharge pressure greater than or equal to 2311 psig and seal injection flow control valve full open, will be sufficient for RCP seal integrity but limited so that the ECCS trains will be capable of delivering sufficient water to match boiloff rates soon enough to minimize uncovering of the core following a large LOCA. It also ensures that the charging pumps will deliver sufficient water for a small LOCA and sufficient boron to maintain the core subcritical. For smaller LOCAs, the charging pumps alone deliver sufficient fluid to overcome the loss and maintain RCS inventory.

ADD

DPR-66

EMERGENCY CORE COOLING SYSTEMS

BASES

3/4.5.5 SEAL INJECTION FLOW (Continued)

LCO

The intent of the LCO limit on seal injection flow is to make sure that flow through the RCP seal water injection line is low enough to ensure that charging pump injection flow is directed to the RCS via the injection points in accordance with the requirements of 10 CFR 50.46.

The LCO is not strictly a flow limit, but rather a flow limit based on a flow line resistance. In order to establish the proper flow line resistance, a pressure and flow must be known. The flow line resistance is determined by assuming that the RCS pressure is at normal operating pressure and that the charging pump discharge pressure is greater than or equal to the value specified in this LCO. The charging pump discharge pressure remains essentially constant through all the applicable MODES of this LCO. A reduction in RCS pressure would result in more flow being diverted to the RCP seal injection line than at normal operating pressure. The valve settings established at the prescribed charging pump discharge pressure result in a conservative valve position should RCS pressure decrease. The additional modifier of this LCO, the air operated seal injection control valve being full open, is required since the valve is designed to fail open for the accident condition. With the discharge pressure and control valve position as specified by the LCO, a flow limit is established. It is this flow limit that is used in the accident analyses.

The limit on seal injection flow, combined with the charging pump discharge pressure limit and an open wide condition of the seal injection flow control valve, must be met to render the ECCS OPERABLE. If these conditions are not met, the ECCS flow will not be as assumed in the accident analyses.

APPLICABILITY

In MODES 1, 2, and 3, the seal injection flow limit is dictated by ECCS flow requirements, which are specified for MODES 1, 2, 3, and 4. The seal injection flow limit is not applicable for MODE 4 and lower because high seal injection flow is less critical as a result of the lower initial RCS pressure and decay heat removal requirements in these MODES. Therefore, RCP seal injection flow must be limited in MODES 1, 2, and 3 to ensure adequate ECCS performance.

EMERGENCY CORE COOLING SYSTEMSBASES3/4.5.5 SEAL INJECTION FLOW (Continued)ACTIONS

- a. With seal injection flow exceeding its limit, the amount of charging flow available to the RCS may be reduced. Under this Condition, action must be taken to restore the flow to below its limit. The operator has 4 hours from the time the flow is known to be above the limit to correctly position the manual valves and thus be in compliance with the accident analysis. The Completion Time minimizes the potential exposure of the plant to a LOCA with insufficient injection flow and ensures that seal injection flow is restored to or below its limit. This time is conservative with respect to the Completion Times of other ECCS LCOs; it is based on operating experience and is sufficient for taking corrective actions by operations personnel.

When the Required Actions cannot be completed within the required Completion Time, a controlled shutdown must be initiated. The Completion Time of 6 hours for reaching MODE 3 from MODE 1 is a reasonable time for a controlled shutdown, based on operating experience and normal cooldown rates, and does not challenge plant safety systems or operators. Continuing the plant shutdown begun in this Required Action, an additional 6 hours is a reasonable time, based on operating experience and normal cooldown rates, to reach MODE 4, where this LCO is no longer applicable.

SURVEILLANCE REQUIREMENTS (SR)SR 3.5.5.1

Verification every 31 days that the manual seal injection throttle valves are adjusted to give a flow within the limit ensures that proper manual seal injection throttle valve position, and hence, proper seal injection flow, is maintained. The Frequency of 31 days is based on engineering judgment and is consistent with other ECCS valve Surveillance Frequencies. The Frequency has proven to be acceptable through operating experience.

As noted, the Surveillance is not required to be performed until 4 hours after the RCS pressure has stabilized within a ± 20 psig range of normal operating pressure. The RCS pressure requirement is specified since this configuration will produce the required pressure conditions necessary to assure that the manual valves are set correctly. The exception is limited to 4 hours to ensure that the Surveillance is timely.

ATTACHMENT A-2

Beaver Valley Power Station, Unit No. 2
Proposed Technical Specification Change No. 77

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(Proposed Wording)

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(Proposed Wording)

DEFINITIONS

~~IDENTIFIED LEAKAGE~~

a. Identified LEAKAGE

1.14 ~~IDENTIFIED LEAKAGE~~ shall be:

1. Leakage ~~(except CONTROLLED LEAKAGE) into closed systems, such as pump seals or valve packing leaks that are captured and conducted to a sump or collecting tank; or~~ *(except reactor coolant pump seal water injection or leakoff) that is* *collection systems or that from*
2. Leakage into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be ~~PRESSURE BOUNDARY LEAKAGE~~; or *Pressure Boundary*
3. Reactor Coolant System leakage through a steam generator to the secondary system.

b. Unidentified UNIDENTIFIED LEAKAGE

1.15 ~~UNIDENTIFIED LEAKAGE~~ shall be all leakage which is not ~~IDENTIFIED LEAKAGE~~ or ~~CONTROLLED LEAKAGE~~.

c. Pressure Boundary PRESSURE BOUNDARY LEAKAGE

1.16 ~~PRESSURE BOUNDARY LEAKAGE~~ shall be leakage ~~(except steam generator tube leakage) through a non-isolable fault in a Reactor Coolant System component body, pipe wall or vessel wall.~~ *(except reactor coolant pump seal water injection or leakoff) that*

~~CONTROLLED LEAKAGE~~

1.17 ~~CONTROLLED LEAKAGE~~ shall be that seal water flow supplied to the reactor coolant pump seals.

QUADRANT POWER TILT RATIO

1.18 QUADRANT POWER TILT RATIO shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater. With one (1) excore detector inoperable, the remaining three (3) detectors shall be used for computing the average.

DOSE EQUIVALENT I-131

1.15 thru 1.17 (DELETED)

1.19 DOSE EQUIVALENT I-131 shall be that concentration of I-131 ($\mu\text{Ci}/\text{gram}$) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Regulatory Guide 1.109, 1977 or TID 14844.

STAGGERED TEST BASIS

1.20 A STAGGERED TEST BASIS shall consist of:

(Proposed Wording)

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 shall be OPERABLE: leakage detection instrumentation

- a. ~~The containment atmosphere particulate radioactivity monitoring system, narrow range level or discharge flow monitor; and~~
- b. ~~The containment sump discharge flow measurement system or narrow range level instrument, and (gaseous or particulate).~~
- c. ~~One containment containment atmosphere gaseous radioactivity monitoring system.~~

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

ACTION: the required containment sump monitor

that a Reactor Coolant System water inventory balance measurement (Specification 4.4.6.2.b) is performed at least once per 24 hours

a. With one of the above required radioactivity monitoring leakage detection systems inoperable, operations may continue for up to 30 days provided: (1)

- 1. ~~The other two above required leakage detection systems are OPERABLE, and~~
- 2. ~~Appropriate grab samples are obtained and analyzed at least once per 24 hours.~~

← DELETE

Otherwise → otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. ~~With both of the above required radioactivity monitoring leakage detection systems inoperable~~, operations may continue for up to 12 hours provided: (1)

30 days → Grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours, or

- 1. ~~The containment sump discharge flow measurement system or narrow range level instrument is OPERABLE, and~~
- 2. A Reactor Coolant System water inventory balance measurement (Specification 4.4.6.2.b) is performed within the next 4 hours at least once per 24

Otherwise → otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

REPLACE WITH INSERT "D"

c. ~~With the containment sump discharge flow measurement system and narrow range level instrument inoperable~~, restore at least one inoperable system to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. ~~The provisions of Specification 3.0.4 are not applicable in MODES 1, 2, and 3.~~

SURVEILLANCE REQUIREMENTS

instrumentation

4.4.6.1 The leakage detection systems shall be demonstrated OPERABLE by:

- a. ~~Containment atmosphere particulate and gaseous monitoring system~~ Performance → performance of CHANNEL CHECK, CHANNEL CALIBRATION, and CHANNEL FUNCTIONAL TEST at the frequencies specified in Table 4.3-3, of the required containment atmosphere radioactivity monitor

(1) The provisions of Specification 3.0.4 are not applicable.

Attachment to Leakage Detection Instrumentation
Insert "D"

With the required containment sump monitor and the containment atmosphere radioactivity monitor inoperable, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

- b. ~~Containment sump discharge flow measurement system performance of~~
→ CHANNEL CALIBRATION at least once per 18 months.
- c. ~~Logging the narrow range level indication every 12 hours~~

Performance of a CHANNEL CALIBRATION of the required containment sump monitor at least once per 18 months.

(Proposed Wording)

REACTOR COOLANT SYSTEM

OPERATIONAL LEAKAGE

operational LEAKAGE

LIMITING CONDITION FOR OPERATION

3.4.6.2 Reactor Coolant System leakage shall be limited to:

a. No PRESSURE BOUNDARY LEAKAGE,

pressure boundary

b. 1 GPM UNIDENTIFIED LEAKAGE,

gpm unidentified

c. 1 GPM total reactor to secondary leakage through all steam generators not isolated from the Reactor Coolant System and 500 gallons per day through any one steam generator not isolated from the Reactor Coolant System,

gpm

primary

DELETE

LEAKAGE

d.

DELETE

primary to Secondary LEAKAGE

10 GPM IDENTIFIED LEAKAGE from the Reactor Coolant System, and

gpm identified

e. 28 GPM CONTROLLED LEAKAGE at a Reactor Coolant System pressure of 2235 ± 20 psig.

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

MOVE TO LIMITING CONDITION FOR OPERATION 3.5.4

ACTION:

pressure boundary

a. With any PRESSURE BOUNDARY LEAKAGE, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the next 30 hours.

b. With any Reactor Coolant System leakage greater than any one of the above limits, excluding PRESSURE BOUNDARY LEAKAGE, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

LEAKAGE

pressure boundary

SURVEILLANCE REQUIREMENTS

4.4.6.2 Reactor Coolant System leakages shall be demonstrated to be within each of the above limits by:

LEAKAGES

a. Monitoring the containment atmosphere particulate and gaseous radioactivity monitor at least once per 12 hours.

REPLACE WITH INSERT "E"

b. Monitoring the containment sump discharge at least once per 12 hours.

DELETE

c. Measurement of the CONTROLLED LEAKAGE to the reactor coolant pump seals when the Reactor Coolant System pressure is 2235 ± 20 psig at least once per 31 days with the modulating valve full open.

MODIFIED AND MOVED TO SURVEILLANCE REQUIREMENT 4.5.4

d. Performance of a Reactor Coolant System water inventory balance at least once per 72 hours during steady state operation.

(a)

(Proposed Wording)

Attachment to Operational Leakage
Insert "E"

- a. Monitoring the following leakage detection instrumentation at least once per 12 hours: ⁽¹⁾
1. Containment atmosphere gaseous radioactivity monitor.
 2. Containment atmosphere particulate radioactivity monitor.
 3. Containment sump discharge flow monitor.
 4. Containment sump narrow range level monitor.

(1) Only on leakage detection instrumentation required by LCO 3.4.6.1.

REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

~~e. Monitoring the reactor head flange leakoff temperature at least once per 24 hours.~~

DELETE ↗

(2) Not required to be performed in MODE 3 or 4 until 12 hours of steady state operation.

ADD ↗

(Proposed Wording)

EMERGENCY CORE COOLING SYSTEMS3/4.5.4 SEAL INJECTION FLOWLIMITING CONDITION FOR OPERATION

3.5.4 Reactor coolant pump seal injection flow shall be less than or equal to 28 gpm with the charging pump discharge pressure greater than or equal to 2410 psig and the seal injection flow control valve full open.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

- a. With the seal injection flow not within the limit, adjust manual seal injection throttle valves to give a flow within the limit with the charging pump discharge pressure greater than or equal to 2410 psig and the seal injection flow control valve full open within 4 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.4 Verify at least once per 31 days that the valves are adjusted to give a flow within the limit with the charging pump discharge at greater than or equal to 2410 psig and the seal injection flow control valve full open. (1)

(1) Not required to be performed until 4 hours after the Reactor Coolant System pressure stabilizes at greater than or equal to 2215 psig and less than or equal to 2255 psig.

BASES

3/4.4.5 STEAM GENERATORS (Continued)

decay heat removal capabilities for RCS temperatures greater than 350°F if one steam generator becomes inoperable due to single failure considerations. Below 350°F, decay heat is removed by the RHR system.

The Surveillance Requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on a modification of Regulatory Guide 1.83, Revision 1. Inservice inspection of steam generator tubing is essential in order to maintain surveillance of the conditions of the tubes in the event that there is evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or inservice conditions that lead to corrosion. Inservice inspection of steam generator tubing also provides a means of characterizing the nature and cause of any tube degradation so that corrective measures can be taken.

