ENCLOSURE 2

VOLUME 7

SEQUOYAH NUCLEAR PLANT
UNIT 1 AND UNIT 2

IMPROVED TECHNICAL SPECIFICATIONS CONVERSION

ITS SECTION 3.2
POWER DISTRIBUTION LIMITS

Revision 0

LIST OF ATTACHMENTS

1. **ITS 3.2.1, – Heat Flux Hot Channel Factor ($F_Q(X,Y, Z)$)**
2. **ITS 3.2.2, – Nuclear Enthalpy Rise Hot Channel Factor ($F_{\Delta H}(X, Y)$)**
3. **ITS 3.2.3 – Axial Flux Difference (AFD)**
4. **ITS 3.2.4 – Quadrant Power Tilt Ratio (QPTR)**

ATTACHMENT 1

ITS 3.2.1, HEAT FLUX HOT CHANNEL FACTOR (F_Q(X,Y,Z))

Current Technical Specification (CTS) Markup and Discussion of Changes (DOCs)

A01

POWER DISTRIBUTION LIMITS

3/4.2.2 HEAT FLUX HOT CHANNEL FACTOR-$F_Q(X,Y,Z)$

LIMITING CONDITION FOR OPERATION

LCO 3.2.1 3.2.2 $F_Q(X,Y,Z)$ shall be maintained within the acceptable limits specified in the COLR:

Applicability APPLICABILITY: MODE 1

ACTION:

Add proposed ACTION A Note M01

ACTION A With ~~$F_Q(X,Y,Z)$~~ exceeding its steady state limit:

$F_Q^C(X,Y,Z)$ A02

Required Action A.1 a. Reduce THERMAL POWER at least 1% for each 1% ~~$F_Q(X,Y,Z)$~~ exceeds the limit within 15 minutes after each $F_Q(X,Y,Z)$ determination, and similarly reduce the following:

M02

Required Action A.2 1. Administratively reduce the allowable power at each point along the AFD limit lines within 2 hours, and

Required Action A.4 2. The Power Range Neutron Flux-High Trip Setpoints within the next ~~4~~ 72 hours after each $F_Q(X,Y,Z)$ determination.

L01 M02

Required Action A.3 b. POWER OPERATION may proceed for up to 48 hours. Subsequent POWER OPERATION may proceed provided the Overpower Delta T Trip Setpoints ~~(value of K_4)~~ have been reduced at least 1% ~~(in ΔT span)~~ for each 1% that ~~$F_Q(X,Y,Z)$~~ exceeds the limit specified in the COLR.

LA01

$F_Q^C(X,Y,Z)$ A02

Required Action A.5 c. Identify and correct the cause of the out-of-limit condition prior to increasing THERMAL POWER above the reduced limit required by Action a. and b., above; THERMAL POWER may then be increased provided ~~$F_Q(X,Y,Z)$~~ is demonstrated ~~through incore mapping~~ to be within its limits.

LA02

Add proposed ACTION D M03

SURVEILLANCE REQUIREMENTS

SR NOTE 4.2.2.1 The provisions of Specification 4.0.4 are not applicable.

M04

April 21, 1997
Amendment No. 19, 95, 140,
155, 223

A01

ITS

ITS 3.2.1

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.2.1.2
SR 3.2.1.3

4.2.2.2 $F_Q^M(X,Y,Z)$ shall be evaluated to determine if F_Q(X,Y,Z) is within its limit by:

~~a. Using the moveable incore detectors to obtain a power distribution map ($F_Q^M(X,Y,Z)$ *) at any THERMAL POWER greater than 5% of RATED THERMAL POWER.~~

~~b. Satisfying the following relationship:~~

~~($F_Q^M(X,Y,Z)$ ≤ BQNOM(X,Y,Z)~~

~~where BQNOM (X,Y,Z)** represents the nominal design increased by an allowance for the expected deviation between the nominal design and the measurement.~~

~~The BQNOM (X,Y,Z) factors are not applicable in the following core plane regions as measured in percent of core height from the bottom of the fuel:~~

~~1. Lower core region from 0 to 15%, inclusive.~~

~~2. Upper core region from 85 to 100%, inclusive.~~

LA03

c. If the above relationship is not satisfied, then

1. For that location, calculate the % margin to the maximum allowable design as follows:

SR 3.2.1.2

$$\%\ \text{AFD Margin} = \left(1 - \frac{F_Q^M(X,Y,Z)}{\text{BQDES}(X,Y,Z)}\right) \text{x } 100\%$$

LA03

SR 3.2.1.3

$$\%\ f_2(\Delta I)\ \text{Margin} = \left(1 - \frac{F_Q^M(X,Y,Z)}{\text{BCDES}(X,Y,Z)}\right) \text{x } 100\%$$

~~where BQDES(X,Y,Z)** and BCDES(X,Y,Z)** represent the maximum allowable design peaking factors which insure that the licensing criteria will be preserved for operation within Limiting Condition for Operation limits, and include allowances for the calculational and measurement uncertainties.~~

LA03

~~* No additional uncertainties are required in the following equations for $F_Q^M(X,Y,Z)$, because the limits include uncertainties.~~

~~** BQNOM (X,Y,Z), BQDES(X,Y,Z), and BCDES(X,Y,Z) Data bases are provided for input to the plant power distribution analysis computer codes on a cycle specific basis and are determined using the methodology for core limit generation described in the references in Specification 6.9.1.14.~~

LA03

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

~~2. Find the minimum margin of all locations examined in 4.2.2.2.c.1 above.~~

~~AFD min margin = minimum % margin value of all locations examined.~~

~~$f_2(\Delta I)$ OPΔT min margin = minimum % margin value of all locations examined.~~

LA03

ACTION B

3. If the AFD min margin in 4.2.2.2.c.2 above is <0, either the following actions shall be taken, ~~or the action statements for 3.2.2 shall be followed.~~

M05

REQUIRED ACTION B.2

(a) Within 2 hours, administratively reduce the negative AFD limit lines at each power level by:

~~Reduced AFD^{Limit} = (AFD^{Limit} from COLR) + absolute value of ($NSLOPE^{AFD*}$ % x AFD min margin of 4.2.2.2.c.2)~~

LA03

REQUIRED ACTION B.1

(b) Within 2 hours, administratively reduce the positive AFD limit lines at each power level by:

~~Reduced AFD^{Limit} = (AFD^{Limit} from COLR) absolute value of ($PSLOPE^{AFD*}$ % X AFD min margin)~~

LA03

ACTION C

4. If the $f_2(\Delta I)$ min margin in 4.2.2.2.c.2 above is <0, either the following actions shall be taken, ~~or the action statements for 3.2.2 shall be followed.~~

M05

REQUIRED ACTION C.2

(a) Within 48 hours, reduce the OPΔT negative $f_2(\Delta I)$ breakpoint limit by:

~~Reduced OPΔT negative $f_2(\Delta I)$ breakpoint limit = ($f_2(\Delta I)$ limit of Table 2.2-1) + absolute value of~~

~~($NSLOPE^{f_2(\Delta I)**}$ % x $f_2(\Delta I)$ min margin)~~

LA03

REQUIRED ACTION B.1/B.2

* $NSLOPE^{AFD}$ and $PSLOPE^{AFD}$ are the amount of AFD adjustment required to compensate for each 1% that $F_Q(X,Y,Z)$ exceeds the limit ~~provided in the COLR per Specification 6.9.1.14~~

LA03

REQUIRED ACTION C.1/C.2

** $NSLOPE^{f_2(\Delta I)}$ and $PSLOPE^{f_2(\Delta I)}$ are the amounts of the OPΔT $f_2(\Delta I)$ limit adjustment required to compensate for each 1% that $F_Q(X,Y,Z)$ exceeds the limit ~~provided in the COLR per Specification 6.9.1.14~~

LA03

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

REQUIRED ACTION C.1

(b) Within 48 hours, reduce the OPΔT positive $f_2(\Delta I)$ breakpoint limit by:

~~Reduced OPΔT positive $f_2(\Delta I)$ breakpoint limit = ($f_2(\Delta I)$ limit of Table 2.2-1)~~ ~~absolute value of~~ $\cancel{(\text{PSLOPE}^{f_2(\Delta I)}**\,\%\ \text{x}\ f_2(\Delta I)\ \text{min margin})}$

LA03

d. Measuring $F_Q^M(X,Y,Z)$ according to the following schedule:

INSERT 1 M06

Once within 12 hours after M07

SR 3.2.1.1 SR 3.2.1.2 SR 3.2.1.3

1. ~~Upon~~ achieving equilibrium conditions after exceeding by 10 percent or more of RATED THERMAL POWER, the THERMAL POWER at which $F_Q(X,Y,Z)$ was last determined,*** ~~or~~ and M08

In accordance with the Surveillance Frequency Control Program LA04

2. ~~At least once per 31 Effective Full Power Days, whichever occurs first.~~

~~thereafter~~ M08

SR 3.2.1.2/SR 3.2.1.3 NOTE

e. With two measurements extrapolated to 31 EFPD beyond the most recent measurement yielding $F_Q^M(X,Y,Z) \succ \text{BQNOM}(X,Y,Z)$, either of the following actions specified shall be taken.

SR 3.2.1.2 / SR 3.2.1.3 NOTE a.

1. $F_Q^M(X,Y,Z)$ shall be increased over that specified in 4.2.2.2.a by the appropriate factor specified in the COLR, and 4.2.2.2.c repeated, or

SR 3.2.1.2 / SR 3.2.1.3 NOTE b.

2. $F_Q^M(X,Y,Z)$ shall be evaluated according to 4.2.2.2 at or before the time when the margin is projected to result in one of the actions specified in 4.2.2.2.c.3 or 4.2.2.2.c.4.

INSERT 2 M09

SR 3.2.1.1

4.2.2.3 When ~~$F_Q(X,Y,Z)$~~ is measured for reasons other than meeting the requirements of Specification 4.2.2.2 an overall measured ~~$F_Q(X,Y,Z)$~~ shall be obtained from a power distribution map~~, increased by 3% to account for manufacturing tolerances and further increased by 5% to account for measurement uncertainty, and compared to the $F_Q(X,Y,Z)$ limit specified in the COLR according to Specification 3.2.2.~~

LA02

$F_Q^C(X,Y,Z)$ A02

REQUIRED ACTION C.1/C.2

** $\text{NSLOPE}^{f_2(\Delta I)}$ and $\text{PSLOPE}^{f_2(\Delta I)}$ are the amounts of the OPΔT $f_2(\Delta I)$ limit adjustment required to compensate for each 1% that $F_Q(X,Y,Z)$ exceeds the limit ~~provided in the COLR per Specification 6.9.1.14~~

LA03

Not required to be performed until 12 hours after an equilibrium

SR Note

*** ~~During power escalation at the beginning of each cycle, power level may be increased until a~~ power level ~~for extended operation~~ has been achieved and power distribution map can be obtained.

M04

DOC M06

INSERT 1

Once after each refueling prior to THERMAL POWER exceeding 75% RTP

DOC M09

INSERT 2

Once after each refueling prior to THERMAL POWER exceeding 75% RTP

AND

Once within 12 hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^C(X,Y,Z)$ was last verified

AND

In accordance with the Surveillance Frequency Control Program

LA04

~~At least once per 31 Effective Full Power Days~~

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POWER DISTRIBUTION LIMITS

3/4.2.2 HEAT FLUX HOT CHANNEL FACTOR- F_Q(X,Y,Z)

LIMITING CONDITION FOR OPERATION

LCO 3.2.1 3.2.2 F_Q(X,Y,Z) shall be maintained within the acceptable limits specified in the COLR.

Applicability APPLICABILITY: MODE 1

ACTION:

Add proposed ACTION A Note M01

ACTION A With ~~F_Q(X,Y,Z)~~ exceeding its limit: steady state $F_Q^C(X,Y,Z)$ A02

Required Action A.1 a. Reduce THERMAL POWER at least 1% for each 1% ~~F_Q(X,Y,Z)~~ exceeds the limit within 15 minutes, and similarly reduce the following:

after each F_Q(X,Y,Z) determination M02

Required Action A.2 1. Administratively reduce the allowable power at each point along the AFD limit lines within 2 hours, and

72 L01

Required Action A.4 2. The Power Range Neutron Flux-High Trip Setpoints within the next ~~4~~ hours.

after each F_Q(X,Y,Z) determination M02

Required Action A.3 b. POWER OPERATION may proceed for up to 48 hours. Subsequent POWER OPERATION may proceed provided the Overpower Delta T Trip Setpoints ~~(value of K_4)~~ have been reduced at least 1% ~~(in ΔT span)~~ for each 1% that ~~F_Q(X,Y,Z)~~ exceeds the limit specified in the COLR.

LA01

$F_Q^C(X,Y,Z)$ A02

Required Action A.5 c. Identify and correct the cause of the out-of-limit condition prior to increasing THERMAL POWER above the reduced limit required by Action a. and b., above; THERMAL POWER may then be increased provided ~~F_Q(X,Y,Z)~~ is demonstrated ~~through incore mapping~~ to be within its limits.

LA02

Add proposed ACTION D M03

SURVEILLANCE REQUIREMENTS

SR NOTE 4.2.2.1 The provisions of Specification 4.0.4 are not applicable.

M04

A01

ITS

ITS 3.2.1

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.2.1.2
SR 3.2.1.3

4.2.2.2 $F_Q^M(X,Y,Z)$ shall be evaluated to determine if $F_Q(X,Y,Z)$ is within its limit by:

~~a. Using the moveable incore detectors to obtain a power distribution map ($F_Q^M(X,Y,Z)$ *) at any THERMAL POWER greater than 5% of RATED THERMAL POWER.~~

~~b. Satisfying the following relationship:~~

~~$F_Q^M(X,Y,Z) \leq BQNOM(X,Y,Z)$~~

~~where BQNOM (X,Y,Z)** represents the nominal design increased by an allowance for the expected deviation between the nominal design and the measurement.~~

~~The BQNOM (X,Y,Z) factors are not applicable in the following core plane regions as measured in percent of core height from the bottom of the fuel:~~

~~1. Lower core region from 0 to 15%, inclusive.~~

~~2. Upper core region from 85 to 100%, inclusive.~~

LA03

c. If the above relationship is not satisfied, then

1. For that location, calculate the % margin to the maximum allowable design as follows:

SR 3.2.1.2

% AFD Margin = ~~$\left(1 - \frac{F_Q^M(X,Y,Z)}{BQDES(X,Y,Z)}\right)$ x 100%~~

SR 3.2.1.3

% $f_2(\Delta I)$ Margin = ~~$\left(1 - \frac{F_Q^M(X,Y,Z)}{BCDES(X,Y,Z)}\right)$~~ x 100%

LA03

~~where BQDES (X,Y,Z)** and BCDES(X,Y,Z)** represent the maximum allowable design peaking factors which insure that the licensing criteria will be preserved for operation within Limiting Condition for Operation limits, and include allowances for the calculational and measurement uncertainties.~~

~~* No additional uncertainties are required in the following equations for $F_Q^M(X,Y,Z)$, because the limits include uncertainties.~~

~~** BQNOM (X,Y,Z), BQDES (X,Y,Z), and BCDES (X,Y,Z) Data bases are provided for input to the plant power distribution analysis computer codes on a cycle specific basis and are determined using the methodology for core limit generation described in the references in Specification 6.9.1.14.~~

LA03

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

~~2.~~ ~~Find the minimum margin of all locations examined in 4.2.2.2.c.1 above.~~

~~AFD min margin = minimum % margin value of all locations examined.~~

~~$f_2(\Delta I)$ OPΔT min margin = minimum % margin value of all locations examined.~~

LA03

ACTION B 3. If the AFD min margin in 4.2.2.2.c.2 above is <0, either the following actions shall be taken, ~~or the action statements for 3.2.2 shall be followed.~~

M05

REQUIRED ACTION B.2 (a) Within 2 hours, administratively reduce the negative AFD limit lines at each power level by:

~~Reduced AFD^{Limit} = (AFD^{Limit} from COLR) + absolute value of ($NSLOPE^{AFD}$* % x AFD min margin of 4.2.2.2.c.2)~~

LA03

REQUIRED ACTION B.1 (b) Within 2 hours, administratively reduce the positive AFD limit lines at each power level by:

~~Reduced AFD^{Limit} = (AFD^{Limit} from COLR)-absolute value of ($PSLOPE^{AFD}$* % X AFD min margin)~~

LA03

ACTION C 4. If the $f_2(\Delta I)$ min margin in 4.2.2.2.c.2 above is <0, either the following actions shall be taken, ~~or the action statements for 3.2.2 shall be followed.~~

M05

REQUIRED ACTION C.2 (a) Within 48 hours, reduce the OPΔT negative $f_2(\Delta I)$ breakpoint limit by:

~~Reduced OPΔT negative $f_2(\Delta I)$ breakpoint limit = ($f_2(\Delta I)$ limit of Table 2.2-1) + absolute value of~~

~~($NSLOPE^{f_2(\Delta I)**}$ % x $f_2(\Delta I)$ min margin)~~

LA03

REQUIRED ACTION B.1/B.2 * $NSLOPE^{AFD}$ and $PSLOPE^{AFD}$ are the amount of AFD adjustment required to compensate for each 1% that $F_Q(X,Y,Z)$ exceeds the limit ~~provided in the COLR per Specification 6.9.1.14.~~

LA03

REQUIRED ACTION C.1/C.2 ** $NSLOPE^{f_2(\Delta I)}$ and $PSLOPE^{f_2(\Delta I)}$ are the amounts of the OPΔT $f_2(\Delta I)$ limit adjustment required to compensate for each 1% that $F_Q(X,Y,Z)$ exceeds the limit ~~provided in the COLR per Specification 6.9.1.14.~~

LA03

A01

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

REQUIRED ACTION C.1

(b) Within 48 hours, reduce the OPΔT positive $f_2(\Delta I)$ breakpoint limit by:

~~Reduced OPΔT positive $f_2(\Delta I)$ breakpoint limit = ($f_2(\Delta I)$ limit of Table 2.2-1) absolute value of $(\text{PSLOPE}^{f_2(\Delta I)}$ ** % x $f_2(\Delta I)$ min margin)~~ LA03

d. Measuring $F_Q^M(X,Y,Z)$ according to the following schedule: INSERT 3 M06

Once within 12 hours after M07

SR 3.2.1.1
SR 3.2.1.2
SR 3.2.1.3

1. ~~Upon~~ achieving equilibrium conditions after exceeding by 10 percent or more of RATED THERMAL POWER, the THERMAL POWER at which $F_Q(X,Y,Z)$ was last determined,*** ~~or~~ and M08

In accordance with the Surveillance Frequency Control Program LA04

~~2.~~ ~~At least once per 31 Effective Full Power Days, whichever occurs first.~~ ~~thereafter~~ M08

SR 3.2.1.2/SR 3.2.1.3 NOTE

e. With two measurements extrapolated to 31 EFPD beyond the most recent measurement yielding $F_Q^M(X,Y,Z) \succ \text{BQNOM}(X,Y,Z)$, either of the following actions specified shall be taken.

