3/4.3.1 and 3/4.3.2 REACTOR TRIP SYSTEM AND ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION (Continued)

The Engineered Safety Feature Actuation System interlocks perform the following functions:

P-4 Reactor tripped - Actuates turbine trip, closes main feedwater valves on T_{avg} below setpoint, prevents the opening of the main feedwater valves which were closed by a safety injection or high steam generator water level signal, allows safety injection block so that components can be reset or tripped.

Reactor not tripped - prevents manual block of safety injection.

P-11 Above the setpoint, P-11 automatically reinstates safety injection actuation on low pressurizer pressure, automatically blocks steamline isolation on high steam pressure rate, and enables safety injection and steamline isolation (with Loop Stop Valve Open) on low steamline pressure. Below the setpoint, P-11 allows the manual block of safety injection actuation on low pressurizer pressure, allows manual block of safety injection and steamline isolation (with Loop Stop Valve Open) on Low steamline pressure and enables steamline isolation on high steam pressure rate.

P-12 Above the setpoint, P-12 automatically reinstates an arming signal to the steam dump system. Below the setpoint P-12 blocks steam dump and allows manual bypass of the steam dump block to cooldown condenser dump valves.

INSERT 5

(Proposed wording)

9410270184 941011
PDR ADOCK 05000334
P PDR

INSERT 5

Table 3.3-1 Action 2 has been modified by two notes. Note (3) allows placing the inoperable channel in the bypass condition for up to 4 hours while performing: a) routine surveillance testing of other channels, and b) setpoint adjustments of other channels when required to reduce the setpoint in accordance with other technical specifications. The 4 hour time limit is justified in accordance with WCAP-10271-P-A, Supplement 2, Revision 1, June 1990. Note (4) only requires SR 4.2.4.b to be performed if a Power Range High Neutron Flux channel input to QPTR becomes inoperable. Failure of a component in the Power Range High Neutron Flux channel which renders the High Neutron Flux trip function inoperable may not affect the capability to monitor QPTR. As such, determining QPTR using the movable incore detectors once per 12 hours may not be necessary.

ATTACHMENT B
Beaver Valley Power Station, Unit Nos. 1 and 2
Proposed Technical Specification Change No. 212 and 78
QUADRANT POWER TILT RATIO

A. DESCRIPTION OF AMENDMENT REQUEST

The proposed amendment would generally incorporate the Improved Standard Technical Specification (ISTS) guidance of NUREG-1431 into the definition of quadrant power tilt ratio (QPTR), Specification 3.2.4, "Quadrant Power Tilt Ratio," QPTR, associated Bases 3/4.2.4, Table 3.3-1 Action 2, and associated Bases 3/4.3.1 and 3/4.3.2.

Attachment D provides a comparison between the above specifications and the modified specifications which generally incorporate the requirements of NUREG-1431 in the current Beaver Valley format.

B. BACKGROUND

There have been various operability and surveillance test questions by plant personnel regarding the QPTR requirements. Therefore, to provide improved understanding and guidance, the QPTR specification and related requirements have been modified by incorporating the ISTS enhancements addressed in NUREG-1431. Additionally, the use of the excore detectors is being clarified for the condition when a nuclear instrumentation system power range instrument is inoperable. This is consistent with an understanding reached regarding these instruments and documented in NRC Inspection Reports 50-334/93-16 and 50-412/93-17.

C. JUSTIFICATION

Definition 1.18, "Quadrant Power Tilt Ratio," currently includes a sentence that allows determination of the QPTR with three operable excore detectors when one is inoperable. This is inconsistent with existing Surveillance Requirement (SR) 4.2.4.c which requires using the incore movable detectors to determine the QPTR when one power range channel is inoperable and reactor power is greater than 75 percent. NUREG-1431 removes this inconsistency and provides revised wording to improve the action statements and SRs to reduce the potential for confusion related to channel operability and required testing. In addition, clarification has been added on the ability of the excore detectors to provide QPTR monitoring, assuming the detectors are operable, as compared to considering the excore detector inoperable because a nuclear instrumentation system (NIS) power range channel has been declared inoperable. This is consistent with the definition of QPTR, where use of the excore detectors are clearly the instruments intended to be used for determining the QPTR. An NIS channel may be declared inoperable while the excore detector remains operable and capable of satisfying Specification 3.2.4. As a result of the change to SR 4.2.4, Table 3.3-1 Action Statement 2 has also been modified to provide the options available in NUREG-1431 for monitoring the QPTR.

D. SAFETY ANALYSIS

The last sentence of the current QPTR definition allows the use of three operable excore detector channels to determine the QPTR when one excore channel is inoperable. This is inconsistent with existing SR 4.2.4.c since no reactor power limitations were addressed in the QPTR definition. SR 4.2.4.c requires determination of the QPTR using the movable detectors when power is greater than 75 percent. The QPTR definition and Specification 4.2.4 have been modified to eliminate this inconsistency by removing the last sentence from the current QPTR definition and incorporating the ISTS wording into SR 4.2.4. Clarification of the ISTS wording has been added to eliminate potential interpretation issues. A power range channel is made-up of two separate portions including the nuclear instrumentation system (NIS) and the excore detector portion. Use of "power range high neutron flux channel input to QPTR" in place of "power range channel" accurately reflects the QPTR definition and avoids the confusion of having an inoperable power range channel when the excore detector has been verified operable and can be used to determine the QPTR. The ISTS wording also involves some editorial changes to the definition where the title now includes the abbreviation "(QPTR)" and the "QUADRANT POWER TILT RATIO" words in the definition text are replaced by this abbreviation. The modified SR 4.2.4.a is consistent with the current surveillance which requires verification that the QPTR is within the limit by calculation at least once per 7 days when the QPTR alarm is operable. This frequency is based on the low probability that this alarm will not be detected if it were to become inoperable. With the QPTR alarm inoperable, the current surveillance increases the frequency to "once per 12 hours" whereas the proposed surveillance states the frequency as "within 12 hours and every 12 hours thereafter" which does not change the intent of this SR. This modified frequency is based on the adequacy of detecting relatively slow changes in QPTR, since for events that cause rapid changes in QPTR other means are available to prompt verification of this parameter. This calculation is clarified by note (2) which allows determination of the QPTR with one "power range high neutron flux channel input to QPTR" inoperable by using the three operable "power range high neutron flux channels" when power is less than 75 percent. SR 4.2.4.b requires verification that the QPTR is within the limit by using the movable incore detectors within 12 hours and every 12 hours thereafter. Large tilts should be detected with the remaining operable "power range high neutron flux channels," however, the ability to detect small tilts in the same quadrants is decreased. This frequency provides an accurate alternative means to verify that any tilt remains within the limit. This verification is clarified by note (3) which states that this SR is only required if less than four "power range high neutron flux channels input to QPTR" are operable and reactor power is greater than or equal to 75 percent. Reactor protection functions associated with the NIS are provided by a power range channel. If an excore detector portion of a power range channel is inoperable, then the power range channel is inoperable since the detector provides input to the NIS which inputs to the solid state protection system (SSPS). However, if the excore detector is operable and the NIS is inoperable, then the power range channel is inoperable but the ability to monitor the QPTR is unaffected. If the NIS portion of a channel is inoperable, appropriate actions are applied in accordance with Specification 3.3.1. Therefore, applying these requirements to the "power range high neutron flux channels" eliminates potential interpretation problems associated with equipment required to be operable and is consistent with the plant design for monitoring the QPTR. The revised SRs clearly state what is required, when and under what conditions the testing is performed. This improves the clarity and understanding of the requirements while ensuring adequate surveillance testing is performed for monitoring the condition of the core.

In addition, the Specification 3.2.4 Title, Limiting Condition for Operation (LCO), Applicability and Action requirements have also been modified. An editorial change to the Title includes adding the abbreviation "(QPTR)," thus eliminating the need to write out the words throughout this specification. The editorial change to the LCO wording replaces "not exceed" with "be less than or equal to" which does not change the intent of the LCO and continues to limit the maximum QPTR to 1.02 which is consistent with other LCOs which specify a limiting value. An editorial change to the Applicability statement replaces "above 50%" with "greater than 50 percent" which is consistent with other specification wording and does not change the affected mode or power level. Another editorial change to the Applicability statement replaces the * note referring to Special Test Exception 3.10.2 with a (1) for consistency with current convention.

The new action statements apply with the QPTR greater than 1.02 and provide a clear and logical progression for power reduction along with a requirement to verify that peaking factors are within the limits. The proposed action statements allow continued operation at higher power levels and do not require a reduction in the power range neutron flux-high trip setpoint. However, the new actions require peaking factor surveillances to verify the continued safe condition of the core. The current 1.09 limit is not necessary since the 1.02 limit will be reached first and the action statements already in progress will address the tilt. The QPTR is an online core tilt monitor, which provides early warning of a condition which may imply problems with power distribution peaking factors. Therefore, when the QPTR exceeds 1.02, the most appropriate action is to investigate the reason for the core tilt by performing a flux map to measure the peaking factors. Performance of a flux map and the calculation of power distribution peaking factors is the principle means of identifying the cause of the tilt. However, a requirement has been added to evaluate the accident analyses if the QPTR remains outside of its limit. Although power reductions, setpoint reductions, and the measurement of core peaking factors will likely compensate for the impact of the tilt and determine its cause, other accident parameters are also a function of the power distribution. This evaluation should confirm the acceptability for continued operation at full power with the actual core tilt outside its limit. The purpose of this specification is to have a means of knowing if the gross radial power distribution of the core has changed. The QPTR provides an estimate of what could be happening to the core power distribution, although an incore map is required in order to determine if there exists a real tilt in the core power distribution. Zeroing out the tilt allows the QPTR monitor to detect changes from the tilted, but acceptable, condition.

Proposed Actions "a" and "b" have been modified in accordance with a Westinghouse Owners Group change provided to the NRC on September 21, 1993. The intent of ISTS Required Action "A.1" is to reduce power in 2 hours and to reverify QPTR every 12 hours. This is consistent with the Bases discussion, however, as written, the action implies that power should be reduced in 2 hours and reduced again in 12 hours. To correct this discrepancy, Actions "a" and "b" have been developed to clarify the separate requirements.

Proposed Action "a" requires a power reduction within 2 hours by 3 percent from rated thermal power for each 1 percent the QPTR exceeds 1.00. The 3 to 1 power reduction provides a conservative trade-off of total core power with peak linear power. The 2 hours provides sufficient time to identify the cause and correct the tilt.

Proposed Action "b" requires the performance of Surveillance Requirement 4.2.4 within 12 hours and again once per 12 hours thereafter with a power reduction by 3 percent from rated thermal power for each 1 percent the QPTR exceeds 1.00. Additional changes in the QPTR would be relatively slow, therefore, a check of the QPTR and subsequent additional power reduction can be performed on a 12 hour frequency.

Proposed Action "c" requires verification that the peaking factors, in accordance with SRs 4.2.2.2 and 4.2.3.1, are within the limits within 24 hours and again every 7 days with the QPTR exceeding the limit. The 24 hour frequency provides time to stabilize the plant and perform the required flux map. The 7 day frequency is based on the relatively small changes in the peaking factors due to either burnup and xenon redistribution or correction of the cause of the tilt condition.

Proposed Action "d" requires confirmation that the reactor core conditions are consistent with the assumptions in the safety analyses prior to increasing power above the limit in Action "a" or "b." This involves evaluating the core peaking factors and the quadrant tilt because they are the parameters that best characterize the core power distribution.

Proposed Action "e" is performed after Action "d" is complete and requires excore detector normalization to show a QPTR less than or equal to 1.02 prior to increasing power above the limit in Action "a" or "b." This is done to detect any subsequent significant changes in QPTR. This is slightly different from the ISTS which specifies recalibrating the excore detectors to a zero QPTR. However, the modified wording is more consistent with the operation of the plant since the QPTR is always greater than or equal to 1.00. The excore detectors cannot be calibrated to show a zero QPTR, therefore, the wording was modified to be consistent with the LCO.

Proposed Action "f" is performed after Action "e" is complete and requires verification that the peaking factors are within the limits within 24 hours after reaching full power or within 48 hours after increasing power above the limit in Action "a" or "b," if power is increased slowly. Verification of the peaking factors within 24 hours of reaching full power provides an added check that the core power distribution is consistent with the safety analysis assumptions. If the core power does not reach full power within 24 hours, because power is increased slowly, then the peaking factors are verified within 48 hours of the time when the ascent to power was begun. These times allow adequate time to increase power above the limit in Action "a" or "b" without allowing core operation for extended periods of time with unconfirmed power distributions.

Proposed Action "g" removes the plant from the condition where this LCO applies and is safe since, up to 50 percent power, there is either insufficient stored energy in the fuel or insufficient energy being transferred to the reactor coolant to require implementation of a QPTR limit on core power distribution. Allowing 4 hours to reduce power to less than 50 percent provides sufficient time to reach the reduced power level without challenging plant systems.

As a result of the changes to SR 4.2.4, Table 3.3-1 Action 2 has been changed to provide various options when one power range neutron flux channel is inoperable to ensure the continued safe operation of the plant. This action is applied to Table 3.3-1 for the "High" and "Low" setpoint functions and for the "High Positive" and "High Negative" rate functions. Action 2 is qualified by Note (3) which provides the capability to bypass an inoperable channel for up to 4 hours to perform surveillance testing on the other channels and to adjust the high neutron flux channel setpoint when required by other technical specifications. Item "a" applies to an inoperable power range high neutron flux channel and requires:

1. tripping the inoperable channel within 6 hours and reducing power to less than 75 percent within the next 6 hours and performing Surveillance Requirement 4.2.4,[(4)] or

2. tripping the inoperable channel within 6 hours and performing Surveillance Requirement 4.2.4,[(4)] or

3. entering Mode 3 within 12 hours.

Option 2 above is qualified by Note (4) which is consistent with Surveillance Requirement 4.2.4 Notes (2) and (3) that specify how the QPTR is to be determined based on whether or not the power range high neutron flux channels input to QPTR are operable. Amendments 181 for Unit 1 and 61 for Unit 2 implemented a change to identify the note applicable to Action 7 as Note (4), however, as a result of the changes proposed here, this note has been changed to Note (5) to maintain consistent order. Item "b" applies to "all other channels" which includes the "Low" setpoint function and the "High Positive" and "High Negative" rate functions and requires:

1. tripping the inoperable channel within 6 hours, or

2. entering Mode 3 within 12 hours.

This will ensure surveillance testing is performed in a manner consistent with the requirements of Specification 3.2.4 when a power range channel is inoperable.

Bases 3/4.2.4, QUADRANT POWER TILT RATIO, has been revised by generally incorporating the ISTS Bases which significantly improve the content and understanding of the QPTR requirements.

Bases 3/4.3.1 and 3/4.3.2 provide the Reactor Trip and Engineered Safety Feature Actuation System basis and has been revised by incorporating a discussion of the qualification notes applied to Table 3.3-1 Action 2.

These changes are consistent with the UFSAR design description and analyses assumptions concerning verification of safe core operation. The proposed changes will ensure the core operates within the fuel design criteria and that the power distribution remains within the bounds of the safety analyses, therefore, the proposed changes are considered to be safe and will not reduce the safety of the plant.

E. NO SIGNIFICANT HAZARDS EVALUATION

The no significant hazards 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 existing QPTR definition and SR 4.2.4.c are inconsistent concerning the QPTR verification requirements. The proposed change modifies these and other related requirements to improve the understanding and consistency by generally incorporating the ISTS requirements of NUREG-1431.