The plant is expected to be operated in a manner such that the secondary coolant will be maintained within those parameter limits found to result in negligible corrosion of the steam generator tubes. If the secondary coolant chemistry is not maintained within these parameter 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~~ = 500 gallons per day per steam generator). 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 500 gallons per day per steam generator can readily be detected by radiation monitors of steam generator blowdown. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged.

Wastage-type defects are unlikely with the all volatile treatment (AVT) of secondary coolant. However, even if a defect of similar type should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging or repair will be required of all tubes with imperfections exceeding the plugging or repair limit. Degraded steam generator tubes may be

primary to secondary LEAKAGE

REACTOR COOLANT SYSTEMBASES3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE3/4.4.6.1 LEAKAGE DETECTION SYSTEMS

INSTRUMENTATION

REPLACE WITH
INSERT " F "

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."

3/4.4.6.2 OPERATIONAL LEAKAGE

Industry experience has shown that while a limited amount of leakage is expected from the RCS, the unidentified portion of this leakage can be reduced to a threshold value of less than 1 GPM. This threshold value is sufficiently low to ensure early detection of additional leakage.

The 10 GPM IDENTIFIED LEAKAGE limitation provides allowance for a limited amount of leakage from known sources whose presence will not interfere with the detection of UNIDENTIFIED LEAKAGE by the leakage detection systems.

The CONTROLLED LEAKAGE limitation restricts operation when the total flow supplied to the reactor coolant pump seals exceeds 28 GPM with the modulating valve in the supply line fully open at RCS pressures in excess 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 analyses.

The total steam generator tube leakage limit of 1 GPM for all steam generators not isolated from the RCS ensures that the dosage contribution from the tube leakage will be limited to a small fraction of 10 CFR Part 100 limits in the event of either a steam generator tube rupture or steam line break. The 1 GPM limit is consistent with the assumptions used in the analysis of these accidents. The 500 gpd leakage limit per steam generator ensures that steam generator tube integrity is maintained in the event of a main steam line rupture or under LOCA conditions.

PRESSURE BOUNDARY LEAKAGE of any magnitude is unacceptable since it may be indicative of an impending gross failure of the pressure boundary. Should PRESSURE BOUNDARY LEAKAGE occur through a component which can be isolated from the balance of the Reactor Coolant System, plant operation may continue provided the leaking component is promptly isolated from the Reactor Coolant System since isolation removes the source of potential failure.

3/4.4.6.3 PRESSURE ISOLATION VALVE LEAKAGE

The leakage from any RCS pressure isolation valve is sufficiently low to ensure early detection of possible in-series valve failure. It is apparent that when pressure isolation is provided by two in-series valves and when failure of one valve in the pair can go undetected for a substantial length of time, verification of valve integrity is required. Since these valves are

Attachment to Reactor Coolant System Leakage
Insert "F"

BACKGROUND

GDC 30 of Appendix A to 10 CFR 50 requires means for detecting and, to the extent practical, identifying the source of RCS LEAKAGE. Regulatory Guide 1.45 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 non-ECCS portion of the containment sump used to collect unidentified LEAKAGE is instrumented to alarm due to abnormal increases in water inventory. The 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. 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.

Attachment to Reactor Coolant System Leakage
Insert "F"

BACKGROUND (Continued)

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements 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. 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.

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, the containment sump monitor, in combination with a gaseous or particulate radioactivity monitor, provides an acceptable minimum. The containment sump monitor is comprised of the instruments associated with the non-ECCS portion of the containment sump which monitor narrow range level and sump pump discharge flow.

Attachment to Reactor Coolant System Leakage
Insert "F"

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

ACTIONS

- a. With the required containment sump monitor inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere radioactivity monitoring system will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 4.4.6.2.b, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage.

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

Required 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.

b.1. and b.2.

With both gaseous and particulate containment atmosphere radioactivity monitoring instrumentation channels inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or water inventory balances, in accordance with SR. 4.4.6.2.b, must be performed to provide alternate periodic information.

Attachment to Reactor Coolant System Leakage
Insert "F"

ACTIONS (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.

The 24 hour interval provides periodic information that is adequate to detect leakage. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

Required 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 channel is inoperable. This allowance is provided because other instrumentation is available to monitor for RCS LEAKAGE.

- c. With all required monitors inoperable, no automatic means of monitoring leakage are available, and immediate plant shutdown is required. 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 condition from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS (SR)

SR 4.4.6.1.a

SR 4.4.6.1.a requires the performance of a CHANNEL CHECK of the required containment atmosphere radioactivity monitor. The check gives reasonable confidence that the channel is operating properly. The Frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

SR 4.4.6.1.a requires the performance of a CHANNEL FUNCTIONAL TEST on the required containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The Frequency of 31 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.

Attachment to Reactor Coolant System Leakage
Insert "F"

SURVEILLANCE REQUIREMENTS (SR) (Continued)

SR 4.4.6.1.a also requires the performance of a CHANNEL CALIBRATION on the required containment atmosphere radioactivity monitor. 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.

SR 4.4.6.1.b

SR 4.4.6.1.b requires the performance of a CHANNEL CALIBRATION on the required containment sump monitor. 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.

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, 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.

Attachment to Reactor Coolant System Leakage
Insert "F"

BACKGROUND (Continued)

A limited amount of leakage inside containment is expected from auxiliary systems that cannot be made 100 percent leaktight. 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).

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 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 a 1 gpm primary to secondary LEAKAGE as the initial condition.

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 SLB is more limiting for site radiation releases. The safety analysis for the SLB accident assumes 1 gpm primary to secondary LEAKAGE. The dose consequences resulting from the SLB accident are well within the limits defined in 10 CFR 100 or the staff approved licensing basis (i.e., a small fraction of these limits).

LCO

RCS 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

Attachment to Reactor Coolant System Leakage
Insert "F"

LCO (Continued)

this LCO could result in continued degradation of the RCPB. LEAKAGE past seals and gaskets is not pressure boundary LEAKAGE. Should pressure boundary LEAKAGE occur through a component which can be isolated from the balance of the Reactor Coolant System, plant operation may continue provided the leaking component is promptly isolated from the Reactor Coolant System since isolation removes the source of potential failure.

b. Unidentified LEAKAGE

One gallon per minute (gpm) of unidentified 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 RCPB, if the LEAKAGE is from the pressure boundary.

c. Primary to Secondary LEAKAGE through All Steam Generators (SGs)

Total primary to secondary LEAKAGE amounting to 1 gpm through all SGs produces acceptable offsite doses in the SLB accident analysis. Violation of this LCO could exceed the offsite dose limits for this accident. Primary to secondary LEAKAGE must be included in the total allowable limit for identified LEAKAGE.

d. Primary to Secondary LEAKAGE through Any One SG

The 500 gallons per day limit on one SG is based on the assumption that a single crack leaking this amount would not propagate to a SGTR under the stress conditions of a LOCA or a main steam line rupture. If leaked through many cracks, the cracks are very small, and the above assumption is conservative.

e. 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 identified LEAKAGE and is well within the capability of the RCS Makeup System. Identified LEAKAGE includes LEAKAGE to the containment from specifically known and located sources, but does not include pressure boundary

Attachment to Reactor Coolant System Leakage
Insert "F"

LCO (Continued)

LEAKAGE or controlled reactor coolant pump (RCP) seal leakoff (a normal function not considered LEAKAGE). Violation of this LCO could result in continued degradation of a component or system.

APPLICABILITY

In MODES 1, 2, 3, and 4, the potential for RCPB LEAKAGE is greatest when the RCS 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.

LCO 3.4.6.2, "RCS Pressure Isolation Valve (PIV)," measures leakage through each individual PIV and can impact this LCO. Of the two PIVs in series in each isolated line, leakage measured through one PIV does not result in RCS LEAKAGE when the other is leak tight. If both valves leak and result in a loss of mass from the RCS, the loss must be included in the allowable identified LEAKAGE.

ACTIONS

- a. If any pressure boundary LEAKAGE exists, the reactor must be brought to lower pressure conditions to reduce the severity of the LEAKAGE and its potential consequences. It should be noted that LEAKAGE past seals and gaskets is not pressure boundary LEAKAGE. The reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 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 RCPB are much lower, and further deterioration is much less likely.

- b. Unidentified LEAKAGE, identified LEAKAGE, or primary to secondary LEAKAGE in excess of the LCO limits must be reduced to within limits within 4 hours. This Completion Time allows time to verify leakage rates and either identify unidentified LEAKAGE or reduce LEAKAGE to within limits before the reactor

Attachment to Reactor Coolant System Leakage
Insert "F"

ACTIONS (Continued)

must be shut down. This action is necessary to prevent further deterioration of the RCPB. If the unidentified LEAKAGE, identified LEAKAGE, or primary to secondary LEAKAGE cannot be reduced to within limits within 4 hours, the reactor must be brought to lower pressure conditions to reduce the severity of the LEAKAGE and its potential consequences. The reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 hours. This action reduces the LEAKAGE.

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 RCPB are much lower, and further deterioration is much less likely.

SURVEILLANCE REQUIREMENTS (SR)

SR 4.4.6.2

Verifying RCS LEAKAGE to be within the LCO limits ensures the integrity of the RCPB 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 an RCS water inventory balance. Primary to secondary LEAKAGE is also measured by performance of an RCS water inventory balance in conjunction with effluent monitoring within the secondary steam and feedwater systems.

The RCS water inventory balance must be met with the reactor at steady state operating conditions and near operating pressure. Therefore, this SR is not required to be performed in MODES 3 and 4 until 12 hours of steady state operation near operating pressure have been established.

Steady state operation is required to perform a proper inventory balance; calculations during maneuvering are not useful and a Note requires the Surveillance to be met when steady state is established. 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 RCP seal injection and return flows.

Attachment to Reactor Coolant System Leakage
Insert "F"

SURVEILLANCE REQUIREMENTS (SR) (Continued)

An early warning of pressure boundary LEAKAGE or unidentified LEAKAGE is provided by the systems that monitor the containment atmosphere radioactivity and the containment sump level. The 12 hour monitoring of the leakage detection system is sufficient to provide an early warning of increased RCS LEAKAGE. These leakage detection systems are specified in LCO 3.4.6.1, "Leakage Detection Instrumentation."

The 72 hour Frequency is a reasonable interval to trend LEAKAGE and recognizes the importance of early leakage detection in the prevention of accidents. Note (1) states that the 12 hour surveillance is required only on leakage detection instrumentation required by LCO 3.4.6.1. This Note allows the 12 hour monitoring to be suspended on leakage detection instrumentation which is inoperable or not required to be operable per LCO 3.4.6.1. Note (2) states that this SR is required to be performed during steady state operation.

REACTOR COOLANT SYSTEMBASES3/4.4.6.3 PRESSURE ISOLATION VALVE LEAKAGE (Continued)

important in preventing overpressurization and rupture of the ECCS low pressure piping which could result in a LOCA, these valves should be tested periodically to ensure low probability of gross failure.

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 valve is IDENTIFIED LEAKAGE and will be considered as a portion of the allowed limit.

← identified

3/4.4.7 CHEMISTRY

The limitations on Reactor Coolant System chemistry ensure that corrosion of the Reactor Coolant System is minimized and reduces the potential for Reactor Coolant System leakage or failure due to stress corrosion. Maintaining the chemistry within the Steady State Limits provides adequate corrosion protection to ensure the structural integrity of the Reactor Coolant System over the life of the plant. The associated effects of exceeding the oxygen, chloride and fluoride limits are time and temperature dependent. Corrosion studies show that operation may be continued with contaminant concentration levels in excess of the Steady State Limits, up to the Transient Limits, for the specified limited time intervals without having a significant effect on the structural integrity of the Reactor Coolant System. The time interval permitting continued operation within the restrictions of the Transient Limits provides time for taking corrective actions to restore the contaminant concentrations to within the Steady State Limits.

The surveillance requirements provide adequate assurance that concentrations in excess of the limits will be detected in sufficient time to take corrective action.

3/4.4.8 SPECIFIC ACTIVITY

The limitations on the specific activity of the primary coolant ensure that the resulting 2 hour doses at the site boundary will not exceed an appropriately small fraction of 10 CFR Part 100 limits following a steam generator tube rupture accident in conjunction with an assumed steady state primary-to-secondary steam generator leakage rate of 1.0 GPM.

The ACTION statement permitting POWER OPERATION to continue for limited time periods with the primary coolant's specific activity $> 1.0 \mu\text{Ci}/\text{gram}$ DOSE EQUIVALENT I-131, but within the allowable limit shown on Figure 3.4-1, accommodates possible iodine spiking phenomenon which may occur following changes in THERMAL POWER. Operation with specific activity levels exceeding $1.0 \mu\text{Ci}/\text{gram}$ DOSE EQUIVALENT I-131 for more than 48 hours during one continuous time interval

(Proposed wording)

EMERGENCY CORE COOLING SYSTEMSBASES3/4.5.4 SEAL INJECTION FLOWBACKGROUND

The function of the seal injection throttle valves during an accident is similar to the function of the Emergency Core Cooling Systems (ECCS) throttle valves in that each restricts flow from the charging pump header to the Reactor Coolant Systems (RCS).