SR 3.2.1.2 / SR 3.2.1.3 NOTE a.

1. $F_Q^M(X,Y,Z)$ shall be increased over that specified in 4.2.2.2.a by the appropriate factor specified in the COLR, and 4.2.2.2.c repeated, or

SR 3.2.1.2 / SR 3.2.1.3 NOTE b.

2. $F_Q^M(X,Y,Z)$shall be evaluated according to 4.2.2.2 at or before the time when the margin is projected to result in one of the actions specified in 4.2.2.2.c.3 or 4.2.2.2.c.4.

INSERT 4 M09

SR 3.2.1.1

4.2.2.3 When ~~$F_Q(X,Y,Z)$~~ is measured for reasons other than meeting the requirements of Specification 4.2.2.2 an overall measured ~~$F_Q(X,Y,Z)$~~ shall be obtained from a power distribution map, ~~increased by 3% to account for manufacturing tolerances and further increased by 5% to account for measurement uncertainty, and compared to the $F_Q(X,Y,Z)$ limit specified in the COLR according to Specification 3.2.2.~~ LA02

$F_Q^C(X,Y,Z)$ A02

REQUIRED ACTION C.1/C.2

** $\text{NSLOPE}^{f2(\Delta I)}$ and $\text{PSLOPE}^{f2(\Delta I)}$ are the amounts of the OPΔT $f_2(\Delta I)$ limit adjustment required to compensate for each 1% that $F_Q(X,Y,Z)$ exceeds the limit ~~provided in the COLR per Specification 6.9.1.14.~~ LA03

SR Note

*** Not required to be performed until 12 hours after an equilibrium ~~During power escalation at the beginning of each cycle, power level may be increased until a~~ power level ~~for extended operation~~ has been achieved and power distribution map can be obtained. M04

DOC M06

INSERT 3

Once after each refueling prior to THERMAL POWER exceeding 75% RTP

DOC M09

INSERT 4

Once after each refueling prior to THERMAL POWER exceeding 75% RTP

AND

Once within 12 hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^C(X, Y, Z)$ was last verified

AND

In accordance with the Surveillance Frequency Control Program

LA04

~~At least once per 31 Effective Full Power Days~~

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DISCUSSION OF CHANGES
ITS 3.2.1, HEAT FLUX HOT CHANNEL FACTOR (F_Q(X,Y,Z))

ADMINISTRATIVE CHANGES

A01 In the conversion of the Sequoyah Nuclear Plant (SQN) Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG - 1431, Rev. 4.0, "Standard Technical Specifications - Westinghouse Plants" (ISTS) and additional Technical Specification Task Force (TSTF) travelers included in this submittal.

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A02 CTS 4.2.2.2 evaluates $F_Q^M(X, Y, Z)$ to determine if F_Q(X,Y,Z) is within the limits.

CTS 4.2.2.3 evaluates F_Q(X,Y,Z) for reasons other than meeting the requirements of CTS 4.2.2.2 and requires the overall measured F_Q(X,Y,Z) be obtained from a distribution flux map and increased by 3% to account for manufacturing tolerances and further increased by 5% to account for measurement uncertainty, and compared to the F_Q(X,Y,Z) limit specified in the COLR. ITS 3.2.1 ACTION A and SR 3.2.1.1 use $F_Q^C(X, Y, Z)$ to represent the overall measured F_Q(X,Y,Z) adjusted for measurement uncertainty and manufacturing tolerances. This changes the CTS by adding a new term, $F_Q^C(X, Y, Z)$ which reflects the requirements in CTS 4.2.2.3 for evaluating the steady state limit of F_Q(X,Y,Z) specified in the COLR.

BAW-10163PA, "Core Operating Limit Methodology for Westinghouse-Designed PWRs" June 1989, requires that F_Q(X,Y,Z) is compared against three limits: (1) steady state limit, (F_Q^{RTP} / P) * K(Z), (2) limiting condition LOCA limit, BQDES(X,Y,Z), and (3) Limiting condition centerline fuel melt limit, BCDES(X,Y,Z). BAW-10163PA further states that the overall measured F_Q(X,Y,Z) must be adjusted for uncertainty prior to comparison to the steady state limit.
The CTS 3.2.2 Surveillance Requirements address both the steady state and the limiting conditions. CTS 4.2.2.2, in part evaluates $F_Q^M(X, Y, Z)$ for both BQDES(X,Y,Z) and BCDES(X,Y,Z) to ensure the F_Q(X,Y,Z) limit is met at limiting conditions. Thus if BQDES(X,Y,Z) and BCDES(X,Y,Z) are met, the steady state limit is met These verifications are reflected in ITS SR 3.2.1.2 and SR 3.2.1.3. CTS 4.2.2.3 addresses evaluation of the steady state limit directly using the overall measured F_Q(X,Y,Z) adjusted by the two penalty factors, $F_Q^C(X, Y, Z)$. ITS 3.2.1 uses $F_Q^C(X, Y, Z)$ throughout the Specification to refer to the steady state limit. This change is designated as administrative because it does not result in technical changes to the CTS.

MORE RESTRICTIVE CHANGES

M01 CTS 3.2.2 ACTION c states that with F_Q(X,Y,Z) exceeding its limit "Identify and correct the cause of the out-of-limit condition prior to increasing THERMAL

POWER above the reduced limit required by Action a. and b., above; THERMAL POWER may then be increased provided F_Q(X,Y,Z) is demonstrated through incore flux mapping to be within its limits." However, under CTS 3.0.2, the F_Q(X,Y,Z) measurement does not have to be completed, if compliance with the LCO is restored. ITS 3.2.1 ACTION A contains a Note which states, "Required Action A.5 must be completed whenever this Condition is entered." ITS Required Action A.5 requires performance of SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.3 prior to increasing THERMAL POWER above the limit of Required Action A.1. This changes the CTS by requiring $F_Q^C(X, Y, Z)$ verification to be made even if $F_Q^C(X, Y, Z)$ is restored to within its limit.

The purpose of CTS 3.2.2 ACTION c is to ensure that when F_Q(X,Y,Z) has exceeded the limit, compensatory measures are commenced to restore core power distribution to within the limits prior to increasing THERMAL POWER. This change is acceptable, because it establishes appropriate compensatory measurements for violation of the F_Q(X,Y,Z) limit. As power is reduced under ITS Required Action A.1, the margin to the F_Q(X,Y,Z) limit increases. Therefore, compliance with the LCO could be restored during the power reduction. Verifying that the limit is met as power is increased ensures that the limit continues to be met and does not remain unmeasured for up to 31 EFPD. This change is designated as a more restrictive change, because it imposes requirements in addition to those in the CTS.

M02 CTS 3.2.2 ACTION states in part that when F_Q(X,Y,Z) has exceeded the limit, to (1) Reduce THERMAL POWER at least 1% for each 1% F_Q(X,Y,Z) exceeds the limit within 15 minutes, (2) Administratively reduce the allowable power at each point along the AFD limit lines within 2 hours, (3) Reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours, (4) Reduce the Overpower Delta T Trip Setpoints (value of K_4) at least 1% (in ΔT span) for each 1% that F_Q(X,Y,Z) exceeds the limit specified in the COLR within the next 48 hours, (5) Identify and correct the cause of the out-of-limit condition prior to increasing THERMAL POWER above the reduced limit required by Action a. and b., above; THERMAL POWER may then be increased provided F_Q(X,Y,Z) is demonstrated through incore mapping to be within its limits. ITS 3.2.1 has similar Required Actions and Completion Times with the added requirement to ensure the times are met after each $F_Q^C(X, Y, Z)$ determination. This changes the CTS by requiring the Required Actions to be re-performed within a specific Completion Time after each flux map determination.

The purpose of the CTS 3.2.2 ACTIONs is to ensure that when F_Q(X,Y,Z) has exceeded the limit, compensatory measures are commenced to restore core power distribution to within the limits assumed in the safety analysis. This change is acceptable because it ensures that the Required Actions for $F_Q^C(X, Y, Z)$ not within limits will be re-performed after each $F_Q^C(X, Y, Z)$ determination within the prescribed Completion Time. When $F_Q^C(X, Y, Z)$ is not met, the margin to the limit prescribes the amount of power reduction and setpoint reduction to be performed. Therefore, each time flux mapping is performed, the determination of margin to the limit will determine if additional power reduction or additional setpoint reduction is required. This change is designated as more restrictive, because it applies new Completion Time requirements which do not exist in the CTS.

M03 CTS 3.2.2 does not contain an Action to follow, if the provided Actions cannot be met. Therefore, CTS 3.0.3 would be entered, which would allow 1 hour to initiate a shutdown and to be in HOT STANDBY within 7 hours. ITS 3.2.1 ACTION D, states that the plant must be in MODE 2 within 6 hours, if any Required Action and associated Completion Time is not met. This changes the CTS by eliminating the one hour to initiate a shutdown and, consequently, allowing one hour less for the unit to be in MODE 2.

This change is acceptable because it provides an appropriate compensatory measure for the described conditions. If any Required Action and associated Completion Time cannot be met, the unit must be placed in a MODE in which the LCO does not apply. The LCO is applicable in MODE 1. Requiring a shutdown to MODE 2 is appropriate in this condition. The one hour allowed by CTS 3.0.3 to prepare for a shutdown is not needed, because the operators have had time to prepare for the shutdown while attempting to follow the Required Actions and associated Completion Times. This change is designated as more restrictive because it allows less time to shut down than does the CTS.

M04 CTS 4.2.2.1 states that the provisions of Specification 4.0.4 are not applicable, and thereby provides an allowance for entering the next higher MODE of Applicability when the Surveillance is not met. CTS 4.2.2.2.d.1 Note *** states that during power escalation at the beginning of each cycle, power level may be increased until a power level for extended operation has been achieved and power distribution map obtained. ITS 3.2.1 has a similar note for the beginning of each cycle, however, there is no specific allowance for changing MODES at any other time with ITS LCO 3.2.1 not met. ITS LCO 3.0.4 requires, in part, that when an LCO is not met, entry into a MODE or other specified condition in the applicability shall only be made: If part a. or part b. or part c. is met. Part c allows, when an allowance is stated in the individual value, parameter or other specification. ITS 3.2.1 Surveillance Requirements Note will provide an allowance whereby, Surveillance performance is not required until 12 hours after an equilibrium power level has been achieved, at which a power distribution map can be obtained. This changes CTS by allowing entry into the MODE of Applicability by only deferring the performance of the Surveillance Requirements instead of deferring compliance with the LCO.

The purpose of CTS 4.2.2.1 is to provide an allowance for entering the next higher MODE of applicability when any Surveillance is not met. This change is acceptable because ITS provides an allowance to enter the MODE of Applicability at any time LCO 3.2.1 is not met solely based on Surveillance performance. SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.3 require using the incore detector system to provide the necessary data to create a power distribution map. To provide the necessary data, MODE 1 needs to be entered, power escalated, stabilized and equilibrium conditions established at some higher power level (~40%-50%). The surveillances cannot be performed in MODE 2. This change is designated as more restrictive because the CTS 4.0.4 MODE change allowance with the LCO not met is now limited to the performance of the SRs and does not include the allowance to change MODES for non-compliance with the acceptance criteria.

M05 CTS 3.2.2 provides two acceptable alternatives for the AFD min margin and $f_2(\Delta I)$ min margin not met. CTS 4.2.2.2.c.3 states, "If the AFD min margin in 4.2.2.2.c.2 above is < 0, either the following actions shall be taken, or the action statements for 3.2.2 shall be followed." CTS 4.2.2.2.c.4 states, "If the $f_2(\Delta I)$ min margin in 4.2.2.2.c.2 above is < 0, either the following actions shall be taken, or the action statements for 3.2.2 shall be followed." CTS 4.2.2.2.c.3.a and CTS 4.2.2.2.c.3.b have been replaced by ITS 3.2.1 Required Actions B.1 and B.2. Similarly, CTS 4.2.2.2.c.4.a and 4.2.2.2.c.4.b have been replaced with ITS 3.2.1 Required Actions C.1 and C.2. However, in both cases the option for, "the action statements for 3.2.2 shall be followed" has not been retained. This changes the CTS by removing the option to follow the action statement of CTS 3.2.2 for either min margin (AFD or $f_2(\Delta I)$) not met.

The purpose of CTS 4.2.2.2.c.3 and CTS 4.2.2.2.c.4 is to provide acceptable alternatives for the required compensatory actions when either AFD min margin or $f_2(\Delta I)$ min margin is not met. The CTS surveillance requirements for either AFD min margin or $f_2(\Delta I)$ min margin not met require either the administrative reduction in their respective setpoints or the option of entering the actions of LCO 3.2.2. The CTS Actions for 3.2.2, F_Q(X,Y,Z) exceeding the limits, require in part the reduction of THERMAL POWER, reduction of AFD limit lines, and reduction $f_2(\Delta I)$ breakpoint limits. ITS 3.2.1 has removed this option, but retains the requirement for administrative reduction in AFD limits, ITS CONDITION B, or $f_2(\Delta I)$ breakpoint limits, ITS CONDITION C. If the ITS Required Actions to administratively reduce the respective setpoints is not performed within the allowed Completion Time, Condition D will be entered requiring the Unit to be placed in MODE 2. This change is designated as more restrictive because an acceptable alternative Required Action available in CTS is being removed.

M06 CTS 4.2.2.2.d requires F_Q(X,Y,Z) to be determined to be within its limit upon achieving equilibrium conditions after exceeding by 10 percent or more of RTP, the THERMAL POWER at which F_Q(X,Y,Z) was last determined, or at least once per 31 EFPD, whichever occurs first. ITS SR 3.2.1.1, SR 3.2.1.2, and SR 3.2.1.3 collectively verify that F_Q(X,Y,Z) is within its limit after each refueling prior to THERMAL POWER exceeding 75% RTP, once within 12 hours after achieving equilibrium conditions after exceeding, by greater than or equal to 10% RTP, the THERMAL POWER at which $F_Q^C(X,Y,Z)$ and $\mathrm{F_Q^M(X,Y,Z)}$ was last verified, and in accordance with the Surveillance Frequency Control Program. This changes the CTS by adding a new Frequency (Once after each refueling prior to THERMAL POWER exceeding 75% RTP). The replacement of the words "whichever occurs first" with the word "thereafter" to the Frequency is discussed in DOC M08. Moving the "31 EFPD thereafter" Frequency to the Surveillance Frequency Control Program is discussed in DOC LA04. The addition of "once within 12 hours" is discussed in DOC M07.

DISCUSSION OF CHANGES
ITS 3.2.1, HEAT FLUX HOT CHANNEL FACTOR ($F_Q(X,Y,Z)$)

The purpose of SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.3 is to verify that $F_Q(X,Y,Z)$ is within the limits assumed in the safety analysis. This change is acceptable, because adopting the new Frequency of confirming $F_Q^C(X,Y,Z)$ and $\mathrm{F_Q^M(X,Y,Z)}$ are within the limits prior to exceeding 75% RTP following each core reload, will ensure that some determination of $F_Q^C(X,Y,Z)$ and $\mathrm{F_Q^M(X,Y,Z)}$ is made at a lower power level at which adequate margin is available, before going to 100% RTP. This change is designated as more restrictive, because it applies new requirements which do not exist in the CTS.

M07 CTS 4.2.2.2.d requires $F_Q(X,Y,Z)$ to be determined to be within its limit upon achieving equilibrium conditions after exceeding by 10 percent or more of RTP, the THERMAL POWER at which $F_Q(X,Y,Z)$ was last determined, or at least once per 31 EFPD, whichever occurs first. ITS SR 3.2.1.1, SR 3.2.1.2, and SR 3.2.1.3 collectively verify that $F_Q(X,Y,Z)$ is within its limit after each refueling prior to THERMAL POWER exceeding 75% RTP, once within 12 hours after achieving equilibrium conditions after exceeding, by greater than or equal to 10% RTP, the THERMAL POWER at which $F_Q(X,Y,Z)$ was last verified, and in accordance with the Surveillance Frequency Control Program. This changes the CTS by modifying the existing Frequency (Upon achieving equilibrium conditions…) by adding a specific time element (Once within 12 hours after achieving equilibrium conditions) which limits the time duration allowed for completing a single performance after a ≥10% RTP change . The replacement of the words "whichever occurs first" with the word "thereafter" to the Frequency is discussed in DOC M08. The relocation of the "31 EFPD thereafter" Frequency to the Surveillance Frequency Control Program is discussed in DOC LA04. The addition of new Frequency (Once after each refueling prior to THERMAL POWER exceeding 75% RTP) is discussed in DOC M06.

The purpose of SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.3 is to verify that $F_Q(X,Y,Z)$ is within the limits assumed in the safety analysis. This change is acceptable, because modifying the existing frequency by adding a specific time element completing a single performance after a ≥10% RTP change is made ensures adequate margin is available, before going to a higher power level. This change is designated as more restrictive, because it applies new requirements which do not exist in the CTS.

M08 CTS 4.2.2.2.d.1 Surveillance states "required to be performed upon achieving equilibrium conditions after exceeding by 10 percent or more of RATED THERMAL POWER, the THERMAL POWER at which $F_Q(X,Y,Z)$ was last determined, or at least once per 31 EFPD, whichever occurs first." ITS SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.3 are similar, but the logical connector between the Frequencies is an "<u>AND</u>" not an "or". Additionally, the ITS 31 EFPD Frequency is qualified with "thereafter". This changes the CTS by (1) removing the phrase, "whichever occurs first" and replacing it with "thereafter" and (2) changing the CTS logical connector from "or" to "<u>AND</u>".