   The QPTR definition has been modified by adding the abbreviation "(QPTR)" to the title and replacing the "QUADRANT POWER TILT RATIO" words in the definition text with the abbreviation. Along with these editorial changes the last sentence in the definition text "With one (1) excore detector inoperable, the remaining three (3) detectors shall be used for computing the average" has been deleted to remove the inconsistency with SR 4.2.4.c.

Specification 3.2.4 has been modified by adding the abbreviation "(QPTR)" to the title to eliminate the need to write out the words throughout this specification. The LCO has been changed by replacing "not exceed" with" be less than or equal to." This modification does not change the intent of the LCO and continues to limit the maximum QPTR to 1.02. The Applicability has been revised by replacing "above 50%" with "greater than 50 percent" which is consistent with other specification wording and does not change the affected mode or power level. The * note referring to Special Test Exception 3.10.2 has been replaced with a (1) for consistency with current convention.

The action statements have been revised to apply with the QPTR greater than 1.02 and provide a clear and logical progression for power reduction along with a requirement to verify that the peaking factors are within the limits. This is more conservative than the current action statements which do not require verification of any other core parameters.

Proposed Actions "a" and "b" have been modified in accordance with a Westinghouse Owners Group change provided to the NRC on September 21, 1993. The intent of ISTS Required Action "A.1" is to reduce power in 2 hours and to reverify QPTR every 12 hours. This is consistent with the Bases discussion, however, as written, the action implies that power should be reduced in 2 hours and reduced again in 12 hours. To correct this discrepancy, Actions "a" and "b" have been developed to clarify the separate requirements.

Action "a" requires a power reduction within 2 hours by 3 percent from rated thermal power for each 1 percent the QPTR exceeds 1.00. The 3 to 1 power reduction provides a conservative trade-off of total core power with peak linear power. The 2 hours provides sufficient time to identify the cause and correct the tilt.

Action "b" requires the performance of Surveillance Requirement 4.2.4 within 12 hours and again once per 12 hours thereafter with a power reduction by 3 percent from rated thermal power for each 1 percent the QPTR exceeds 1.00. Additional changes in the QPTR would be relatively slow, therefore, a check of the QPTR and subsequent additional power reduction can be performed on a 12 hour frequency.

Action "c" requires verification that the peaking factors, in accordance with SRs 4.2.2.2 and 4.2.3.1, are within the limits within 24 hours and again every 7 days with the QPTR exceeding the limit. The 24 hour frequency provides time to stabilize the plant and perform the required flux map. The 7 day frequency is based on the relatively small changes in the peaking factors due to either burnup and xenon redistribution or correction of the cause of the tilt condition.

Action "d" requires confirmation that the reactor core conditions are consistent with the assumptions in the safety analyses prior to increasing power above the limit in Action "a" or "b." This involves evaluating the core peaking factors and the quadrant tilt because they are the parameters that best characterize the core power distribution.

Action "e" is performed after Action "d" is complete and requires excore detector recalibration to show a zero QPTR prior to increasing power above the limit in Action "a" or "b." This is done to detect any subsequent significant changes in QPTR. This differs from the ISTS which specifies recalibrating the excore detectors to show a zero QPTR. However, the modified wording is more consistent with the operation of the plant since the QPTR is always greater than or equal to 1.00. The excore detectors cannot be calibrated to show a zero QPTR, therefore, the wording was modified to be consistent with the LCO.

Action "f" is performed after Action "e" is complete and requires verification that the peaking factors are within the limits within 24 hours after reaching full power or within 48 hours after increasing power above the limit in Action "a" or "b," if power is increased slowly. Verification of the peaking factors within 24 hours of reaching full power provides an added check that the core power distribution is consistent with the safety analysis assumptions. If the core power does not reach full power within 24 hours, because power is increased slowly, then the peaking factors are verified within 48 hours of the time when the ascent to power was begun. These times allow adequate time to increase power above the limit in Action "a" or "b" without allowing core operation for extended periods of time with unconfirmed power distributions.

Action "g" removes the plant from the condition where this LCO applies and is safe since, up to 50 percent power, there is either insufficient stored energy in the fuel or insufficient energy being transferred to the reactor coolant to require implementation of a QPTR limit on core power distribution. Allowing 4 hours to reduce power to less than 50 percent provides sufficient time to reach the reduced power level without challenging plant systems.

SR 4.2.4.a requires verification that the QPTR is within the limit by calculation at least once per 7 days when the QPTR alarm is operable. This frequency is based on the low probability that this alarm will not be detected if it were to become inoperable. The frequency is increased to within 12 hours and every 12 hours thereafter when the QPTR alarm is inoperable. This frequency is based on the adequacy of detecting relatively slow changes in QPTR, since for events that cause rapid changes in QPTR other means are available to prompt verification of this parameter. This calculation is clarified by note (2) which allows determination of the QPTR with one "power range high neutron flux channel input to QPTR" inoperable by using the three operable "power range high neutron flux channels" when power is less than 75 percent.

SR 4.2.4.b requires verification that the QPTR is within the limit by using the movable incore detectors within 12 hours and every 12 hours thereafter. Large tilts should be detected with the remaining operable "power range high neutron flux channels," however, the ability to detect small tilts in the same quadrants is decreased. This frequency provides an accurate alternative means to ensure that any tilt remains within the limit. This verification is clarified by note (3) which states that this SR is only required if less than four power range high neutron flux channels input to QPTR are operable and reactor power is greater than or equal to 75 percent. Therefore, the revised SRs clearly state what is required, when and under what conditions the testing is performed. This improves the clarity and understanding of the requirements while ensuring adequate surveillance testing is performed for monitoring the condition of the core.

Table 3.3-1 Action 2 has been changed to provide various options when one power range neutron flux channel is inoperable to ensure the continued safe operation of the plant. This action is applied to Table 3.3-1 for the "High" and "Low" setpoint functions and for the "High Positive" and "High Negative" rate functions. Action 2 is qualified by Note (3) which provides the capability to bypass an inoperable channel for up to 4 hours to perform surveillance testing on the other channels and to adjust the high neutron flux channel setpoint when required by other technical specifications. Item "a" applies to an inoperable power range high neutron flux channel and requires:

1. tripping the inoperable channel within 6 hours and reducing power to less than 75 percent within the next 6 hours and performing Surveillance Requirement 4.2.4,[4] or

2. tripping the inoperable channel within 6 hours and performing Surveillance Requirement 4.2.4,(4) or

3. entering Mode 3 within 12 hours.

Options 1 and 2 above are qualified by Note (4) which is consistent with Surveillance Requirement 4.2.4 Notes (2) and (3) that specify how the QPTR is to be determined based on whether or not the power range high neutron flux channels input to QPTR are operable. Item "b" applies to "all other channels" which includes the "Low" setpoint function and the "High Positive" and "High Negative" rate functions and requires:

1. tripping the inoperable channel within 6 hours, or

2. entering Mode 3 within 12 hours.

This will ensure surveillance testing is performed in a manner consistent with the requirements of Specification 3.2.4 when a power range channel is inoperable.

Bases 3/4.2.4, QUADRANT POWER TILT RATIO, has been revised by generally incorporating the ISTS Bases which significantly improve the content and understanding of the QPTR requirements.

Bases 3/4.3.1 and 3/4.3.2 provide the Reactor Trip and Engineered Safety Feature Actuation System basis and has been revised by incorporating a discussion of the qualification notes applied to Table 3.3-1 Action 2.

These changes are consistent with the UFSAR design description and analyses assumptions where core parameters are monitored to verify the safe operation of the plant. The proposed changes will ensure the core operates within the fuel design criteria and that the power distribution remains within the bounds of the safety analyses, therefore, the proposed changes will 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 changes incorporate modifications generally consistent with the ISTS QPTR requirements to ensure the core power distribution is adequately monitored. The revised action statements provide for peaking factor verification as a logical compensatory measure to ensure the core is operating within required limits. This is more conservative than the current requirements and provides additional assurance that Specification 3.2.4 will continue to govern the QPTR limitations in a manner consistent with the accident analyses assumptions. The revised SR provides clear and understandable testing requirements to reduce confusion concerning how the QPTR is to be monitored based on plant conditions. The proposed change does not introduce any new mode of plant operation or require any physical modification to the plant, therefore, this change will 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 QPTR limit ensures that the gross radial power distribution is maintained within the assumptions used in the safety analyses. The QPTR is one of the variables that is monitored to ensure the core operates within the bounds used in the safety analyses. When the QPTR is maintained below 1.02 it provides an indication that the peaking factors are within the limiting values by preventing an undetected change in the gross radial power distribution. The proposed changes ensure the required parameters are verified during the applicable conditions and on a consistent basis, therefore, these changes will not reduce the margin of safety.

F. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Based on the above safety analysis, 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. 212

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.

Remove	Insert
1-4	1-4
3/4 2-10	3/4 2-10
3/4 2-11	3/4 2-11
3/4 3-5	3/4 3-5
3/4 3-6	3/4 3-6
3/4 3-7	3/4 3-7
B 3/4 2-5	B 3/4 2-5
B 3/4 2-6	B 3/4 2-6
----	B 3/4 2-7
----	B 3/4 2-8
----	B 3/4 2-9
----	B 3/4 2-10
----	B 3/4 2-11
----	B 3/4 3-1b

(Proposed Wording)

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 (QPTR)

1.18 QPTR 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.

DOSE EQUIVALENT I-131

1.19 DOSE EQUIVALENT I-131 shall be that concentration of I-131 (μCi/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.

POWER DISTRIBUTION LIMITS

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR)

LIMITING CONDITION FOR OPERATION

3.2.4 The QUADRANT POWER TILT RATIO shall be less than or equal to 1.02.

APPLICABILITY: MODE 1 greater than 50 percent of RATED THERMAL POWER.(1)

ACTION: With the QPTR not within the limit:

a. Within 2 hours, reduce THERMAL POWER greater than or equal to 3 percent from RATED THERMAL POWER (RTP) for each 1 percent of QPTR greater than 1.00, and

b. Within 12 hours and once per 12 hours thereafter, perform Surveillance Requirement 4.2.4 and reduce THERMAL POWER greater than or equal to 3 percent from RTP for each 1 percent of QPTR greater than 1.00, and

c. Within 24 hours and once per 7 days thereafter, perform Surveillance Requirements 4.2.2.2 and 4.2.3.1, and

d. Prior to increasing THERMAL POWER above the limit of ACTION a or b above, re-evaluate the safety analyses and confirm the results remain valid for the duration of operation under this condition, and

e. After ACTION d above is completed and prior to increasing THERMAL POWER above the limit of ACTION a or b above, normalize the excore detectors to show a QPTR less than or equal to 1.02, and

f. After ACTION e above is completed and within 24 hours after reaching RTP or within 48 hours after increasing THERMAL POWER above the limit of ACTION a or b above, perform Surveillance Requirements 4.2.2.2 and 4.2.3.1.

g. Otherwise, reduce THERMAL POWER to less than or equal to 50 percent RTP within 4 hours.

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(1) See Special Test Exception 3.10.2.

4.2.4 Verify the QPTR is within the limit:

a. By calculation(2) at least:

1) Once per 7 days with the QPTR alarm OPERABLE, and

2) Once within 12 hours and every 12 hours thereafter with the QPTR alarm inoperable.

b. Using the movable incore detectors once within 12 hours and every 12 hours thereafter.(3)

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(2) With one power range high neutron flux channel input to QPTR inoperable and THERMAL POWER less than 75 percent RTP, the remaining three power range high neutron flux channels can be used for calculating the QPTR.

(3) Only required to be performed with less than four power range high neutron flux channels input to QPTR operable with THERMAL POWER greater than or equal to 75 percent RTP.

TABLE 3.3-1 (Continued)

TABLE NOTATION

(1) Trip function may be manually bypassed in this Mode above P-10.

(2) Trip function may be manually bypassed in this Mode above P-6.

(3) With the reactor trip system breakers in the closed position and the control rod drive system capable of rod withdrawal.

ACTION STATEMENTS

ACTION 1 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 6 hours or be in at least HOT STANDBY within the next 6 hours; however, one channel may be bypassed for up to 4 hours for surveillance testing per specification 4.3.1.1.1, provided the other channel is OPERABLE.

ACTION 2 - With one power range neutron flux channel inoperable,(3) perform one of the following, as applicable:

a. Power Range High Neutron Flux Channel

1. Place the inoperable channel in trip within 6 hours and reduce THERMAL POWER to less than or equal to 75 percent RATED THERMAL POWER within the next 6 hours and perform SR 4.2.4,(4) or

2. Place the inoperable channel in trip within 6 hours and perform SR 4.2.4,(4) or

3. Be in MODE 3 within 12 hours.

b. All other channels

1. Place the inoperable channel in trip within 6 hours, or

2. Be in MODE 3 within 12 hours.

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(3) The inoperable channel may be bypassed for up to 4 hours for surveillance testing and setpoint adjustment of other channels.

(4) Only required to be performed when the power range high neutron flux channel input to QPTR is inoperable.

TABLE 3.3-1 (Continued)

ACTION 3 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 setpoint.

b. Above P-6 but below 5 percent of RATED THERMAL POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 5 percent of RATED THERMAL POWER.

c. Above 5 percent of RATED THERMAL POWER, POWER OPERATION may continue.

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 setpoint.

b. Above P-6, operation may continue.

ACTION 5 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, verify compliance with the SHUTDOWN MARGIN requirements of Specification 3.1.1.1 or Specification 3.1.1.2, as applicable within 1 hour, and at least once per 12 hours thereafter.

ACTION 6 - Not Applicable.

ACTION 7 - With the number of OPERABLE channels(5) one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours, and

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.1.

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(5) An OPERABLE hot leg channel consists of: 1) three RTDs per hot leg, or 2) two RTDs per hot leg with the failed RTD disconnected and the required bias applied.

TABLE 3.3-1 (Continued)

ACTION 8 - With the number of OPERABLE channels one less than the Total Number of Channels and with the THERMAL POWER level above P-7, place the inoperable channel in the tripped condition within 6 hours; operation may continue until performance of the next required CHANNEL FUNCTIONAL TEST.

ACTION 9 - Not applicable.

ACTION 10 - Not applicable.

ACTION 11 - With less than the Minimum Number of Channels OPERABLE, operation may continue provided the inoperable channel is placed in the tripped condition within 6 hours.

ACTION 12 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or be in HOT STANDBY within the next 6 hours and/or open the reactor trip breakers.

ACTION 39 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or open the reactor trip breakers within the next hour.

ACTION 40 -

a. With one of the diverse trip features (undervoltage or shunt trip attachment) of a reactor trip breaker inoperable, restore the diverse trip feature to OPERABLE status within 48 hours or declare the breaker inoperable and be in HOT STANDBY within the next 6 hours. Neither breaker shall be bypassed while one of the diverse trip features is inoperable except for the time required for performing maintenance to restore the breaker to OPERABLE status.

b. With one reactor trip breaker inoperable as a result of something other than an inoperable diverse trip feature; be in at least HOT STANDBY within 6 hours, however, one channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.1.1.1, provided the other channel is OPERABLE.

(next page is 3/4 3-9)
(Proposed Wording)

3/4.2.2 AND 3/4.2.3 HEAT FLUX AND NUCLEAR ENTHALPY HOT CHANNEL

FACTORS-$F_Q(Z)$ and FNΔH (Continued)

Fuel rod bowing reduces the value of the DNB ratio. Margin has been maintained between the DNBR value used in the safety analyses (1.33) and the design limit (1.21) to offset the rod bow penalty and other penalties which may apply.