The restriction on reactor coolant pump (RCP) seal injection flow limits the amount of ECCS flow that would be diverted from the injection path following an accident. This limit is based on safety analysis assumptions that are required because RCP seal injection flow is not isolated during SI.

APPLICABLE SAFETY ANALYSES

All ECCS subsystems are taken credit for in the large break loss of coolant accident (LOCA) at full power. The LOCA analysis establishes the minimum flow for the ECCS pumps. The charging pumps are also credited in the small break LOCA analysis. This analysis establishes the flow and discharge head at the design point for the charging pumps. The steam generator tube rupture and main steam line break event analyses also credit the charging pumps, but are not limiting in their design. Reference to these analyses is made in assessing changes to the Seal Injection System for evaluation of their effects in relation to the acceptance limits in these analyses.

This LCO ensures that seal injection flow of less than or equal to 28 gpm, with charging pump discharge pressure greater than or equal to 2410 psig and seal injection flow control valve full open, will be sufficient for RCP seal integrity but limited so that the ECCS trains will be capable of delivering sufficient water to match boiloff rates soon enough to minimize uncovering of the core following a large LOCA. It also ensures that the charging pumps will deliver sufficient water for a small LOCA and sufficient boron to maintain the core subcritical. For smaller LOCAs, the charging pumps alone deliver sufficient fluid to overcome the loss and maintain RCS inventory.

EMERGENCY CORE COOLING SYSTEMSBASES

3/4.5.4 SEAL INJECTION FLOW (Continued)LCO

The intent of the LCO limit on seal injection flow is to make sure that flow through the RCP seal water injection line is low enough to ensure that charging pump injection flow is directed to the RCS via the injection points in accordance with the requirements of 10 CFR 50.46.

The LCO is not strictly a flow limit, but rather a flow limit based on a flow line resistance. In order to establish the proper flow line resistance, a pressure and flow must be known. The flow line resistance is determined by assuming that the RCS pressure is at normal operating pressure and that the charging pump discharge pressure is greater than or equal to the value specified in this LCO. The charging pump discharge pressure remains essentially constant through all the applicable MODES of this LCO. A reduction in RCS pressure would result in more flow being diverted to the RCP seal injection line than at normal operating pressure. The valve settings established at the prescribed charging pump discharge pressure result in a conservative valve position should RCS pressure decrease. The additional modifier of this LCO, the air operated seal injection control valve being full open, is required since the valve is designed to fail open for the accident condition. With the discharge pressure and control valve position as specified by the LCO, a flow limit is established. It is this flow limit that is used in the accident analyses.

The limit on seal injection flow, combined with the charging pump discharge pressure limit and an open wide condition of the seal injection flow control valve, must be met to render the ECCS OPERABLE. If these conditions are not met, the ECCS flow will not be as assumed in the accident analyses.

APPLICABILITY

In MODES 1, 2, and 3, the seal injection flow limit is dictated by ECCS flow requirements, which are specified for MODES 1, 2, 3, and 4. The seal injection flow limit is not applicable for MODE 4 and lower because high seal injection flow is less critical as a result of the lower initial RCS pressure and decay heat removal requirements in these MODES. Therefore, RCP seal injection flow must be limited in MODES 1, 2, and 3 to ensure adequate ECCS performance.

EMERGENCY CORE COOLING SYSTEMSBASES3/4.5.4 SEAL INJECTION FLOW (Continued)ACTIONS

- a. With seal injection flow exceeding its limit, the amount of charging flow available to the RCS may be reduced. Under this Condition, action must be taken to restore the flow to below its limit. The operator has 4 hours from the time the flow is known to be above the limit to correctly position the manual valves and thus be in compliance with the accident analysis. The Completion Time minimizes the potential exposure of the plant to a LOCA with insufficient injection flow and ensures that seal injection flow is restored to or below its limit. This time is conservative with respect to the Completion Times of other ECCS LCOs; it is based on operating experience and is sufficient for taking corrective actions by operations personnel.

When the Required Actions cannot be completed within the required Completion Time, a controlled shutdown must be initiated. The Completion Time of 6 hours for reaching MODE 3 from MODE 1 is a reasonable time for a controlled shutdown, based on operating experience and normal cooldown rates, and does not challenge plant safety systems or operators. Continuing the plant shutdown begun in this Required Action, an additional 6 hours is a reasonable time, based on operating experience and normal cooldown rates, to reach MODE 4, where this LCO is no longer applicable.

SURVEILLANCE REQUIREMENTS (SR)SR 3.5.4.1

Verification every 31 days that the manual seal injection throttle valves are adjusted to give a flow within the limit ensures that proper manual seal injection throttle valve position, and hence, proper seal injection flow, is maintained. The Frequency of 31 days is based on engineering judgment and is consistent with other ECCS valve Surveillance Frequencies. The Frequency has proven to be acceptable through operating experience.

As noted, the Surveillance is not required to be performed until 4 hours after the RCS pressure has stabilized within a ± 20 psig range of normal operating pressure. The RCS pressure requirement is specified since this configuration will produce the required pressure conditions necessary to assure that the manual valves are set correctly. The exception is limited to 4 hours to ensure that the Surveillance is timely.

ATTACHMENT B

Beaver Valley Power Station, Unit Nos. 1 and 2
Proposed Technical Specification Change No. 211 and 77
REVISION OF SPECIFICATION 3.4.6.1 TITLED "LEAKAGE DETECTION
SYSTEMS", SPECIFICATION 3.4.6.2 TITLED "OPERATIONAL LEAKAGE"
AND ASSOCIATED BASES AND DEFINITION OF LEAKAGE

A. DESCRIPTION OF AMENDMENT REQUEST

The index pages would be revised to reflect changes in page numbers, specification title changes and the addition of a new specification due to this proposed amendment. The Bases section, for Specifications 3/4.4.6.3 titled "Pressure Isolation Valve Leakage" and 3/4.4.5 titled "Steam Generators" would be revised to reflect that the word "Leakage" is a defined term as a result of the proposed revision to the definition section.

The Definition Section 1.0 would be revised by this proposed change. Specifically, the definition of Identified, Unidentified and Pressure Boundary leakage would be a subset of the main definition of the term Leakage. The term Leakage would be capitalized and the three terms Identified, Unidentified and Pressure Boundary would be lower case. The term Leakage will be defined by the existing definitions of Identified, Unidentified and Pressure Boundary leakage. The existing definitions of Identified and Unidentified leakage would be modified by deletion of the reference to Controlled leakage and by the addition of the words "(except reactor coolant pump seal water injection or leakoff), that is" and the words "collection systems or." The existing definition of Controlled leakage would be deleted.

The proposed amendment would revise the Reactor Coolant System (RCS) leakage detection instrumentation Specification 3.4.6.1 for Beaver Valley Power Station (BVPS) Units No. 1 and No. 2. Specification 3.4.6.1 would be revised as follows: The Limiting Condition for Operation (LCO) would be revised by combining the existing three limiting conditions for operation into two. The current LCO 3.4.6.1.a would be deleted and incorporated into the existing LCO 3.4.6.1.c. The current LCO 3.4.6.1.b would be revised to state the following: "One containment sump (narrow range level or discharge flow) monitor; and" and then would become the new LCO 3.4.6.1.a. The existing LCO 3.4.6.1.c would become the new LCO 3.4.6.1.b and would state the following: "One containment atmosphere radioactivity monitor (gaseous or particulate)."

The existing action statement "a" would be revised to specifically address the condition when the required containment sump monitor is inoperable. The existing action statements "a.1" and "a.2" would be deleted and replaced with the requirement to perform a RCS water inventory balance measurement at least once per 24 hours. The existing action statement "b" would be revised to specifically address the condition when the required containment atmosphere radioactivity monitor is inoperable. The proposed action statement "b" would allow 30 days to restore the

containment atmosphere radioactivity monitor instead of the current 12 hour limitation. The existing action statement "b.1" would be replaced by a requirement to obtain grab samples of the containment atmosphere at least once per 24 hours or to perform action statement "b.2." The existing action statement "b.2" would be revised to require a RCS water inventory balance measurement at least once per 24 hours instead of within the next four hours. The existing action statement "c" would be replaced with a new action statement which addresses the condition when both the required containment sump monitor and containment atmosphere radioactivity monitor are inoperable. The existing action statement "d" would be deleted. The exception to Specification 3.0.4 would be then incorporated into a new footnote number (1) and applied to the proposed action statements "a" and "b."

The existing Surveillance Requirement (SR) 4.4.6.1.a would be modified by replacing the words "containment atmosphere particulate and gaseous monitoring system" with words "of the required containment atmosphere radioactivity monitor." The existing SR 4.4.6.1.b would be modified to require a channel calibration of the required containment sump monitor instead of just the containment sump discharge flow measurement system. The existing SR 4.4.6.1.c would be moved to SR 4.4.6.2. The Bases section for Specification 3.4.6.1 would be expanded to address each specific aspect of the specification.

The proposed amendment would also revise the RCS Operational Leakage Specification 3.4.6.2. LCO 3.4.6.2 would be revised by adding the word "operational" in reference to RCS leakage. The terms "Pressure Boundary," "Unidentified," and "Identified" would be stated in lower case letters. The following words would be deleted: "not isolated from the Reactor Coolant System," "from the Reactor Coolant System, and". The following words would be added: "primary to secondary leakage." The existing item "e" would be moved to a new LCO 3.5.5 for BVPS Unit No. 1 and to a new LCO 3.5.4 for BVPS Unit No. 2.

The existing SR 4.4.6.2.a and 4.4.6.2.b would be incorporated into a new SR 4.4.6.2.a. The existing SR 4.4.6.1.c would also be incorporated into the new SR 4.4.6.2.a. A new footnote (1) would be applied to the proposed SR 4.4.6.2.a. This footnote would state that the monitoring is only on leakage detection instrumentation required by LCO 3.4.6.1. SR 4.4.6.2.c would be moved to the new SR 4.5.5 for BVPS Unit No. 1 and SR 4.5.4 for BVPS Unit No. 2. The existing SR 4.4.6.2.d would become SR 4.4.6.2.b and would be modified by the addition of footnote (2). This footnote would state that following: "Not required to be performed in Mode 3 or 4 until 12 hours of steady state operation." The existing SR 4.4.6.2.e would be deleted. The Bases section for Specification 3.4.6.2 would be expanded to address each specific aspect of the specification.

The proposed amendment would add a new Specification 3.5.5 for BVPS Unit No. 1 and 3.5.4 for BVPS Unit No. 2, titled "Seal Injection Flow." The Bases section for this specification would also be added. The proposed wording contained in this new specification and associated Bases reflects the wording contained in NUREG-1431 Revision 0 titled, "Standard Technical Specifications for Westinghouse Plants."

B. BACKGROUND

General Design Criteria (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 describes acceptable methods for selecting leakage detection systems. Leakage detection systems must have the capability to detect significant reactor coolant pressure boundary degradation as soon after occurrence as practical to minimize the potential for propagation to the gross failure. Thus, an early indication or warning signal is necessary to permit proper evaluation of all unidentified leakage.

BVPS Unit Nos. 1 and 2 have four primary instruments used to detect RCS leakage. They are the containment sump discharge flow measurement system, the containment sump narrow range level instrument(s), the containment atmosphere gaseous radioactivity monitor and the containment atmosphere particulate radioactivity monitor. BVPS Unit Nos. 1 and 2 do not have an installed containment air cooler condensate flow rate monitor. Both the containment particulate and gaseous radiation monitors share a common piping system and pumping arrangement. Because of this design configuration, both radiation monitors must be taken out of service to perform the required periodic calibration and/or maintenance on either radiation monitor. There has been numerous events in which a single component failure has rendered both the containment particulate and gaseous radioactivity monitors inoperable. This has required the plant to expedite difficult recovery efforts due to containment subatmospheric design and the very restrictive time limitations in order to prevent a plant shutdown in 12 hours as required by the current action statement "b." The containment sump discharge flow monitor consists of a single flow rate meter on the containment sump discharge line which gives an indication of the pump out rate of the containment sump. For BVPS Unit No. 2 only, the containment sump discharge flow measurement system also contains a programmable controller which provides an alarm. The alarm setpoint is based on a predetermined leakage rate in gallons. If the sump pump flow rate exceeds this value, an alarm is annunciated. The narrow range containment sump level instrumentation consists of a single level instrument in the containment sump for BVPS Unit No. 1 and two independent instruments in the containment sump for BVPS Unit No. 2.

C. JUSTIFICATION

The proposed changes are consistent with the wording contained in NUREG 1431 Revision 0.

The proposed revisions to the Index pages and the Bases sections for Specifications 3/4.4.5 and 3/4.4.6.3 are editorial in nature and are necessary due to the proposed changes which are described below.

The proposed revision to the definition section would not change the meaning of each of the types of leakage. This change is editorial in nature and will make these definitions consistent with the format of NUREG 1431. The definition of controlled leakage is no longer required since the specifications will no longer reference this term.