The purpose of CTS 4.2.2.2 is to establish both when and how often $\mathrm{F_Q^M(X,Y,Z)}$ is measured. The intent of the CTS Frequency logical connector "or" does not provide an exclusion to perform either the situational performance or the repetitive performance of the test, because both are continuously applicable when $F_Q^M(X,Y,Z)$ is measured. Additionally, the CTS Frequency describes "when" the first performance is required (i.e. whichever occurs first) based on plant conditions. This change is acceptable because the ITS use of "AND" will ensure both the situational and periodic performances are continuously applicable. This change is designated more restrictive because the Surveillance Requirements will be required to be performed more frequently than is required in CTS.

M09 CTS 4.2.2.3 states that when F_Q(X,Y,Z) is measured for reasons other than meeting the requirements of Specification 4.2.2.2 an overall measured F_Q(X,Y,Z) shall be obtained from a power distribution map, increased by 3% to account for manufacturing tolerances and further increased by 5% to account for measurement uncertainty, and compared to the F_Q(X,Y,Z) limit specified in the COLR according to Specification 3.2.2. Proposed ITS SR 3.2.1.1, verifies $F_Q^C(X,Y,Z)$ is within the steady state limits, (1) Once after each refueling prior to THERMAL POWER exceeding 75% RTP, and (2) Once within 12 hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^C(X,Y,Z)$ was last verified, and (3) In accordance with the Surveillance Frequency Control Program. This changes the CTS from a 4.2.2.3 measurement of F_Q(X,Y,Z) to be within limits on a situational Frequency basis to the ITS Frequency of (1) Once after each refueling prior to THERMAL POWER exceeding 75% RTP, and (2) Once within 12 hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^C(X,Y,Z)$ was last verified, and (3) In accordance with the Surveillance Frequency Control Program. (The relocation of "31 EFPD, thereafter to the Surveillance Frequency Control program" is discussed in DOC LA04 (Refer to DOC A02 for the discussion of the addition of a new term describing the steady state limit, $F_Q^C(X,Y,Z)$).

The purpose of CTS 4.2.2.3 is to evaluate F_Q(X,Y,Z) during those situational conditions where core power distribution limits may exceed limits assumed in the safety analysis. BAW-10163PA "Core Operating Limit Methodology for Westinghouse-Designed PWRs" June 1989 requires the measured F_Q(X,Y,Z) to be compared against the steady state limit (ITS SR 3.2.1.1) and the two transient limits BQDES(X,Y,Z)(ITS SR 3.2.1.2) and BCDES(X,Y,Z)(ITS SR 3.2.1.3). ITS SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.3 will be performed at the same Frequencies. This change is designated as more restrictive because the situational testing Frequency of CTS 4.2.2.3 is being replaced with two new situational Frequencies and a periodic performance, once every 31 EFPD.

RELOCATED SPECIFICATIONS

None

DISCUSSION OF CHANGES
ITS 3.2.1, HEAT FLUX HOT CHANNEL FACTOR ($F_Q(X,Y,Z)$)

REMOVED DETAIL CHANGES

LA01 (*Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 3.2.2 ACTION b requires within 48 hours when $F_Q(X,Y,Z)$ is not within limits to reduce the Overpower Delta T Trip setpoints (value of K_4) at least 1% (in ΔT span) for each 1% that $F_Q(X,Y,Z)$ exceeds the limit provided in the COLR. ITS LCO 3.2.1 Required Action A.3 requires within 48 hours of discovery that $F_Q^C(X,Y,Z)$ is not within limits, to reduce Overpower ΔT trip setpoints at least 1% for each 1% that $F_Q^C(X,Y,Z)$ exceeds the limit. This changes the CTS by moving the specific information regarding the terms, "value of K_4" and "in ΔT span," to the COLR.

The removal of these details for performing actions from the Technical Specifications is acceptable, because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirements to reduce Overpower ΔT trip setpoints at least 1% for each 1% that $F_Q^C(X,Y,Z)$ exceeds the limit. Also, this change is acceptable because the removed information will be adequately controlled in the COLR requirements provided in ITS 5.6.5, "Core Operating Limits Report." ITS 5.6.5 ensures that the applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems limits, and nuclear limits such as transient analysis limits and accident analysis limits) of the safety analyses are met. This change is designated as a less restrictive removal of detail change, because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LA02 (*Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 3.2.2 ACTION c requires $F_Q(X,Y,Z)$ to be determined to be within its limit through incore mapping. CTS 4.2.2.3 requires $F_Q(X,Y,Z)$ to be determined to be within its limit by obtaining a power distribution map and applying manufacturing tolerances and measurement uncertainty factors before comparing the results to the $F_Q(X,Y,Z)$ limit specified in the COLR. ITS 3.2.1 Required Action A.5 and ITS SR 3.2.1.1 require verification that $F_Q^C(X,Y,Z)$ is within its limit. This changes the CTS by moving the manner in which the $F_Q(X,Y,Z)$ determination is performed to the Bases.

The removal of these details for performing actions from the Technical Specifications is acceptable, because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement to determine $F_Q(X,Y,Z)$ is within its limit. Also, this change is acceptable, because these types of procedural details will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail change, because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

DISCUSSION OF CHANGES
ITS 3.2.1, HEAT FLUX HOT CHANNEL FACTOR ($F_Q(X,Y,Z)$)

LA03 (*Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 4.2.2.2, 4.2.2.2.a, 4.2.2.2.b, 4.2.2.2.*, 4.2.2.2.**, 4.2.2.2.c.1, 4.2.2.2.c.2, 4.2.2.2.c.3.a, 4.2.2.2.c.3.b, 4.2.2.2.c.4.a, 4.2.2.2.c.4.b, 4.2.2.2.d, and 4.2.2.3 provide details for evaluating $F^M_Q(X,Y,Z)$ to determine if $F_Q(X,Y,Z)$ is within limits. ITS SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.3 collectively verify that $F_Q(X,Y,Z)$ (as discussed in DOC A4) is within limits specified in the COLR. This changes the CTS by moving the details for evaluating $F^M_Q(X,Y,Z)$ to determine if $F_Q(X,Y,Z)$ is within limits to the ITS Bases.

The removal of these details from the Technical Specifications and their relocation into the ITS Bases is acceptable, because the procedural steps and further details for making a determination that $F_Q(X,Y,Z)$ is within its limits is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS Surveillance Requirement to verify $F_Q(X,Y,Z)$ is within its limits will more closely align with the LCO requirement for $F_Q(X,Y,Z)$ to be within the limits specified in the COLR. Also, this change is acceptable, because these types of procedural details will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail change, because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LA04 *(Type 5 – Removal of SR Frequency to the Surveillance Frequency Control Program)* CTS 4.2.2.2 requires, in part, a determination that $F_Q(X,Y,Z)$ is within its limits at least once per 31 EFPD. ITS SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.3 require a similar Surveillance and specifies the periodic Frequency as, "In accordance with the Surveillance Frequency Control Program." This changes the CTS by moving the specified Frequencies for this SR and associated Bases to the Surveillance Frequency Control Program.

The removal of these details related to Surveillance Requirement Frequencies from the Technical Specifications is acceptable, because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The existing Surveillance Frequencies are removed from Technical Specifications and placed under licensee control pursuant to the methodology described in NEI 04-10. A new program (Surveillance Frequency Control Program) is being added to the Administrative Controls section of the Technical Specifications describing the control of Surveillance Frequencies. The surveillance test requirements remain in the Technical Specifications. The control of changes to the Surveillance Frequencies will be in accordance with the Surveillance Frequency Control Program. The Program shall ensure that Surveillance Requirements specified in the Technical Specifications are performed at intervals sufficient to assure the associated Limiting Conditions for Operation are met. This change is designated as a less restrictive removal of detail change, because the Surveillance Frequencies are being removed from the Technical Specifications.

DISCUSSION OF CHANGES
ITS 3.2.1, HEAT FLUX HOT CHANNEL FACTOR (F_Q(X,Y,Z))

LESS RESTRICTIVE CHANGES

L01 (Category 3 – Relaxation of Completion Time) CTS 3.2.2 ACTION a.2 states, in part, that when F_Q(X,Y,Z) exceeds its limit, reduce the Power Range Neutron Flux - High Trip setpoints within the next 4 hours. ITS 3.2.1 Required Actions A.4 states with $F_Q^C(X, Y, Z)$ not within limit, reduce the Power Range Neutron Flux - High Trip setpoints by ≥ 1% for each 1% $F_Q^C(X, Y, Z)$ exceeds the limit. The ITS 3.2.1 Required Action A.4 Completion Time is "within 72 hours after each $F_Q^C(X, Y, Z)$ determination." This changes the CTS by increasing the time allowed to reduce the trip setpoints.

The purpose of CTS 3.2.2 ACTION a.2 is to lower the Power Range Neutron Flux - High Trip setpoints, which ensures continued operation is at an acceptably low power level with an adequate DNBR margin and avoids violating the $F_Q^C(X, Y, Z)$ limit. This change is acceptable, because the Completion Time is consistent with safe operation and recognizes that the safety analysis assumptions are satisfied once power is reduced, and considers the low probability of a DBA occurring during the allowed Completion Time. The revised Completion Time allows the Power Range Neutron Flux - High Trip setpoints to be reduced in a controlled manner without challenging operators, technicians, or plant systems. Following a significant power reduction, a time period of 24 hours is allowed to reestablish steady state xenon concentration and power distribution and to take and analyze a flux map. If it is determined that $F_Q^C(X, Y, Z)$ is still not within its limit, reducing the Power Range Neutron Flux - High Trip Setpoints can be accomplished within a few hours. Furthermore, setpoint changes should only be required for extended operation in this condition, because of the risk of a plant trip during the adjustment. This change is designated as less restrictive, because additional time is allowed to lower the Power Range Neutron Flux - High Trip setpoints than was allowed in the CTS.

Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

3.2 POWER DISTRIBUTION LIMITS

3.2.1~~B~~ Heat Flux Hot Channel Factor (F_Q(~~Z~~ X,Y,Z) ~~(RAOC-W(Z) Methodology)~~ ② ①

3.2.2 LCO 3.2.1~~B~~ F_Q(~~Z~~ X,Y,Z)~~, as approximated by F^C_Q(Z) and F^W_Q(Z),~~ shall be within the limits specified in the COLR. ② ①

Applicability APPLICABILITY: MODE 1.

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME	
ACTION a DOC M01 DOC M02 DOC L01 ACTION a.2 DOC M02	A. ------------NOTE------------ 5 Required Action A.~~4~~ 5 shall be completed whenever this Condition is entered. ------------------------------------ ~~F^C_Q(Z)~~ $F^C_Q(X,Y,Z)$ not within the steady state limit.	A.1 Reduce THERMAL POWER ≥ 1% RTP for each 1% ~~F^C_Q(Z)~~ $F^C_Q(X,Y,Z)$ exceeds limit. INSERT 1 AND	15 minutes after each ~~F^C_Q(Z)~~ $F^C_Q(X,Y,Z)$ determination	③ ① ③
		A.~~2~~ 4 Reduce Power Range Neutron Flux - High trip setpoints ≥ 1% for each 1% ~~F^C_Q(Z)~~ $F^C_Q(X,Y,Z)$ exceeds limit. AND	72 hours after each ~~F^C_Q(Z)~~ $F^C_Q(X,Y,Z)$ determination	③ ①
ACTION b DOC M02		A.3 Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% ~~F^C_Q(Z)~~ $F^C_Q(X,Y,Z)$ exceeds limit. AND	48 ~~72~~ hours after each ~~F^C_Q(Z)~~ $F^C_Q(X,Y,Z)$ determination	③ ①
ACTION c DOC M02		A.~~4~~ 5 Perform SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.~~2~~ 3.	Prior to increasing THERMAL POWER above the limit of Required Action A.1	③ ④

③ INSERT 1

ACTION a.1
DOC M02

CONDITION	REQUIRED ACTION	COMPLETION TIME
	AND A.2 Reduce, by administrative means, AFD limits ≥ 1% for each 1% $F_Q^C(X,Y,Z)$ exceeds limit.	2 hours after each $F_Q^C(X,Y,Z)$ determination

CTS

F_Q(~~Z~~ X,Y,Z) ~~(RAOC-W(Z) Methodology)~~ ① ②
3.2.1~~B~~

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~B. ------------NOTE------------~~ ~~Required Action B.4 shall be completed whenever this Condition is entered.~~ ~~---------------------------------~~ ~~$F_Q^W(Z)$ not within limits.~~	~~B.1 Reduce AFD limits ≥ 1% for each 1% $F_Q^W(Z)$ exceeds limit.~~ ~~AND~~ ~~B.2 Reduce Power Range Neutron Flux - High trip setpoints ≥ 1% for each 1% that the maximum allowable power of the AFD limits is reduced.~~ ~~AND~~ ~~B.3 Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% that the maximum allowable power of the AFD limits is reduced.~~ ~~AND~~ ~~B.4 Perform SR 3.2.1.1 and SR 3.2.1.2.~~	~~4 hours~~ ~~72 hours~~ INSERT 2 ~~72 hours~~ ~~Prior to increasing THERMAL POWER above the maximum allowable power of the AFD limits~~
~~C~~ D. Required Action and associated Completion Time not met.	~~C~~ D.1 Be in MODE 2.	6 hours

④

DOC M03

④ INSERT 2

	CONDITION	REQUIRED ACTION		COMPLETION TIME
4.2.2.2.c.3 4.2.2.2.c.3.b 4.2.2.2.c.3	B. AFD min margin < 0	B.1	Reduce, by administrative means, positive AFD limit lines for each power level by $PSLOPE^{AFD}$ for each 1% $F_Q(X,Y,Z)$ exceeds limit.	2 hours
		AND		
4.2.2.2.c.3.a Note *		B.2	Reduce, by administrative means, negative AFD limit lines for each power level by $NSLOPE^{AFD}$ for each 1% $F_Q(X,Y,Z)$ exceeds limit.	2 hours
4.2.2.2.c.4 4.2.2.2.c.4.b Note **	C. $f_2(\Delta I)$ min margin < 0	C.1	Reduce Overpower ΔT positive $f_2(\Delta I)$ breakpoint limit by $PSLOPE^{f2(\Delta I)}$ for each 1% $F_Q(X,Y,Z)$ exceeds limit.	48 hours
		AND		
4.2.2.2.c.4.a Note **		C.2	Reduce Overpower ΔT negative $f_2(\Delta I)$ breakpoint limit by $NSLOPE^{f2(\Delta I)}$ for each 1% $F_Q(X,Y,Z)$ exceeds limit.	48 hours

CTS

F_Q(~~Z~~) ~~(RAOC-W(Z) Methodology)~~ ① ②

X,Y,Z

3.2.1~~B~~

Not required to be performed until 12 hours after

SURVEILLANCE REQUIREMENTS

4.2.2.2 Note ***

4.2.2.1 DOC M04

---NOTE--- ⑤

~~During power escalation at the beginning of each cycle, THERMAL POWER may be increased until~~ an equilibrium power level has been achieved, at which a power distribution map ~~is~~ can be obtained. ⑤

4.2.2.2
4.2.2.3
DOC M06
DOC M09
DOC A02

4.2.2.2.d.1
DOC M07

4.2.2.2.d.2

SURVEILLANCE	FREQUENCY
SR 3.2.1.1 Verify ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ is within the steady state limit. INSERT 3	⑥ Once after each refueling prior to THERMAL POWER exceeding 75% RTP ① AND Once within ~~[~~12~~]~~ hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ was last verified ⑦ ① AND ~~[31 EFPD thereafter~~ ~~OR~~ ⑧ In accordance with the Surveillance Frequency Control Program ~~]~~ ⑧

SEQUOYAH UNIT 1 ~~WOG STS~~ 3.2.1~~B~~-3 Amendment xxx ~~Rev. 4.0,~~ ① ②

⑥ **INSERT 3**

--NOTE-----------------------------------
Not required to be performed if SR 3.2.1.2 and SR 3.2.1.3 are met.
4.2.2.2 ---

CTS

F_Q(~~Z~~) ~~(RAOC-W(Z) Methodology)~~ ①
X,Y,Z
3.2.1~~B~~ ②

SURVEILLANCE REQUIREMENTS (continued)

④

SURVEILLANCE	FREQUENCY
~~SR 3.2.1.2~~ ~~-----------------------------NOTE-----------------------------~~ ~~If measurements indicate that the~~ ~~maximum over z [~~ $F_Q^C(Z)$ ~~/ K(Z)]~~ ~~has increased since the previous evaluation of~~ $F_Q^C(Z)$ ~~:~~ ~~a. Increase~~ $F_Q^W(Z)$ ~~by the greater of a factor of [1.02] or by an appropriate factor specified in the COLR and reverify~~ $F_Q^W(Z)$ ~~is within limits or~~ ~~b. Repeat SR 3.2.1.2 once per 7 EFPD until either a. above is met or two successive flux maps indicate that the~~ ~~maximum over z [~~ $F_Q^C(Z)$ ~~/ K(Z)]~~ ~~has not increased.~~ ~~---~~ ~~Verify~~ $F_Q^W(Z)$ ~~is within limit.~~	~~Once after each refueling prior to THERMAL POWER exceeding 75% RTP~~ ~~AND~~ ~~Once within [12] hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which~~ $F_Q^W(Z)$ ~~was last verified~~ ~~AND~~

CTS

F_Q(~~Z~~) ~~(RAOC-W(Z) Methodology)~~ ① ②

X,Y,Z

3.2.1~~B~~

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
	~~[31 EFPD thereafter~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

④

INSERT 4 ④

SEQUOYAH UNIT 1

Amendment xxx

④ INSERT 4

	SURVEILLANCE		FREQUENCY
4.2.2.2.e	SR 3.2.1.2	-------------------------------NOTE------------------------------ If two measurements extrapolated to 31 EFPD beyond the most recent measurement yield: $F_Q^M(X,Y,Z)$ > BQNOM(X,Y,Z)	
4.2.2.2.e.1		a. Increase $F_Q^M(X,Y,Z)$ by the appropriate factor specified in the COLR and reverify AFD min margin > 0; or	
4.2.2.2.e.2		b. Repeat SR 3.2.1.2 prior to the time at which the projected AFD min margin will be < 0. ---	
4.2.2.2.c.1 DOC M06		Verify AFD min margin > 0.	Once after each refueling prior to THERMAL POWER exceeding 75% RTP <u>AND</u>
4.2.2.2.d.1 DOC M07			Once within 12 hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^M(X,Y,Z)$ was last verified <u>AND</u>

④ **INSERT 4 (continued)**

	SURVEILLANCE	FREQUENCY
4.2.2.2.d.2		~~[31 EFPD thereafter]~~ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~

④ INSERT 4 (continued)

	SURVEILLANCE		FREQUENCY
4.2.2.2.e	SR 3.2.1.3	-------------------------------NOTE------------------------------ If two measurements extrapolated to 31 EFPD beyond the most recent measurement yield: $F_Q^M(X,Y,Z)$ > BQNOM(X,Y,Z)	
4.2.2.2.e.1		a. Increase $F_Q^M(X,Y,Z)$ by the appropriate factor specified in the COLR and reverify $f_2(\Delta I)$ min margin > 0; or	
4.2.2.2.e.2		b. Repeat SR 3.2.1.3 prior to the time at which the projected $f_2(\Delta I)$ min margin will be < 0. ---	
4.2.2.2.c.1 DOC M06		Verify $f_2(\Delta I)$ min margin > 0.	Once after each refueling prior to THERMAL POWER exceeding 75% RTP <u>AND</u>
4.2.2.2.d.1 DOC M07			Once within 12 hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^M(X,Y,Z)$ was last verified <u>AND</u>

④ INSERT 4 (continued)

	SURVEILLANCE	FREQUENCY
4.2.2.2.d.2		~~[31 EFPD thereafter~~ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~

3.2 POWER DISTRIBUTION LIMITS

3.2.1~~B~~ Heat Flux Hot Channel Factor (F_Q(~~Z~~ X,Y,Z) ~~(RAOC-W(Z) Methodology)~~ ② ①

3.2.2 LCO 3.2.1~~B~~ F_Q(~~Z~~ X,Y,Z)~~, as approximated by $F_Q^C(Z)$ and $F_Q^W(Z)$,~~ shall be within the limits specified in the COLR. ② ①

Applicability APPLICABILITY: MODE 1.