The radial peaking factor $F_{xy}(Z)$ is measured periodically to provide assurance that the hot channel factor, $F_Q(Z)$, remains within its limits. The F_{xy} limit for RATED THERMAL POWER F_{xy}^{RTP} provided in the CORE OPERATING LIMITS REPORT was determined from expected power control maneuvers over the full range of burnup conditions in the core.

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR)

BACKGROUND

The Quadrant Power Tilt Ratio limit ensures that the gross radial power distribution remains consistent with the design values used in the safety analyses. Precise radial power distribution measurements are made during startup testing, after refueling, and periodically during power operation. The QPTR is routinely determined using the power range channel input which is part of the power range nuclear instrumentation (NI). The power range channel provides a protection function and has operability requirements in LCO 3.3.1. While part of the NI channel, the power range channel input to QPTR functions independently of the power range channel in monitoring radial power distribution. For this reason, if the power range channel output is inoperable, the power range channel input to QPTR may be unaffected and capable of monitoring for the QPTR.

The power density at any point in the core must be limited so that the fuel design criteria are maintained. Together, LCO 3.2.1, "AXIAL FLUX DIFFERENCE (AFD)," LCO 3.2.4, and LCO 3.1.3.6, "Control Rod Insertion Limits," provide limits on process variables that characterize and control the three dimensional power distribution of the reactor core. Control of these variables ensures that the core operates within the design criteria and that the power distribution remains within the bounds used in the safety analyses.

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

APPLICABLE SAFETY ANALYSES

This LCO precludes core power distributions that violate the following fuel design criteria:

a. During a large break loss of coolant accident, the peak cladding temperature must not exceed 2200°F in accordance with 10 CFR 50.46;

b. During a loss of forced reactor coolant flow accident, there must be at least 95 percent probability at the 95 percent confidence level (the 95/95 departure from nucleate boiling (DNB) criterion) that the hot fuel rod in the core does not experience a DNB condition;

c. During an ejected rod accident, the fission energy input to the fuel must not exceed 280 cal/gm in accordance with the indicated failure threshold from the TREAT results (UFSAR 14.2.6), and

d. The control rods must be capable of shutting down the reactor with a minimum required Shutdown Margin (SDM) with the highest worth control rod stuck fully withdrawn in accordance with 10 CFR 50, Appendix A, GDC 26.

The LCO limits on the AFD, the QPTR, the Heat Flux Hot Channel Factor ($F_Q(Z)$), the Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$), and control bank insertion are established to preclude core power distributions that exceed the safety analyses limits.

The QPTR limits ensure that $F^N_{\Delta H}$ and $F_Q(Z)$ remain below their limiting values by preventing an undetected change in the gross radial power distribution.

In MODE 1, the $F^N_{\Delta H}$ and $F_Q(Z)$ limits must be maintained to preclude core power distributions from exceeding design limits assumed in the safety analysis.

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

LCO

The QPTR limit of 1.02, at which corrective action is required, provides a margin of protection for both the DNB ratio and linear heat generation rate contributing to excessive power peaks resulting from X-Y plane power tilts. A limiting QPTR of 1.02 can be tolerated before the margin for uncertainty in $F_Q(Z)$ and $(F^N_{\Delta H})$ is possibly challenged.

APPLICABILITY

The QPTR limit must be maintained in MODE 1 with THERMAL POWER greater than 50 percent RATED THERMAL POWER (RTP) to prevent core power distributions from exceeding the design limits.

Applicability in MODE 1 less than or equal to 50 percent RTP and in other MODES is not required because there is either insufficient stored energy in the fuel or insufficient energy being transferred to the reactor coolant to require the implementation of a QPTR limit on the distribution of core power. The QPTR limit in these conditions is, therefore, not important. Note that the $F^N_{\Delta H}$ and $F_Q(Z)$ LCOs still apply, but allow progressively higher peaking factors at 50 percent RTP or lower.

ACTIONS

a. With the QPTR exceeding its limit, a power level reduction of 3 percent RTP for each 1 percent by which the QPTR exceeds 1.00 is a conservative tradeoff of total core power with peak linear power. The completion time of 2 hours allows sufficient time to identify the cause and correct the tilt. Note that the power reduction itself may cause a change in the tilted condition.

b. After completion of Action a, the QPTR alarm may still be in its alarmed state. As such, any additional changes in the QPTR are detected by requiring a check of the QPTR once per 12 hours thereafter. If the QPTR continues to increase, THERMAL POWER has to be reduced accordingly. A 12 hour completion time is sufficient because any additional change in QPTR would be relatively slow.

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

ACTION (Continued)

c. The peaking factors $F^N_{\Delta H}$ and $F_Q(Z)$ are of primary importance in ensuring that the power distribution remains consistent with the initial conditions used in the safety analyses. Performing surveillances on $F^N_{\Delta H}$ and $F_Q(Z)$ within the completion time of 24 hours ensures that these primary indicators of power distribution are within their respective limits. A completion time of 24 hours takes into consideration the rate at which peaking factors are likely to change, and the time required to stabilize the plant and perform a flux map. If these peaking factors are not within their limits, the actions provide an appropriate response for the abnormal condition. If the QPTR remains above its specified limit, the peaking factor surveillances are required each 7 days thereafter to evaluate $F^N_{\Delta H}$ and $F_Q(Z)$ with changes in power distribution. Relatively small changes are expected due to either burnup and xenon redistribution or correction of the cause for exceeding the QPTR limit.

d. Although $F^N_{\Delta H}$ and $F_Q(Z)$ are of primary importance as initial conditions in the safety analyses, other changes in the power distribution may occur as the QPTR limit is exceeded and may have an impact on the validity of the safety analysis. A change in the power distribution can affect such reactor parameters as bank worths and peaking factors for rod malfunction accidents. When the QPTR exceeds its limit, it does not necessarily mean a safety concern exists. It does mean that there is an indication of a change in the gross radial power distribution that requires an investigation and evaluation that is accomplished by examining the incore power distribution. Specifically, the core peaking factors and the quadrant tilt must be evaluated because they are the factors that best characterize the core power distribution. This re-evaluation is required to ensure that, before increasing THERMAL POWER to above the limit of ACTION a or b, the reactor core conditions are consistent with the assumptions in the safety analyses.

e. If the QPTR has exceeded the 1.02 limit and a re-evaluation of the safety analysis is completed and shows that safety requirements are met, the excore detectors are normalized to

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

ACTION (Continued)

show a QPTR less than or equal to 1.02 prior to increasing THERMAL POWER to above the limit of ACTION a or b. This is done to detect any subsequent significant changes in QPTR.

This action assures that the indicated QPT is not normalized until after the re-evaluation of the safety analysis has determined that core conditions at RTP are within the safety analysis assumptions (i.e., ACTION d). This is intended to prevent any ambiguity about the required sequence of actions.

f. Once the flux tilt is normalized (i.e., ACTION e is performed), it is acceptable to return to full power operation. However, as an added check that the core power distribution at RTP is consistent with the safety analysis assumptions, ACTION f requires verification that $F_Q(Z)$ and $F^N_{\Delta H}$ are within their specified limits within 24 hours of reaching RTP. As an added precaution, if the core power does not reach RTP within 24 hours, but is increased slowly, then the peaking factor surveillances must be performed within 48 hours of the time when the ascent to power was begun. These completion times are intended to allow adequate time to increase THERMAL POWER to above the limit of ACTION a or b, while not permitting the core to remain with unconfirmed power distributions for extended periods of time.

This action assures that the peaking factor surveillances may only be done after the excore detectors have been normalized to show a tilt less than or equal to 1.02 (i.e., ACTION e). The intent of this is to have the peaking factor surveillances performed at operating power levels, which can only be accomplished after the excore detectors are normalized to show a tilt less than or equal to 1.02 and the core returned to power.

g. If ACTIONS a through f are not completed within their associated completion times, the unit must be brought to a MODE or condition in which the requirements do not apply. To achieve this status, THERMAL POWER must be reduced to less than 50 percent RTP within 4 hours. The allowed completion time of 4 hours is reasonable, based on operating experience regarding the amount of time required to reach the reduced power level without challenging plant systems.

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

SURVEILLANCE REQUIREMENTS (SR)

SR 4.2.4.a

SR 4.2.4.a is modified by a Note that allows QPTR to be calculated with three power range high neutron flux channels that input to QPTR if THERMAL POWER is less than 75 percent RTP and one power range high neutron flux channel is inoperable.

This surveillance verifies that the QPTR, as indicated by the Nuclear Instrumentation System (NIS) channels, excore channels, is within its limits. The frequency of 7 days when the QPTR alarm is OPERABLE is acceptable because of the low probability that this alarm can remain inoperable without detection.

When the QPTR alarm is inoperable, the frequency is increased to 12 hours. This frequency is adequate to detect any relatively slow changes in QPTR, because for those causes of QPT that occur quickly (e.g., a dropped rod), there typically are other indications of abnormality that prompt a verification of core power tilt.

SR 4.2.4.b

This surveillance is modified by a Note, which states that it is required only when less than four power range high neutron flux channels input to QPTR are operable and the THERMAL POWER is greater than or equal to 75 percent RTP.

With an excore detector inoperable, tilt monitoring for a portion of the reactor core becomes degraded. Large tilts are likely detected with the remaining channels, but the capability for detection of small power tilts in some quadrants is decreased. Performing SR 4.2.4.b at a frequency of 12 hours provides an accurate alternative means for ensuring that any tilt remains within its limits.

For purposes of monitoring the QPTR when one excore detector is inoperable, the moveable incore detectors are used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR and any previous data indicating a tilt. The incore detector monitoring is performed with a full incore flux map or a partial core flux map with quarter core symmetry detailed in accordance with controlled procedures.

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

SURVEILLANCE REQUIREMENTS (SR) (Continued)

The symmetric thimble flux map can be used to generate symmetric thimble "tilt." This can be compared to a reference symmetric thimble tilt, from the most recent full core flux map, to generate an incore QPTR. Therefore, the symmetric thimble flux map can be used to confirm that QPTR is within limits.

With one excore detector inoperable, the indicated tilt may be changed from the value indicated with all four channels OPERABLE. To confirm that no change in tilt has actually occurred, which might cause the QPTR limit to be exceeded, the incore results may be compared against previous flux maps either using the symmetric thimbles as described above or a complete flux map. Nominally, quadrant tilt from the surveillance should be within 2 percent of the tilt shown by the most recent flux map data.

3/4.2.5 DNB PARAMETERS

The limits on the DNB related parameters assure that each of the parameters are maintained within the normal steady state envelope of operation assumed in the transient and accident analyses. The limits are consistent with the initial FSAR assumptions and have been analytically demonstrated adequate to maintain a minimum DNBR greater than or equal to the design DNBR limit throughout each analyzed transient.

The 12 hour periodic surveillance of these parameters through instrument readout is sufficient to ensure that the parameters are restored within their limits following load changes and other expected transient operation. The 18 month periodic measurement of the RCS total flow rate is adequate to detect flow degradation and ensure correlation of the flow indication channels with measured flow such that the indicated percent flow will provide sufficient verification of flow rate on a 12 hour basis.

3/4.3.1 and 3/4.3.2 PROTECTIVE AND ENGINEERED SAFETY FEATURES (ESF) INSTRUMENTATION (Continued)

Below the setpoint P-11 allows the manual block of safety injection actuation on low pressurizer pressure, allows manual block of safety injection and steamline isolation on low steamline pressure (with Loop Stop Valves Open) and enabling steamline isolation on high steam pressure rate, automatically disables auto actuation of the pressurizer PORVs unless the Reactor Vessel Over Pressure Protection System is in service.

P-12 Above the setpoint P-12 automatically reinstates an arming signal to the steam dump system. Below the setpoint P-12 blocks steam dump and allows manual bypass of the steam dump block to cooldown condenser dump valves.

Table 3.3-1 Action 2 has been modified by two notes. Note (3) allows placing the inoperable channel in the bypass condition for up to 4 hours while performing: a) routine surveillance testing of other channels, and b) setpoint adjustments of other channels when required to reduce the setpoint in accordance with other technical specifications. The 4 hour time limit is justified in accordance with WCAP-10271-P-A, Supplement 2, Revision 1, June 1990. Note (4) only requires SR 4.2.4.b to be performed if a Power Range High Neutron Flux channel input to QPTR becomes inoperable. Failure of a component in the Power Range High Neutron Flux channel which renders the High Neutron Flux trip function inoperable may not affect the capability to monitor QPTR. As such, determining QPTR using the movable incore detectors once per 12 hours may not be necessary.

ATTACHMENT C-2

Beaver Valley Power Station, Unit No. 2
Proposed Technical Specification Change No. 78

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.

Remove	Insert
1-3	1-3
3/4 2-9	3/4 2-9
3/4 2-10	3/4 2-10
3/4 3-5	3/4 3-5
3/4 3-6	3/4 3-6
3/4 3-7	3/4 3-7
B 3/4 2-5	B 3/4 2-5
B 3/4 2-6	B 3/4 2-6
----	B 3/4 2-7
----	B 3/4 2-8
----	B 3/4 2-9
----	B 3/4 2-10
----	B 3/4 2-11
B 3/4 3-3	B 3/4 3-3

(Proposed Wording)

IDENTIFIED LEAKAGE

1.14 IDENTIFIED LEAKAGE shall be:

a. Leakage (except CONTROLLED LEAKAGE) into closed systems, such as pump seal or valve packing leaks that are captured and conducted to a sump or collecting tank, or

b. 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

c. Reactor Coolant System leakage through a steam generator to the secondary system.

UNIDENTIFIED LEAKAGE

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

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 (QPTR)

1.18 QPTR 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.

DOSE EQUIVALENT I-131

1.19 DOSE EQUIVALENT I-131 shall be that concentration of I-131 (μCi/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:

QUADRANT POWER TILT RATIO (QPTR)

LIMITING CONDITION FOR OPERATION

3.2.4 The QUADRANT POWER TILT RATIO shall be less than or equal to 1.02.

APPLICABILITY: MODE 1 greater than 50 percent of RATED THERMAL POWER.[(1)]

ACTION: With the QPTR not within the limit:

a. Within 2 hours, reduce THERMAL POWER greater than or equal to 3 percent from RATED THERMAL POWER (RTP) for each 1 percent of QPTR greater than 1.00, and

b. Within 12 hours and once per 12 hours thereafter, perform Surveillance Requirement 4.2.4 and reduce THERMAL POWER greater than or equal to 3 percent from RTP for each 1 percent of QPTR greater than 1.00, and

c. Within 24 hours and once per 7 days thereafter, perform Surveillance Requirements 4.2.2.2 and 4.2.3.1, and

d. Prior to increasing THERMAL POWER above the limit of ACTION a or b above, re-evaluate the safety analyses and confirm the results remain valid for the duration of operation under this condition, and

e. After ACTION d above is completed and prior to increasing THERMAL POWER above the limit of ACTION a or b above, normalize the excore detectors to show QPTR less than or equal to 1.02, and

f. After ACTION e above is completed and within 24 hours after reaching RTP or within 48 hours after increasing THERMAL POWER above the limit of ACTION a or b above, perform Surveillance Requirements 4.2.2.2 and 4.2.3.1.

g. Otherwise, reduce THERMAL POWER to less than or equal to 50 percent RTP within 4 hours.

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(1) See Special Test Exception 3.10.2.

SURVEILLANCE REQUIREMENTS

4.2.4 Verify the QPTR is within the limit:

a. By calculation(2) at least:

1) Once per 7 days with the QPTR alarm OPERABLE, and

2) Once within 12 hours and every 12 hours thereafter with the QPTR alarm inoperable.

b. Using the movable incore detectors once within 12 hours and every 12 hours thereafter.(3)

---

(2) With one power range high neutron flux channel input to QPTR inoperable and THERMAL POWER less than 75 percent RTP, the remaining three power range high neutron flux channels can be used for calculating the QPTR.