The proposed reduction in the minimum number of leakage detection monitors required to be operable, from three to two, will continue to ensure that monitors of diverse measurement means are available. In the proposed change, one monitor, which is capable of monitoring increased flow into the containment sump, i.e., discharge flow measurement or narrow range level, will still be required to be operable. This will ensure that at least one monitor is operable to provide the operators with a quantitative indication of unidentified leakage into the containment sump. The second monitor, which is capable of monitoring the containment atmosphere for increases in radiation, i.e., the gaseous or particulate monitor, will still be required to be operable. This will ensure that at least one monitor is operable to provide the operators with rapid highly sensitive indication of RCS leakage. Two of the three monitors which are presently required to be operable are redundant in that both the instruments (gaseous and particulate) monitor the containment atmosphere for increases in radiation. While these monitors are redundant, they both depend on the same flow path to monitor for gaseous or particulate activity. The containment sump instrument level and discharge flow measurement instruments are also redundant in that they both monitor the containment sump for increases in water inventory. The current specification only requires one of these two monitors to be operable. Therefore, the proposed reduction in the number of monitors required to be operable does not reduce the ability of the plant operators to detect unidentified leakage from the RCS and does not substantially reduce the existing capability for monitoring RCS leakage.

The proposed revision to action statement "a" will ensure that one of two independent indications of RCS leakage will be available. The containment atmosphere monitor will continue to provide indication of changes in RCS leakage. Performance of the RCS water inventory balance at least once per 24 hours will

provide information that is adequate to detect RCS leakage. Therefore, the 30 day allowable outage time for the containment sump monitor is acceptable based on the availability of the containment atmosphere monitor and the increased frequency and adequacy of the RCS water inventory balance.

The proposed revision to action statement "b" will ensure that one of two independent indications of RCS leakage will be available. The containment sump monitor will continue to provide indication of changes in RCS leakage. Performance of the RCS water inventory balance or obtaining grab samples of the containment at least once per 24 hours will provide information that is adequate to detect RCS leakage. Therefore, the 30 day allowable outage time for the containment atmosphere monitor is acceptable based on the availability of the containment sump monitor and the increased frequency and adequacy of the RCS water inventory balance or the grab samples of the containment atmosphere.

The proposed revision to action statement "c" will require that the plant be placed in cold shutdown when no installed instrumentation as a means of monitoring RCS leakage is available. Therefore, the proposed action statement "c" will require the plant to be placed in a mode in which the requirements of LCO 3.4.6.1 no longer apply.

The proposed incorporation of action statement "d" into footnote (1) will allow a plant mode change when the required containment sump monitor or the containment atmosphere radioactivity monitor is inoperable. This allowance is provided because other instrumentation and detection methods are still available to monitor RCS leakage. The monitoring instrumentation required by LCO 3.4.6.1 does not result in any automatic actuations or isolations. Therefore, the present exception to Specification 3.0.4 can be applied to Modes 1, 2, 3 and 4 instead of just Modes 1, 2 and 3.

The proposed revision to SR 4.4.6.1.b will require a channel calibration of the required containment sump monitor at least once per 18 months. The current SR 4.4.6.1.b only requires a channel calibration of the sump discharge flow monitor. SR 4.4.6.1.c will be moved to the proposed SR 4.4.6.2.a. Monitoring of the narrow range level provides an early warning of an increase in operational leakage. Therefore, this surveillance requirement is better suited in LCO 3.4.6.2 since this LCO ensues that operational leakage is maintained within prescribed limits.

The proposed addition of the word "operational" to LCO 3.4.6.2 is editorial in nature and reflects the wording contained in the LCO title. The reference to an isolated steam generator can be deleted since operation in Modes 1 through 4 is not permitted with an RCS loop isolated. The proposed removal of the term

controlled leakage from LCO 3.4.6.2 is justified based on the fact that this requirement is actually verification of emergency core cooling capabilities and not a measure of operational leakage. This requirement to verify emergency core cooling capabilities will be stated in the new seal injection flow specification.

The proposed SR 4.4.6.2.a will consist of monitoring requirements for each of the leakage detection instruments specified in LCO 3.4.6.2.1. Monitoring of each of these instruments is important to ensure an early warning is provided to the operations personnel of increasing operational leakage. Once recognized, operations can identify and quantify the leakage to ensure the requirements of LCO 3.4.6.2 continue to be met. The proposed addition of footnote (1) will permit the monitoring of only the leakage detection instruments which are required to be operable per LCO 3.4.6.1. This LCO requires at least two of the four leakage detection monitors to be operable. In the case where certain leakage detection instrumentation is inoperable or not available, monitoring of these instruments would not be possible. Therefore, this footnote is necessary for these situations.

The surveillance for controlled leakage will be moved to a new surveillance requirement for seal injection flow for the reasons previously discussed. The deletion of the surveillance requirement on reactor head flange leakoff temperature is based on the fact that leakage into this system is identified leakage. This leakage is monitored by a temperature detector, which provides an alarm, in the leakoff line and collected by a drains tank. Leakage from this pathway is therefore sufficiently monitored and accounted for in the RCS water inventory balance.

The proposed addition of footnote (2) is to allow the plant to be in a stable condition. Steady state operation is required to perform a proper inventory balance. Therefore, footnote (2) is necessary to ensure a valid inventory balance is performed in Modes 3 or 4.

The proposed addition of a separate specification for seal water injection flow will place the requirement, which actually is a verification of emergency core cooling capabilities, in the technical specification chapter that pertains to the emergency core cooling system. The proposed seal injection flow specification will include the addition of a value for charging pump discharge pressure. This value will ensure the bounding conditions used in the analysis, to determine the limit on seal injection flow, are met. This analysis uses a flow line resistance which is determined by assuming that the RCS pressure is at normal operating pressure and that the charging pump discharge pressure is greater than or equal to the proposed value specified in this new LCO.

The Mode applicable for the seal injection specification is Modes 1, 2 and 3. The seal injection flow limit is not applicable for Mode 4 and lower because high seal injection flow is less critical as a result of the lower initial RCS pressure and decay heat removal requirements in these Modes.

The remaining items in this proposed new specification are consistent with the requirements on seal injection flow contained in the current Specification 3.4.6.2. The term "CONTROLLED Leakage" in reference to seal injection flow has been deleted since this requirement will no longer be contained in a specification which pertains to operational leakage, i.e., LCO 3.4.6.2.

D. SAFETY ANALYSIS

The proposed change does not affect the safety of the plant. The proposed revisions to the Definitions of "Leakage" are editorial in nature and do not change the basic meanings of each type of leakage. The proposed revisions to Specification 3.4.6.1 do reduce the minimum number of detection systems required to be operable from three to two. However, the two detection monitors provide diverse measurement means, unlike the currently required three monitors, and will continue to ensure that the plant operators are provided with an early indication of RCS leakage. If the leakage rate indicates possible RCS pressure boundary degradation, appropriate actions will continue to be taken to place the plant in a safe condition. The proposed action statements will require additional monitoring to be performed when one of the required two leakage detection monitors is inoperable. These actions also ensure adequate early indication of RCS leakage to plant operators.

The proposed revisions to Specification 3.4.6.2 do not change the operational leakage limits. The proposed changes do not affect the required action when RCS leakage exceeds the current limits. The addition of footnote (1) will permit the monitoring of only the leakage detection instrumentation which is required to be operable per LCO 3.4.6.1. When a leakage detection instrumentation is inoperable or not available, it will not provide any indication of RCS leakage. Therefore, there is no reason to continue monitoring of these instruments. The addition of footnote (2) does not change the ability of plant operators to trend and monitor RCS leakage. When the plant is not in a steady state condition, the RCS water inventory does not provide meaningful information. Therefore, this is an inappropriate time to perform this surveillance. The deletion of SR 4.4.6.2.e will not affect the ability to monitor leakage from the reactor head flange. A temperature detector will provide an alarm if the head flange leakoff line reaches a predetermined temperature. Since leakage from the head flange is collected by a drain tank,

leakage from this pathway is sufficiently monitored by the RCS water inventory. Therefore, the 24 hour monitoring of the head flange leakoff temperature provides little additional information to plant operators.

The proposed addition of a new specification for seal injection flow will not change the current requirements for seal injection flow. The new specification will continue to ensure that seal injection flow is limited as assumed in the safety analysis. This will ensure that sufficient flow to the reactor core is provided during accident conditions. The proposed elimination of the Mode 4 applicability, for seal injection flow, will not significantly reduce the level of safety. High seal injection flow is less critical as a result of lower initial RCS pressure and decay heat removal requirements in Mode 4.

Therefore, the proposed change is considered safe based on the continued ability of the leakage detection monitors to provide an early indication of RCS leakage. The operational leakage limits will continue to ensure that any RCS leakage does not compromise safety. The proposed seal injection flow specification will continue to limit seal injection flow to ensure the sufficient flow to the reactor core is provided during accident conditions. The seal injection flow specification will limit flow when high seal injection flow is critical as a result of initial RCS pressure and decay heat removal requirements.

E. NO SIGNIFICANT HAZARDS EVALUATION

The no significant hazard considerations involved with the proposed amendment have been evaluated, focusing on the three standards set forth in 10 CFR 50.92(c) as quoted below:

The Commission may make a final determination, pursuant to the procedures in paragraph 50.91, that a proposed amendment to an operating license for a facility licensed under paragraph 50.21(b) or paragraph 50.22 or for a testing facility involves no significant hazards consideration, if operation of the facility in accordance with the proposed amendment would not:

- (1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or
- (2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or
- (3) Involve a significant reduction in a margin of safety.

The following evaluation is provided for the no significant hazards consideration standards.

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

The probability of occurrence of a previously evaluated accident, i.e., loss of coolant accident (LOCA), is not increased because the ability of the plant operators to detect RCS leakage and take appropriate corrective action is not changed. The proposed change will continue to ensure that diverse means for detecting extremely small leaks are available to plant operators. In addition, the proposed amendment does not change the operational leakage limits. The seal injection flow limit is not affected by this proposed change. Due to these three factors, the probability of occurrence of a LOCA is not increased. The consequences of an accident previously evaluated are not significantly increased because the proposed changes do not affect the ability of the various safety systems to perform their intended function. The leakage detection monitors do not initiate any automatic function to mitigate the consequences of a LOCA. They provide an early indication of RCS leakage. The operational leakage limits are not affected by this proposed change and they do not initiate any automatic function to mitigate the consequences of a LOCA. The proposed change to the seal injection flow requirement will continue to ensure that ECCS flow will be as assumed in the accident analyses.

Therefore, based on the continued ability of the leakage detection monitors and independent monitoring capabilities to detect extremely small leaks, the fact that this proposed amendment does not change the operational leakage limits, the seal injection flow limit is not affected by this proposed change, and that the proposed changes do not affect the ability of the various safety systems to perform their intended functions, this proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

The proposed amendment does not change the plant configuration in a way which introduces a new potential hazard to the plant. Since design requirements continue to be met and the integrity of the RCS pressure boundary is not challenged, no new failure mode has been created. As a result, an accident which is different than any already evaluated in the Updated Final Safety Analysis Report (UFSAR) will not be created due to this change.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

The proposed change does not involve a significant reduction in a margin of safety since the operational leakage limits will not be affected. Continued plant operation will not be permitted if operational leakage exceeds the current technical specification limits. The operational leakage limits establish limits which ensure that any RCS leakage does not compromise safety. The protection of the RCS pressure boundary from degradation and the core from inadequate cooling, in addition to preventing the accident analyses radiation release assumptions from being exceeded, is the main purpose of the operational leakage limits. The ability to detect and quantify operational leakage allows plant operators to perform actions to place the plant in a safe condition when leakage rate indicates possible RCS pressure boundary degradation. The proposed change will continue to ensure that diverse measurement means are available to provide the plant operators with an early indication of extremely small RCS leakage. Therefore, allowing action to be taken to place the plant in a safe condition when RCS leakage indicates possible RCS pressure boundary leakage.

The proposed addition of the separate seal injection specification will not change the flow limit on seal injection. The new specification will continue to ensure that seal injection flow is limited. This will ensure that sufficient flow to the reactor core is provided during accident conditions. The proposed elimination of the Mode 4 applicability, for seal injection flow specification, will not involve a significant reduction in the margin of safety since high seal injection flow is less critical as a result of the lower initial RCS pressure and decay heat removal requirements in Mode 4.

Therefore, this proposed change does not involve a significant reduction in a margin of safety.

F. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Based on the considerations expressed above, it is concluded that the activities associated with this license amendment request satisfies the no significant hazards consideration standards of 10 CFR 50.92(c) and, accordingly, a no significant hazards consideration finding is justified.

ATTACHMENT C-1

Beaver Valley Power Station, Unit No. 1
Proposed Technical Specification Change No. 211

Applicable Typed Pages

ATTACHMENT TO LICENSE AMENDMENT NO.