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME	
ACTION a DOC M01 DOC M02	A. ------------NOTE------------ 5 Required Action A.~~4~~ shall be completed whenever this Condition is entered. ------------------------------------ ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ not within the steady state limit.	A.1 Reduce THERMAL POWER ≥ 1% RTP for each 1% ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ exceeds limit. INSERT 1	15 minutes after each ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ determination	③ ① ③
		AND		
DOC L01 ACTION a.2 DOC M02		4 A.~~2~~ Reduce Power Range Neutron Flux - High trip setpoints ≥ 1% for each 1% ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ exceeds limit.	72 hours after each ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ determination	③ ①
		AND		
ACTION b DOC M02		A.3 Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ exceeds limit.	48 ~~72~~ hours after each ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ determination	③ ①
		AND		
ACTION c DOC M02		5 A.~~4~~ Perform SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.~~2~~ 3.	Prior to increasing THERMAL POWER above the limit of Required Action A.1	③ ④

③ **INSERT 1**

ACTION a.1
DOC M02

CONDITION	REQUIRED ACTION	COMPLETION TIME
	AND A.2 Reduce, by administrative means, AFD limits ≥ 1% for each 1% $F_Q^C(X,Y,Z)$ exceeds limit.	2 hours after each $F_Q^C(X,Y,Z)$ determination

CTS

F_Q(~~Z~~) ~~(RAOC-W(Z) Methodology)~~ ① ②
X,Y,Z
3.2.1~~B~~

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~B. ------------NOTE------------ Required Action B.4 shall be completed whenever this Condition is entered. ---------------------------------~~ ~~$F_Q^W(Z)$ not within limits.~~	~~B.1 Reduce AFD limits ≥ 1% for each 1% $F_Q^W(Z)$ exceeds limit.~~ ~~AND~~ ~~B.2 Reduce Power Range Neutron Flux - High trip setpoints ≥ 1% for each 1% that the maximum allowable power of the AFD limits is reduced.~~ ~~AND~~ ~~B.3 Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% that the maximum allowable power of the AFD limits is reduced.~~ ~~AND~~ ~~B.4 Perform SR 3.2.1.1 and SR 3.2.1.2.~~	~~4 hours~~ ~~72 hours~~ INSERT 2 ~~72 hours~~ ~~Prior to increasing THERMAL POWER above the maximum allowable power of the AFD limits~~
~~C~~ D. Required Action and associated Completion Time not met.	~~C~~ D.1 Be in MODE 2.	6 hours

④

DOC M03

④ INSERT 2

	CONDITION	REQUIRED ACTION		COMPLETION TIME
4.2.2.2.c.3 4.2.2.2.c.3.b 4.2.2.2.c.3	B. AFD min margin < 0	B.1	Reduce, by administrative means, positive AFD limit lines for each power level by $PSLOPE^{AFD}$ for each 1% $F_Q(X,Y,Z)$ exceeds limit.	2 hours
		AND		
4.2.2.2.c.3.a Note *		B.2	Reduce, by administrative means, negative AFD limit lines for each power level by $NSLOPE^{AFD}$ for each 1% $F_Q(X,Y,Z)$ exceeds limit.	2 hours
4.2.2.2.c.4 4.2.2.2.c.4.b Note **	C. $f_2(\Delta I)$ min margin < 0	C.1	Reduce Overpower ΔT positive $f_2(\Delta I)$ breakpoint limit by $PSLOPE^{f2(\Delta I)}$ for each 1% $F_Q(X,Y,Z)$ exceeds limit.	48 hours
		AND		
4.2.2.2.c.4.a Note **		C.2	Reduce Overpower ΔT negative $f_2(\Delta I)$ breakpoint limit by $NSLOPE^{f2(\Delta I)}$ for each 1% $F_Q(X,Y,Z)$ exceeds limit.	48 hours

CTS

F_Q(~~Z~~ X,Y,Z) ~~(RAOC-W(Z) Methodology)~~ ① ②
3.2.1~~B~~

Not required to be performed until 12 hours after

SURVEILLANCE REQUIREMENTS

4.2.2.2 Note ***
4.2.2.1
DOC M04

--NOTE-- ⑤

~~During power escalation at the beginning of each cycle, THERMAL POWER may be increased until~~ an equilibrium power level has been achieved, at which a power distribution map ~~is~~ can be obtained. ⑤

SURVEILLANCE	FREQUENCY
4.2.2.2 4.2.2.3 DOC M06 DOC M09 DOC A02 SR 3.2.1.1 Verify ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ is within the steady state limit. INSERT 3	⑥ Once after each refueling prior to THERMAL POWER exceeding 75% RTP ① AND 4.2.2.2.d.1 DOC M07 Once within ~~[~~12~~]~~ hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ was last verified ① ⑦ AND 4.2.2.2.d.2 ~~[31 EFPD thereafter~~ ~~OR~~ ⑧ In accordance with the Surveillance Frequency Control Program ~~]~~ ⑧

⑥ **INSERT 3**

4.2.2.2

---NOTE------------------------------------
Not required to be performed if SR 3.2.1.2 and SR 3.2.1.3 are met.

CTS

F_Q(~~Z~~) ~~(RAOC-W(Z) Methodology)~~ ① ②
X,Y,Z
3.2.1~~B~~

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
~~SR 3.2.1.2~~ ~~------------------------------NOTE------------------------------~~ ~~If measurements indicate that the~~ ~~maximum over z [$F_Q^C(Z)$ / K(Z)]~~ ~~has increased since the previous evaluation of $F_Q^C(Z)$:~~ ~~a. Increase $F_Q^W(Z)$ by the greater of a factor of [1.02] or by an appropriate factor specified in the COLR and reverify $F_Q^W(Z)$ is within limits or~~ ~~b. Repeat SR 3.2.1.2 once per 7 EFPD until either a. above is met or two successive flux maps indicate that the~~ ~~maximum over z [$F_Q^C(Z)$ / K(Z)]~~ ~~has not increased.~~ ~~--~~ ~~Verify $F_Q^W(Z)$ is within limit.~~	~~Once after each refueling prior to THERMAL POWER exceeding 75% RTP~~ ~~AND~~ ~~Once within [12] hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^W(Z)$ was last verified~~ ~~AND~~

④

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
	~~[31 EFPD thereafter~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

④

INSERT 4 ④

④ INSERT 4

	SURVEILLANCE		FREQUENCY
4.2.2.2.e 4.2.2.2.e.1 4.2.2.2.e.2	SR 3.2.1.2	-------------------------------NOTE------------------------------ If two measurements extrapolated to 31 EFPD beyond the most recent measurement yield: $F_Q^M(X,Y,Z)$ > BQNOM(X,Y,Z) a. Increase $F_Q^M(X,Y,Z)$ by the appropriate factor specified in the COLR and reverify AFD min margin > 0; or b. Repeat SR 3.2.1.2 prior to the time at which the projected AFD min margin will be < 0. ---	
4.2.2.2.c.1 DOC M06 4.2.2.2.d.1 DOC M07		Verify AFD min margin > 0.	Once after each refueling prior to THERMAL POWER exceeding 75% RTP AND Once within 12 hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^M(X,Y,Z)$ was last verified AND

④ INSERT 4 (continued)

	SURVEILLANCE	FREQUENCY
4.2.2.2.d.2		~~[31 EFPD thereafter]~~ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~

④ INSERT 4 (continued)

	SURVEILLANCE	FREQUENCY
SR 3.2.1.3	4.2.2.2.e ------------------------------NOTE------------------------------ If two measurements extrapolated to 31 EFPD beyond the most recent measurement yield: $F_Q^M(X,Y,Z)$ > BQNOM(X,Y,Z) 4.2.2.2.e.1 a. Increase $F_Q^M(X,Y,Z)$ by the appropriate factor specified in the COLR and reverify $f_2(\Delta I)$ min margin > 0; or 4.2.2.2.e.2 b. Repeat SR 3.2.1.3 prior to the time at which the projected $f_2(\Delta I)$ min margin will be < 0. ---	
	4.2.2.2.c.1 DOC M06 Verify $f_2(\Delta I)$ min margin > 0.	Once after each refueling prior to THERMAL POWER exceeding 75% RTP <u>AND</u> 4.2.2.2.d.1 DOC M07 Once within 12 hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^M(X,Y,Z)$ was last verified <u>AND</u>

④ INSERT 4 (continued)

4.2.2.2.d.2

SURVEILLANCE	FREQUENCY
	~~[31 EFPD thereafter~~ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.1, HEAT FLUX HOT CHANNEL FACTOR ($F_Q(X,Y,Z)$)

1. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

2. The RAOC-W(Z) methodology and the Specification designator "B" are deleted because they are unnecessary. (Only one Heat Flux Hot Channel Factor Specification is used in the SQN ITS). This information is provided in NUREG-1431, Rev. 4 to assist in identifying the appropriate Specification to be used as a model for the plant specific ITS conversion, but serves no purpose in a plant specific implementation. In addition, the CAOC-F_{XY} and CAOC-W(Z) methodology Specifications (ISTS 3.2.1A and 3.2.1C) are not used and are not shown.

3. ISTS ACTIONS do not contain a requirement to reduce the AFD limits when ACTION A is entered for $F_Q^C(X,Y,Z)$ not met. CTS 3.2.2 ACTION a.1 requires a reduction of the allowable power at each point along the AFD limit lines to be reduced within 2 hours. This requirement and Completion Time are being added as Required Action A.2.

4. ISTS SR 3.2.1.2 and ISTS ACTION B have been deleted. CTS does not include requirements to verify $F_Q^W(Z)$ is within limits, or actions to take if $F_Q^W(Z)$ is not within limits. However, CTS does require the verification that both AFD min margin is > 0 and $f_2(\Delta I)$ min margin is > 0. Additionally, the CTS specifies the actions to take if the above verifications are not met. These verifications and actions are added to ITS 3.2.1 as SR 3.2.1.2 and SR 3.2.1.3 with the associated ACTIONS B and C.

5. ISTS 3.2.1 Surveillance Requirements Note allows, during power escalation at the beginning of each cycle, THERMAL POWER may be increased until an equilibrium power level has been achieved at which a power distribution map is obtained. CTS 3.2.2 *** Note has a similar allowance. However, in both CTS and ISTS the allowance is for the first power escalation at the beginning of a new core cycle. Additionally, the CTS has SR 4.2.2.1 which provides, The provisions of Specification 4.0.4 are not applicable. This allowance enables SQN to enter the MODE of Applicability with the Surveillance not being met. ISTS does not have a similar allowance in LCO 3.2.1. Therefore, SQN is retaining the allowance to change the MODE of Applicability with the surveillance not being met by modifying the existing Surveillance Note.

6. ISTS 3.2.1.1 has been modified by a Note providing an allowance to not perform SR 3.2.1.1 if the Surveillance has been determined to be met based on the performance results of both SR 3.2.1.2 and SR 3.2.1.3. If both the AFD min margin and the $f_2(\Delta I)$ min margin are positive, then the steady state limit is met because these margins represent bounding limiting conditions.

7. The ISTS contains bracketed information and/or values that are generic to all Westinghouse vintage plants. The brackets are removed and the proper plant specific information/value is inserted to reflect the current licensing basis.

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.1, HEAT FLUX HOT CHANNEL FACTOR ($F_Q(X,Y,Z)$)

8. ISTS SR 3.2.1.1 provides two options for controlling the Frequencies of Surveillance Requirements. SQN is proposing to control the Surveillance Frequencies under the Surveillance Frequency Control Program.

Improved Standard Technical Specifications (ISTS) Bases Markup and Bases Justification for Deviations (JFDs)

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.1~~B~~ Heat Flux Hot Channel Factor (F_Q(~~Z~~) ~~(RAOC-W(Z) Methodology)~~ ② ①

X,Y,Z

BASES

BACKGROUND

X,Y,Z
X,Y,Z

The purpose of the limits on the values of F_Q(~~Z~~) is to limit the local (i.e., pellet) peak power density. The value of F_Q(~~Z~~) varies along the axial height (Z) of the core.

and by assembly location, X, Y

①

⑧

X,Y,Z
X,Y,Z

F_Q(~~Z~~) is defined as the maximum local fuel rod linear power density divided by the average fuel rod linear power density~~, assuming nominal fuel pellet and fuel rod dimensions~~. Therefore, F_Q(~~Z~~) is a measure of the peak fuel pellet power within the reactor core.

During power operation, the global power distribution is limited by LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," and LCO 3.2.4, "QUADRANT POWER TILT RATIO(QPTR)," which are directly and continuously measured process variables. These LCOs, along with LCO 3.1.6, "Control Bank Insertion Limits," maintain the core limits on power distributions on a continuous basis.

X,Y,Z

F_Q(~~Z~~) varies with fuel loading patterns, control bank insertion, fuel burnup, and changes in axial power distribution. ①

X,Y,Z

F_Q(~~Z~~) is measured periodically using the incore detector system. These measurements are generally taken with the core at or near equilibrium conditions. ①

X,Y,Z
X,Y,Z

Using the measured three dimensional power distributions, it is possible to derive a measured value for F_Q(~~Z~~). However, because this value represents an equilibrium condition, it does not include the variations in the value of F_Q(~~Z~~) which are present during nonequilibrium situations such as load following or power ascension.

①

INSERT 1

To account for these possible variations, ~~the equilibrium value of F_Q(Z) is adjusted as $F_Q^W(Z)$ by an elevation dependent factor that accounts for the calculated worst case transient conditions.~~

Core monitoring and control under non-equilibrium conditions are accomplished by operating the core within the limits of the appropriate LCOs, including the limits on AFD, QPTR, and control rod insertion.

① **INSERT 1**

"the $F_Q(X,Y,Z)$ limits, BQDES(X,Y,Z) and BCDES(X,Y,Z), have been adjusted by pre-calculated factors (MQ(X,Y,Z) and MC(X,Y,Z) respectively) to account for the calculated worst case transient conditions."

BASES

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 (LOCA), the peak cladding temperature must not exceed 2200°F (Ref. 1),

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

c. During an ejected rod accident, the energy deposition to the fuel must not exceed 280 cal/gm (Ref. 2), and

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. 3).