(3) Only required to be performed with less than four power range high neutron flux channels input to QPTR operable with THERMAL POWER greater than or equal to 75 percent RTP.

TABLE 3.3-1 (Continued)

TABLE NOTATION

(1) Trip function may be manually bypassed in this MODE above P-10.

(2) Trip function may be manually bypassed in this MODE above P-6.

(3) With the reactor trip system breakers in the closed position and the control rod drive system capable of rod withdrawal.

ACTION STATEMENTS

ACTION 1 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 6 hours or be in at least HOT STANDBY within the next 6 hours; however, one channel may be bypassed for up to 4 hours for surveillance testing per specification 4.3.1.1.1, provided the other channel is OPERABLE.

ACTION 2 - With one power range neutron flux channel inoperable,[3] perform one of the following, as applicable:

a. Power Range High Neutron Flux Channel

1. Place the inoperable channel in trip within 6 hours and reduce THERMAL POWER to less than or equal to 75 percent RATED THERMAL POWER within the next 6 hours and perform SR 4.2.4,[4] or

2. Place the inoperable channel in trip within 6 hours and perform SR 4.2.4,[4] or

3. Be in MODE 3 within 12 hours.

b. All other channels

1. Place the inoperable channel in trip within 6 hours, or

2. Be in MODE 3 within 12 hours.

---

(3) The inoperable channel may be bypassed for up to 4 hours for surveillance testing and setpoint adjustment of other channels.

(4) Only required to be performed when the power range high neutron flux channel input to QPTR is inoperable.

TABLE 3.3-1 (Continued)

ACTION 3 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increaing THERMAL POWER above the P-6 setpoint.

b. Above P-6 but below 5 percent of RATED THERMAL POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 5 percent of RATED THERMAL POWER.

c. Above 5 percent of RATED THERMAL POWER, POWER OPERATION may continue.

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 setpoint and suspend positive reactivity operations.

b. Above P-6, operation may continue.

ACTION 5 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or open the Reactor Trip System breakers, suspend all operations involving positive reactivity changes and verify Valve 2CHS-91 is closed and secured in position within the next hour.

ACTION 6 - This Action is not used.

ACTION 7 - With the number of OPERABLE channels(5) one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours, and

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.1.

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(5) An OPERABLE hot leg channel consists of: 1) three RTDs per hot leg, or 2) two RTDs per hot leg with the failed RTD disconnected and the required bias applied.

TABLE 3.3-1 (Continued)

ACTION 8 - With the number of OPERABLE channels one less than the Total Number of Channels and with the THERMAL POWER level above P-9, place the inoperable channel in the tripped condition within 6 hours; operation may continue until performance of the next required CHANNEL FUNCTIONAL TEST.

ACTION 9 - This Action is not used.

ACTION 10 - This Action is not used.

ACTION 11 - With less than the Minimum Number of Channels OPERABLE, operation may continue provided the inoperable channel is placed in the tripped condition within 6 hours.

ACTION 12 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or be in HOT STANDBY within the next 6 hours and/or open the reactor trip breakers.

ACTION 39 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or open the reactor trip breakers within the next hour.

ACTION 40 -

a. With one of the diverse trip features (undervoltage or shunt trip attachment) of a reactor trip breaker inoperable, restore the diverse trip feature to OPERABLE status within 48 hours or declare the breaker inoperable and be in HOT STANDBY within the next 6 hours. Neither breaker shall be bypassed while one of the diverse trip features is inoperable except for the time required for performing maintenance to restore the breaker to OPERABLE status.

b. With one reactor trip breaker inoperable as a result of something other than an inoperable diverse trip feature, be in at least HOT STANDBY within 6 hours; however, one channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.1.1.1, provided the other channel is OPERABLE.

ACTION 44 - With less than the Minimum Number of Channels OPERABLE, within 1 hour determine by observation of the associated permissive annunciator window(s) that the interlock is in its required state for the existing plant condition, or apply Specification 3.0.3.

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR)

BACKGROUND

The Quadrant Power Tilt Ratio limit ensures that the gross radial power distribution remains consistent with the design values used in the safety analyses. Precise radial power distribution measurements are made during startup testing, after refueling, and periodically during power operation. The QPTR is routinely determined using the power range channel input which is part of the power range nuclear instrumentation (NI). The power range channel provides a protection function and has operability requirements in LCO 3.3.1. While part of the NI channel, the power range channel input to QPTR functions independently of the power range channel in monitoring radial power distribution. For this reason, if the power range channel output is inoperable, the power range channel input to QPTR may be unaffected and capable of monitoring for the QPTR.

The power density at any point in the core must be limited so that the fuel design criteria are maintained. Together, LCO 3.2.1, "AXIAL FLUX DIFFERENCE (AFD)," LCO 3.2.4, and LCO 3.1.3.6, "Control Rod Insertion Limits," provide limits on process variables that characterize and control the three dimensional power distribution of the reactor core. Control of these variables ensures that the core operates within the design criteria and that the power distribution remains within the bounds used in the safety analyses.

APPLICABLE SAFETY ANALYSES

This LCO precludes core power distributions that violate the following fuel design criteria:

a. During a large break loss of coolant accident, the peak cladding temperature must not exceed 2200°F in accordance with 10 CFR 50.46;

b. During a loss of forced reactor coolant flow accident, there must be at least 95 percent probability at the 95 percent confidence level (the 95/95 departure from nucleate boiling (DNB) criterion) that the hot fuel rod in the core does not experience a DNB condition;

c. During an ejected rod accident, the fission energy input to the fuel must not exceed 280 cal/gm in accordance with the indicated failure threshold from the TREAT results (UFSAR 15.4.8), and

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

APPLICABLE SAFETY ANALYSES (Continued)

d. The control rods must be capable of shutting down the reactor with a minimum required Shutdown Margin (SDM) with the highest worth control rod stuck fully withdrawn in accordance with 10 CFR 50, Appendix A, GDC 26.

The LCO limits on the AFD, the QPTR, the Heat Flux Hot Channel Factor ($F_Q(Z)$), the Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$), and control bank insertion are established to preclude core power distributions that exceed the safety analyses limits.

The QPTR limits ensure that $F^N_{\Delta H}$ and $F_Q(Z)$ remain below their limiting values by preventing an undetected change in the gross radial power distribution.

In MODE 1, the $F^N_{\Delta H}$ and $F_Q(Z)$ limits must be maintained to preclude core power distributions from exceeding design limits assumed in the safety analysis.

LCO

The QPTR limit of 1.02, at which corrective action is required, provides a margin of protection for both the DNB ratio and linear heat generation rate contributing to excessive power peaks resulting from X-Y plane power tilts. A limiting QPTR of 1.02 can be tolerated before the margin for uncertainty in $F_Q(Z)$ and ($F^N_{\Delta H}$) is possibly challenged.

APPLICABILITY

The QPTR limit must be maintained in MODE 1 with THERMAL POWER greater than 50 percent RATED THERMAL POWER (RTP) to prevent core power distributions from exceeding the design limits.

Applicability in MODE 1 less than or equal to 50 percent RTP and in other MODES is not required because there is either insufficient stored energy in the fuel or insufficient energy being transferred to

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

APPLICABILITY (Continued)

the reactor coolant to require the implementation of a QPTR limit on the distribution of core power. The QPTR limit in these conditions is, therefore, not important. Note that the $F^N_{\Delta H}$ and $F_Q(Z)$ LCOs still apply, but allow progressively higher peaking factors at 50 percent RTP or lower.

ACTION

a. With the QPTR exceeding its limit, a power level reduction of 3 percent RTP for each 1 percent by which the QPTR exceeds 1.00 is a conservative tradeoff of total core power with peak linear power. The completion Time of 2 hours allows sufficient time to identify the cause and correct the tilt. Note that the power reduction itself may cause a change in the tilted condition.

b. After completion of ACTION a, the QPTR alarm may still be in its alarmed state. As such, any additional changes in the QPTR are detected by requiring a check of the QPTR once per 12 hours thereafter. If the QPTR continues to increase, THERMAL POWER has to be reduced accordingly. A 12 hour completion time is sufficient because any additional change in QPTR would be relatively slow.

c. The peaking factors $F^N_{\Delta H}$ and $F_Q(Z)$ are of primary importance in ensuring that the power distribution remains consistent with the initial conditions used in the safety analyses. Performing surveillances on $F^N_{\Delta H}$ and $F_Q(Z)$ within the completion time of 24 hours ensures that these primary indicators of power distribution are within their respective limits. A completion time of 24 hours takes into consideration the rate at which peaking factors are likely to change, and the time required to stabilize the plant and perform a flux map. If these peaking factors are not within their limits, the actions provide an appropriate response for the abnormal condition. If the QPTR remains above its specified limit, the peaking factor surveillances are required each 7 days thereafter to evaluate $F^N_{\Delta H}$ and $F_Q(Z)$ with changes in power distribution. Relatively small changes are expected due to either burnup and xenon redistribution or correction of the cause for exceeding the QPTR limit.

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

ACTION (Continued)

d. Although $F^N_{\Delta H}$ and $F_Q(Z)$ are of primary importance as initial conditions in the safety analyses, other changes in the power distribution may occur as the QPTR limit is exceeded and may have an impact on the validity of the safety analysis. A change in the power distribution can affect such reactor parameters as bank worths and peaking factors for rod malfunction accidents. When the QPTR exceeds its limit, it does not necessarily mean a safety concern exists. It does mean that there is an indication of a change in the gross radial power distribution that requires an investigation and evaluation that is accomplished by examining the incore power distribution. Specifically, the core peaking factors and the quadrant tilt must be evaluated because they are the factors that best characterize the core power distribution. This re-evaluation is required to ensure that, before increasing THERMAL POWER to above the limit of ACTION a or b, the reactor core conditions are consistent with the assumptions in the safety analyses.

e. If the QPTR has exceeded the 1.02 limit and a re-evaluation of the safety analysis is completed and shows that safety requirements are met, the excore detectors are normalized to show a QPTR less than or equal to 1.02 prior to increasing THERMAL POWER to above the limit of ACTION a or b. This is done to detect any subsequent significant changes in QPTR.

   This action assures that the indicated QPT is not normalized until after the re-evaluation of the safety analysis has determined that core conditions at RTP are within the safety analysis assumptions (i.e., ACTION d). This is intended to prevent any ambiguity about the required sequence of actions.

f. Once the flux tilt is normalized (i.e., ACTION e is performed), it is acceptable to return to full power operation. However, as an added check that the core power distribution at RTP is consistent with the safety analysis assumptions, ACTION f requires verification that $F_Q(Z)$ and $F^N_{\Delta H}$ are within their specified limits within 24 hours of reaching RTP. As an added precaution, if the core

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

ACTION (Continued)

power does not reach RTP within 24 hours, but is increased slowly, then the peaking factor surveillances must be performed within 48 hours of the time when the ascent to power was begun. These completion times are intended to allow adequate time to increase THERMAL POWER to above the limit of ACTION a or b, while not permitting the core to remain with unconfirmed power distributions for extended periods of time.

This action assures that the peaking factor surveillances may only be done after the excore detectors have been normalized to show a tilt less than or equal to 1.02 (i.e., ACTION e). The intent of this is to have the peaking factor surveillances performed at operating power levels, which can only be accomplished after the excore detectors are normalized to show a tilt less than or equal to 1.02 and the core returned to power.

g. If ACTIONS a through f are not completed within their associated completion times, the unit must be brought to a MODE or condition in which the requirements do not apply. To achieve this status, THERMAL POWER must be reduced to less than 50 percent RTP within 4 hours. The allowed completion time of 4 hours is reasonable, based on operating experience regarding the amount of time required to reach the reduced power level without challenging plant systems.

SURVEILLANCE REQUIREMENTS (SR)

SR 4.2.4.a

SR 4.2.4.a is modified by a Note that allows QPTR to be calculated with three power range high neutron flux channels that input to QPTR if THERMAL POWER is less than 75 percent RTP and one power range neutron flux channel is inoperable.

This surveillance verifies that the QPTR, as indicated by the Nuclear Instrumentation System (NIS) channels, excore channels, is within its limits. The frequency of 7 days when the QPTR alarm is OPERABLE is acceptable because of the low probability that this alarm can remain inoperable without detection.

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR) (Continued)

SURVEILLANCE REQUIREMENTS (SR) (Continued)

When the QPTR alarm is inoperable, the frequency is increased to 12 hours. This frequency is adequate to detect any relatively slow changes in QPTR, because for those causes of QPT that occur quickly (e.g., a dropped rod), there typically are other indications of abnormality that prompt a verification of core power tilt.

SR 4.2.4.b

This surveillance is modified by a Note, which states that it is required only when less than four power range high neutron flux channels input to QPTR are operable and the THERMAL POWER is greater than or equal to 75 percent RTP.

With an excore detector inoperable, tilt monitoring for a portion of the reactor core becomes degraded. Large tilts are likely detected with the remaining channels, but the capability for detection of small power tilts in some quadrants is decreased. Performing SR 4.2.4.b at a frequency of 12 hours provides an accurate alternative means for ensuring that any tilt remains within its limits.

For purposes of monitoring the QPTR when one excore detector is inoperable, the moveable incore detectors are used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR and any previous data indicating a tilt. The incore detector monitoring is performed with a full incore flux map or a partial core flux map with quarter core symmetry detailed in accordance with controlled procedures.

The symmetric thimble flux map can be used to generate symmetric thimble "tilt." This can be compared to a reference symmetric thimble tilt, from the most recent full core flux map, to generate an incore QPTR. Therefore, the symmetric thimble flux map can be used to confirm that QPTR is within limits.

With one excore detector inoperable, the indicated tilt may be changed from the value indicated with all four channels OPERABLE. To confirm that no change in tilt has actually occurred, which might cause the QPTR limit to be exceeded, the incore results may be compared against previous flux maps either using the symmetric thimbles as described above or a complete flux map. Nominally, quadrant tilt from the surveillance should be within 2 percent of the tilt shown by the most recent flux map data.

3/4.2.5 DNB PARAMETERS

The limits on the DNB related parameters assure that each of the parameters are maintained within the normal steady state envelope of operation assumed in the transient and accident analyses. The limits are consistent with the initial FSAR assumptions and have been analytically demonstrated adequate to maintain a minimum DNBR greater than or equal to the design DNBR limit throughout each analyzed transient.

The 12 hour periodic surveillance of these parameters through instrument readout is sufficient to ensure that the parameters are restored within their limits following load changes and other expected transient operation. The 18 month periodic measurement of the RCS total flow rate is adequate to detect flow degradation and ensure correlation of the flow indication channels with measured flow such that the indicated percent flow will provide sufficient verification of flow rate on a 12 hour basis.

3/4.3.1 and 3/4.3.2 REACTOR TRIP SYSTEM AND ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION (Continued)

The Engineered Safety Feature Actuation System interlocks perform the following functions:

P-4 Reactor tripped - Actuates turbine trip, closes main feedwater valves on T_{avg} below setpoint, prevents the opening of the main feedwater valves which were closed by a safety injection or high steam generator water level signal, allows safety injection block so that components can be reset or tripped.

Reactor not tripped - prevents manual block of safety injection.