FACILITY OPERATING LICENSE NO. DPR-66

DOCKET NO. 50-334

Replace the following pages of Appendix A, Technical Specifications, with the enclosed pages as indicated. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

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VII	VII
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B 3/4 4-3	B 3/4 4-3
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CHANNEL FUNCTIONAL TEST

1.11 A CHANNEL FUNCTIONAL TEST shall be the injection of a simulated signal into the channel as close to the primary sensor as practicable to verify OPERABILITY including alarm and/or trip functions.

CORE ALTERATION

1.12 CORE ALTERATION shall be the movement or manipulation of any component within the reactor pressure vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe conservative position.

SHUTDOWN MARGIN

1.13 SHUTDOWN MARGIN shall be the instantaneous amount of reactivity by which the reactor is or would be subcritical from its present condition assuming all full length rod cluster assemblies (shutdown and control) are fully inserted except for the single rod cluster assembly of highest reactivity worth which is assumed to be fully withdrawn.

LEAKAGE

1.14 LEAKAGE shall be:

a. Identified LEAKAGE

1. LEAKAGE, such as that from pump seals or valve packing (except reactor coolant pump seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank;
2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be Pressure Boundary LEAKAGE, or
3. Reactor coolant system LEAKAGE through a steam generator to the secondary system.

b. Unidentified LEAKAGE

Unidentified LEAKAGE shall be all LEAKAGE (except reactor coolant pump seal water injection or leakoff) that is not Identified LEAKAGE.

c. Pressure Boundary LEAKAGE

Pressure Boundary LEAKAGE shall be LEAKAGE (except steam generator tube LEAKAGE) through a nonisolable fault in a Reactor Coolant System component body, pipe wall or vessel wall.

1.15 THROUGH 1.17 (DELETED)

QUADRANT POWER TILT RATIO

1.18 QUADRANT POWER TILT RATIO shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater. With one (1) excore detector inoperable, the remaining three (3) detectors shall be used for computing the average.

DOSE EQUIVALENT I-131

1.19 DOSE EQUIVALENT I-131 shall be that concentration of I-131 ($\mu\text{Ci}/\text{gram}$) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Regulatory Guide 1.109, 1977.

STAGGERED TEST BASIS

1.20 A STAGGERED TEST BASIS shall consist of:

- a. A test schedule for n systems, subsystems, trains or other designated components obtained by dividing the specified test interval into n equal subintervals;
- b. The testing of one (1) system, subsystem, train or other designated component at the beginning of each subinterval.

FREQUENCY NOTATION

1.21 The FREQUENCY NOTATION specified for the performance of Surveillance Requirements shall correspond to the intervals defined in Table 1.2.

REACTOR COOLANT SYSTEM

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

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

- a. One containment sump (narrow range level or discharge flow) monitor; and
- b. One containment atmosphere radioactivity monitor (gaseous or particulate).

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

- a. With the required containment sump monitor inoperable⁽¹⁾, operations may continue for up to 30 days provided that a Reactor Coolant System water inventory balance measurement (Specification 4.4.6.2.b) is 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.
- b. With the required containment atmosphere radioactivity monitor inoperable⁽¹⁾, operations may continue for up to 30 days provided:
 1. Grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours, or
 2. A Reactor Coolant System water inventory balance measurement (Specification 4.4.6.2.b) is 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.

(1) The provisions of Specification 3.0.4 are not applicable.

REACTOR COOLANT SYSTEM

LIMITING CONDITION FOR OPERATION (Continued)

- c. With the required containment sump monitor and the containment atmosphere radioactivity monitor inoperable, 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 instrumentation shall be demonstrated OPERABLE by:
 - a. Performance of a CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST of the required containment atmosphere radioactivity monitor at the frequencies specified in Table 4.3-3.
 - b. Performance of a CHANNEL CALIBRATION of the required containment sump monitor at least once per 18 months.

REACTOR COOLANT SYSTEM

OPERATIONAL LEAKAGE

LIMITING CONDITION FOR OPERATION

3.4.6.2 Reactor Coolant System operational LEAKAGE shall be limited to:

- a. No pressure boundary LEAKAGE,
- b. 1 gpm unidentified LEAKAGE,
- c. 1 gpm total primary to secondary LEAKAGE through all steam generators,
- d. 500 gallons per day primary to secondary LEAKAGE through any one steam generator, and
- e. 10 gpm identified LEAKAGE.

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

ACTION:

- a. With any pressure boundary LEAKAGE, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the next 30 hours.
- b. With any Reactor Coolant System LEAKAGE greater than any one of the above limits, excluding pressure boundary LEAKAGE, reduce the LEAKAGE rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.4.6.2 Reactor Coolant System LEAKAGES shall be demonstrated to be within each of the above limits by:

- a. Monitoring the following leakage detection instrumentation at least once per 12 hours: ⁽¹⁾
 1. Containment atmosphere gaseous radioactivity monitor.

(1) Only on leakage detection instrumentation required by LCO 3.4.6.1.

REACTOR COOLANT SYSTEM

OPERATIONAL LEAKAGE

SURVEILLANCE REQUIREMENTS (Continued)

2. Containment atmosphere particulate radioactivity monitor.
 3. Containment sump discharge flow monitor.
 4. Containment sump narrow range level monitor.
- b. Performance of a Reactor Coolant System water inventory balance at least once per 72 hours during steady state operation.⁽²⁾

(2) Not required to be performed in MODE 3 or 4 until 12 hours of steady state operation.

EMERGENCY CORE COOLING SYSTEMS

3/4.5.5 SEAL INJECTION FLOW

LIMITING CONDITION FOR OPERATION

3.5.5 Reactor coolant pump seal injection flow shall be less than or equal to 28 gpm with the charging pump discharge pressure greater than or equal to 2311 psig and the seal injection flow control valve full open.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

- a. With the seal injection flow not within the limit, adjust manual seal injection throttle valves to give a flow within the limit with the charging pump discharge pressure greater than or equal to 2311 psig and the seal injection flow control valve full open within 4 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.5 Verify at least once per 31 days that the valves are adjusted to give a flow within the limit with the charging pump discharge at greater than or equal to 2311 psig and the seal injection flow control valve full open. (1)

(1) Not required to be performed until 4 hours after the Reactor Coolant System pressure stabilizes at greater than or equal to 2210 psig and less than or equal to 2250 psig.

REACTOR COOLANT SYSTEMBASES3/4.4.5 STEAM GENERATORS (Continued)

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 = 500 gallons per day per steam generator). 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 500 gallons per day per steam generator can readily be detected by radiation monitors of steam generator blowdown. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged.

Stage-type defects are unlikely with the all volatile treatment (VT) of secondary coolant. However, even if a defect of similar type should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging or repair will be required of all tubes with imperfections exceeding the plugging or repair limit. Degraded steam generator tubes may be repaired by the installation of sleeves which span the degraded tube section. A steam generator tube with a sleeve installed meets the structural requirements of tubes which are not degraded, therefore, the sleeve is considered a part of the tube. The surveillance requirements identify those sleeving methodologies approved for use. If an installed sleeve is found to have through wall penetration greater than or equal to the plugging limit, the tube must be plugged. The plugging limit for the sleeve is derived from R.G. 1.121 analysis which utilizes a 20 percent allowance for eddy current uncertainty in determining the depth of tube wall penetration and additional degradation growth. Steam generator tube inspections of operating plants have demonstrated the capability to reliably detect degradation that has penetrated 20 percent of the original tube wall thickness.

Whenever the results of any steam generator tubing inservice inspection fall into Category C-3, these results will be reported to the Commission pursuant to Specification 6.6 prior to resumption of plant operation. Such cases will be considered by the Commission on a case-by-case basis and may result in a requirement for analysis, laboratory examinations, tests, additional eddy-current inspection, and revision of the Technical Specifications, if necessary.

REACTOR COOLANT SYSTEMBASES

3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATIONBACKGROUND

GDC 30 of Appendix A to 10 CFR 50 requires means for detecting and, to the extent practical, identifying the source of RCS LEAKAGE. Regulatory Guide 1.45 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 non-ECCS portion of the containment sump used to collect unidentified LEAKAGE is instrumented to alarm due to abnormal increases in the water inventory. The 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. 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.

REACTOR COOLANT SYSTEMBASES3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATION (Continued)BACKGROUND (Continued)

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements 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. 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.

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.

REACTOR COOLANT SYSTEMBASES

3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATION (Continued)LCO (Continued)

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with a gaseous or particulate radioactivity monitor, provides an acceptable minimum. The containment sump monitor is comprised of the instruments associated with the non-ECCS portion of the containment sump which monitor narrow range level and sump pump discharge flow.

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

ACTIONS

- a. With the required containment sump monitor inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere radioactivity monitoring system will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 4.4.6.2.b, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage.

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

REACTOR COOLANT SYSTEMBASES3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATION (Continued)ACTIONS (Continued)

Required 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.

b.1. and b.2.

With both gaseous and particulate containment atmosphere radioactivity monitoring instrumentation channels inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or water inventory balances, in accordance with SR. 4.4.6.2.b, must be performed to provide alternate periodic information.

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

The 24 hour interval provides periodic information that is adequate to detect leakage. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

Required 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 channel is inoperable. This allowance is provided because other instrumentation is available to monitor for RCS LEAKAGE.

- c. With all required monitors inoperable, no automatic means of monitoring leakage are available, and immediate plant shutdown is required. 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 condition from full power conditions in an orderly manner and without challenging plant systems.

REACTOR COOLANT SYSTEMBASES3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATION (Continued)SURVEILLANCE REQUIREMENTS (SR)SR 4.4.6.1.a

SR 4.4.6.1.a requires the performance of a CHANNEL CHECK of the required containment atmosphere radioactivity monitor. The check gives reasonable confidence that the channel is operating properly. The Frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

SR 4.4.6.1.a requires the performance of a CHANNEL FUNCTIONAL TEST on the required containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The Frequency of 31 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.

SR 4.4.6.1.a also requires the performance of a CHANNEL CALIBRATION on the required containment atmosphere radioactivity monitor. 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.

SR 4.4.6.1.b

SR 4.4.6.1.b requires the performance of a CHANNEL CALIBRATION on the required containment sump monitor. 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.

3/4.4.6.2 OPERATIONAL LEAKAGEBACKGROUND

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.

REACTOR COOLANT SYSTEMBASES

3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)BACKGROUND (Continued)

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, 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 percent leaktight. 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).

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 LOCA; the amount of leakage can

REACTOR COOLANT SYSTEMBASES

3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)APPLICABLE SAFETY ANALYSES (Continued)

affect the probability of such an event. The safety analysis for an event resulting in steam discharge to the atmosphere conservatively assumes a 10 gpm primary to secondary LEAKAGE.

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 SLB is more limiting for site radiation releases. The safety analysis for the SLB accident conservatively assumes a 10 gpm primary to secondary LEAKAGE. The dose consequences resulting from the SLB accident are well within the limits defined in 10 CFR 100 or the staff approved licensing basis (i.e., a small fraction of these limits).

LCO

RCS 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 RCPB. LEAKAGE past seals and gaskets is not pressure boundary LEAKAGE. Should pressure boundary LEAKAGE occur through a component which can be isolated from the balance of the Reactor Coolant System, plant operation may continue provided the leaking component is promptly isolated from the Reactor Coolant System since isolation removes the source of potential failure.

REACTOR COOLANT SYSTEMBASES

3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)LCO (Continued)b. Unidentified LEAKAGE

One gallon per minute (gpm) of unidentified 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 RCPB, if the LEAKAGE is from the pressure boundary.

c. Primary to Secondary LEAKAGE through All Steam Generators (SGs)

Total primary to secondary LEAKAGE amounting to 1 gpm through all SGs produces acceptable offsite doses in the SLB accident analysis. Violation of this LCO could exceed the offsite dose limits for this accident. Primary to secondary LEAKAGE must be included in the total allowable limit for identified LEAKAGE.

d. Primary to Secondary LEAKAGE through Any One SG

The 500 gallons per day limit on one SG is based on the assumption that a single crack leaking this amount would not propagate to a SGTR under the stress conditions of a LOCA or a main steam line rupture. If leaked through many cracks, the cracks are very small, and the above assumption is conservative.

e. 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 identified LEAKAGE and is well within the capability of the RCS Makeup System. Identified LEAKAGE includes LEAKAGE to the containment from specifically known and located sources, but does not include pressure boundary LEAKAGE or controlled reactor coolant pump (RCP) seal leakoff (a normal function not considered LEAKAGE). Violation of this LCO could result in continued degradation of a component or system.

REACTOR COOLANT SYSTEMBASES

3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)APPLICABILITY

In MODES 1, 2, 3, and 4, the potential for RCPB LEAKAGE is greatest when the RCS 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.

LCO 3.4.6.3, "RCS Pressure Isolation Valve (PIV)," measures leakage through each individual PIV and can impact this LCO. Of the two PIVs in series in each isolated line, leakage measured through one PIV does not result in RCS LEAKAGE when the other is leak tight. If both valves leak and result in a loss of mass from the RCS, the loss must be included in the allowable identified LEAKAGE.