Limits on F_Q(~~Z~~ X,Y,Z) ensure that the value of the initial total peaking factor assumed in the accident analyses remains valid. Other criteria must also be met (e.g., maximum cladding oxidation, maximum hydrogen generation, coolable geometry, and long term cooling). However, the peak cladding temperature is typically most limiting. ①

F_Q(~~Z~~ X,Y,Z) limits assumed in the LOCA analysis are typically limiting relative to (i.e., lower than) the F_Q(~~Z~~ X,Y,Z) limit assumed in safety analyses for other postulated accidents. Therefore, this LCO provides conservative limits for other postulated accidents. ⑧

F_Q(~~Z~~ X,Y,Z) satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The Heat Flux Hot Channel Factor, F_Q(~~Z~~ X,Y,Z), shall be limited by the following relationships: ①

F_Q(~~Z~~ X,Y,Z) ≤ (~~CFQ~~ F_Q^{RTP} / P) K(Z)   for P > 0.5

F_Q(~~Z~~ X,Y,Z) ≤ (~~CFQ~~ F_Q^{RTP} / 0.5) K(Z)   for P ≤ 0.5

where: ~~CFQ~~ F_Q^{RTP} is the F_Q(~~Z~~ X,Y,Z) limit at RTP provided in the COLR,

K(Z) is the normalized ~~FQ(Z)~~ F_Q (X,Y,Z) as a function of core height provided in the COLR, and

P = THERMAL POWER / RTP

BASES

LCO (continued)

For ~~this facility~~ SQN, the actual values of ~~CFQ~~ F_Q^{RTP} and K(Z) are given in the COLR; however, ~~CFQ~~ F_Q^{RTP} is normally a number on the order of [2.32] 2.62, ~~and K(Z) is a function that looks like the one provided in Figure B 3.2.1B-1~~. ① ③

INSERT 2 ~~For Relaxed Axial Offset Control operation, $F_Q(Z)$ is approximated by $F_Q^C(Z)$ and $F_Q^W(Z)$. Thus, both $F_Q^C(Z)$ and $F_Q^W(Z)$ must meet the preceding limits on $F_Q(Z)$.~~ ④

~~An $F_Q^C(Z)$ evaluation requires obtaining an incore flux map in MODE 1. From the incore flux map results we obtain the measured value ($F_Q^M(Z)$) of $F_Q(Z)$. Then,~~

~~$F_Q^C(Z) = F_Q^M(Z)$ [1.0815]~~

~~where [1.0815] is a factor that accounts for fuel manufacturing tolerances and flux map measurement uncertainty.~~

~~$F_Q^C(Z)$ is an excellent approximation for $F_Q(Z)$ when the reactor is at the steady state power at which the incore flux map was taken.~~

~~The expression for $F_Q^W(Z)$ is:~~

~~$F_Q^W(Z) = F_Q^C(Z)$ W(Z)~~

~~where W(Z) is a cycle dependent function that accounts for power distribution transients encountered during normal operation. W(Z) is included in the COLR. The $F_Q^C(Z)$ is calculated at equilibrium conditions.~~

~~The $F_Q(Z)$ limits define limiting values for core power peaking that precludes peak cladding temperatures above 2200°F during either a large or small break LOCA.~~

This LCO requires operation within the bounds assumed in the safety analyses. Calculations are performed in the core design process to confirm that the core can be controlled in such a manner during operation that it can stay within the LOCA F_Q(~~Z~~ X,Y,Z) limits. If ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ cannot be maintained within the LCO limits, reduction of the core power is required ① ~~and if $F_Q^W(Z)$ cannot be maintained within the LCO limits, reduction of the AFD limits is required~~. Note that sufficient reduction of the AFD limits will also result in a reduction of the core power. ⑤

Violating the LCO limits for F_Q(~~Z~~ X,Y,Z) produces unacceptable consequences if a design basis event occurs while F_Q(~~Z~~ X,Y,Z) is outside its specified limits. ①

④ **INSERT 2**

Measured $F_Q(X,Y,Z)$ is compared against three limits:

- Steady state limit, $(F_Q^{RTP} / P) * K(Z)$,
- Limiting condition LOCA limit, BQDES(X,Y,Z), and
- Limiting condition centerline fuel melt limit, BCDES(X,Y,Z).

$F_Q(X,Y,Z)$ is approximated by $F_Q^C(X,Y,Z)$ for the steady state limit on $F_Q(X,Y,Z)$. An $F_Q^C(X,Y,Z)$ evaluation requires using the moveable incore detectors to obtain a power distribution map in MODE 1. From the incore flux map results we obtain the measured value ($F_Q^M(X,Y,Z)$) of $F_Q(X,Y,Z)$. Then,

$$F_Q^C(X,Y,Z) = \text{overall measured } F_Q(X,Y,Z) * 1.05 * 1.03$$

where, 1.05 is the measurement reliability factor that accounts for flux map measurement uncertainty (Reference 5) and 1.03 is the local engineering heat flux hot channel factor to account for fuel rod manufacturing tolerance (Reference 4).

BQDES(X,Y,Z) and BCDES(X,Y,Z) are cycle dependent design limits to ensure the $F_Q(X,Y,Z)$ limit is met during transients. An evaluation of these limits requires obtaining an incore flux map in MODE 1. From the incore flux map results we obtain the assembly nodal measured value ($F_Q^M(X,Y,Z)$) of $F_Q(X,Y,Z)$. $F_Q^M(X,Y,Z)$ is compared directly to the limits BQDES(X,Y,Z) and BCDES(X,Y,Z). This is appropriate since BQDES(X,Y,Z) and BCDES(X,Y,Z) have been adjusted for uncertainties.

The expression for BQDES(X,Y,Z) is: $BQDES(X,Y,Z) = P^d(X,Y,Z) * MQ(X,Y,Z) * NRF * F1 / MRF$

where:

- BQDES(X,Y,Z) is the cycle dependent maximum allowable design peaking factor for fuel assembly X,Y at axial location Z. BQDES(X,Y,Z) ensures that the LOCA limit will be preserved for operation within the LCO limits, including allowances for calculational and measurement uncertainties;
- $P^d(X,Y,Z)$ is the design power distribution for fuel assembly X,Y at axial location Z, including the operational flexibility factor;
- MQ(X,Y,Z) is the minimum available margin ratio for the LOCA limit at assembly X,Y and axial location Z;
- NRF is the nuclear reliability factor;
- F1 is the spacer grid factor;
- MRF is measurement reliability factor.

④

INSERT 2 (continued)

The expression for BCDES(X,Y,Z) is: BCDES(X,Y,Z) = P^d(X,Y,Z) * MC(X,Y,Z) * NRF * F1 / MRF

where:

- BCDES(X,Y,Z) is the cycle dependent maximum allowable design peaking factor for fuel assembly X,Y, at axial location Z. BCDES(X,Y,Z) ensures that the centerline fuel melt limit will be preserved for operation within the LCO limits, including allowances for calculational and measurement uncertainties;
- MC(X,Y,Z) is the minimum available margin ratio for the centerline fuel melt limit at assembly X,Y and axial location Z;

The reactor core is operating as designed if the measured steady state core power distribution agrees with prediction within statistical variation. This guarantees that the operating limits will preserve the thermal criteria in the applicable safety analyses. The core is operating as designed if the following relationship is satisfied:

$$F_Q^M(X, Y, Z) \le \text{BQNOM}(X,Y,Z)$$

where:

- BQNOM(X,Y,Z) is the nominal design peaking factor for assembly X,Y at axial location Z increased by an allowance for the expected deviation between the measured and predicted design power distribution.

The F_Q(X,Y,Z) limits define limiting values for core power peaking that precludes peak cladding temperatures above 2200°F during either a large or small break LOCA.

BQNOM (X,Y,Z), BQDES(X,Y,Z), and BCDES(X,Y,Z) Data bases are provided for the plant power distribution analysis computer codes on a cycle specific basis and are determined using the methodology for core limit generation described in the references in the COLR.

BASES

APPLICABILITY

X,Y,Z ①

The F_Q(~~Z~~) limits must be maintained in MODE 1 to prevent core power distributions from exceeding the limits assumed in the safety analyses. Applicability 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 a limit on the distribution of core power.

ACTIONS

A.1

$F_Q^C(X,Y,Z)$ $F_Q^C(X,Y,Z)$ $F_Q^M(X,Y,Z)$ $F_Q^M(X,Y,Z)$ F_Q (X,Y,Z) ⑤

Reducing THERMAL POWER by ≥ 1% RTP for each 1% by which ~~$F_Q^C(Z)$~~ exceeds its limit, maintains an acceptable absolute power density. ~~$F_Q^C(Z)$~~ is ~~$F_Q^M(Z)$~~ multiplied by a factor accounting for manufacturing tolerances and measurement uncertainties. ~~$F_Q^M(Z)$~~ is the measured value of ~~$F_Q(Z)$.~~ The Completion Time of 15 minutes provides an acceptable time to reduce power in an orderly manner and without allowing the plant to remain in an unacceptable condition for an extended period of time. The maximum allowable power level initially determined by Required Action A.1 may be affected by subsequent determinations of ~~$F_Q^C(Z)$~~ and would require power reductions within 15 minutes of the ~~$F_Q^C(Z)$~~ determination, if necessary to comply with the decreased maximum allowable power level. Decreases in ~~$F_Q^C(Z)$~~ would allow increasing the maximum allowable power level and increasing power up to this revised limit.

$F_Q^C(X,Y,Z)$ $F_Q^C(X,Y,Z)$ $F_Q^C(X,Y,Z)$

INSERT 3 ⑤

A.~~2~~ ④

$F_Q^C(X,Y,Z)$ ⑤

A reduction of the Power Range Neutron Flux - High trip setpoints by ≥ 1% for each 1% by which ~~$F_Q^C(Z)$~~ exceeds its limit, is a conservative action for protection against the consequences of severe transients with unanalyzed power distributions. The Completion Time of 72 hours is sufficient considering the small likelihood of a severe transient in this time period and the preceding prompt reduction in THERMAL POWER in accordance with Required Action A.1. The maximum allowable Power Range Neutron Flux - High trip setpoints initially determined by Required Action A.~~2~~ ④ may be affected by subsequent determinations of ~~$F_Q^C(Z)$~~ and would require Power Range Neutron Flux - High trip setpoint reductions within 72 hours of the ~~$F_Q^C(Z)$~~ determination, if necessary to comply with the decreased maximum allowable Power Range Neutron Flux - High trip setpoints. Decreases in ~~$F_Q^C(Z)$~~ would allow increasing the maximum allowable Power Range Neutron Flux - High trip setpoints.

$F_Q^C(X,Y,Z)$ $F_Q^C(X,Y,Z)$ $F_Q^C(X,Y,Z)$

Move to next page after A.3

⑤

INSERT 3

A.2

Required Action A.2 requires an administrative reduction of the AFD limits by ≥ 1% for each 1% by which $F_Q^C(X,Y,Z)$ exceeds the steady state limit. The allowed Completion Time of 2 hours, restricts the axial flux distribution such that even if a transient occurred, core peaking factor limits are not exceeded. The maximum allowable AFD limits initially determined by Required Action A.2 may be affected by subsequent determinations of $F_Q^C(X,Y,Z)$ and would require further AFD limit reductions within 2 hours of the $F_Q^C(X,Y,Z)$ determination, if necessary to comply with the decreased maximum allowable AFD limits. Decreases in $F_Q^C(X,Y,Z)$ would allow increasing the maximum allowable AFD limits.

ACTIONS (continued)

A.3

Reduction in the Overpower ΔT trip setpoints (value of K_4) by ≥ 1% in ΔT span for each 1% by which ~~$F^C_Q(Z)$~~ $F^C_Q(X,Y,Z)$ exceeds its limit, is a conservative action for protection against the consequences of severe transients with unanalyzed power distributions. The Completion Time of ~~72~~ 48 hours is sufficient considering the small likelihood of a severe transient in this time period, and the preceding prompt reduction in THERMAL POWER in accordance with Required Action A.1. The maximum allowable Overpower ΔT trip setpoints initially determined by Required Action A.3 may be affected by subsequent determinations of ~~$F^C_Q(Z)$~~ $F^C_Q(X,Y,Z)$ and would require Overpower ΔT trip setpoint reductions within ~~72~~ 48 hours of the ~~$F^C_Q(Z)$~~ $F^C_Q(X,Y,Z)$ determination, if necessary to comply with the decreased maximum allowable Overpower ΔT trip setpoints. Decreases in ~~$F^C_Q(Z)$~~ $F^C_Q(X,Y,Z)$ would allow increasing the maximum allowable Overpower ΔT trip setpoints. ⑤

A.~~4~~ 5

Verification that ~~$F^C_Q(Z)$~~ $F^C_Q(X,Y,Z)$ has been restored to within its steady state and transient limit, by performing SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.~~2~~ 3 prior to increasing THERMAL POWER above the limit imposed by Required Action A.1, ensures that core conditions during operation at higher power levels and future operation are consistent with safety analyses assumptions. ① ⑤

INSERT 4

Condition A is modified by a Note that requires Required Action A.~~4~~ 5 to be performed whenever the Condition is entered. This ensures that SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.~~2~~ 3 will be performed prior to increasing THERMAL POWER above the limit of Required Action A.1, even when Condition A is exited prior to performing Required Action A.~~4~~ 5. Performance of SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.~~2~~ 3 are necessary to assure ~~$F_Q(Z)$~~ $F^C_Q(X,Y,Z)$ is properly evaluated prior to increasing THERMAL POWER. ⑤ ⑤ ⑤ ①

INSERT 5

INSERT 6 ④ ⑤

~~B.1~~

~~If it is found that the maximum calculated value of $F_Q(Z)$ that can occur during normal maneuvers, $F^W_Q(Z)$, exceeds its specified limits, there exists a potential for $F^C_Q(Z)$ to become excessively high if a normal operational transient occurs. Reducing the AFD by ≥ 1% for each 1% by which $F^W_Q(Z)$ exceeds its limit within the allowed Completion Time of 4 hours, restricts the axial flux distribution such that even if a transient occurred, core peaking factors are not exceeded.~~ ⑤

⑤ INSERT 4

Since $F_Q^C(X, Y, Z)$ exceeds the steady state limit, the limiting condition operational limit (BQDES) and the limiting condition Reactor Protection System limit (BCDES) may also be exceeded. By performing SR 3.2.1.2 and SR 3.2.1.3, appropriate actions with respect to reductions in AFD limits and OPΔT trip setpoints will be performed, ensuring that core conditions during operational and Condition II transients are maintained within the bounds of the safety analysis.

3.2.1

④ ⑤ **INSERT 5**

B.1 and B.2

The $F_Q(X,Y,Z)$ margin supporting AFD operational limits (AFD margin) during transient operations is based on the relationship between $F_Q^M(X,Y,Z)$ and the limiting condition operational limit, BQDES (X,Y,Z), as follows:

$$\%\text{AFD margin} = \left(1 - \frac{F_Q^M(X,Y,Z)}{BQDES\,(X,Y,Z)}\right) * 100\%$$

The AFD min margin = minimum % margin value of all locations examined. If the reactor core is operating as designed, then $F_Q^M(X,Y,Z)$ is less than BQDES (X,Y,Z) and calculation of %AFD margin is not required. If the AFD margin is less than zero, then $F_Q^M(X,Y,Z)$ is greater than BQDES (X,Y,Z) and the AFD limits may not be adequate to prevent exceeding the peaking criteria for a LOCA if a normal operational transient occurs.

Required Actions B.1 and B.2 require reducing the AFD limit lines as follows. The AFD limit reduction is from the full power AFD limits. The adjusted AFD limits must be used until a new measurement shows that a smaller adjustment can be made to the AFD limits, or that no adjustment is necessary:

APL = PAFDL – Absolute Value of ($PSLOPE^{AFD}$ * % AFD Margin)
ANL = NAFDL + Absolute Value of ($NSLOPE^{AFD}$ * % AFD Margin)

where,

- APL is the adjusted positive AFD limit.
- ANL is the adjusted negative AFD limit.
- PAFDL is the positive AFD limit defined in the COLR.
- NAFDL is the negative AFD limit defined in the COLR.
- $PSLOPE^{AFD}$ is the adjustment to the positive AFD limit required to compensate for each 1% that $F_Q^M(X,Y,Z)$ exceeds BQDES (X,Y,Z) as defined in the COLR.
- $NSLOPE^{AFD}$ is the adjustment to the negative AFD limit required to compensate for each 1% that $F_Q^M(X,Y,Z)$ exceeds BQDES (X,Y,Z) as defined in the COLR.
- % AFD Margin is the most negative margin determined above.

Completing Required Actions B.1 and B.2 within the allowed Completion Time of 2 hours, restricts the axial flux distribution such that even if a transient occurred, core peaking factor limits are not exceeded.

④ ⑤

INSERT 6

C.1 and C.2

The $F_Q(X,Y,Z)$ margin supporting the Overpower ΔT $f_2(\Delta I)$ breakpoints ($f_2(\Delta I)$ margin) during transient operations is based on the relationship between $F_Q^M(X,Y,Z)$ and the limit, BCDES(X,Y,Z), as follows:

$$\% \ f_2(\Delta I) \text{ margin} = \left(1 - \frac{F_Q^M(X,Y,Z)}{BCDES(X,Y,Z)}\right) * 100\%$$

The $f_2(\Delta I)$ min margin = minimum % margin value of all locations examined. If the reactor core is operating as designed, then $F_Q^M(X,Y,Z)$ is less than BCDES(X,Y,Z) and calculation of % $f_2(\Delta I)$ margin is not required. If the $f_2(\Delta I)$ margin is less than zero, then $F_Q^M(X,Y,Z)$ is greater than BCDES(X,Y,Z) and there is a potential that the $f_2(\Delta I)$ limits are insufficient to preclude centerline fuel melt during certain transients.

Required Actions C.1 and C.2 require reducing the $f_2(\Delta I)$ breakpoint limits as follows. The $f_2(\Delta I)$ breakpoint limit reduction is always from the full power $f_2(\Delta I)$ breakpoint limits. The adjusted $f_2(\Delta I)$ breakpoint limits must be used until a new measurement shows that a smaller adjustment can be made to the $f_2(\Delta I)$ breakpoint limits, or that no adjustment is necessary.

$Posf_2(\Delta I)_{Adjusted}$ = $Posf_2(\Delta I)^{Limit}$ – Absolute Value of ($PSLOPE^{f2(\Delta I)}$ * % $f_2(\Delta I)$ Margin)
$Negf_2(\Delta I)_{Adjusted}$ = $Negf_2(\Delta I)^{Limit}$ + Absolute Value of ($NSLOPE^{f2(\Delta I)}$ * % $f_2(\Delta I)$ Margin)

where:

- $Posf_2(\Delta I)_{Adjusted}$ is the adjusted OPΔT positive $f_2(\Delta I)$ breakpoint limit.
- $Negf_2(\Delta I)_{Adjusted}$ is the adjusted OPΔT negative $f_2(\Delta I)$ breakpoint limit.
- $Posf_2(\Delta I)^{Limit}$ is the OPΔT positive $f_2(\Delta I)$ breakpoint limit defined in the COLR.
- $Negf_2(\Delta I)^{Limit}$ is the OPΔT negative $f_2(\Delta I)$ breakpoint limit defined in the COLR.
- $PSLOPE^{f2(\Delta I)}$ is the adjustment to the positive OPΔT $f_2(\Delta I)$ limit required to compensate for each 1% that $F_Q^M(X,Y,Z)$ exceeds BCDES(X,Y,Z) as defined in the COLR.
- $NSLOPE^{f2(\Delta I)}$ is the adjustment to the negative OPΔT $f_2(\Delta I)$ limit required to compensate for each 1% that $F_Q^M(X,Y,Z)$ exceeds BCDES(X,Y,Z) as defined in the COLR.
- % $f_2(\Delta I)$ Margin is the most negative margin determined above.