P-11 Above the setpoint, P-11 automatically reinstates safety injection actuation on low pressurizer pressure, automatically blocks steamline isolation on high steam pressure rate, and enables safety injection and steamline isolation (with Loop Stop Valve Open) on low steamline pressure. Below the setpoint, P-11 allows the manual block of safety injection actuation on low pressurizer pressure, allows manual block of safety injection and steamline isolation (with Loop Stop Valve Open) on Low steamline pressure and enables steamline isolation on high steam pressure rate.

P-12 Above the setpoint, P-12 automatically reinstates an arming signal to the steam dump system. Below the setpoint P-12 blocks steam dump and allows manual bypass of the steam dump block to cooldown condenser dump valves.

Table 3.3-1 Action 2 has been modified by two notes. Note (3) allows placing the inoperable channel in the bypass condition for up to 4 hours while performing: a) routine surveillance testing of other channels, and b) setpoint adjustments of other channels when required to reduce the setpoint in accordance with other technical specifications. The 4 hour time limit is justified in accordance with WCAP-10271-P-A, Supplement 2, Revision 1, June 1990. Note (4) only requires SR 4.2.4.b to be performed if a Power Range High Neutron Flux channel input to QPTR becomes inoperable. Failure of a component in the Power Range High Neutron Flux channel which renders the High Neutron Flux trip function inoperable may not affect the capability to monitor QPTR. As such, determining QPTR using the movable incore detectors once per 12 hours may not be necessary.

ATTACHMENT D

Beaver Valley Power Station, Unit Nos. 1 and 2
Proposed Technical Specification Change Nos. 212 and 78
CHANGE COMPARISON

CURRENT REQUIREMENT	MODIFIED REQUIREMENT (NUREG-1431)
DEFINITION 1.18 Includes the following sentence: "With one (1) excore detector inoperable, the remaining three (3) detectors shall be used for computing the average."	DEFINITION 1.18 No similar sentence, however, Note (1) applicable to surveillance requirement 4.2.4.a allows determination of QPTR with 3 operable detectors when less than 75% power.
3/4.2.4 QUADRANT POWER TILT RATIO	3/4.2.4 QUADRANT POWER TILT RATIO (QPTR)
LCO The QUADRANT POWER TILT RATIO shall not exceed 1.02.	LCO The QUADRANT POWER TILT RATIO shall be less than or equal to 1.02.
APPLICABILITY MODE 1 above 50% of RATED THERMAL POWER.*	APPLICABILITY MODE 1 greater that 50 percent of RATED THERMAL POWER.(1)
NOTE ____________ * See Special Test Exception 3.10.2.	NOTE ____________ (1) See Special Test Exception 3.10.2.
ACTIONS a. With the QUADRANT POWER TILT RATIO determined to exceed 1.02 but ≤ 1.09: 1. Within 2 hours: a) Either reduce the QUADRANT POWER TILT RATIO to within its limit, or b) Reduce THERMAL POWER at least 3% for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.0 and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours.	ACTIONS With the QPTR not within the limit: a. Within 2 hours, reduce THERMAL POWER greater than or equal to 3 percent from RATED THERMAL POWER (RTP) for each 1 percent of QPTR greater than 1.00, and b. Within 12 hours and once per 12 hours thereafter, perform Surveillance Requirement 4.2.4 and reduce THERMAL POWER greater than or equal to 3 percent from RTP for each 1 percent of QPTR greater than 1.00, and

CURRENT REQUIREMENT

ACTIONS

2. Verify that the QUADRANT POWER TILT RATIO is within its limit within 24 hours after exceeding the limit or reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within the next 2 hours and reduce the Power Range Neutron Flux-High Trip Setpoints to ≤ 55% of RATED THERMAL POWER within the next 4 hours.

3. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50% of RATED THERMAL POWER may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour until verified acceptable at 95% or greater RATED THERMAL POWER.

b. With the QUADRANT POWER TILT RATION determined to exceed 1.09 due to misalignment of either a shutdown or control rod:

MODIFIED REQUIREMENT (NUREG-1431)

ACTIONS

c. Within 24 hours and once per 7 days thereafter, perform surveillance requirements 4.2.2.2 and 4.2.3.1, and

d. Prior to increasing THERMAL POWER above the limit of "a" or "b" above, re-evaluate the safety analyses and confirm the results remain valid for the duration of operation under this condition, and

e. After "d" above is completed and prior to increasing THERMAL POWER above the limit of "a" or "b" above, normalize the excore detectors to show a QPTR less than or equal to 1.02, and

f. After "e" above is completed and within 24 hours after reaching RTP or within 48 hours after increasing THERMAL POWER above the limit of "a" or "b" above, perform surveillance requirements 4.2.2.2 and 4.2.3.1.

CURRENT REQUIREMENT	MODIFIED REQUIREMENT (NUREG-1431)
1. Reduce THERMAL POWER at least 3% for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.0, within 30 minutes.	
2. Verify that the QUADRANT POWER TILT RATIO is within its limit within 2 hours after exceeding the limit or reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within the next 2 hours and reduce the Power Range Neutron Flux-High Trip Setpoints to $\leq$ 55% of RATED THERMAL POWER within the next 4 hours.	
3. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50% of RATED THERMAL POWER may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour until verified acceptable at 95% or greater RATED THERMAL POWER.	
c. With the QUADRANT POWER TILT RATIO determined to exceed 1.09 due to cause other than the misalignment of either a shutdown or control rod:	

Beaver Valley Power Station, Unit Nos. 1 and 2
Proposed Technical Specification Change Nos. 212 and 78
CHANGE COMPARISON

CURRENT REQUIREMENT	MODIFIED REQUIREMENT (NUREG-1431)
1. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 2 hours and reduce the Power Range Neutron Flux-High Trip Setpoints to ≤ 55% of RATED THERMAL POWER within the next 4 hours.	
2. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50% of RATED THERMAL POWER may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour until verified acceptable at 95% or greater RATED THERMAL POWER.	
The current requirements of Action "a.2" provide an option to reduce power to less than 50% of RATED THERMAL POWER within 2 hours.	g. Otherwise, reduce THERMAL POWER to less than or equal to 50 percent RTP within 4 hours.
<u>SURVEILLANCE REQUIREMENTS</u> 4.2.4 The QUADRANT POWER TILT RATIO shall be determined to be within the limit above 50% of RATED THERMAL POWER by:	<u>SURVEILLANCE REQUIREMENTS</u> 4.2.4 Verify the QPTR is within the limit:
	a. By calculation[2] at least:
a. Calculating the ratio at least once per 7 days when the alarm is OPERABLE.	1) Once per 7 days with the QPTR alarm OPERABLE, and
b. Calculating the ratio at least once per 12 hours during steady state operation when the alarm is inoperable.	2) Once within 12 hours and every 12 hours thereafter with the QPTR alarm inoperable.

Beaver Valley Power Station, Unit Nos. 1 and 2
Proposed Technical Specification Change Nos. 212 and 78
CHANGE COMPARISON

CURRENT REQUIREMENT

c. Using the movable detectors to determine the QUADRANT POWER TILT RATIO at least once per 12 hours when one Power Range Channel is inoperable and THERMAL POWER is > 75 percent of RATED THERMAL POWER.

The contents of the NUREG-1431 notes are similar to the intent of the QPTR definition and Surveillance Requirement 4.2.4 requirements.

MODIFIED REQUIREMENT (NUREG-1431)

b. Using the movable incore detectors once within 12 hours and every 12 hours thereafter.(3)

NOTES (These differ from NUREG-1431 in that reference is made to "power range high neutron flux channel input to QPTR" instead of "power range channels."

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(2) With one power range high neutron flux channel input to QPTR inoperable and THERMAL POWER less than 75 percent RTP, the remaining three power range high neutron flux channels can be used for calculating the QPTR.

(3) Only required to be performed with less than four power range high neutron flux channels input to QPTR operable with THERMAL POWER greater than or equal 75 percent RTP.

CURRENT REQUIREMENT

TABLE 3.3-1 ACTION 2
With the number of OPERABLE channels one less than the Total Number of channels and with the THERMAL POWER level:

a. Less than or equal to 5% of RATED THERMAL POWER, place the inoperable channel in the tripped condition within 1 hour and restore the inoperable channel to OPERABLE status within 24 hours after increasing THERMAL POWER above 5% of RATED THERMAL POWER;

MODIFIED REQUIREMENT (NUREG-1431)

TABLE 3.3-1 ACTION 2
With one power range neutron flux channel inoperable,(3) perform one of the following, as applicable:

a. Power Range High Neutron Flux Channel

   1. Place the inoperable channel in trip within 6 hours and reduce THERMAL POWER to less than or equal to 75 percent RATED THERMAL POWER within the next 6 hours and perform SR 4.2.4,(4) or

Beaver Valley Power Station, Unit Nos. 1 and 2
Proposed Technical Specification Change Nos. 212 and 78
CHANGE COMPARISON

CURRENT REQUIREMENT

otherwise, reduce thermal power to less than 5% RATED THERMAL POWER within the following 6 hours.

b. Above 5% of RATED THERMAL POWER, operation may continue provided all of the following conditions are satisfied:

1. The inoperable channel is placed in the tripped condition within 1 hour.

2. The Minimum Channels OPERABLE requirement is met; however, one additional channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.1.1.

3. Either, THERMAL POWER is restricted to ≤ 75% of RATED THERMAL POWER and the Power Range, Neutron Flux Trip setpoint is reduced to ≤ 85% of RATED THERMAL POWER within 4 hours; or, the Quadrant Power Tilt Ratio is monitored at least once per 12 hours per Specification 4.2.4.c.

MODIFIED REQUIREMENT (NUREG-1431)

2. Place the inoperable channel in trip within 6 hours and perform SR 4.2.4,[4] or

3. Be in MODE 3 within 12 hours.

b. All other channels

1. Place the inoperable channel in trip within 6 hours, or

2. Be in MODE 3 within 12 hours.

NOTES

(3) The inoperable channel may be bypassed for up to 4 hours for surveillance testing and setpoint adjustment of other channels.

(4) Only required to be performed when the power range high neutron flux channel input to QPTR is inoperable.

ATTACHMENT D

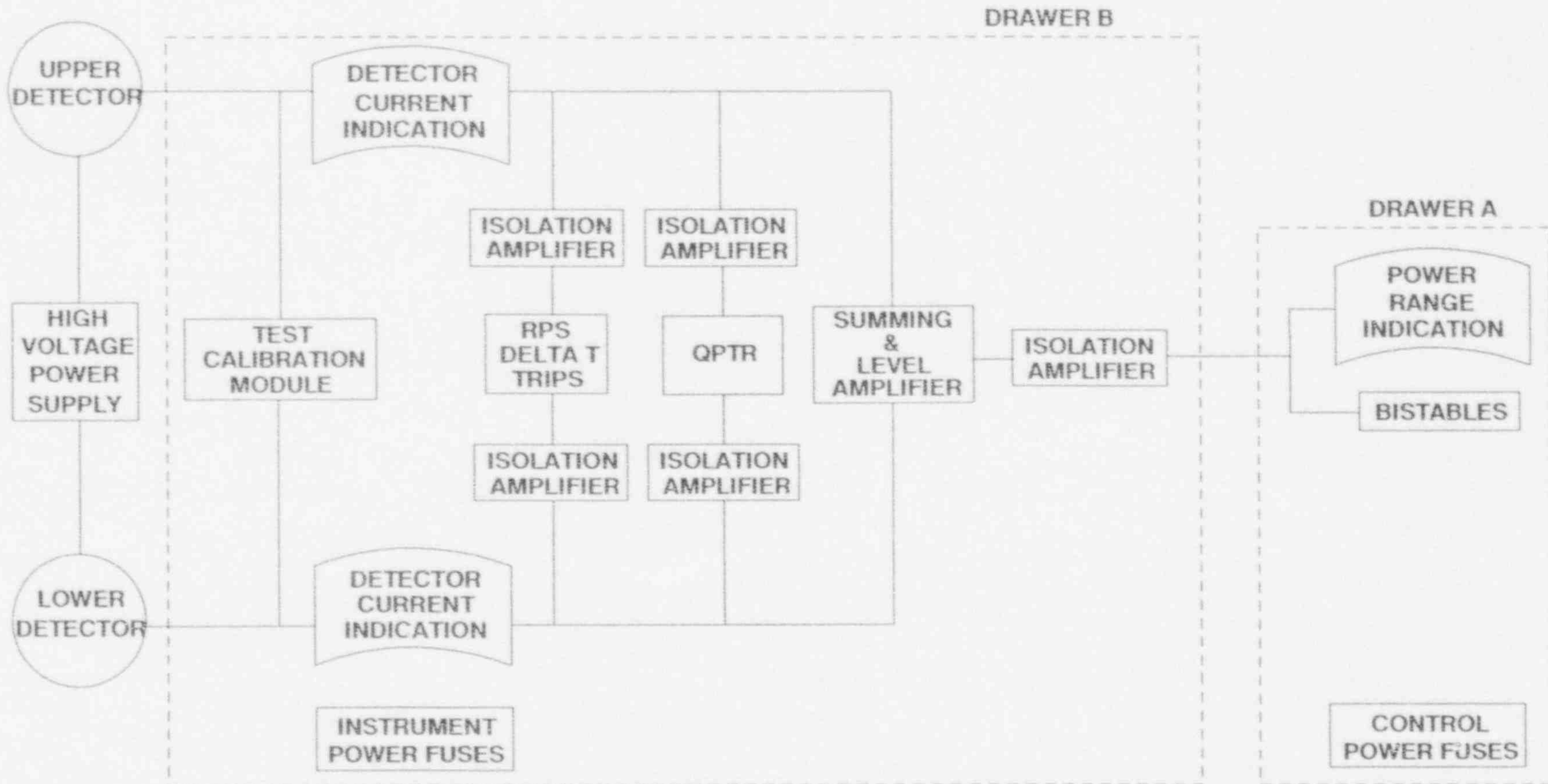
Beaver Valley Power Station, Unit Nos. 1 and 2
Proposed Technical Specification Change Nos. 212 and 78
CHANGE COMPARISON

CURRENT REQUIREMENT	MODIFIED REQUIREMENT (NUREG-1431)
BASES 3/4.2.4 QUADRANT POWER TILT RATIO	BASES 3/4.2.4 QUADRANT POWER TILT RATIO (QPTR)

Replaced the current BASES with the NUREG-1431 BASES with modifications to address "power range high neutron flux channel input to QPTR" instead of "power range channels." Also modified the action "e" and "f" discussions to address normalizing the excore detectors to show a QPTR less than or equal to 1.02.

CURRENT REQUIREMENT	MODIFIED REQUIREMENT (NUREG-1431)
BV-1 BASES 3/4.2.5 DNB PARAMETERS ≥	BV-1 BASES 3/4.2.5 DNB PARAMETERS greater than or equal to
BASES 3/4.3.1 AND 3/4.3.2 Reactor Trip and Engineered Safety Feature Actuation System Basis.	BASES 3/4.3.1 AND 3/4.3.2 Incorporated a paragraph to address the addition of Note (3) and (4) applicable to Table 3.3-1 Action 2. Note (3) provides the ability to bypass an inoperable channel when testing other channels and when required to adjust setpoints in accordance with other technical specifications. Note (4) states that unless a power range high neutron flux channel input to the QPTR is inoperable, then determining the QPTR using the movable incore detectors may not be necessary.

ATTACHMENT E
Beaver Valley Power Station, Unit Nos. 1 and 2
Proposed Technical Specification Change Nos. 212 and 78
POWER RANGE CHANNEL DIAGRAM



Note: As shown above, a power range channel may be inoperable due to control power fuses or an inoperable bistable, which would have no affect on the operator's ability to determine QPTR. Since there are many ways in which a power range channel may be declared inoperable, the proposed technical specification change separates the power range channel into two parts for QPTR verification purposes.