ACTIONS

- a. If any pressure boundary LEAKAGE exists, the reactor must be brought to lower pressure conditions to reduce the severity of the LEAKAGE and its potential consequences. It should be noted that LEAKAGE past seals and gaskets is not pressure boundary LEAKAGE. The reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 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 RCPB are much lower, and further deterioration is much less likely.

- b. Unidentified LEAKAGE, identified LEAKAGE, or primary to secondary LEAKAGE in excess of the LCO limits must be reduced to within limits within 4 hours. This Completion Time 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 RCPB. If the unidentified LEAKAGE, identified LEAKAGE, or primary to secondary LEAKAGE

REACTOR COOLANT SYSTEMBASES

3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)ACTIONS (Continued)

cannot be reduced to within limits within 4 hours, the reactor must be brought to lower pressure conditions to reduce the severity of the LEAKAGE and its potential consequences. The reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 hours. This action reduces the LEAKAGE.

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 RCPB are much lower, and further deterioration is much less likely.

SURVEILLANCE REQUIREMENTS (SR)SR 4.4.6.2

Verifying RCS LEAKAGE to be within the LCO limits ensures the integrity of the RCPB 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 an RCS water inventory balance. Primary to secondary LEAKAGE is also measured by performance of an RCS water inventory balance in conjunction with effluent monitoring within the secondary steam and feedwater systems.

The RCS water inventory balance must be met with the reactor at steady state operating conditions and near operating pressure. Therefore, this SR is not required to be performed in MODES 3 and 4 until 12 hours of steady state operation near operating pressure have been established.

Steady state operation is required to perform a proper inventory balance; calculations during maneuvering are not useful and a Note requires the Surveillance to be met when steady state is established. 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 RCP seal injection and return flows.

REACTOR COOLANT SYSTEMBASES

3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)SURVEILLANCE REQUIREMENTS (SR) (Continued)

An early warning of pressure boundary LEAKAGE or unidentified LEAKAGE is provided by the systems that monitor the containment atmosphere radioactivity and the containment sump level. The 12 hour monitoring of the leakage detection system is sufficient to provide an early warning of increased RCS LEAKAGE. These leakage detection systems are specified in LCO 3.4.6.1, "Leakage Detection Instrumentation."

The 72 hour Frequency is a reasonable interval to trend LEAKAGE and recognizes the importance of early leakage detection in the prevention of accidents. Note (1) states that the 12 hour surveillance is required only on leakage detection instrumentation required by LCO 3.4.6.1. This Note allows the 12 hour monitoring to be suspended on leakage detection instrumentation which is inoperable or not required to be operable per LCO 3.4.6.1. Note (2) states that this SR is required to be performed during steady state operation.

3/4.4.6.3 PRESSURE ISOLATION VALVE LEAKAGE

The leakage from any RCS pressure isolation valve is sufficiently low to ensure early detection of possible in-series valve failure. It is apparent that when pressure isolation is provided by two in-series valves and when failure of one valve in the pair can go undetected for a substantial length of time, verification of valve integrity is required. Since these valves are important in preventing overpressurization and rupture of the ECCS low pressure piping which could result in a LOCA, these valves should be tested periodically to ensure low probability of gross failure.

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 valve is identified LEAKAGE and will be considered as a portion of the allowed limit.

REACTIVITY CONTROL SYSTEMSBASES

3/4.4.7 CHEMISTRY

The limitations on Reactor Coolant System chemistry ensure that corrosion of the Reactor Coolant System is minimized and reduces the potential for Reactor Coolant System leakage or failure due to stress corrosion. Maintaining the chemistry within the Steady State Limits provides adequate corrosion protection to ensure the structural integrity of the Reactor Coolant system over the life of the plant. The associated effects of exceeding the oxygen, chloride and fluoride limits are time and temperature dependent. Corrosion studies show that operation may be continued with contaminant concentration levels in excess of the Steady State Limits, up to the Transient Limits, for the specified limited time intervals without having a significant effect on the structural integrity of the Reactor Coolant System. The time interval permitting continued operation within the restrictions of the Transient Limits provides time for taking corrective actions to restore the contaminant concentrations to within the Steady State Limits.

The surveillance requirements provide adequate assurance that concentrations in excess of the limits will be detected in sufficient time to take corrective action.

3/4.4.8 SPECIFIC ACTIVITY

The limitations on the specific activity of the primary coolant ensure that the resulting 2 hour doses at the site boundary will not exceed an appropriately small fraction of Part 100 limits following a steam generator tube rupture accident in conjunction with an assumed steady state primary-to-secondary steam generator leakage rate of 1.0 GPM.

EMERGENCY CORE COOLING SYSTEMSBASES

3/4.5.5 SEAL INJECTION FLOWBACKGROUND

The function of the seal injection throttle valves during an accident is similar to the function of the Emergency Core Cooling Systems (ECCS) throttle valves in that each restricts flow from the charging pump header to the Reactor Coolant Systems (RCS).

The restriction on reactor coolant pump (RCP) seal injection flow limits the amount of ECCS flow that would be diverted from the injection path following an accident. This limit is based on safety analysis assumptions that are required because RCP seal injection flow is not isolated during SI.

APPLICABLE SAFETY ANALYSES

All ECCS subsystems are taken credit for in the large break loss of coolant accident (LOCA) at full power. The LOCA analysis establishes the minimum flow for the ECCS pumps. The charging pumps are also credited in the small break LOCA analysis. This analysis establishes the flow and discharge head at the design point for the charging pumps. The steam generator tube rupture and main steam line break event analyses also credit the charging pumps, but are not limiting in their design. Reference to these analyses is made in assessing changes to the Seal Injection System for evaluation of their effects in relation to the acceptance limits in these analyses.

This LCO ensures that seal injection flow of less than or equal to 28 gpm, with charging pump discharge pressure greater than or equal to 2311 psig and seal injection flow control valve full open, will be sufficient for RCP seal integrity but limited so that the ECCS trains will be capable of delivering sufficient water to match boiloff rates soon enough to minimize uncovering of the core following a large LOCA. It also ensures that the charging pumps will deliver sufficient water for a small LOCA and sufficient boron to maintain the core subcritical. For smaller LOCAs, the charging pumps alone deliver sufficient fluid to overcome the loss and maintain RCS inventory.

EMERGENCY CORE COOLING SYSTEMSBASES

3/4.5.5 SEAL INJECTION FLOW (Continued)LCO

The intent of the LCO limit on seal injection flow is to make sure that flow through the RCP seal water injection line is low enough to ensure that charging pump injection flow is directed to the RCS via the injection points in accordance with the requirements of 10 CFR 50.46.

The LCO is not strictly a flow limit, but rather a flow limit based on a flow line resistance. In order to establish the proper flow line resistance, a pressure and flow must be known. The flow line resistance is determined by assuming that the RCS pressure is at normal operating pressure and that the charging pump discharge pressure is greater than or equal to the value specified in this LCO. The charging pump discharge pressure remains essentially constant through all the applicable MODES of this LCO. A reduction in RCS pressure would result in more flow being diverted to the RCP seal injection line than at normal operating pressure. The valve settings established at the prescribed charging pump discharge pressure result in a conservative valve position should RCS pressure decrease. The additional modifier of this LCO, the air operated seal injection control valve being full open, is required since the valve is designed to fail open for the accident condition. With the discharge pressure and control valve position as specified by the LCO, a flow limit is established. It is this flow limit that is used in the accident analyses.

The limit on seal injection flow, combined with the charging pump discharge pressure limit and an open wide condition of the seal injection flow control valve, must be met to render the ECCS OPERABLE. If these conditions are not met, the ECCS flow will not be as assumed in the accident analyses.

APPLICABILITY

In MODES 1, 2, and 3, the seal injection flow limit is dictated by ECCS flow requirements, which are specified for MODES 1, 2, 3, and 4. The seal injection flow limit is not applicable for MODE 4 and lower because high seal injection flow is less critical as a result of the lower initial RCS pressure and decay heat removal requirements in these MODES. Therefore, RCP seal injection flow must be limited in MODES 1, 2, and 3 to ensure adequate ECCS performance.

EMERGENCY CORE COOLING SYSTEMSBASES

3/4.5.5 SEAL INJECTION FLOW (Continued)ACTIONS

- a. With seal injection flow exceeding its limit, the amount of charging flow available to the RCS may be reduced. Under this Condition, action must be taken to restore the flow to below its limit. The operator has 4 hours from the time the flow is known to be above the limit to correctly position the manual valves and thus be in compliance with the accident analysis. The Completion Time minimizes the potential exposure of the plant to a LOCA with insufficient injection flow and ensures that seal injection flow is restored to or below its limit. This time is conservative with respect to the Completion Times of other ECCS LCOs; it is based on operating experience and is sufficient for taking corrective actions by operations personnel.

When the Required Actions cannot be completed within the required Completion Time, a controlled shutdown must be initiated. The Completion Time of 6 hours for reaching MODE 3 from MODE 1 is a reasonable time for a controlled shutdown, based on operating experience and normal cooldown rates, and does not challenge plant safety systems or operators. Continuing the plant shutdown begun in this Required Action, an additional 6 hours is a reasonable time, based on operating experience and normal cooldown rates, to reach MODE 4, where this LCO is no longer applicable.

SURVEILLANCE REQUIREMENTS (SR)SR 3.5.5.1

Verification every 31 days that the manual seal injection throttle valves are adjusted to give a flow within the limit ensures that proper manual seal injection throttle valve position, and hence, proper seal injection flow, is maintained. The Frequency of 31 days is based on engineering judgment and is consistent with other ECCS valve Surveillance Frequencies. The Frequency has proven to be acceptable through operating experience.

As noted, the Surveillance is not required to be performed until 4 hours after the RCS pressure has stabilized within a ± 20 psig range of normal operating pressure. The RCS pressure requirement is specified since this configuration will produce the required pressure conditions necessary to assure that the manual valves are set correctly. The exception is limited to 4 hours to ensure that the Surveillance is timely.

ATTACHMENT C-2

Beaver Valley Power Station, Unit No. 2
Proposed Technical Specification Change No. 77

Applicable Typed Pages

ATTACHMENT TO LICENSE AMENDMENT NO. _____

FACILITY OPERATING LICENSE NO. NPF-73

DOCKET NO. 50-412

Replace the following pages of Appendix A, Technical Specifications, with the enclosed pages as indicated. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

<u>Remove</u>	<u>Insert</u>
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II	II
VI	VI
XI	XI
1-3	1-3
----	1-4
----	1-5
----	1-6
----	1-7
----	1-8
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----	3/4 5-7
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B 3/4 4-4	B 3/4 4-4
----	B 3/4 4-4a
----	B 3/4 4-4b
----	B 3/4 4-4c
----	B 3/4 4-4d
----	B 3/4 4-4e
----	B 3/4 4-4f
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(Proposed Wording)

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LEAKAGE

1.14 LEAKAGE shall be:

a. Identified LEAKAGE

1. LEAKAGE, such as that from pump seals or valve packing (except reactor coolant pump seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank;
2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be Pressure Boundary LEAKAGE, or
3. Reactor coolant system LEAKAGE through a steam generator to the secondary system.

b. Unidentified LEAKAGE

Unidentified LEAKAGE shall be all LEAKAGE (except reactor coolant pump seal water injection or leakoff) that is not Identified LEAKAGE.

c. Pressure Boundary LEAKAGE

Pressure Boundary LEAKAGE shall be LEAKAGE (except steam generator tube LEAKAGE) through a nonisolable fault in a Reactor Coolant System component body, pipe wall or vessel wall.

1.15 THROUGH 1.17 (DELETED)

QUADRANT POWER TILT RATIO

1.18 QUADRANT POWER TILT RATIO shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater. With one (1) excore detector inoperable, the remaining three (3) detectors shall be used for computing the average.

DOSE EQUIVALENT I-131

1.19 DOSE EQUIVALENT I-131 shall be that concentration of I-131 ($\mu\text{Ci}/\text{gram}$) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Regulatory Guide 1.109, 1977 or TID 14844.

STAGGERED TEST BASIS

1.20 A STAGGERED TEST BASIS shall consist of:

- a. A test schedule for n systems, subsystems, trains or other designated components obtained by dividing the specified test interval into n equal subintervals;
- b. The testing of one (1) system, subsystem, train or other designated component at the beginning of each subinterval.

FREQUENCY NOTATION

1.21 The FREQUENCY NOTATION specified for the performance of Surveillance Requirements shall correspond to the intervals defined in Table 1.2.

REACTOR TRIP SYSTEM RESPONSE TIME

1.22 The REACTOR TRIP SYSTEM RESPONSE TIME shall be the time interval from when the monitored parameter exceeds its trip setpoint at the channel sensor until loss of stationary gripper coil voltage.

ENGINEERED SAFETY FEATURE RESPONSE TIME

1.23 The ENGINEERED SAFETY FEATURE RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays where applicable.

AXIAL FLUX DIFFERENCE

1.24 AXIAL FLUX DIFFERENCE shall be the difference in normalized flux signals between the top and bottom halves of a two-section excore neutron detector.