④ ⑤

INSERT 6 (continued)

Completing Required Actions C.1 and C.2 is a conservative action for protection against the consequences of transients since this adjustment limits the peak transient power level which can be achieved during an anticipated operational occurrence. Completing Required Actions C.1 and C.2 within the allowed Completion Time of 48 hours is sufficient considering the small likelihood of a limiting transient in this time period.

BASES

ACTIONS (continued)

~~The implicit assumption is that if W(Z) values were recalculated (consistent with the reduced AFD limits), then $F_Q^C(Z)$ times the recalculated W(Z) values would meet the $F_Q(Z)$ limit. Note that complying with this action (of reducing AFD limits) may also result in a power reduction. Hence the need for Required Actions B.2, B.3 and B.4.~~

~~B.2~~

~~A reduction of the Power Range Neutron Flux-High trip setpoints by ≥ 1% for each 1% by which the maximum allowable power is reduced, is a conservative action for protection against the consequences of severe transients with unanalyzed power distributions. The Completion Time of 72 hours is sufficient considering the small likelihood of a severe transient in this time period and the preceding prompt reduction in THERMAL POWER as a result of reducing AFD limits in accordance with Required Action B.1.~~

~~B.3~~

~~Reduction in the Overpower ΔT trip setpoints value of K_4 by ≥ 1% for each 1% by which the maximum allowable power is reduced, is a conservative action for protection against the consequences of severe transients with unanalyzed power distributions. The Completion Time of 72 hours is sufficient considering the small likelihood of a severe transient in this time period, and the preceding prompt reduction in THERMAL POWER as a result of reducing AFD limits in accordance with Required Action B.1.~~

~~B.4~~

~~Verification that $F_Q^W(Z)$ has been restored to within its limit, by performing SR 3.2.1.1 and SR 3.2.1.2 prior to increasing THERMAL POWER above the maximum allowable power limit imposed by Required Action B.1 ensures that core conditions during operation at higher power levels and future operation are consistent with safety analyses assumptions.~~

~~Condition B is modified by a Note that requires Required Action B.4 to be performed whenever the Condition is entered. This ensures that SR 3.2.1.1 and SR 3.2.1.2 will be performed prior to increasing THERMAL POWER above the limit of Required Action B.1, even when Condition A is exited prior to performing Required Action B.4. Performance of SR 3.2.1.1 and SR 3.2.1.2 are necessary to assure $F_Q(Z)$ is properly evaluated prior to increasing THERMAL POWER.~~

⑤

BASES

ACTIONS (continued)

D ~~C~~.1 ⑤

If Required Actions A.1 through ~~A.4 or B.1 through B.4~~ A.5, B.1, B.2, C.1 or C.2 are not met within their associated Completion Times, the plant must be placed in a mode or condition in which the LCO requirements are not applicable. This is done by placing the plant in at least MODE 2 within 6 hours.

This allowed Completion Time is reasonable based on operating experience regarding the amount of time it takes to reach MODE 2 from full power operation in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.1.1 , SR 3.2.1.2 and SR 3.2.1.~~2~~ 3 are modified by a Note. ~~The Note applies during the first power ascension after a refueling.~~ It states that Surveillance performance is not required ~~THERMAL POWER may be increased~~ until 12 hours after an equilibrium power level has been achieved at which a power distribution map can be obtained. ⑤ This allowance is modified, however, by one of the Frequency conditions that requires verification that ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$ are within their specified limits after a power rise of more than 10% RTP over the THERMAL POWER at which they were last verified to be within specified limits. Because ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$ could not have previously been measured in this reload core, there is a second Frequency condition, applicable only for reload cores, that requires determination of these parameters before exceeding 75% RTP. This ensures that some determination of ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$ are made at a lower power level at which adequate margin is available before going to 100% RTP. Also, this Frequency condition, together with the Frequency condition requiring verification of ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$ following a power increase of more than 10%, ensures that they are verified as soon as RTP (or any other level for extended operation) is achieved. In the absence of these Frequency conditions, it is possible to increase power to RTP and operate for 31 days without verification of ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$. The Frequency condition is not intended to require verification of these parameters after every 10% increase in power level above the last verification. It only requires verification after a power level is achieved for extended operation that is 10% higher than that power at which F_Q(~~Z~~ X,Y,Z) was last measured. ①

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.2.1.1

$F_Q^C(X,Y,Z)$ Direct verification the overall measured F_Q (X,Y,Z) $F_Q^C(X,Y,Z)$

~~Verification~~ that ~~$F_Q^C(Z)$~~ is within its specified limits involves increasing ~~$F_Q^M(Z)$~~ to allow for manufacturing tolerance and measurement uncertainties in order to obtain ~~$F_Q^C(Z)$~~. ~~Specifically, $F_Q^M(Z)$ is the measured value of $F_Q(Z)$ obtained from incore flux map results and $F_Q^C(Z)$ = $F_Q^M(Z)$ [1.0815] (Ref. 4).~~ ~~$F_Q^C(Z)$~~ is then compared to its specified limits. ① ③

$F_Q^C(X,Y,Z)$

The limit with which ~~$F_Q^C(Z)$~~ is compared varies inversely with power above 50% RTP and directly with a function called K(Z) provided in the COLR.

INSERT 7 ④

$F_Q^C(X,Y,Z)$

Performing this Surveillance in MODE 1 prior to exceeding 75% RTP ensures that the ~~$F_Q^C(Z)$~~ limit is met when RTP is achieved, because peaking factors generally decrease as power level is increased. ①

$F_Q^C(X,Y,Z)$ $F_Q^C(X,Y,Z)$

If THERMAL POWER has been increased by ≥ 10% RTP since the last determination of ~~$F_Q^C(Z)$~~, another evaluation of this factor is required ~~[~~12~~]~~ hours after achieving equilibrium conditions at this higher power level (to ensure that ~~$F_Q^C(Z)$~~ values are being reduced sufficiently with power increase to stay within the LCO limits). ① ② ①

~~[The Frequency of 31 EFPD is adequate to monitor the change of power distribution with core burnup because such changes are slow and well controlled when the plant is operated in accordance with the Technical Specifications (TS).~~ ⑥

~~OR~~

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~
~~---]~~ ⑦

④ **INSERT 7**

The surveillance has been modified by a Note providing an allowance to not perform SR 3.2.1.1 if the Surveillance has been determined to be met based on the performance results of both SR 3.2.1.2 and SR 3.2.1.3. If both the AFD min margin and the $f_2(\Delta I)$ min margin are positive, then the steady state limit is met because these margins represent bounding limiting conditions. However, if AFD min margin or $f_2(\Delta I)$ min margin is negative then a direct evaluation of the steady state limit is required to satisfy this surveillance requirement.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.2.1.2 and 3.2.1.3 ⑤ ②

The nuclear design process includes calculations performed to determine that the core can be operated within the ~~F_Q(Z)~~ F_Q (X,Y,Z) limits. Because flux maps are taken in steady state conditions, the variations in power distribution resulting from normal operational maneuvers are not present in the flux map data. These variations are, however, conservatively calculated by considering a wide range of unit maneuvers in normal operation. The maximum peaking factor increase over steady state values, calculated as a function of INSERT 8 ~~core elevation, Z, is called W(Z). Multiplying the measured total peaking factor, $F_Q^C(Z)$, by W(Z) gives the maximum F_Q(Z) calculated to occur in normal operation, $F_Q^W(Z)$~~.

INSERT 9 ~~The limit with which $F_Q^W(Z)$ is compared varies inversely with power above 50% RTP and directly with the function K(Z) provided in the COLR~~.

~~The W(Z) curve is provided in the COLR for discrete core elevations. Flux map data are typically taken for 30 to 75 core elevations. $F_Q^W(Z)$ evaluations~~ BQDES (X,Y,Z) and BCDES (X,Y,Z) limits are not applicable for the following axial core regions, measured in percent of core height: ④

a. Lower core region, from 0 to 15% inclusive and

b. Upper core region, from 85 to 100% inclusive.

The top and bottom 15% of the core are excluded from the evaluation because of the low probability that these regions would be more limiting in the safety analyses and because of the difficulty of making a precise measurement in these regions.

This Surveillance has been modified by a Note that may require that more frequent surveillances be performed and found to be within the applicable limiting condition limits. If ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$ is evaluated, based on future projections an evaluation ~~of the expression below~~ is required to account for any increase to ~~$F_Q^M(Z)$~~ that may occur and cause the F_Q~~(Z)~~ F_Q (X,Y,Z) limit to be exceeded before the next required ~~F_Q(Z)~~ evaluation.

INSERT 10

~~If the two most recent F_Q(Z) evaluations show an increase in the expression maximum over z [$F_Q^C(Z)$ / K(Z)], it is required to meet the F_Q(Z) limit with the last $F_Q^W(Z)$ increased by the greater of a factor of [1.02] or by an appropriate factor specified in the COLR (Ref. 5)~~ ④

④ **INSERT 8**

both assembly and axial location (X,Y,Z), has been included in the cycle specific limits BQDES(X,Y,Z) and BCDES(X,Y,Z) using margin factors MQ(X,Y,Z) and MC(X,Y,Z), respectively (Reference 5).

④ **INSERT 9**

No uncertainties are applied to $F_Q^M(X, Y, Z)$ because the limits, BQDES(X,Y,Z) and BCDES(X,Y,Z), have been adjusted for uncertainties.

④ **INSERT 10**

In addition to ensuring via surveillance that the heat flux hot channel factor is within its limits when a measurement is taken, there are also requirements to extrapolate trends in $F_Q^M(X,Y,Z)$ for the last two measurements out to 31 EFPD beyond the most recent measurement. If the extrapolation yields an $F_Q^M(X,Y,Z)$ > BQNOM(X,Y,Z), further consideration is required.

The implications of these extrapolations are considered separately for both the operational and RPS heat flux hot channel factor limits. If the extrapolations of $F_Q^M(X,Y,Z)$ are unfavorable, additional actions must be taken. These actions are to meet the F_Q(X,Y,Z) limit with the last $F_Q^M(X,Y,Z)$ increased by the appropriate factor specified in the COLR or to evaluate $F_Q^M(X,Y,Z)$ prior to the projected point in time when the extrapolated values are expected to exceed the extrapolated limits. These alternative requirements prevent F_Q(X,Y,Z) from exceeding its limit for any significant period of time without detection using the best available data.

Extrapolation is not required for the initial flux map taken after reaching equilibrium conditions following a refueling outage since the initial flux map establishes the baseline measurement for future trending.

F_Q(X,Y,Z) is verified at power levels ≥ 10% RTP above the THERMAL POWER of its last verification within 12 hours after achieving equilibrium conditions to ensure that F_Q(X,Y,Z) is within its limit at higher power levels.

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~WCAP-10216-P-A, Rev. 1A, "Relaxation of Constant Axial Offset Control and F_Q Surveillance Technical Specification," February 1994, or other appropriate plant specific methodology, is to be listed in the COLR description in the Administrative Controls Section 5.0 to address the methodology used to derive this factor.~~
~~--~~

~~or to evaluate F_Q(Z) more frequently, each 7 EFPD. These alternative requirements prevent F_Q(Z) from exceeding its limit for any significant period of time without detection.~~ ④

~~Performing the Surveillance in MODE 1 prior to exceeding 75% RTP ensures that the F_Q(Z) limit is met when RTP is achieved, because peaking factors are generally decreased as power level is increased.~~

~~F_Q(Z) is verified at power levels ≥ 10% RTP above the THERMAL POWER of its last verification, [12] hours after achieving equilibrium conditions to ensure that F_Q(Z) is within its limit at higher power levels.~~

~~The Surveillance Frequency of 31 EFPD is adequate to monitor the change of power distribution with core burnup. The Surveillance may be done more frequently if required by the results of F_Q(Z) evaluations.~~

~~[The Frequency of 31 EFPD is adequate to monitor the change of power distribution because such a change is sufficiently slow, when the plant is operated in accordance with the TS, to preclude adverse peaking factors between 31 day surveillances.~~ ⑥

~~OR~~

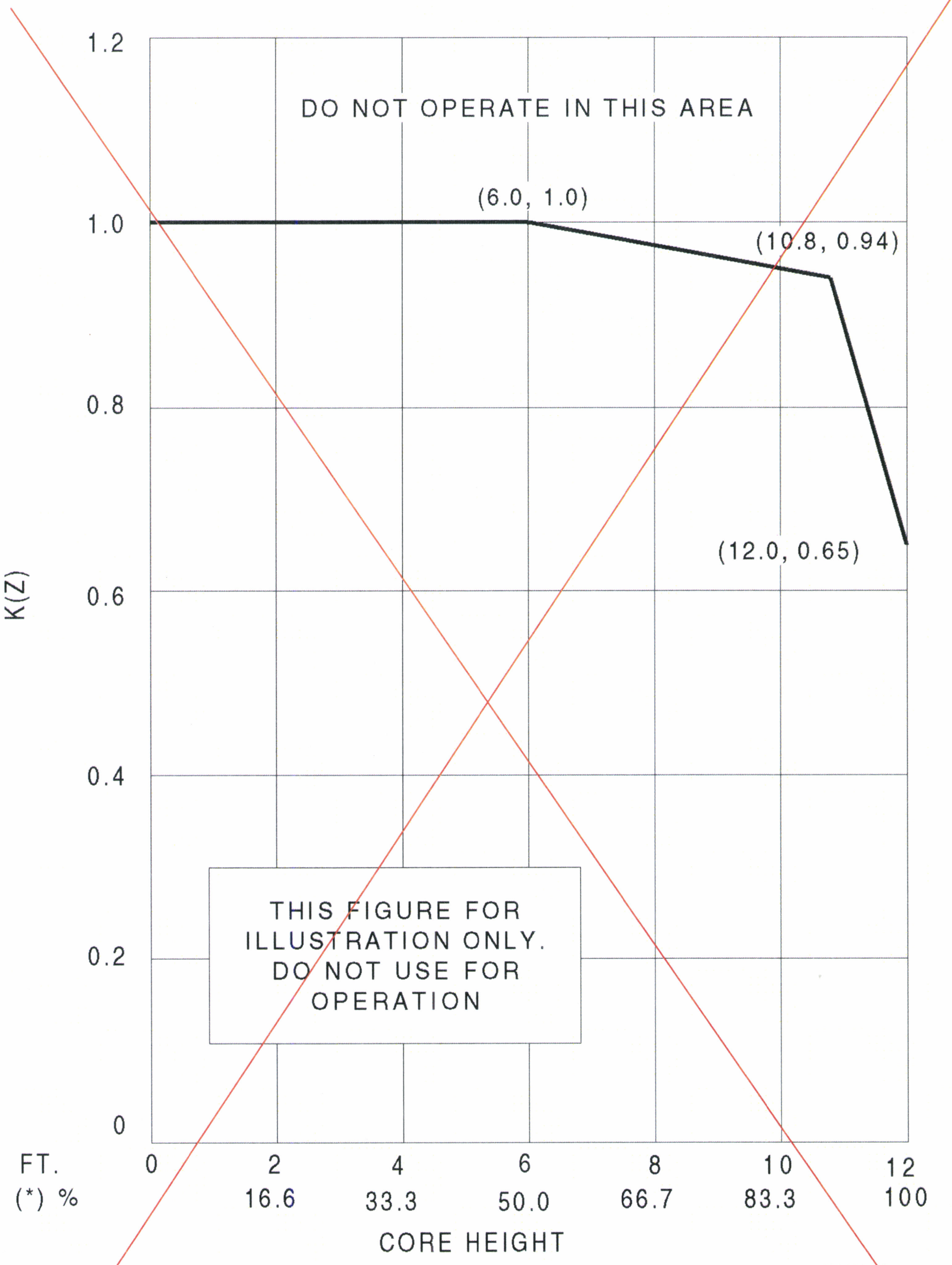
The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ ⑦
~~--]~~

REFERENCES

1. 10 CFR 50.46, 1974.
2. Regulatory Guide 1.77, Rev. 0, May 1974.
3. 10 CFR 50, Appendix A, GDC 26.
4. WCAP-7308-L-P-A, "Evaluation of Nuclear Hot Channel Factor Uncertainties," June 1988.
5. ~~WCAP-10216-P-A, Rev. 1A, "Relaxation of Constant Axial Offset Control (and) F_Q Surveillance Technical Specification," February 1994.~~ ④

BAW-10163PA "Core Operating Limit Methodology for Westinghouse-Designed PWRs" June 1989.



④

*For core height of 12 feet

Figure B 3.2.1B-1 (page 1 of 1)
K(Z) - Normalized F_Q(Z) as a Function of Core Height

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.1~~B~~ Heat Flux Hot Channel Factor (F_Q(~~Z~~ X,Y,Z) ~~(RAOC-W(Z) Methodology)~~ ② ①

BASES

BACKGROUND

The purpose of the limits on the values of F_Q(~~Z~~ X,Y,Z) is to limit the local (i.e., pellet) peak power density. The value of F_Q(~~Z~~ X,Y,Z) varies along the axial height (Z) of the core and by assembly location, X, Y. ①

F_Q(~~Z~~ X,Y,Z) is defined as the maximum local fuel rod linear power density divided by the average fuel rod linear power density~~, assuming nominal fuel pellet and fuel rod dimensions~~. Therefore, F_Q(~~Z~~ X,Y,Z) is a measure of the peak fuel pellet power within the reactor core. ⑧

During power operation, the global power distribution is limited by LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," and LCO 3.2.4, "QUADRANT POWER TILT RATIO(QPTR)," which are directly and continuously measured process variables. These LCOs, along with LCO 3.1.6, "Control Bank Insertion Limits," maintain the core limits on power distributions on a continuous basis.

F_Q(~~Z~~ X,Y,Z) varies with fuel loading patterns, control bank insertion, fuel burnup, and changes in axial power distribution. ①

F_Q(~~Z~~ X,Y,Z) is measured periodically using the incore detector system. These measurements are generally taken with the core at or near equilibrium conditions. ①

Using the measured three dimensional power distributions, it is possible to derive a measured value for F_Q(~~Z~~ X,Y,Z). However, because this value represents an equilibrium condition, it does not include the variations in the value of F_Q(~~Z~~ X,Y,Z) which are present during nonequilibrium situations such as load following or power ascension. ①

To account for these possible variations, INSERT 1 ~~the equilibrium value of $F_Q(Z)$ is adjusted as $F_Q^W(Z)$ by an elevation dependent factor that accounts for the calculated worst case transient conditions.~~

Core monitoring and control under non-equilibrium conditions are accomplished by operating the core within the limits of the appropriate LCOs, including the limits on AFD, QPTR, and control rod insertion.