AFFIDAVIT FOR APPLICATION

OF AMENDMENT

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF BEAVER)

Subject: **Beaver Valley Power Station, Unit No. 1 and No. 2**
BV-1 Docket No. 50-334, License No. DPR-66
BV-2 Docket No. 50-412, License No. NPF-73
Proposed Operating License Change Request Nos. 212 and 78

Before me, the undersigned notary public, in and for the County and Commonwealth aforesaid, this day personally appeared George S. Thomas, to me known, who being duly sworn according to law, deposes and says that he is Division Vice President, Nuclear Services of the Nuclear Power Division, Duquesne Light Company, he is duly authorized to execute and file the foregoing submittal on behalf of said Company, and the statements set forth in the submittal are true and correct to the best of his knowledge, information and belief.

George S. Thomas

George S. Thomas

Subscribed and sworn to before me
on this 11th day of October, 1994

Tracey A. Baczek

Notary Public

Notarial Seal
Tracey A. Baczek, Notary Public
Shippingport Boro, Beaver County
My Commission Expires Aug. 10, 1997
Member, Pennsylvania Association of Notaries

ATTACHMENT A-1

Beaver Valley Power Station, Unit No. 1
Proposed Technical Specification Change No. 212

The following is a list of the affected pages:

Affected Pages:

1-4
3/4 2-10
3/4 2-11
3/4 3-5
3/4 3-6
B 3/4 2-5
B 3/4 2-6
B 3/4 3-1a

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 (QPTR)

1.18 ~~QUADRANT POWER TILT RATIO~~ QPTR 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)

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR)

LIMITING CONDITION FOR OPERATION

3.2.4 THE QUADRANT POWER TILT RATIO shall ~~not exceed~~ be less than or equal to 1.02.

APPLICABILITY: MODE 1 ~~above~~ greater than 50~~%~~ percent of RATED THERMAL POWER*(1).

ACTION:

REPLACE WITH INSERT 1

a. With the QUADRANT POWER TILT RATIO determined to exceed 1.02 but ≤ 1.09:

1. Within 2 hours:

a) Either reduce the QUADRANT POWER TILT RATIO to within its limit, or

b) Reduce THERMAL POWER at least 3% for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.0 and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours.

2. Verify that the QUADRANT POWER TILT RATIO is within its limit within 24 hours after exceeding the limit or reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within the next 2 hours and reduce the Power Range Neutron Flux-High Trip setpoints to ≤ 55% of RATED THERMAL POWER within the next 4 hours.

3. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50% of RATED THERMAL power may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour until verified acceptable at 95% or greater RATED THERMAL POWER.

b. With the QUADRANT POWER TILT RATIO determined to exceed 1.09 due to misalignment of either a shutdown or control rod:

1. Reduce THERMAL POWER at least 3% for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.0, within 30 minutes.

2. Verify that the QUADRANT POWER TILT RATIO is within its limit within 2 hours after exceeding the limit or

(1) ~~*~~ See Special Test Exception 3.10.2.

INSERT 1

ACTION: With the QPTR not within the limit:

a. Within 2 hours, reduce THERMAL POWER greater than or equal to 3 percent from RATED THERMAL POWER (RTP) for each 1 percent of QPTR greater than 1.00, and

b. Within 12 hours and once per 12 hours thereafter, perform Surveillance Requirement 4.2.4 and reduce THERMAL POWER greater than or equal to 3 percent from RTP for each 1 percent of QPTR greater than 1.00, and

c. Within 24 hours and once per 7 days thereafter, perform Surveillance Requirements 4.2.2.2 and 4.2.3.1, and

d. Prior to increasing THERMAL POWER above the limit of ACTION a or b above, re-evaluate the safety analyses and confirm the results remain valid for the duration of operation under this condition, and

e. After ACTION d above is completed and prior to increasing THERMAL POWER above the limit of ACTION a or b above, normalize the excore detectors to show a QPTR less than or equal to 1.02, and

f. After ACTION e above is completed and within 24 hours after reaching RTP or within 48 hours after increasing THERMAL POWER above the limit of ACTION a or b above, perform Surveillance Requirements 4.2.2.2 and 4.2.3.1.

g. Otherwise, reduce THERMAL POWER to less than or equal to 50 percent RTP within 4 hours.

LIMITING CONDITION FOR OPERATION (Continued)

Replace with INSERT 1 →

reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within the next 2 hours and reduce the Power Range Neutron Flux-High trip Setpoints to ≤ 55% of RATED THERMAL POWER within the next 4 hours.

3. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50% of RATED THERMAL POWER may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour until verified acceptable at 95% or greater RATED THERMAL POWER.

c. With the QUADRANT POWER TILT RATIO determined to exceed 1.09 due to causes other than the misalignment of either a shutdown or control rod:

1. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 2 hours and reduce the Power Range Neutron Flux-High Trip Setpoints to ≤ 55% of RATED THERMAL POWER within the next 4 hours.

2. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50% of RATED THERMAL POWER may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour until verified at 95% or greater RATED THERMAL POWER.

SURVEILLANCE REQUIREMENTS

4.2.4 The QUADRANT POWER TILT RATIO shall be determined to be within the limit above 50% of RATED THERMAL POWER by:

a. Calculating the ratio at least once per 7 days when the alarm is OPERABLE.

b. Calculating the ratio at least once per 12 hours during steady state operation when the alarm is inoperable.

c. Using the movable detectors to determine the QUADRANT POWER TILT RATIO at least once per 12 hours when one Power Range Channel is inoperable and THERMAL POWER is > 75 percent of RATED THERMAL POWER.

REPLACE WITH INSERT 2

(Proposed wording)

INSERT 2

4.2.4 Verify the QPTR is within the limit:

a. By calculation[(2)] at least:

1) Once per 7 days with the QPTR alarm OPERABLE, and

2) Once within 12 hours and every 12 hours thereafter with the QPTR alarm inoperable.

b. Using the movable incore detectors once within 12 hours and every 12 hours thereafter.[(3)]

---

(2) With one power range high neutron flux channel input to QPTR inoperable and THERMAL POWER less than 75 percent RTP, the remaining three power range high neutron flux channels can be used for calculating the QPTR.

(3) Only required to be performed with less than four power range high neutron flux channels input to QPTR operable with THERMAL POWER greater than or equal to 75 percent RTP.

TABLE 3.3-1 (Continued)

TABLE NOTATION

(1) Trip function may be manually bypassed in this Mode above P-10.

(2) Trip function may be manually bypassed in this Mode above P-6.

(3) With the reactor trip system breakers in the closed position and the control rod drive system capable of rod withdrawal.

ACTION STATEMENTS

ACTION 1 - With the number of OPERABLE Channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 6 hours or be in at least HOT STANDBY within the next 6 hours; however, one channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.1.1.1, provided the other channel is OPERABLE.

ACTION 2 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

REPLACE WITH INSERT 4

a. The inoperable channel is placed in the tripped condition within 6 hours,

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.1, and

c. Either, THERMAL POWER is restricted to less than or equal to 75 percent of RATED THERMAL POWER and the Power Range Neutron Flux setpoint is reduced to less than or equal to 85 percent of RATED THERMAL POWER within 4 hours; or, the QUADRANT POWER TILT RATIO is monitored at least once per 12 hours per Specification 4.2.4.c.

ACTION 3 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 setpoint.

b. Above P-6 but below 5 percent of RATED THERMAL POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 5 percent of RATED THERMAL POWER.

c. Above 5 percent of RATED THERMAL POWER, POWER OPERATION may continue.

INSERT 4

ACTION 2 - With one power range neutron flux channel inoperable,[3] perform one of the following, as applicable:

a. Power Range High Neutron Flux Channel

1. Place the inoperable channel in trip within 6 hours and reduce THERMAL POWER to less than or equal to 75 percent RATED THERMAL POWER within the next 6 hours and perform SR 4.2.4,[4] or

2. Place the inoperable channel in trip within 6 hours and perform SR 4.2.4,[4] or

3. Be in MODE 3 within 12 hours.

b. All other channels

1. Place the inoperable channel in trip within 6 hours, or

2. Be in MODE 3 within 12 hours.

---

(3) The inoperable channel may be bypassed for up to 4 hours for surveillance testing and setpoint adjustment of other channels.

(4) Only required to be performed when the power range high neutron flux channel input to QPTR is inoperable.

TABLE 3.3-1 (Continued)

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 setpoint.

b. Above P-6, operation may continue.

ACTION 5 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, verify compliance with the SHUTDOWN MARGIN requirements of Specification 3.1.1.1 or Specification 3.1.1.2, as applicable within 1 hour, and at least once per 12 hours thereafter.

ACTION 6 - Not Applicable.

ACTION 7 - With the number of OPERABLE channels[4] one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours, and

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.1.

ACTION 8 - With the number of OPERABLE channels one less than the Total Number of Channels and with the THERMAL POWER level above P-7, place the inoperable channel in the tripped condition within 6 hours; operation may continue until performance of the next required CHANNEL FUNCTIONAL TEST.

ACTION 9 - Not applicable.

ACTION 10 - Not applicable.

---

(4) An OPERABLE hot leg channel consists of: 1) three RTDs per hot leg, or 2) two RTDs per hot leg with the failed RTD disconnected and the required bias applied.

3/4.2.2 AND 3/4.2.3 HEAT FLUX AND NUCLEAR ENTHALPY HOT CHANNEL FACTORS-$F_Q(Z)$ and FN∆H (Continued)

Fuel rod bowing reduces the value of the DNB ratio. Margin has been maintained between the DNBR value used in the safety analyses (1.33) and the design limit (1.21) to offset the rod bow penalty and other penalties which may apply.

The radial peaking factor Fxy(Z) is measured periodically to provide assurance that the hot channel factor, FQ(Z), remains within its limits. The Fxy limit for Rated Thermal Power F_{xy}^{RTP} provided in the CORE OPERATING LIMITS REPORT was determined from expected power control maneuvers over the full range of burnup conditions in the core.

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR)

The quadrant power tilt ratio limit assures that the radial power distribution satisfies the design values used in the power capability analysis. Radial power distribution measurements are made during start-up testing and periodically during power operation.

The limit of 1.02 at which corrective action is required provides DNB and linear heat generation rate protection with x-y plane power tilts.

The two-hour time allowance for operation with a tilt condition greater than 1.02 but less than 1.09 is provided to allow identification and correction of a dropped or misaligned rod. In the event such action does not correct the tilt, the margin for uncertainty on FQ is reinstated by reducing the maximum allowed power by 3 percent for each percent of tilt in excess of 1.0

REPLACE WITH INSERT 3

3/4.2.5 DNB PARAMETERS

The limits on the DNB related parameters assure that each of the parameters are maintained within the normal steady state envelope of operation assumed in the transient and accident analyses. The limits are consistent with the initial FSAR assumptions and have been analytically demonstrated adequate to maintain a minimum DNBR ≥ the design DNBR limit throughout each analyzed transient.

greater than or equal to

The 12 hour periodic surveillance of these parameters through instrument readout is sufficient to ensure that the parameters are restored within their limits following load changes and other expected transient operation. The 18 month periodic measurement of the RCS total flow rate is adequate to detect flow degradation and ensure correlation of the flow indication channels with measured flow such that the indicated percent flow will provide sufficient verification of flow rate on a 12 hour basis.

INSERT 3

BACKGROUND

The Quadrant Power Tilt Ratio limit ensures that the gross radial power distribution remains consistent with the design values used in the safety analyses. Precise radial power distribution measurements are made during startup testing, after refueling, and periodically during power operation. The QPTR is routinely determined using the power range channel input which is part of the power range nuclear instrumentation (NI). The power range channel provides a protection function and has operability requirements in LCO 3.3.1. While part of the NI channel, the power range channel input to QPTR functions independently of the power range channel in monitoring radial power distribution. For this reason, if the power range channel output is inoperable, the power range channel input to QPTR may be unaffected and capable of monitoring for the QPTR.

The power density at any point in the core must be limited so that the fuel design criteria are maintained. Together, LCO 3.2.1, "AXIAL FLUX DIFFERENCE (AFD)," LCO 3.2.4, and LCO 3.1.3.6, "Control Rod Insertion Limits," provide limits on process variables that characterize and control the three dimensional power distribution of the reactor core. Control of these variables ensures that the core operates within the design criteria and that the power distribution remains within the bounds used in the safety analyses.

APPLICABLE SAFETY ANALYSES

This LCO precludes core power distributions that violate the following fuel design criteria:

a. During a large break loss of coolant accident, the peak cladding temperature must not exceed 2200°F in accordance with 10 CFR 50.46;

b. During a loss of forced reactor coolant flow accident, there must be at least 95 percent probability at the 95 percent confidence level (the 95/95 departure from nucleate boiling (DNB) criterion) that the hot fuel rod in the core does not experience a DNB condition;

c. During an ejected rod accident, the fission energy input to the fuel must not exceed 280 cal/gm in accordance with the indicated failure threshold from the TREAT results (UFSAR 14.2.6), and

d. The control rods must be capable of shutting down the reactor with a minimum required Shutdown Margin (SDM) with the highest worth control rod stuck fully withdrawn in accordance with 10 CFR 50, Appendix A, GDC 26.

APPLICABLE SAFETY ANALYSES (Continued)

The LCO limits on the AFD, the QPTR, the Heat Flux Hot Channel Factor ($F_Q(Z)$), the Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$), and control bank insertion are established to preclude core power distributions that exceed the safety analyses limits.

The QPTR limits ensure that $F^N_{\Delta H}$ and $F_Q(Z)$ remain below their limiting values by preventing an undetected change in the gross radial power distribution.

In MODE 1, the $F^N_{\Delta H}$ and $F_Q(Z)$ limits must be maintained to preclude core power distributions from exceeding design limits assumed in the safety analysis.

LCO

The QPTR limit of 1.02, at which corrective action is required, provides a margin of protection for both the DNB ratio and linear heat generation rate contributing to excessive power peaks resulting from X-Y plane power tilts. A limiting QPTR of 1.02 can be tolerated before the margin for uncertainty in $F_Q(Z)$ and ($F^N_{\Delta H}$) is possibly challenged.

APPLICABILITY

The QPTR limit must be maintained in MODE 1 with THERMAL POWER greater than 50 percent RATED THERMAL POWER (RTP) to prevent core power distributions from exceeding the design limits.

Applicability in MODE 1 less than or equal to 50 percent RTP and in other MODES is not required because there is either insufficient stored energy in the fuel or insufficient energy being transferred to the reactor coolant to require the implementation of a QPTR limit on the distribution of core power. The QPTR limit in these conditions is, therefore, not important. Note that the $F^N_{\Delta H}$ and $F_Q(Z)$ LCOs still apply, but allow progressively higher peaking factors at 50 percent RTP or lower.