PHYSICS TESTS

1.25 PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation and 1) described in Chapter 14.0 of the FSAR, 2) authorized under the provisions of 10 CFR 50.59, or 3) otherwise approved by the Commission.

\bar{E} - AVERAGE DISINTEGRATION ENERGY

1.26 \bar{E} shall be the average sum (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the average beta and gamma energies per disintegration (in MeV) for isotopes, other than iodines, with half lives greater than 15 minutes, making up at least 95% of the total non-iodine activity in the coolant.

SOURCE CHECK

1.27 A SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to a radioactive source.

PROCESS CONTROL PROGRAM

1.28 A PROCESS CONTROL PROGRAM (PCP) shall be the manual or set of operating parameters detailing the program of sampling, analysis, and evaluation by which SOLIDIFICATION of wet radioactive wastes is assured. Requirements of the PCP are provided in Specification 6.14.

SOLIDIFICATION

1.29 SOLIDIFICATION shall be the conversion of wet radioactive wastes into a form that meets shipping and burial ground requirements.

OFFSITE DOSE CALCULATION MANUAL (ODCM)

1.30 An OFFSITE DOSE CALCULATION MANUAL (ODCM) shall be a manual containing the methodology and parameters to be used in the calculation of offsite doses due to radioactive gaseous and liquid effluents and in the calculation of gaseous and liquid effluent monitoring instrumentation alarm/trip setpoints. Requirements of the ODCM are provided in Specification 6.15.

GASEOUS RADWASTE TREATMENT SYSTEM

1.31 A GASEOUS RADWASTE TREATMENT SYSTEM is any system designed and installed to reduce radioactive gaseous effluents by collecting primary coolant system offgases from the primary system and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

VENTILATION EXHAUST TREATMENT SYSTEM

1.32 VENTILATION EXHAUST TREATMENT SYSTEM is any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal adsorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to the release to the environment (such a system is not considered to have any effect on noble gas effluents). Engineered Safety Feature (ESF) atmospheric cleanup systems are not considered to be VENTILATION EXHAUST TREATMENT SYSTEM components.

PURGE-PURGING

1.33 PURGE or PURGING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating conditions, in such a manner that replacement air or gas is required to purify the confinement.

VENTING

1.34 VENTING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating conditions, in such a manner that replacement air or gas is not provided or required during VENTING. Vent, used in system names, does not imply a VENTING process.

MAJOR CHANGES

1.35 MAJOR CHANGES to radioactive waste systems, as addressed in Paragraph 6.16.2, (liquid, gaseous and solid) shall include the following:

- 1) Major changes in process equipment, components, structures, and effluent monitoring instrumentation from those described in the Final Safety Analysis Report (FSAR) or the Hazards Summary Report and evaluated in the

MAJOR CHANGES (Continued)

- staff's Safety Evaluation Report (SER) (e.g., deletion of evaporators and installation of demineralizers; use of fluidized bed calciner/incineration in place of cement solidification systems);
- 2) Major changes in the design of radwaste treatment systems (liquid, gaseous, and solid) that could significantly increase the quantities or activity of effluents released or volumes of solid waste stored or shipped offsite from those previously considered in the FSAR and SER (e.g., use of asphalt system in place of cement);
 - 3) Changes in system design which may invalidate the accident analysis as described in the SER (e.g., changes in tank capacity that would alter the curies released); and
 - 4) Changes in system design that could potentially result in a significant increase in occupational exposure of operating personnel (e.g., use of temporary equipment without adequate shielding provisions).

MEMBER(S) OF THE PUBLIC

1.36 MEMBER(S) OF THE PUBLIC shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors, or its vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries and persons who traverse portions of the site as the consequence of a public highway, railway, or waterway located within the confines of the site boundary. This category does include persons who use portions of the site for recreational, occupational, or other purposes not associated with the plant.

CORE OPERATING LIMITS REPORT

1.37 The CORE OPERATING LIMITS REPORT (COLR) is the unit-specific document that provides core operating limits for the current operating reload cycle. These cycle-specific core operating limits shall be determined for each reload cycle in accordance with Specification 6.9.1.14. Plant operation within these operating limits is addressed in individual specifications.

TABLE 1.1
OPERATIONAL MODES

<u>MODE</u>	<u>REACTIVITY CONDITION, K_{eff}</u>	<u>% RATED THERMAL POWER*</u>	<u>AVERAGE COOLANT TEMPERATURE</u>
1. POWER OPERATION	≥ 0.99	$> 5\%$	$\geq 350^\circ\text{F}$
2. STARTUP	≥ 0.99	$\leq 5\%$	$\geq 350^\circ\text{F}$
3. HOT STANDBY	< 0.99	0	$\geq 350^\circ\text{F}$
4. HOT SHUTDOWN	< 0.99	0	$350^\circ\text{F} > T_{avg}$ $> 200^\circ\text{F}$
5. COLD SHUTDOWN	< 0.99	0	$\leq 200^\circ\text{F}$
6. REFUELING**	≤ 0.95	0	$\leq 140^\circ\text{F}$

* Excluding decay heat.

**Reactor vessel head unbolted or removed and fuel in the vessel.

TABLE 1.2
FREQUENCY NOTATION

<u>NOTATION</u>	<u>FREQUENCY</u>
S	At least once per 12 hours.
D	At least once per 24 hours.
W	At least once per 7 days.
M	At least once per 31 days.
Q	At least once per 92 days.
SA	At least once per 184 days.
R	At least once per 18 months.
S/U	Prior to each reactor startup.
P	Completed prior to each release.
N.A.	Not applicable.

REACTOR COOLANT SYSTEM

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

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

- a. One containment sump (narrow range level or discharge flow) monitor; and
- b. One containment atmosphere radioactivity monitor (gaseous or particulate).

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

- a. With the required containment sump monitor inoperable⁽¹⁾, operations may continue for up to 30 days provided that a Reactor Coolant System water inventory balance measurement (Specification 4.4.6.2.b) is 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.
- b. With the required containment atmosphere radioactivity monitor inoperable⁽¹⁾, operations may continue for up to 30 days provided:
 1. Grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours, or
 2. A Reactor Coolant System water inventory balance measurement (Specification 4.4.6.2.b) is 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.

(1) The provisions of Specification 3.0.4 are not applicable.

REACTOR COOLANT SYSTEM

LIMITING CONDITION FOR OPERATION (Continued)

- c. With the required containment sump monitor and the containment atmosphere radioactivity monitor inoperable, 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 instrumentation shall be demonstrated OPERABLE by:
 - a. Performance of a CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST of the required containment atmosphere radioactivity monitor at the frequencies specified in Table 4.3-3.
 - b. Performance of a CHANNEL CALIBRATION of the required containment sump monitor at least once per 18 months.

REACTOR COOLANT SYSTEM

OPERATIONAL LEAKAGE

LIMITING CONDITION FOR OPERATION

3.4.6.2 Reactor Coolant System operational LEAKAGE shall be limited to:

- a. No pressure boundary LEAKAGE,
- b. 1 gpm unidentified LEAKAGE,
- c. 1 gpm total primary to secondary LEAKAGE through all steam generators,
- d. 500 gallons per day primary to secondary LEAKAGE through any one steam generator, and
- e. 10 gpm identified LEAKAGE.

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

ACTION:

- a. With any pressure boundary LEAKAGE, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the next 30 hours.
- b. With any Reactor Coolant System LEAKAGE greater than any one of the above limits, excluding pressure boundary LEAKAGE, reduce the LEAKAGE rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.4.6.2 Reactor Coolant System LEAKAGES shall be demonstrated to be within each of the above limits by:

- a. Monitoring the following leakage detection instrumentation at least once per 12 hours:⁽¹⁾
 - 1. Containment atmosphere gaseous radioactivity monitor.

(1) Only on leakage detection instrumentation required by LCO 3.4.6.1.

REACTOR COOLANT SYSTEM

OPERATIONAL LEAKAGE

SURVEILLANCE REQUIREMENTS (Continued)

2. Containment atmosphere particulate radioactivity monitor.
 3. Containment sump discharge flow monitor.
 4. Containment sump narrow range level monitor.
- b. Performance of a Reactor Coolant System water inventory balance at least once per 72 hours during steady state operation. (2)

(2) Not required to be performed in MODE 3 or 4 until 12 hours of steady state operation.

EMERGENCY CORE COOLING SYSTEMS

3/4.5.4 SEAL INJECTION FLOW

LIMITING CONDITION FOR OPERATION

3.5.4 Reactor coolant pump seal injection flow shall be less than or equal to 28 gpm with the charging pump discharge pressure greater than or equal to 2410 psig and the seal injection flow control valve full open.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

- a. With the seal injection flow not within the limit, adjust manual seal injection throttle valves to give a flow within the limit with the charging pump discharge pressure greater than or equal to 2410 psig and the seal injection flow control valve full open within 4 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.4 Verify at least once per 31 days that the valves are adjusted to give a flow within the limit with the charging pump discharge at greater than or equal to 2410 psig and the seal injection flow control valve full open. (1)

(1) Not required to be performed until 4 hours after the Reactor Coolant System pressure stabilizes at greater than or equal to 2215 psig and less than or equal to 2255 psig.

REACTOR COOLANT SYSTEMBASES3/4.4.5 STEAM GENERATORS (Continued)

decay heat removal capabilities for RCS temperatures greater than 350°F if one steam generator becomes inoperable due to single failure considerations. Below 350°F, decay heat is removed by the RHR system.

The Surveillance Requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on a modification of Regulatory Guide 1.83, Revision 1. Inservice inspection of steam generator tubing is essential in order to maintain surveillance of the conditions of the tubes in the event that there is evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or inservice conditions that lead to corrosion. Inservice inspection of steam generator tubing also provides a means of characterizing the nature and cause of any tube degradation so that corrective measures can be taken.

The plant is expected to be operated in a manner such that the secondary coolant will be maintained within those parameter limits found to result in negligible corrosion of the steam generator tubes. If the secondary coolant chemistry is not maintained within these parameter 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 = 500 gallons per day per steam generator). 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 500 gallons per day per steam generator can readily be detected by radiation monitors of steam generator blowdown. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged.

Wastage-type defects are unlikely with the all volatile treatment (AVT) of secondary coolant. However, even if a defect of similar type should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging or repair will be required of all tubes with imperfections exceeding the plugging or repair limit. Degraded steam generator tubes may be

REACTOR COOLANT SYSTEMBASES

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATIONBACKGROUND

GDC 30 of Appendix A to 10 CFR 50 requires means for detecting and, to the extent practical, identifying the source of RCS LEAKAGE. Regulatory Guide 1.45 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 non-ECCS portion of the containment sump used to collect unidentified LEAKAGE is instrumented to alarm due to abnormal increases in water inventory. The 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. 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.

REACTOR COOLANT SYSTEMBASES

3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATION (Continued)BACKGROUND (Continued)

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements 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 sensors is necessary. 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.

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.

REACTOR COOLANT SYSTEMBASES

3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATION (Continued)LCO (Continued)

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with a gaseous or particulate radioactivity monitor, provides an acceptable minimum. The containment sump monitor is comprised of the instruments associated with the non-ECCS portion of the containment sump which monitor narrow range level and sump pump discharge flow.

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

ACTIONS

- a. With the required containment sump monitor inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere radioactivity monitoring system will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 4.4.6.2.b, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage.

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

REACTOR COOLANT SYSTEMBASES3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATION (Continued)ACTIONS (Continued)

Required 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.

b.1. and b.2.

With both gaseous and particulate containment atmosphere radioactivity monitoring instrumentation channels inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or water inventory balances, in accordance with SR. 4.4.6.2.b, must be performed to provide alternate periodic information.

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

The 24 hour interval provides periodic information that is adequate to detect leakage. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

Required 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 channel is inoperable. This allowance is provided because other instrumentation is available to monitor for RCS LEAKAGE.

- c. With all required monitors inoperable, no automatic means of monitoring leakage are available, and immediate plant shutdown is required. 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 condition from full power conditions in an orderly manner and without challenging plant systems.

REACTOR COOLANT SYSTEMBASES

3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATION (Continued)SURVEILLANCE REQUIREMENTS (SR)SR 4.4.6.1.a

SR 4.4.6.1.a requires the performance of a CHANNEL CHECK of the required containment atmosphere radioactivity monitor. The check gives reasonable confidence that the channel is operating properly. The Frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

SR 4.4.6.1.a requires the performance of a CHANNEL FUNCTIONAL TEST on the required containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The Frequency of 31 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.

SR 4.4.6.1.a also requires the performance of a CHANNEL CALIBRATION on the required containment atmosphere radioactivity monitor. 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.

SR 4.4.6.1.b

SR 4.4.6.1.b requires the performance of a CHANNEL CALIBRATION on the required containment sump monitor. 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.

3/4.4.6.2 OPERATIONAL LEAKAGEBACKGROUND

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.

REACTOR COOLANT SYSTEMBASES3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)BACKGROUND (Continued)

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, 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 percent leaktight. 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).

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 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 a 1 gpm primary to secondary LEAKAGE as the initial condition.