① INSERT 1

"the F_Q(X,Y,Z) limits, BQDES(X,Y,Z) and BCDES(X,Y,Z), have been adjusted by pre-calculated factors (MQ(X,Y,Z) and MC(X,Y,Z) respectively) to account for the calculated worst case transient conditions."

BASES

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 (LOCA), the peak cladding temperature must not exceed 2200°F (Ref. 1),

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

c. During an ejected rod accident, the energy deposition to the fuel must not exceed 280 cal/gm (Ref. 2), and

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. 3).

Limits on F_Q(~~Z~~ X,Y,Z) ensure that the value of the initial total peaking factor assumed in the accident analyses remains valid. Other criteria must also be met (e.g., maximum cladding oxidation, maximum hydrogen generation, coolable geometry, and long term cooling). However, the peak cladding temperature is typically most limiting. ①

F_Q(~~Z~~ X,Y,Z) limits assumed in the LOCA analysis are typically limiting relative to (i.e., lower than) the F_Q(~~Z~~ X,Y,Z) limit assumed in safety analyses for other postulated accidents. Therefore, this LCO provides conservative limits for other postulated accidents. ⑧

X,Y,Z F_Q(~~Z~~) satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The Heat Flux Hot Channel Factor, F_Q(~~Z~~ X,Y,Z), shall be limited by the following relationships: ①

F_Q(~~Z~~ X,Y,Z) ≤ (~~CFQ~~ F_Q^{RTP} / P) K(Z)   for P > 0.5

F_Q(~~Z~~ X,Y,Z) ≤ (~~CFQ~~ F_Q^{RTP} / 0.5) K(Z)   for P ≤ 0.5

where: ~~CFQ~~ F_Q^{RTP} is the F_Q(~~Z~~ X,Y,Z) limit at RTP provided in the COLR,

K(Z) is the normalized ~~FQ(Z)~~ F_Q (X,Y,Z) as a function of core height provided in the COLR, and

P = THERMAL POWER / RTP

BASES

LCO (continued)

For ~~this facility~~ SQN, the actual values of ~~CFQ~~ F_Q^{RTP} and K(Z) are given in the COLR; however, ~~CFQ~~ F_Q^{RTP} is normally a number on the order of [2.32] 2.62, ~~and K(Z) is a function that looks like the one provided in Figure B 3.2.1B-1~~. ① ③

INSERT 2 ~~For Relaxed Axial Offset Control operation, $F_Q(Z)$ is approximated by $F_Q^C(Z)$ and $F_Q^W(Z)$. Thus, both $F_Q^C(Z)$ and $F_Q^W(Z)$ must meet the preceding limits on $F_Q(Z)$.~~ ④

~~An $F_Q^C(Z)$ evaluation requires obtaining an incore flux map in MODE 1. From the incore flux map results we obtain the measured value ($F_Q^M(Z)$) of $F_Q(Z)$. Then,~~

~~$F_Q^C(Z) = F_Q^M(Z)$ [1.0815]~~

~~where [1.0815] is a factor that accounts for fuel manufacturing tolerances and flux map measurement uncertainty.~~

~~$F_Q^C(Z)$ is an excellent approximation for $F_Q(Z)$ when the reactor is at the steady state power at which the incore flux map was taken.~~

~~The expression for $F_Q^W(Z)$ is:~~

~~$F_Q^W(Z) = F_Q^C(Z)$ W(Z)~~

~~where W(Z) is a cycle dependent function that accounts for power distribution transients encountered during normal operation. W(Z) is included in the COLR. The $F_Q^C(Z)$ is calculated at equilibrium conditions.~~

~~The $F_Q(Z)$ limits define limiting values for core power peaking that precludes peak cladding temperatures above 2200°F during either a large or small break LOCA.~~

This LCO requires operation within the bounds assumed in the safety analyses. Calculations are performed in the core design process to confirm that the core can be controlled in such a manner during operation that it can stay within the LOCA F_Q(~~Z~~) X,Y,Z limits. If ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ cannot be maintained within the LCO limits, reduction of the core power is required ~~and if $F_Q^W(Z)$ cannot be maintained within the LCO limits, reduction of the AFD limits is required~~. Note that sufficient reduction of the AFD limits will also result in a reduction of the core power. ① ⑤

Violating the LCO limits for F_Q(~~Z~~) X,Y,Z produces unacceptable consequences if a design basis event occurs while F_Q(~~Z~~) X,Y,Z is outside its specified limits. ①

④ **INSERT 2**

Measured $F_Q(X,Y,Z)$ is compared against three limits:

- Steady state limit, $(F_Q^{RTP} / P) * K(Z)$,
- Limiting condition LOCA limit, BQDES(X,Y,Z), and
- Limiting condition centerline fuel melt limit, BCDES(X,Y,Z).

$F_Q(X,Y,Z)$ is approximated by $F_Q^C(X,Y,Z)$ for the steady state limit on $F_Q(X,Y,Z)$. An $F_Q^C(X,Y,Z)$ evaluation requires using the moveable incore detectors to obtain a power distribution map in MODE 1. From the incore flux map results we obtain the measured value ($F_Q^M(X,Y,Z)$) of $F_Q(X,Y,Z)$. Then,

$$F_Q^C(X,Y,Z) = \text{overall measured } F_Q(X,Y,Z) * 1.05 * 1.03$$

where, 1.05 is the measurement reliability factor that accounts for flux map measurement uncertainty (Reference 5) and 1.03 is the local engineering heat flux hot channel factor to account for fuel rod manufacturing tolerance (Reference 4).

BQDES(X,Y,Z) and BCDES(X,Y,Z) are cycle dependent design limits to ensure the $F_Q(X,Y,Z)$ limit is met during transients. An evaluation of these limits requires obtaining an incore flux map in MODE 1. From the incore flux map results we obtain the assembly nodal measured value ($F_Q^M(X,Y,Z)$) of $F_Q(X,Y,Z)$. $F_Q^M(X,Y,Z)$ is compared directly to the limits BQDES(X,Y,Z) and BCDES(X,Y,Z). This is appropriate since BQDES(X,Y,Z) and BCDES(X,Y,Z) have been adjusted for uncertainties.

The expression for BQDES(X,Y,Z) is: BQDES(X,Y,Z) = $P^d(X,Y,Z)$ * MQ(X,Y,Z) * NRF * F1 / MRF

where:

- BQDES(X,Y,Z) is the cycle dependent maximum allowable design peaking factor for fuel assembly X,Y at axial location Z. BQDES(X,Y,Z) ensures that the LOCA limit will be preserved for operation within the LCO limits, including allowances for calculational and measurement uncertainties;
- $P^d(X,Y,Z)$ is the design power distribution for fuel assembly X,Y at axial location Z, including the operational flexibility factor;
- MQ(X,Y,Z) is the minimum available margin ratio for the LOCA limit at assembly X,Y and axial location Z;
- NRF is the nuclear reliability factor;
- F1 is the spacer grid factor;
- MRF is measurement reliability factor.

④

INSERT 2 (continued)

The expression for BCDES(X,Y,Z) is: BCDES(X,Y,Z) = P^d(X,Y,Z) * MC(X,Y,Z) * NRF * F1 / MRF

where:

- BCDES(X,Y,Z) is the cycle dependent maximum allowable design peaking factor for fuel assembly X,Y, at axial location Z. BCDES(X,Y,Z) ensures that the centerline fuel melt limit will be preserved for operation within the LCO limits, including allowances for calculational and measurement uncertainties;

- MC(X,Y,Z) is the minimum available margin ratio for the centerline fuel melt limit at assembly X,Y and axial location Z;

The reactor core is operating as designed if the measured steady state core power distribution agrees with prediction within statistical variation. This guarantees that the operating limits will preserve the thermal criteria in the applicable safety analyses. The core is operating as designed if the following relationship is satisfied:

$$F_Q^M(X, Y, Z) \leq \text{BQNOM(X,Y,Z)}$$

where:

- BQNOM(X,Y,Z) is the nominal design peaking factor for assembly X,Y at axial location Z increased by an allowance for the expected deviation between the measured and predicted design power distribution.

The F_Q(X,Y,Z) limits define limiting values for core power peaking that precludes peak cladding temperatures above 2200°F during either a large or small break LOCA.

BQNOM (X,Y,Z), BQDES(X,Y,Z), and BCDES(X,Y,Z) Data bases are provided for the plant power distribution analysis computer codes on a cycle specific basis and are determined using the methodology for core limit generation described in the references in the COLR.

F_Q(~~Z~~) X,Y,Z ~~(RAOC-W(Z) Methodology)~~ ① ②
B 3.2.1~~B~~

BASES

APPLICABILITY

The F_Q(~~Z~~) X,Y,Z limits must be maintained in MODE 1 to prevent core power distributions from exceeding the limits assumed in the safety analyses. Applicability 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 a limit on the distribution of core power. ①

ACTIONS

A.1

Reducing THERMAL POWER by ≥ 1% RTP for each 1% by which ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ exceeds its limit, maintains an acceptable absolute power density. ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ is ~~$F_Q^M(Z)$~~ $F_Q^M(X,Y,Z)$ multiplied by a factor accounting for manufacturing tolerances and measurement uncertainties. ~~$F_Q^M(Z)$~~ $F_Q^M(X,Y,Z)$ is the measured value of ~~$F_Q(Z)$.~~ F_Q (X,Y,Z) The Completion Time of 15 minutes provides an acceptable time to reduce power in an orderly manner and without allowing the plant to remain in an unacceptable condition for an extended period of time. The maximum allowable power level initially determined by Required Action A.1 may be affected by subsequent determinations of ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and would require power reductions within 15 minutes of the ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ determination, if necessary to comply with the decreased maximum allowable power level. Decreases in ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ would allow increasing the maximum allowable power level and increasing power up to this revised limit. ⑤

INSERT 3 ⑤

A.~~2~~ 4

A reduction of the Power Range Neutron Flux - High trip setpoints by ≥ 1% for each 1% by which ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ exceeds its limit, is a conservative action for protection against the consequences of severe transients with unanalyzed power distributions. The Completion Time of 72 hours is sufficient considering the small likelihood of a severe transient in this time period and the preceding prompt reduction in THERMAL POWER in accordance with Required Action A.1. The maximum allowable Power Range Neutron Flux - High trip setpoints initially determined by Required Action A.~~2~~ 4 may be affected by subsequent determinations of ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and would require Power Range Neutron Flux - High trip setpoint reductions within 72 hours of the ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ determination, if necessary to comply with the decreased maximum allowable Power Range Neutron Flux - High trip setpoints. Decreases in ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ would allow increasing the maximum allowable Power Range Neutron Flux - High trip setpoints. ⑤

Move to next page after A.3

⑤

INSERT 3

A.2

Required Action A.2 requires an administrative reduction of the AFD limits by ≥ 1% for each 1% by which $F_Q^C(X, Y, Z)$ exceeds the steady state limit. The allowed Completion Time of 2 hours, restricts the axial flux distribution such that even if a transient occurred, core peaking factor limits are not exceeded. The maximum allowable AFD limits initially determined by Required Action A.2 may be affected by subsequent determinations of $F_Q^C(X, Y, Z)$ and would require further AFD limit reductions within 2 hours of the $F_Q^C(X, Y, Z)$ determination, if necessary to comply with the decreased maximum allowable AFD limits. Decreases in $F_Q^C(X,Y,Z)$ would allow increasing the maximum allowable AFD limits.

ACTIONS (continued)

A.3

Reduction in the Overpower ΔT trip setpoints (value of K_4) by ≥ 1% in ΔT span for each 1% by which ~~F_Q^C(Z)~~ $F_Q^C(X,Y,Z)$ exceeds its limit, is a conservative action for protection against the consequences of severe transients with unanalyzed power distributions. The Completion Time of ~~72~~ 48 hours is sufficient considering the small likelihood of a severe transient in this time period, and the preceding prompt reduction in THERMAL POWER in accordance with Required Action A.1. The maximum allowable Overpower ΔT trip setpoints initially determined by Required Action A.3 may be affected by subsequent determinations of ~~F_Q^C(Z)~~ $F_Q^C(X,Y,Z)$ and would require Overpower ΔT trip setpoint reductions within ~~72~~ 48 hours of the ~~F_Q^C(Z)~~ $F_Q^C(X,Y,Z)$ determination, if necessary to comply with the decreased maximum allowable Overpower ΔT trip setpoints. Decreases in ~~F_Q^C(Z)~~ $F_Q^C(X,Y,Z)$ would allow increasing the maximum allowable Overpower ΔT trip setpoints. ⑤

A.~~4~~ 5

Verification that ~~F_Q^C(Z)~~ $F_Q^C(X,Y,Z)$ has been restored to within its steady state and transient limit, by performing SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.~~2~~ 3 prior to increasing THERMAL POWER above the limit imposed by Required Action A.1, ensures that core conditions during operation at higher power levels and future operation are consistent with safety analyses assumptions. ① ⑤

INSERT 4

Condition A is modified by a Note that requires Required Action A.~~4~~ 5 to be performed whenever the Condition is entered. This ensures that SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.~~2~~ 3 will be performed prior to increasing THERMAL POWER above the limit of Required Action A.1, even when Condition A is exited prior to performing Required Action A.~~4~~ 5. Performance of SR 3.2.1.1, SR 3.2.1.2 and SR 3.2.1.~~2~~ 3 are necessary to assure ~~F_Q(Z)~~ $F_Q^C(X,Y,Z)$ is properly evaluated prior to increasing THERMAL POWER. ⑤ ⑤ ⑤ ①

INSERT 5 ④ ⑤

INSERT 6

~~B.1~~

~~If it is found that the maximum calculated value of F_Q(Z) that can occur during normal maneuvers, F_Q^W(Z), exceeds its specified limits, there exists a potential for F_Q^C(Z) to become excessively high if a normal operational transient occurs. Reducing the AFD by ≥ 1% for each 1% by which F_Q^W(Z) exceeds its limit within the allowed Completion Time of 4 hours, restricts the axial flux distribution such that even if a transient occurred, core peaking factors are not exceeded.~~ ⑤

⑤ **INSERT 4**

Since $F_Q^C(X, Y, Z)$ exceeds the steady state limit, the limiting condition operational limit (BQDES) and the limiting condition Reactor Protection System limit (BCDES) may also be exceeded. By performing SR 3.2.1.2 and SR 3.2.1.3, appropriate actions with respect to reductions in AFD limits and OPΔT trip setpoints will be performed, ensuring that core conditions during operational and Condition II transients are maintained within the bounds of the safety analysis.

④ ⑤

INSERT 5

B.1 and B.2

The $F_Q(X,Y,Z)$ margin supporting AFD operational limits (AFD margin) during transient operations is based on the relationship between $F_Q^M(X,Y,Z)$ and the limiting condition operational limit, BQDES (X,Y,Z), as follows:

$$\%\text{AFD margin} = \left(1 - \frac{F_Q^M(X,Y,Z)}{BQDES(X,Y,Z)}\right) * 100\%$$

The AFD min margin = minimum % margin value of all locations examined. If the reactor core is operating as designed, then $F_Q^M(X,Y,Z)$ is less than BQDES (X,Y,Z) and calculation of %AFD margin is not required. If the AFD margin is less than zero, then $F_Q^M(X,Y,Z)$ is greater than BQDES (X,Y,Z) and the AFD limits may not be adequate to prevent exceeding the peaking criteria for a LOCA if a normal operational transient occurs.

Required Actions B.1 and B.2 require reducing the AFD limit lines as follows. The AFD limit reduction is from the full power AFD limits. The adjusted AFD limits must be used until a new measurement shows that a smaller adjustment can be made to the AFD limits, or that no adjustment is necessary:

APL = PAFDL – Absolute Value of ($PSLOPE^{AFD}$ * % AFD Margin)
ANL = NAFDL + Absolute Value of ($NSLOPE^{AFD}$ * % AFD Margin)

where,

- APL is the adjusted positive AFD limit.
- ANL is the adjusted negative AFD limit.
- PAFDL is the positive AFD limit defined in the COLR.
- NAFDL is the negative AFD limit defined in the COLR.
- $PSLOPE^{AFD}$ is the adjustment to the positive AFD limit required to compensate for each 1% that $F_Q^M(X,Y,Z)$ exceeds BQDES (X,Y,Z) as defined in the COLR.
- $NSLOPE^{AFD}$ is the adjustment to the negative AFD limit required to compensate for each 1% that $F_Q^M(X,Y,Z)$ exceeds BQDES (X,Y,Z) as defined in the COLR.
- % AFD Margin is the most negative margin determined above.

Completing Required Actions B.1 and B.2 within the allowed Completion Time of 2 hours, restricts the axial flux distribution such that even if a transient occurred, core peaking factor limits are not exceeded.

④ ⑤

INSERT 6

C.1 and C.2

The $F_Q(X,Y,Z)$ margin supporting the Overpower ΔT $f_2(\Delta I)$ breakpoints ($f_2(\Delta I)$ margin) during transient operations is based on the relationship between $F_Q^M(X,Y,Z)$ and the limit, BCDES(X,Y,Z), as follows:

$$\% \; f_2(\Delta I) \text{ margin} = \left(1 - \frac{F_Q^M(X,Y,Z)}{BCDES(X,Y,Z)}\right) * 100\%$$

The $f_2(\Delta I)$ min margin = minimum % margin value of all locations examined. If the reactor core is operating as designed, then $F_Q^M(X,Y,Z)$ is less than BCDES(X,Y,Z) and calculation of % $f_2(\Delta I)$ margin is not required. If the $f_2(\Delta I)$ margin is less than zero, then $F_Q^M(X,Y,Z)$ is greater than BCDES(X,Y,Z) and there is a potential that the $f_2(\Delta I)$ limits are insufficient to preclude centerline fuel melt during certain transients.