ACTION

a. With the QPTR exceeding its limit, a power level reduction of 3 percent RTP for each 1 percent by which the QPTR exceeds 1.00 is a conservative tradeoff of total core power with peak linear power. The completion time of 2 hours

INSERT 3 (Continued)

ACTION (Continued)

allows sufficient time to identify the cause and correct the tilt. Note that the power reduction itself may cause a change in the tilted condition.

b. After completion of ACTION a, the QPTR alarm may still be in its alarmed state. As such, any additional changes in the QPTR are detected by requiring a check of the QPTR once per 12 hours thereafter. If the QPTR continues to increase, THERMAL POWER has to be reduced accordingly. A 12 hour completion time is sufficient because any additional change in QPTR would be relatively slow.

c. The peaking factors $F^N_{\Delta H}$ and $F_Q(Z)$ are of primary importance in ensuring that the power distribution remains consistent with the initial conditions used in the safety analyses. Performing surveillances on $F^N_{\Delta H}$ and $F_Q(Z)$ within the completion time of 24 hours ensures that these primary indicators of power distribution are within their respective limits. A completion time of 24 hours takes into consideration the rate at which peaking factors are likely to change, and the time required to stabilize the plant and perform a flux map. If these peaking factors are not within their limits, the actions provide an appropriate response for the abnormal condition. If the QPTR remains above its specified limit, the peaking factor surveillances are required each 7 days thereafter to evaluate $F^N_{\Delta H}$ and $F_Q(Z)$ with changes in power distribution. Relatively small changes are expected due to either burnup and xenon redistribution or correction of the cause for exceeding the QPTR limit.

d. Although $F^N_{\Delta H}$ and $F_Q(Z)$ are of primary importance as initial conditions in the safety analyses, other changes in the power distribution may occur as the QPTR limit is exceeded and may have an impact on the validity of the safety analysis. A change in the power distribution can affect such reactor parameters as bank worths and peaking factors for rod malfunction accidents. When the QPTR exceeds its limit, it does not necessarily mean a safety concern exists. It does mean that there is an indication of a change in the gross radial power distribution that requires an investigation and evaluation that is accomplished by examining the incore power distribution. Specifically, the core peaking factors and the quadrant tilt must be evaluated because they are the factors that best characterize the core power distribution. This re-evaluation is required to ensure that, before increasing THERMAL POWER to above the limit of ACTION a or b, the reactor core conditions are consistent with the assumptions in the safety analyses.

INSERT 3 (Continued)

ACTION (Continued)

e. If the QPTR has exceeded the 1.02 limit and a re-evaluation of the safety analysis is completed and shows that safety requirements are met, the excore detectors are normalized to show a QPTR less than or equal to 1.02 prior to increasing THERMAL POWER to above the limit of ACTION a or b. This is done to detect any subsequent significant changes in QPTR.

This action assures that the indicated QPT is not normalized until after the re-evaluation of the safety analysis has determined that core conditions at RTP are within the safety analysis assumptions (i.e., ACTION d). This is intended to prevent any ambiguity about the required sequence of actions.

f. Once the flux tilt is normalized (i.e., ACTION e is performed), it is acceptable to return to full power operation. However, as an added check that the core power distribution at RTP is consistent with the safety analysis assumptions, ACTION f requires verification that $F_Q(Z)$ and $F^N_{\Delta H}$ are within their specified limits within 24 hours of reaching RTP. As an added precaution, if the core power does not reach RTP within 24 hours, but is increased slowly, then the peaking factor surveillances must be performed within 48 hours of the time when the ascent to power was begun. These completion times are intended to allow adequate time to increase THERMAL POWER to above the limit of ACTION a or b, while not permitting the core to remain with unconfirmed power distributions for extended periods of time.

This action assures that the peaking factor surveillances may only be done after the excore detectors have been normalized to show a tilt less than or equal to 1.02 (i.e., ACTION e). The intent of this is to have the peaking factor surveillances performed at operating power levels, which can only be accomplished after the excore detectors are normalized to show a tilt less than or equal to 1.02 and the core returned to power.

g. If ACTIONS a through f are not completed within their associated completion times, the unit must be brought to a MODE or condition in which the requirements do not apply. To achieve this status, THERMAL POWER must be reduced to less than 50 percent RTP within 4 hours. The allowed completion time of 4 hours is reasonable, based on operating experience regarding the amount of time required to reach the reduced power level without challenging plant systems.

INSERT 3 (Continued)

SURVEILLANCE REQUIREMENTS (SR)

SR 4.2.4.a

SR 4.2.4.a is modified by a Note that allows QPTR to be calculated with three power range high neutron flux channels that input to QPTR if THERMAL POWER is less than 75 percent RTP and one power range high neutron flux channel is inoperable.

This surveillance verifies that the QPTR, as indicated by the Nuclear Instrumentation System (NIS) channels, excore channels, is within its limits. The frequency of 7 days when the QPTR alarm is OPERABLE is acceptable because of the low probability that this alarm can remain inoperable without detection.

When the QPTR alarm is inoperable, the frequency is increased to 12 hours. This frequency is adequate to detect any relatively slow changes in QPTR, because for those causes of QPT that occur quickly (e.g., a dropped rod), there typically are other indications of abnormality that prompt a verification of core power tilt.

SR 4.2.4.b

This surveillance is modified by a Note, which states that it is required only when less than four power range high neutron flux channels input to QPTR are operable and the THERMAL POWER is greater than or equal to 75 percent RTP.

With an excore detector inoperable, tilt monitoring for a portion of the reactor core becomes degraded. Large tilts are likely detected with the remaining channels, but the capability for detection of small power tilts in some quadrants is decreased. Performing SR 4.2.4.b at a frequency of 12 hours provides an accurate alternative means for ensuring that any tilt remains within its limits.

For purposes of monitoring the QPTR when one excore detector is inoperable, the moveable incore detectors are used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR and any previous data indicating a tilt. The incore detector monitoring is performed with a full incore flux map or a partial core flux map with quarter core symmetry detailed in accordance with controlled procedures.

The symmetric thimble flux map can be used to generate symmetric thimble "tilt." This can be compared to a reference symmetric thimble tilt, from the most recent full core flux map, to generate an incore QPTR. Therefore, the symmetric thimble flux map can be used to confirm that QPTR is within limits.

INSERT 3 (Continued)

SURVEILLANCE REQUIREMENTS (SR) (Continued)

With one excore detector inoperable, the indicated tilt may be changed from the value indicated with all four channels OPERABLE. To confirm that no change in tilt has actually occurred, which might cause the QPTR limit to be exceeded, the incore results may be compared against previous flux maps either using the symmetric thimbles as described above or a complete flux map. Nominally, quadrant tilt from the surveillance should be within 2 percent of the tilt shown by the most recent flux map data.

3/4.3.1 and 3/4.3.2 PROTECTIVE AND ENGINEERED SAFETY FEATURES (ESF) INSTRUMENTATION (Continued)

valves. When sequential operation of the RWST and VCT valves is not included in the response times (Note *), the values specified are based on the LOCA analyses. The LOCA analyses take credit for injection flow regardless of the source. Verification of the response times specified in Table 3.3-5 will assure that the assumptions used for the LOCA and Non-LOCA analyses with respect to operation of the VCT and RWST valves are valid.

Response time may be demonstrated by any series of sequential, overlapping or total channel test measurements provided that such tests demonstrate the total channel response time as defined. Sensor response time verification may be demonstrated by either 1) in place, onsite or offsite test measurements or 2) utilizing replacement sensors with certified response times.

The Engineered Safety Feature Actuation System interlocks perform the following functions:

P-4 Reactor tripped - Actuates turbine trip, closes main feedwater valves on Tavg below setpoint, prevents the opening of the main feedwater valves which were closed by a safety injection or high steam generator water level signal, allows safety injection block so that components can be reset or tripped. Reactor not tripped - prevents manual block of safety injection.

P-11 Above the setpoint P-11 automatically reinstates safety injection actuation on Low pressurizer pressure, automatically blocks steamline isolation on high steam pressure rate, enables safety injection and steamline isolation on low steamline pressure (with Loop Stop Valves Open), and enables auto actuation of the pressurizer PORVs.

Below the setpoint P-11 allows the manual block of safety injection actuation on low pressurizer pressure, allows manual block of safety injection and steamline isolation on Low steamline pressure (with Loop Stop Valves Open) and enabling steamline isolation on high steam pressure rate, automatically disables auto actuation of the pressurizer PORV's unless the Reactor Vessel Over Pressure Protection System is in service.

P-12 Above the setpoint P-12 automatically reinstates an arming signal to the steam dump system. Below the setpoint P-12 blocks steam dump and allows manual bypass of the steam dump block to cooldown condenser dump valves.

INSERT 5

(Proposed Wording)

INSERT 5

Table 3.3-1 Action 2 has been modified by two notes. Note (3) allows placing the inoperable channel in the bypass condition for up to 4 hours while performing: a) routine surveillance testing of other channels, and b) setpoint adjustments of other channels when required to reduce the setpoint in accordance with other technical specifications. The 4 hour time limit is justified in accordance with WCAP-10271-P-A, Supplement 2, Revision 1, June 1990. Note (4) only requires SR 4.2.4.b to be performed if a Power Range High Neutron Flux channel input to QPTR becomes inoperable. Failure of a component in the Power Range High Neutron Flux channel which renders the High Neutron Flux trip function inoperable may not affect the capability to monitor QPTR. As such, determining QPTR using the movable incore detectors once per 12 hours may not be necessary.

ATTACHMENT A-2

Beaver Valley Power Station, Unit No. 2
Proposed Technical Specification Change No. 78

The following is a list of the affected pages:

Affected Pages:

1-3
3/4 2-9
3/4 2-10
3/4 3-5
3/4 3-6
B 3/4 2-5
B 3/4 3-3

DEFINITIONS

IDENTIFIED LEAKAGE

1.14 IDENTIFIED LEAKAGE shall be:

a. Leakage (except CONTROLLED LEAKAGE) into closed systems, such as pump seal or valve packing leaks that are captured and conducted to a sump or collecting tank, or

b. 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

c. Reactor Coolant System leakage through a steam generator to the secondary system.

UNIDENTIFIED LEAKAGE

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

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 (QPTR)

1.18 ~~QUADRANT POWER TILT RATIO~~ QPTR 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 (μCi/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)

QUADRANT POWER TILT RATIO (QPTR)

LIMITING CONDITION FOR OPERATION

3.2.4 THE QUADRANT POWER TILT RATIO shall ~~not exceed~~ be less than or equal to 1.02.

APPLICABILITY: MODE 1 ~~above~~ greater than 50 percent ~~OF~~ of RATED THERMAL POWER~~*~~(1).

ACTION:

REPLACE WITH INSERT 1

a. With the QUADRANT POWER TILT RATIO determined to exceed 1.02 but ≤ 1.09:

1. Within 2 hours:

a) Either reduce the QUADRANT POWER TILT RATIO to within its limit, or

b) Reduce THERMAL POWER at least 3 percent for each 1 percent of indicated QUADRANT POWER TILT RATIO in excess of 1.0 and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours.

2. Verify that the QUADRANT POWER TILT RATIO is within its limit within 24 hours after exceeding the limit or reduce THERMAL POWER to less than 50 percent of RATED THERMAL POWER within the next 2 hours and reduce the Power Range Neutron Flux-High Trip setpoints to ≤ 55% of RATED THERMAL POWER within the next 4 hours.

3. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50 percent of RATED THERMAL power may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour until verified acceptable at 95% or greater RATED THERMAL POWER.

b. With the QUADRANT POWER TILT RATIO determined to exceed 1.09 due to misalignment of either a shutdown or control rod:

1. Reduce THERMAL POWER at least 3 percent for each 1 percent of indicated QUADRANT POWER TILT RATIO in excess of 1.0, within 30 minutes.

2. Verify that the QUADRANT POWER TILT RATIO is within its limit within 2 hours after exceeding the limit or recuce THERMAL POWER to less than 50 percent of RATED THERMAL POWER within the next 2 hours and reduce the Power Range Neutron Flux-High Trip Setpoints to ≤ 55 percent of RATED THERMAL POWER within the next 4 hours.

---

(1) ~~*~~See Special Test Exception 3.10.2

(Proposed Wording)

INSERT 1

ACTION: With the QPTR not within the limit:

a. Within 2 hours, reduce THERMAL POWER greater than or equal to 3 percent from RATED THERMAL POWER (RTP) for each 1 percent of QPTR greater than 1.00, and

b. Within 12 hours and once per 12 hours thereafter, perform Surveillance Requirement 4.2.4 and reduce THERMAL POWER greater than or equal to 3 percent from RTP for each 1 percent of QPTR greater than 1.00, and

c. Within 24 hours and once per 7 days thereafter, perform Surveillance Requirements 4.2.2.2 and 4.2.3.1, and

d. Prior to increasing THERMAL POWER above the limit of ACTION a or b above, re-evaluate the safety analyses and confirm the results remain valid for the duration of operation under this condition, and

e. After ACTION d above is completed and prior to increasing THERMAL POWER above the limit of ACTION a or b above, normalize the excore detectors to show a QPTR less than or equal to 1.02, and

f. After ACTION e above is completed and within 24 hours after reaching RTP or within 48 hours after increasing THERMAL POWER above the limit of ACTION a or b above, perform Surveillance Requirements 4.2.2.2 and 4.2.3.1.

g. Otherwise, reduce THERMAL POWER to less than or equal to 50 percent RTP within 4 hours.

LIMITING CONDITION FOR OPERATION (Continued)

REPLACE WITH INSERT 1

3. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50 percent of RATED THERMAL POWER may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour until verified acceptable at 95% or greater RATED THERMAL POWER.

c. With the QUADRANT POWER TILT RATIO determined to exceed 1.09 due to causes other than the misalignment of either a shutdown or control rod:

1. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 2 hours and reduce the Power Range Neutron Flux-High Trip Setpoints to ≤ 55% of RATED THERMAL POWER within the next 4 hours.

2. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER; subsequent POWER OPERATION above 50 percent of RATED THERMAL POWER may proceed provided that the QUADRANT POWER TILT RATIO is verified within its limit at least once per hour until verified at 95% or greater RATED THERMAL POWER.

SURVEILLANCE REQUIREMENTS

4.2.4 The QUADRANT POWER TILT RATIO shall be determined to be within the limit above 50% of RATED THERMAL POWER by:

a. Calculating the ratio at least once per 7 days when the alarm is OPERABLE.

b. Calculating the ratio at least once per 12 hours during steady state operation when the alarm is inoperable.

c. Using the movable detectors to determine the QUADRANT POWER TILT RATIO at least once per 12 hours when one Power Range Channel is inoperable and THERMAL POWER is > 75 percent of RATED THERMAL POWER.

REPLACE WITH INSERT 2

(Proposed Wording)

INSERT 2

4.2.4 Verify the QPTR is within the limit:

a. By calculation[2] at least:

1) Once per 7 days with the QPTR alarm OPERABLE, and

2) Once within 12 hours and every 12 hours thereafter with the QPTR alarm inoperable.

b. Using the movable incore detectors once within 12 hours and every 12 hours thereafter.[3]

---

(2) With one power range high neutron flux channel input to QPTR inoperable and THERMAL POWER less than 75 percent RTP, the remaining three power range high neutron flux channels can be used for calculating the QPTR.

(3) Only required to be performed with less than four power range high neutron flux channels input to QPTR operable with THERMAL POWER greater than or equal to 75 percent RTP.

TABLE 3.3-1 (Continued)

TABLE NOTATION

(1) Trip function may be manually bypassed in this Mode above P-10.

(2) Trip function may be manually bypassed in this Mode above P-6.

(3) With the reactor trip system breakers in the closed position and the control rod drive system capable of rod withdrawal.

ACTION STATEMENTS

ACTION 1 - With the number of OPERABLE Channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 6 hours or be in at least HOT STANDBY within the next 6 hours; however, one channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.1.1.1, provided the other channel is OPERABLE.

ACTION 2 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

REPLACE WITH INSERT 4

a. The inoperable channel is placed in the tripped condition within 6 hours,

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.1, and

c. Either, THERMAL POWER is restricted to less than or equal to 75 percent of RATED THERMAL POWER and the Power Range Neutron Flux setpoint is reduced to less than or equal to 85 percent of RATED THERMAL POWER within 4 hours; or, the QUADRANT POWER TILT RATIO is monitored at least once per 12 hours per Specification 4.2.4.c.