REACTOR COOLANT SYSTEMBASES3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)APPLICABLE SAFETY ANALYSES (Continued)

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 SLB is more limiting for site radiation releases. The safety analysis for the SLB accident assumes 1 gpm primary to secondary LEAKAGE. The dose consequences resulting from the SLB accident are well within the limits defined in 10 CFR 100 or the staff approved licensing basis (i.e., a small fraction of these limits).

LCO

RCS 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 RCPB. LEAKAGE past seals and gaskets is not pressure boundary LEAKAGE. Should pressure boundary LEAKAGE occur through a component which can be isolated from the balance of the Reactor Coolant System, plant operation may continue provided the leaking component is promptly isolated from the Reactor Coolant System since isolation removes the source of potential failure.

b. Unidentified LEAKAGE

One gallon per minute (gpm) of unidentified 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 RCPB, if the LEAKAGE is from the pressure boundary.

REACTOR COOLANT SYSTEMBASES3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)LCO (Continued)c. Primary to Secondary LEAKAGE through All Steam Generators (SGs)

Total primary to secondary LEAKAGE amounting to 1 gpm through all SGs produces acceptable offsite doses in the SLB accident analysis. Violation of this LCO could exceed the offsite dose limits for this accident. Primary to secondary LEAKAGE must be included in the total allowable limit for identified LEAKAGE.

d. Primary to Secondary LEAKAGE through Any One SG

The 500 gallons per day limit on one SG is based on the assumption that a single crack leaking this amount would not propagate to a SGTR under the stress conditions of a LOCA or a main steam line rupture. If leaked through many cracks, the cracks are very small, and the above assumption is conservative.

e. 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 identified LEAKAGE and is well within the capability of the RCS Makeup System. Identified LEAKAGE includes LEAKAGE to the containment from specifically known and located sources, but does not include pressure boundary LEAKAGE or controlled reactor coolant pump (RCP) seal leakoff (a normal function not considered LEAKAGE). Violation of this LCO could result in continued degradation of a component or system.

APPLICABILITY

In MODES 1, 2, 3, and 4, the potential for RCPB LEAKAGE is greatest when the RCS 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.

REACTOR COOLANT SYSTEMBASES3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)APPLICABILITY (Continued)

LCO 3.4.6.2, "RCS Pressure Isolation Valve (PIV)," measures leakage through each individual PIV and can impact this LCO. Of the two PIVs in series in each isolated line, leakage measured through one PIV does not result in RCS LEAKAGE when the other is leak tight. If both valves leak and result in a loss of mass from the RCS, the loss must be included in the allowable identified LEAKAGE.

ACTIONS

- a. If any pressure boundary LEAKAGE exists, the reactor must be brought to lower pressure conditions to reduce the severity of the LEAKAGE and its potential consequences. It should be noted that LEAKAGE past seals and gaskets is not pressure boundary LEAKAGE. The reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 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 RCPB are much lower, and further deterioration is much less likely.

- b. Unidentified LEAKAGE, identified LEAKAGE, or primary to secondary LEAKAGE in excess of the LCO limits must be reduced to within limits within 4 hours. This Completion Time 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 RCPB. If the unidentified LEAKAGE, identified LEAKAGE, or primary to secondary LEAKAGE cannot be reduced to within limits within 4 hours, the reactor must be brought to lower pressure conditions to reduce the severity of the LEAKAGE and its potential consequences. The reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 hours. This action reduces the LEAKAGE.

REACTOR COOLANT SYSTEMBASES

3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)ACTIONS (Continued)

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 RCPB are much lower, and further deterioration is much less likely.

SURVEILLANCE REQUIREMENTS (SR)SR 4.4.6.2

Verifying RCS LEAKAGE to be within the LCO limits ensures the integrity of the RCPB 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 an RCS water inventory balance. Primary to secondary LEAKAGE is also measured by performance of an RCS water inventory balance in conjunction with effluent monitoring within the secondary steam and feedwater systems.

The RCS water inventory balance must be met with the reactor at steady state operating conditions and near operating pressure. Therefore, this SR is not required to be performed in MODES 3 and 4 until 12 hours of steady state operation near operating pressure have been established.

Steady state operation is required to perform a proper inventory balance; calculations during maneuvering are not useful and a Note requires the Surveillance to be met when steady state is established. 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 RCP seal injection and return flows.

An early warning of pressure boundary LEAKAGE or unidentified LEAKAGE is provided by the systems that monitor the containment atmosphere radioactivity and the containment sump level. The 12 hour monitoring of the leakage detection system is sufficient to provide an early warning of increased RCS LEAKAGE. These leakage detection systems are specified in LCO 3.4.6.1, "Leakage Detection Instrumentation."

REACTOR COOLANT SYSTEMBASES

3/4.4.6.2 OPERATIONAL LEAKAGE (Continued)SURVEILLANCE REQUIREMENTS (SR) (Continued)

The 72 hour Frequency is a reasonable interval to trend LEAKAGE and recognizes the importance of early leakage detection in the prevention of accidents. Note (1) states that the 12 hour surveillance is required only on leakage detection instrumentation required by LCO 3.4.6.1. This Note allows the 12 hour monitoring to be suspended on leakage detection instrumentation which is inoperable or not required to be operable per LCO 3.4.6.1. Note (2) states that this SR is required to be performed during steady state operation.

3/4.4.6.3 PRESSURE ISOLATION VALVE LEAKAGE

The leakage from any RCS pressure isolation valve is sufficiently low to ensure early detection of possible in-series valve failure. It is apparent that when pressure isolation is provided by two in-series valves and when failure of one valve in the pair can go undetected for a substantial length of time, verification of valve integrity is required. Since these valves are important in preventing overpressurization and rupture of the ECCS low pressure piping which could result in a LOCA, these valves should be tested periodically to ensure low probability of gross failure.

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 valve is identified LEAKAGE and will be considered as a portion of the allowed limit.

REACTOR COOLANT SYSTEMBASES

3/4.4.7 CHEMISTRY

The limitations on Reactor Coolant System chemistry ensure that corrosion of the Reactor Coolant System is minimized and reduces the potential for Reactor Coolant System leakage or failure due to stress corrosion. Maintaining the chemistry within the Steady State Limits provides adequate corrosion protection to ensure the structural integrity of the Reactor Coolant System over the life of the plant. The associated effects of exceeding the oxygen, chloride and fluoride limits are time and temperature dependent. Corrosion studies show that operation may be continued with contaminant concentration levels in excess of the Steady State Limits, up to the Transient Limits, for the specified limited time intervals without having a significant effect on the structural integrity of the Reactor Coolant System. The time interval permitting continued operation within the restrictions of the Transient Limits provides time for taking corrective actions to restore the contaminant concentrations to within the Steady State Limits.

The surveillance requirements provide adequate assurance that concentrations in excess of the limits will be detected in sufficient time to take corrective action.

3/4.4.8 SPECIFIC ACTIVITY

The limitations on the specific activity of the primary coolant ensure that the resulting 2 hour doses at the site boundary will not exceed an appropriately small fraction of 10 CFR Part 100 limits following a steam generator tube rupture accident in conjunction with an assumed steady state primary-to-secondary steam generator leak rate of 1.0 GPM.

The ACTION statement permitting POWER OPERATION to continue for limited time periods with the primary coolant's specific activity > 1.0 $\mu\text{Ci/gram}$ DOSE EQUIVALENT I-131, but within the allowable limit shown on Figure 3.4-1, accommodates possible iodine spiking phenomenon which may occur following changes in THERMAL POWER. Operation with specific activity levels exceeding 1.0 $\mu\text{Ci/gram}$ DOSE EQUIVALENT I-131 for more than 48 hours during one continuous time interval

EMERGENCY CORE COOLING SYSTEMSBASES

3/4.5.4 SEAL INJECTION FLOWBACKGROUND

The function of the seal injection throttle valves during an accident is similar to the function of the Emergency Core Cooling Systems (ECCS) throttle valves in that each restricts flow from the charging pump header to the Reactor Coolant Systems (RCS).

The restriction on reactor coolant pump (RCP) seal injection flow limits the amount of ECCS flow that would be diverted from the injection path following an accident. This limit is based on safety analysis assumptions that are required because RCP seal injection flow is not isolated during SI.

APPLICABLE SAFETY ANALYSES

All ECCS subsystems are taken credit for in the large break loss of coolant accident (LOCA) at full power. The LOCA analysis establishes the minimum flow for the ECCS pumps. The charging pumps are also credited in the small break LOCA analysis. This analysis establishes the flow and discharge head at the design point for the charging pumps. The steam generator tube rupture and main steam line break event analyses also credit the charging pumps, but are not limiting in their design. Reference to these analyses is made in assessing changes to the Seal Injection System for evaluation of their effects in relation to the acceptance limits in these analyses.

This LCO ensures that seal injection flow of less than or equal to 28 gpm, with charging pump discharge pressure greater than or equal to 2410 psig and seal injection flow control valve full open, will be sufficient for RCP seal integrity but limited so that the ECCS trains will be capable of delivering sufficient water to match boiloff rates soon enough to minimize uncovering of the core following a large LOCA. It also ensures that the charging pumps will deliver sufficient water for a small LOCA and sufficient boron to maintain the core subcritical. For smaller LOCAs, the charging pumps alone deliver sufficient fluid to overcome the loss and maintain RCS inventory.

EMERGENCY CORE COOLING SYSTEMSBASES

3/4.5.4 SEAL INJECTION FLOW (Continued)LCO

The intent of the LCO limit on seal injection flow is to make sure that flow through the RCP seal water injection line is low enough to ensure that charging pump injection flow is directed to the RCS via the injection points in accordance with the requirements of 10 CFR 50.46.

The LCO is not strictly a flow limit, but rather a flow limit based on a flow line resistance. In order to establish the proper flow line resistance, a pressure and flow must be known. The flow line resistance is determined by assuming that the RCS pressure is at normal operating pressure and that the charging pump discharge pressure is greater than or equal to the value specified in this LCO. The charging pump discharge pressure remains essentially constant through all the applicable MODES of this LCO. A reduction in RCS pressure would result in more flow being diverted to the RCP seal injection line than at normal operating pressure. The valve settings established at the prescribed charging pump discharge pressure result in a conservative valve position should RCS pressure decrease. The additional modifier of this LCO, the air operated seal injection control valve being full open, is required since the valve is designed to fail open for the accident condition. With the discharge pressure and control valve position as specified by the LCO, a flow limit is established. It is this flow limit that is used in the accident analyses.

The limit on seal injection flow, combined with the charging pump discharge pressure limit and an open wide condition of the seal injection flow control valve, must be met to render the ECCS OPERABLE. If these conditions are not met, the ECCS flow will not be as assumed in the accident analyses.

APPLICABILITY

In MODES 1, 2, and 3, the seal injection flow limit is dictated by ECCS flow requirements, which are specified for MODES 1, 2, 3, and 4. The seal injection flow limit is not applicable for MODE 4 and lower because high seal injection flow is less critical as a result of the lower initial RCS pressure and decay heat removal requirements in these MODES. Therefore, RCP seal injection flow must be limited in MODES 1, 2, and 3 to ensure adequate ECCS performance.

EMERGENCY CORE COOLING SYSTEMSBASES

3/4.5.4 SEAL INJECTION FLOW (Continued)ACTIONS

- a. With seal injection flow exceeding its limit, the amount of charging flow available to the RCS may be reduced. Under this Condition, action must be taken to restore the flow to below its limit. The operator has 4 hours from the time the flow is known to be above the limit to correctly position the manual valves and thus be in compliance with the accident analysis. The Completion Time minimizes the potential exposure of the plant to a LOCA with insufficient injection flow and ensures that seal injection flow is restored to or below its limit. This time is conservative with respect to the Completion Times of other ECCS LCOs; it is based on operating experience and is sufficient for taking corrective actions by operations personnel.

When the Required Actions cannot be completed within the required Completion Time, a controlled shutdown must be initiated. The Completion Time of 6 hours for reaching MODE 3 from MODE 1 is a reasonable time for a controlled shutdown, based on operating experience and normal cooldown rates, and does not challenge plant safety systems or operators. Continuing the plant shutdown begun in this Required Action, an additional 6 hours is a reasonable time, based on operating experience and normal cooldown rates, to reach MODE 4, where this LCO is no longer applicable.

SURVEILLANCE REQUIREMENTS (SR)SR 3.5.4.1

Verification every 31 days that the manual seal injection throttle valves are adjusted to give a flow within the limit ensures that proper manual seal injection throttle valve position, and hence, proper seal injection flow, is maintained. The Frequency of 31 days is based on engineering judgment and is consistent with other ECCS valve Surveillance Frequencies. The Frequency has proven to be acceptable through operating experience.

As noted, the Surveillance is not required to be performed until 4 hours after the RCS pressure has stabilized within a ± 20 psig range of normal operating pressure. The RCS pressure requirement is specified since this configuration will produce the required pressure conditions necessary to assure that the manual valves are set correctly. The exception is limited to 4 hours to ensure that the Surveillance is timely.