ACTION 3 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 setpoint.

b. Above P-6 but below 5 percent of RATED THERMAL POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 5 percent of RATED THERMAL POWER.

c. Above 5 percent of RATED THERMAL POWER, POWER OPERATION may continue.

(Proposed Wording)

INSERT 4

ACTION 2 - With one power range neutron flux channel inoperable,[3] perform one of the following, as applicable:

a. Power Range High Neutron Flux Channel

1. Place the inoperable channel in trip within 6 hours and reduce THERMAL POWER to less than or equal to 75 percent RATED THERMAL POWER within the next 6 hours and perform SR 4.2.4,[4], or

2. Place the inoperable channel in trip within 6 hours and perform SR 4.2.4,[4] or

3. Be in MODE 3 within 12 hours.

b. All other channels

1. Place the inoperable channel in trip within 6 hours, or

2. Be in MODE 3 within 12 hours.

---

(3) The inoperable channel may be bypassed for up to 4 hours for surveillance testing and setpoint adjustment of other channels.

(4) Only required to be performed when the power range high neutron flux channel input to QPTR is inoperable.

TABLE 3.3-1 (Continued)

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below P-6, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 setpoint and suspend positive reactivity operations.

b. Above P-6, operation may continue.

ACTION 5 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or open the Reactor Trip System breakers, suspend all operations involving positive reactivity changes and verify Valve 2CHS-91 is closed and secured in position within the next hour.

ACTION 6 - This Action is not used.

ACTION 7 - With the number of OPERABLE channels[5] one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours, and

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.1.

ACTION 8 - With the number of OPERABLE channels one less than the Total Number of Channels and with the THERMAL POWER level above P-9, place the inoperable channel in the tripped condition within 6 hours; operation may continue until performance of the next required CHANNEL FUNCTIONAL TEST.

ACTION 9 - This Action is not used.

ACTION 10 - This Action is not used.

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(5) An OPERABLE hot leg channel consists of: 1) three RTDs per hot leg, or 2) two RTDs per hot leg with the failed RTD disconnected and the required bias applied.

(Proposed Wording)

3/4.2.4 QUADRANT POWER TILT RATIO (QPTR)

The Quadrant Power Tilt Ratio limit assures that the radial power distribution satisfies the design values used in the power capability analysis.

Radial power distribution measurements are made during startup testing and periodically during power operation.

The limit of 1.02 at which corrective action is required provides DNB and linear heat generation rate protection with x-y plane power tilts.

The two-hour time allowance for operation with a tilt condition greater than 1.02 but less than 1.09 is provided to allow identification and correction of a dropped or misaligned rod. In the event such action does not correct the tilt, the margin for uncertainly on F_Q is reinstated by reducing the maximum allowed power by 3 percent for each percent of tilt in excess of 1.0.

REPLACE WITH: INSERT 3

3/4.2.5 DNB PARAMETER

The limits on the DNB related parameters assure that each of the parameters are maintained within the normal steady state envelope of operation assumed in the transient and accident analyses. The limits are consistent with the initial FSAR assumptions and have been analytically demonstrated adequate to maintain a minimum DNBR greater than or equal to the design DNBR limit throughout each analyzed transient.

The 12 hour periodic surveillance of these parameters through instrument readout is sufficient to ensure that the parameters are restored within their limits following load changes and other expected transient operation. The 18 month periodic measurement of the RCS total flow rate is adequate to detect flow degradation and ensure correlation of the flow indication channels with measured flow such that the indicated percent flow will provide sufficient verification of flow rate on a 12 hour basis.

(Proposed Wording)

INSERT 3

BACKGROUND

The Quadrant Power Tilt Ratio limit ensures that the gross radial power distribution remains consistent with the design values used in the safety analyses. Precise radial power distribution measurements are made during startup testing, after refueling, and periodically during power operation. The QPTR is routinely determined using the power range channel input which is part of the power range nuclear instrumentation (NI). The power range channel provides a protection function and has operability requirements in LCO 3.3.1. While part of the NI channel, the power range channel input to QPTR functions independently of the power range channel in monitoring radial power distribution. For this reason, if the power range channel output is inoperable, the power range channel input to QPTR may be unaffected and capable of monitoring for the QPTR.

The power density at any point in the core must be limited so that the fuel design criteria are maintained. Together, LCO 3.2.1, "AXIAL FLUX DIFFERENCE (AFD)," LCO 3.2.4, and LCO 3.1.3.6, "Control Rod Insertion Limits," provide limits on process variables that characterize and control the three dimensional power distribution of the reactor core. Control of these variables ensures that the core operates within the design criteria and that the power distribution remains within the bounds used in the safety analyses.

APPLICABLE SAFETY ANALYSES

This LCO precludes core power distributions that violate the following fuel design criteria:

a. During a large break loss of coolant accident, the peak cladding temperature must not exceed 2200°F in accordance with 10 CFR 50.46;

b. During a loss of forced reactor coolant flow accident, there must be at least 95 percent probability at the 95 percent confidence level (the 95/95 departure from nucleate boiling (DNB) criterion) that the hot fuel rod in the core does not experience a DNB condition;

c. During an ejected rod accident, the fission energy input to the fuel must not exceed 280 cal/gm in accordance with the indicated failure threshold from the TREAT results (UFSAR 15.4.8), and

d. The control rods must be capable of shutting down the reactor with a minimum required Shutdown Margin (SDM) with the highest worth control rod stuck fully withdrawn in accordance with 10 CFR 50, Appendix A, GDC 26.

INSERT 3 (Continued)

APPLICABLE SAFETY ANALYSES (Continued)

The LCO limits on the AFD, the QPTR, the Heat Flux Hot Channel Factor ($F_Q(Z)$), the Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$), and control bank insertion are established to preclude core power distributions that exceed the safety analyses limits.

The QPTR limits ensure that $F^N_{\Delta H}$ and $F_Q(Z)$ remain below their limiting values by preventing an undetected change in the gross radial power distribution.

In MODE 1, the $F^N_{\Delta H}$ and $F_Q(Z)$ limits must be maintained to preclude core power distributions from exceeding design limits assumed in the safety analysis.

LCO

The QPTR limit of 1.02, at which corrective action is required, provides a margin of protection for both the DNB ratio and linear heat generation rate contributing to excessive power peaks resulting from X-Y plane power tilts. A limiting QPTR of 1.02 can be tolerated before the margin for uncertainty in $F_Q(Z)$ and ($F^N_{\Delta H}$) is possibly challenged.

APPLICABILITY

The QPTR limit must be maintained in MODE 1 with THERMAL POWER greater than 50 percent RATED THERMAL POWER (RTP) to prevent core power distributions from exceeding the design limits.

Applicability in MODE 1 less than or equal to 50 percent RTP and in other MODES is not required because there is either insufficient stored energy in the fuel or insufficient energy being transferred to the reactor coolant to require the implementation of a QPTR limit on the distribution of core power. The QPTR limit in these conditions is, therefore, not important. Note that the $F^N_{\Delta H}$ and $F_Q(Z)$ LCOs still apply, but allow progressively higher peaking factors at 50 percent RTP or lower.

ACTIONS

a. With the QPTR exceeding its limit, a power level reduction of 3 percent RTP for each 1 percent by which the QPTR exceeds 1.00 is a conservative tradeoff of total core power with peak linear power. The completion time of 2 hours allows sufficient time to identify the cause and correct the

APPLICABLE SAFETY ANALYSES (Continued)

The LCO limits on the AFD, the QPTR, the Heat Flux Hot Channel Factor ($F_Q(Z)$), the Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$), and control bank insertion are established to preclude core power distributions that exceed the safety analyses limits.

The QPTR limits ensure that $F^N_{\Delta H}$ and $F_Q(Z)$ remain below their limiting values by preventing an undetected change in the gross radial power distribution.

In MODE 1, the $F^N_{\Delta H}$ and $F_Q(Z)$ limits must be maintained to preclude core power distributions from exceeding design limits assumed in the safety analysis.

LCO

The QPTR limit of 1.02, at which corrective action is required, provides a margin of protection for both the DNB ratio and linear heat generation rate contributing to excessive power peaks resulting from X-Y plane power tilts. A limiting QPTR of 1.02 can be tolerated before the margin for uncertainty in $F_Q(Z)$ and ($F^N_{\Delta H}$) is possibly challenged.

APPLICABILITY

The QPTR limit must be maintained in MODE 1 with THERMAL POWER greater than 50 percent RATED THERMAL POWER (RTP) to prevent core power distributions from exceeding the design limits.

Applicability in MODE 1 less than or equal to 50 percent RTP and in other MODES is not required because there is either insufficient stored energy in the fuel or insufficient energy being transferred to the reactor coolant to require the implementation of a QPTR limit on the distribution of core power. The QPTR limit in these conditions is, therefore, not important. Note that the $F^N_{\Delta H}$ and $F_Q(Z)$ LCOs still apply, but allow progressively higher peaking factors at 50 percent RTP or lower.

ACTION

a. With the QPTR exceeding its limit, a power level reduction of 3 percent RTP for each 1 percent by which the QPTR exceeds 1.00 is a conservative tradeoff of total core power with peak linear power. The completion time of 2 hours allows sufficient time to identify the cause and correct the

ACTION (Continued)

tilt. Note that the power reduction itself may cause a change in the tilted condition.

b. After completion of ACTION a, the QPTR alarm may still be in its alarmed state. As such, any additional changes in the QPTR are detected by requiring a check of the QPTR once per 12 hours thereafter. If the QPTR continues to increase, THERMAL POWER has to be reduced accordingly. A 12 hour completion time is sufficient because any additional change in QPTR would be relatively slow.

c. The peaking factors $F^N_{\Delta H}$ and $F_Q(Z)$ are of primary importance in ensuring that the power distribution remains consistent with the initial conditions used in the safety analyses. Performing surveillances on $F^N_{\Delta H}$ and $F_Q(Z)$ within the completion time of 24 hours ensures that these primary indicators of power distribution are within their respective limits. A completion time of 24 hours takes into consideration the rate at which peaking factors are likely to change, and the time required to stabilize the plant and perform a flux map. If these peaking factors are not within their limits, the actions provide an appropriate response for the abnormal condition. If the QPTR remains above its specified limit, the peaking factor surveillances are required each 7 days thereafter to evaluate $F^N_{\Delta H}$ and $F_Q(Z)$ with changes in power distribution. Relatively small changes are expected due to either burnup and xenon redistribution or correction of the cause for exceeding the QPTR limit.

d. Although $F^N_{\Delta H}$ and $F_Q(Z)$ are of primary importance as initial conditions in the safety analyses, other changes in the power distribution may occur as the QPTR limit is exceeded and may have an impact on the validity of the safety analysis. A change in the power distribution can affect such reactor parameters as bank worths and peaking factors for rod malfunction accidents. When the QPTR exceeds its limit, it does not necessarily mean a safety concern exists. It does mean that there is an indication of a change in the gross radial power distribution that requires an investigation and evaluation that is accomplished by examining the incore power distribution. Specifically, the core peaking factors and the quadrant tilt must be evaluated because they are the factors that best characterize the core power distribution. This re-evaluation is required to ensure that, before increasing THERMAL POWER to above the limit of ACTION a or b, the reactor core conditions are consistent with the assumptions in the safety analyses.

ACTION (Continued)

e. If the QPTR has exceeded the 1.02 limit and a re-evaluation of the safety analysis is completed and shows that safety requirements are met, the excore detectors are normalized to show a QPTR less than or equal to 1.02 prior to increasing THERMAL POWER to above the limit of ACTION a or b. This is done to detect any subsequent significant changes in QPTR.

This action assures that the indicated QPT is not normalized until after the re-evaluation of the safety analysis has determined that core conditions at RTP are within the safety analysis assumptions (i.e., ACTION d). This is intended to prevent any ambiguity about the required sequence of actions.

f. Once the flux tilt is normalized (i.e., ACTION e is performed), it is acceptable to return to full power operation. However, as an added check that the core power distribution at RTP is consistent with the safety analysis assumptions, ACTION f requires verification that $F_Q(Z)$ and $F^N_{\Delta H}$ are within their specified limits within 24 hours of reaching RTP. As an added precaution, if the core power does not reach RTP within 24 hours, but is increased slowly, then the peaking factor surveillances must be performed within 48 hours of the time when the ascent to power was begun. These completion times are intended to allow adequate time to increase THERMAL POWER to above the limit of ACTION a or b, while not permitting the core to remain with unconfirmed power distributions for extended periods of time.

This action assures that the peaking factor surveillances may only be done after the excore detectors have been normalized to show a tilt less than or equal to 1.02 (i.e., ACTION e). The intent of this is to have the peaking factor surveillances performed at operating power levels, which can only be accomplished after the excore detectors are normalized to show a tilt less than or equal to 1.02 and the core returned to power.

g. If ACTIONS a through f are not completed within their associated completion times, the unit must be brought to a MODE or condition in which the requirements do not apply. To achieve this status, THERMAL POWER must be reduced to less than 50 percent RTP within 4 hours. The allowed completion time of 4 hours is reasonable, based on operating experience regarding the amount of time required to reach the reduced power level without challenging plant systems.

INSERT 3 (Continued)

SURVEILLANCE REQUIREMENTS (SR)

SR 4.2.4.a

SR 4.2.4.a is modified by a Note that allows QPTR to be calculated with three power range high neutron flux channels that input to QPTR if THERMAL POWER is less than 75 percent RTP and one power range high neutron flux channel is inoperable.

This surveillance verifies that the QPTR, as indicated by the Nuclear Instrumentation System (NIS) channels, excore channels, is within its limits. The frequency of 7 days when the QPTR alarm is OPERABLE is acceptable because of the low probability that this alarm can remain inoperable without detection.

When the QPTR alarm is inoperable, the frequency is increased to 12 hours. This frequency is adequate to detect any relatively slow changes in QPTR, because for those causes of QPT that occur quickly (e.g., a dropped rod), there typically are other indications of abnormality that prompt a verification of core power tilt.

SR 4.2.4.b

This surveillance is modified by a Note, which states that it is required only when less than four power range high neutron flux channels input to QPTR are operable and the THERMAL POWER is greater than or equal to 75 percent RTP.

With an excore detector inoperable, tilt monitoring for a portion of the reactor core becomes degraded. Large tilts are likely detected with the remaining channels, but the capability for detection of small power tilts in some quadrants is decreased. Performing SR 4.2.4.b at a frequency of 12 hours provides an accurate alternative means for ensuring that any tilt remains within its limits.

For purposes of monitoring the QPTR when one excore detector is inoperable, the moveable incore detectors are used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR and any previous data indicating a tilt. The incore detector monitoring is performed with a full incore flux map or a partial core flux map with quarter core symmetry detailed in accordance with controlled procedures.

The symmetric thimble flux map can be used to generate symmetric thimble "tilt." This can be compared to a reference symmetric thimble tilt, from the most recent full core flux map, to generate an incore QPTR. Therefore, the symmetric thimble flux map can be used to confirm that QPTR is within limits.

SURVEILLANCE REQUIREMENTS (SR) (Continued)

With one excore detector inoperable, the indicated tilt may be changed from the value indicated with all four channels OPERABLE. To confirm that no change in tilt has actually occurred, which might cause the QPTR limit to be exceeded, the incore results may be compared against previous flux maps either using the symmetric thimbles as described above or a complete flux map. Nominally, quadrant tilt from the surveillance should be within 2 percent of the tilt shown by the most recent flux map data.