Required Actions C.1 and C.2 require reducing the $f_2(\Delta I)$ breakpoint limits as follows. The $f_2(\Delta I)$ breakpoint limit reduction is always from the full power $f_2(\Delta I)$ breakpoint limits. The adjusted $f_2(\Delta I)$ breakpoint limits must be used until a new measurement shows that a smaller adjustment can be made to the $f_2(\Delta I)$ breakpoint limits, or that no adjustment is necessary.

$\text{Posf}_2(\Delta I)_{\text{Adjusted}} = \text{Posf}_2(\Delta I)^{\text{Limit}}$ – Absolute Value of ($\text{PSLOPE}^{f2(\Delta I)}$ * % $f_2(\Delta I)$ Margin)

$\text{Negf}_2(\Delta I)_{\text{Adjusted}} = \text{Negf}_2(\Delta I)^{\text{Limit}}$ + Absolute Value of ($\text{NSLOPE}^{f2(\Delta I)}$ * % $f_2(\Delta I)$ Margin)

where:

- $\text{Posf}_2(\Delta I)_{\text{Adjusted}}$ is the adjusted OPΔT positive $f_2(\Delta I)$ breakpoint limit.
- $\text{Negf}_2(\Delta I)_{\text{Adjusted}}$ is the adjusted OPΔT negative $f_2(\Delta I)$ breakpoint limit.
- $\text{Posf}_2(\Delta I)^{\text{Limit}}$ is the OPΔT positive $f_2(\Delta I)$ breakpoint limit defined in the COLR.
- $\text{Negf}_2(\Delta I)^{\text{Limit}}$ is the OPΔT negative $f_2(\Delta I)$ breakpoint limit defined in the COLR.
- $\text{PSLOPE}^{f2(\Delta I)}$ is the adjustment to the positive OPΔT $f_2(\Delta I)$ limit required to compensate for each 1% that $F_Q^M(X,Y,Z)$ exceeds BCDES(X,Y,Z) as defined in the COLR.
- $\text{NSLOPE}^{f2(\Delta I)}$ is the adjustment to the negative OPΔT $f_2(\Delta I)$ limit required to compensate for each 1% that $F_Q^M(X,Y,Z)$ exceeds BCDES(X,Y,Z) as defined in the COLR.
- % $f_2(\Delta I)$ Margin is the most negative margin determined above.

④ ⑤

INSERT 6 (continued)

Completing Required Actions C.1 and C.2 is a conservative action for protection against the consequences of transients since this adjustment limits the peak transient power level which can be achieved during an anticipated operational occurrence. Completing Required Actions C.1 and C.2 within the allowed Completion Time of 48 hours is sufficient considering the small likelihood of a limiting transient in this time period.

BASES

ACTIONS (continued)

~~The implicit assumption is that if W(Z) values were recalculated (consistent with the reduced AFD limits), then $F_Q^C(Z)$ times the recalculated W(Z) values would meet the $F_Q(Z)$ limit. Note that complying with this action (of reducing AFD limits) may also result in a power reduction. Hence the need for Required Actions B.2, B.3 and B.4.~~

~~B.2~~

~~A reduction of the Power Range Neutron Flux-High trip setpoints by ≥ 1% for each 1% by which the maximum allowable power is reduced, is a conservative action for protection against the consequences of severe transients with unanalyzed power distributions. The Completion Time of 72 hours is sufficient considering the small likelihood of a severe transient in this time period and the preceding prompt reduction in THERMAL POWER as a result of reducing AFD limits in accordance with Required Action B.1.~~

~~B.3~~

~~Reduction in the Overpower ΔT trip setpoints value of K_4 by ≥ 1% for each 1% by which the maximum allowable power is reduced, is a conservative action for protection against the consequences of severe transients with unanalyzed power distributions. The Completion Time of 72 hours is sufficient considering the small likelihood of a severe transient in this time period, and the preceding prompt reduction in THERMAL POWER as a result of reducing AFD limits in accordance with Required Action B.1.~~

~~B.4~~

~~Verification that $F_Q^W(Z)$ has been restored to within its limit, by performing SR 3.2.1.1 and SR 3.2.1.2 prior to increasing THERMAL POWER above the maximum allowable power limit imposed by Required Action B.1 ensures that core conditions during operation at higher power levels and future operation are consistent with safety analyses assumptions.~~

~~Condition B is modified by a Note that requires Required Action B.4 to be performed whenever the Condition is entered. This ensures that SR 3.2.1.1 and SR 3.2.1.2 will be performed prior to increasing THERMAL POWER above the limit of Required Action B.1, even when Condition A is exited prior to performing Required Action B.4. Performance of SR 3.2.1.1 and SR 3.2.1.2 are necessary to assure $F_Q(Z)$ is properly evaluated prior to increasing THERMAL POWER.~~ ⑤

BASES

ACTIONS (continued)

~~C~~ D.1 ⑤

If Required Actions A.1 through ~~A.4 or B.1 through B.4~~ A.5, B.1, B.2, C.1 or C.2 are not met within their associated Completion Times, the plant must be placed in a mode or condition in which the LCO requirements are not applicable. This is done by placing the plant in at least MODE 2 within 6 hours.

This allowed Completion Time is reasonable based on operating experience regarding the amount of time it takes to reach MODE 2 from full power operation in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.1.1 , SR 3.2.1.2 and SR 3.2.1.~~2~~ 3 are modified by a Note. ~~The Note applies during the first power ascension after a refueling.~~ It states that Surveillance performance is not required ~~THERMAL POWER may be increased~~ until 12 hours after an equilibrium power level has been achieved at which a power distribution map can be obtained. ⑤

This allowance is modified, however, by one of the Frequency conditions that requires verification that ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$ are within their specified limits after a power rise of more than 10% RTP over the THERMAL POWER at which they were last verified to be within specified limits. Because ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$ could not have previously been measured in this reload core, there is a second Frequency condition, applicable only for reload cores, that requires determination of these parameters before exceeding 75% RTP. This ensures that some determination of ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$ are made at a lower power level at which adequate margin is available before going to 100% RTP. Also, this Frequency condition, together with the Frequency condition requiring verification of ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$ following a power increase of more than 10%, ensures that they are verified as soon as RTP (or any other level for extended operation) is achieved. In the absence of these Frequency conditions, it is possible to increase power to RTP and operate for 31 days without verification of ~~$F_Q^C(Z)$~~ $F_Q^C(X,Y,Z)$ and ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$. The Frequency condition is not intended to require verification of these parameters after every 10% increase in power level above the last verification. It only requires verification after a power level is achieved for extended operation that is 10% higher than that power at which F_Q(~~Z~~ X,Y,Z) was last measured. ①

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.2.1.1

$F_Q^C(X,Y,Z)$
Direct verification
the overall measured F_Q (X,Y,Z)
$F_Q^C(X,Y,Z)$

~~Verification~~ that ~~$F_Q^C(Z)$~~ is within its specified limits involves increasing ~~$F_Q^M(Z)$~~ to allow for manufacturing tolerance and measurement uncertainties in order to obtain ~~$F_Q^C(Z)$~~. ~~Specifically, $F_Q^M(Z)$ is the measured value of $F_Q(Z)$ obtained from incore flux map results and $F_Q^C(Z)$ = $F_Q^M(Z)$ [1.0815] (Ref. 4).~~ ~~$F_Q^C(Z)$~~ is then compared to its specified limits. ① ③

$F_Q^C(X,Y,Z)$

The limit with which ~~$F_Q^C(Z)$~~ is compared varies inversely with power above 50% RTP and directly with a function called K(Z) provided in the COLR.

INSERT 7 ④

$F_Q^C(X,Y,Z)$

Performing this Surveillance in MODE 1 prior to exceeding 75% RTP ensures that the ~~$F_Q^C(Z)$~~ limit is met when RTP is achieved, because peaking factors generally decrease as power level is increased. ①

$F_Q^C(X,Y,Z)$
$F_Q^C(X,Y,Z)$

If THERMAL POWER has been increased by ≥ 10% RTP since the last determination of ~~$F_Q^C(Z)$~~, another evaluation of this factor is required ~~[~~12~~]~~ hours after achieving equilibrium conditions at this higher power level (to ensure that ~~$F_Q^C(Z)$~~ values are being reduced sufficiently with power increase to stay within the LCO limits). ① ② ①

~~[The Frequency of 31 EFPD is adequate to monitor the change of power distribution with core burnup because such changes are slow and well controlled when the plant is operated in accordance with the Technical Specifications (TS).~~

~~OR~~ ⑥

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~
~~---]~~ ⑦

④ **INSERT 7**

The surveillance has been modified by a Note providing an allowance to not perform SR 3.2.1.1 if the Surveillance has been determined to be met based on the performance results of both SR 3.2.1.2 and SR 3.2.1.3. If both the AFD min margin and the $f_2(\Delta I)$ min margin are positive, then the steady state limit is met because these margins represent bounding limiting conditions. However, if AFD min margin or $f_2(\Delta I)$ min margin is negative then a direct evaluation of the steady state limit is required to satisfy this surveillance requirement.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.2.1.2 and 3.2.1.3

⑤ ②

The nuclear design process includes calculations performed to determine that the core can be operated within the ~~F_Q(Z)~~ F_Q (X,Y,Z) limits. Because flux maps are taken in steady state conditions, the variations in power distribution resulting from normal operational maneuvers are not present in the flux map data. These variations are, however, conservatively calculated by considering a wide range of unit maneuvers in normal operation. The maximum peaking factor increase over steady state values, calculated as a function of INSERT 8 ~~core elevation, Z, is called W(Z). Multiplying the measured total peaking factor, $F_Q^C(Z)$, by W(Z) gives the maximum $F_Q(Z)$ calculated to occur in normal operation, $F_Q^W(Z)$~~.

~~The limit with which $F_Q^W(Z)$ is compared varies inversely with power above 50% RTP and directly with the function K(Z) provided in the COLR~~. INSERT 9

~~The W(Z) curve is provided in the COLR for discrete core elevations. Flux map data are typically taken for 30 to 75 core elevations. $F_Q^W(Z)$ evaluations~~ BQDES (X,Y,Z) and BCDES (X,Y,Z) limits are not applicable for the following axial core regions, measured in percent of core height:

④

a. Lower core region, from 0 to 15% inclusive and

b. Upper core region, from 85 to 100% inclusive.

The top and bottom 15% of the core are excluded from the evaluation because of the low probability that these regions would be more limiting in the safety analyses and because of the difficulty of making a precise measurement in these regions.

This Surveillance has been modified by a Note that may require that more frequent surveillances be performed based on future projections. If ~~$F_Q^W(Z)$~~ $F_Q^M(X,Y,Z)$ is evaluated and found to be within the applicable limiting condition limits, an evaluation ~~of the expression below~~ is required to account for any increase to ~~$F_Q^M(Z)$~~ $F_Q^M(X,Y,Z)$ that may occur and cause the F_Q(~~Z~~) F_Q (X,Y,Z) limit to be exceeded before the next required ~~$F_Q(Z)$~~ F_Q (X,Y,Z) evaluation.

INSERT 10

~~If the two most recent $F_Q(Z)$ evaluations show an increase in the expression maximum over z [$F_Q^C(Z)$ / K(Z)], it is required to meet the $F_Q(Z)$ limit with the last $F_Q^W(Z)$ increased by the greater of a factor of [1.02] or by an appropriate factor specified in the COLR (Ref. 5)~~

④

④ **INSERT 8**

both assembly and axial location (X,Y,Z), has been included in the cycle specific limits BQDES(X,Y,Z) and BCDES(X,Y,Z) using margin factors MQ(X,Y,Z) and MC(X,Y,Z), respectively (Reference 5).

④ **INSERT 9**

No uncertainties are applied to $F_Q^M(X, Y, Z)$ because the limits, BQDES(X,Y,Z) and BCDES(X,Y,Z), have been adjusted for uncertainties.

④ INSERT 10

In addition to ensuring via surveillance that the heat flux hot channel factor is within its limits when a measurement is taken, there are also requirements to extrapolate trends in $F_Q^M(X,Y,Z)$ for the last two measurements out to 31 EFPD beyond the most recent measurement. If the extrapolation yields an $F_Q^M(X,Y,Z)$ > BQNOM(X,Y,Z), further consideration is required.

The implications of these extrapolations are considered separately for both the operational and RPS heat flux hot channel factor limits. If the extrapolations of $F_Q^M(X,Y,Z)$ are unfavorable, additional actions must be taken. These actions are to meet the F_Q(X,Y,Z) limit with the last $F_Q^M(X,Y,Z)$ increased by the appropriate factor specified in the COLR or to evaluate $F_Q^M(X,Y,Z)$ prior to the projected point in time when the extrapolated values are expected to exceed the extrapolated limits. These alternative requirements prevent F_Q(X,Y,Z) from exceeding its limit for any significant period of time without detection using the best available data.

Extrapolation is not required for the initial flux map taken after reaching equilibrium conditions following a refueling outage since the initial flux map establishes the baseline measurement for future trending.

F_Q(X,Y,Z) is verified at power levels ≥ 10% RTP above the THERMAL POWER of its last verification within 12 hours after achieving equilibrium conditions to ensure that F_Q(X,Y,Z) is within its limit at higher power levels.

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~WCAP-10216-P-A, Rev. 1A, "Relaxation of Constant Axial Offset Control and F_Q Surveillance Technical Specification," February 1994, or other appropriate plant specific methodology, is to be listed in the COLR description in the Administrative Controls Section 5.0 to address the methodology used to derive this factor.~~
~~---~~

~~or to evaluate F_Q(Z) more frequently, each 7 EFPD. These alternative requirements prevent F_Q(Z) from exceeding its limit for any significant period of time without detection.~~ ④

~~Performing the Surveillance in MODE 1 prior to exceeding 75% RTP ensures that the F_Q(Z) limit is met when RTP is achieved, because peaking factors are generally decreased as power level is increased.~~

~~F_Q(Z) is verified at power levels ≥ 10% RTP above the THERMAL POWER of its last verification, [12] hours after achieving equilibrium conditions to ensure that F_Q(Z) is within its limit at higher power levels.~~

~~The Surveillance Frequency of 31 EFPD is adequate to monitor the change of power distribution with core burnup. The Surveillance may be done more frequently if required by the results of F_Q(Z) evaluations.~~

~~[The Frequency of 31 EFPD is adequate to monitor the change of power distribution because such a change is sufficiently slow, when the plant is operated in accordance with the TS, to preclude adverse peaking factors between 31 day surveillances.~~ ⑥

~~OR~~

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

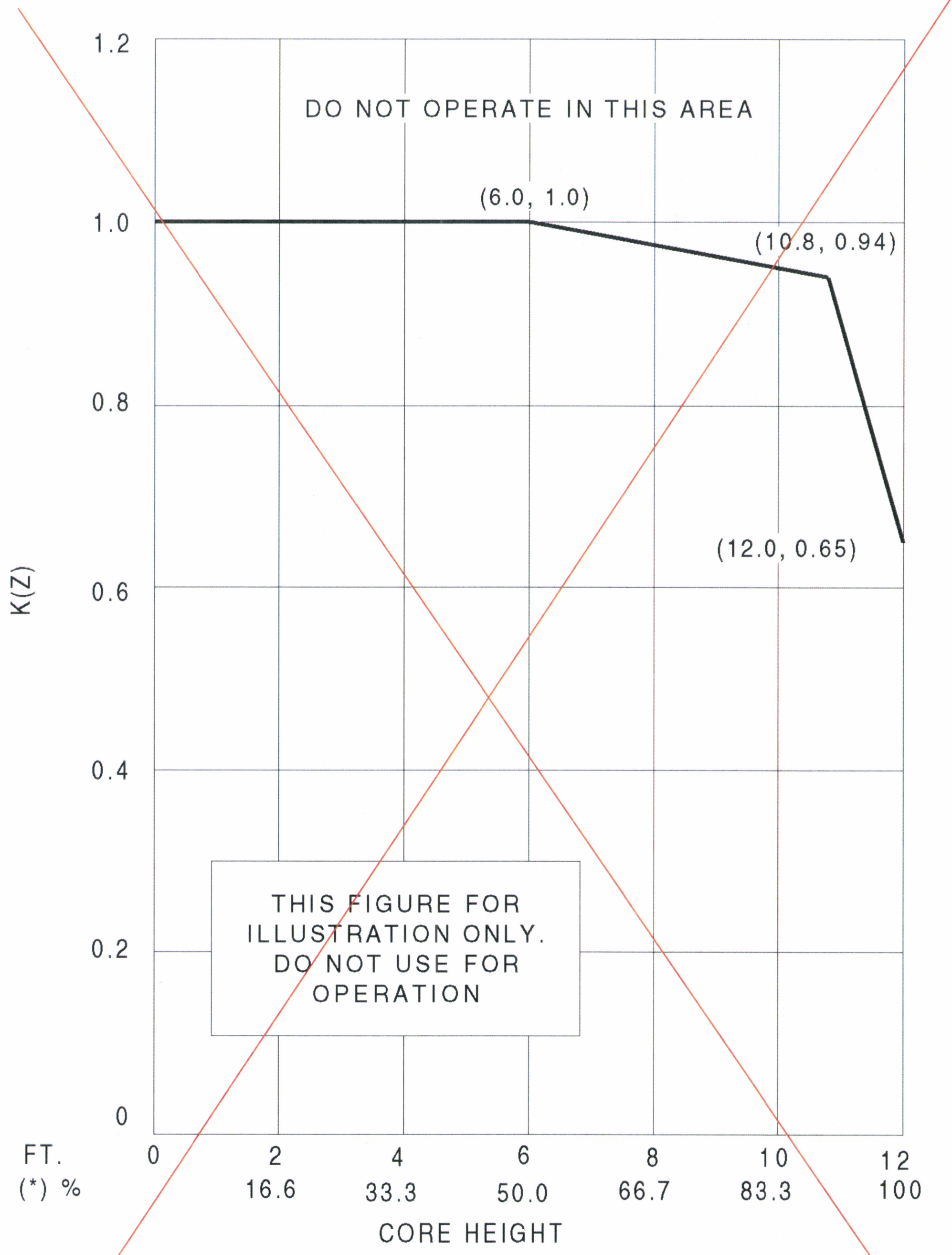
~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ ⑦
~~---~~]

BASES

REFERENCES

1. 10 CFR 50.46, 1974.
2. Regulatory Guide 1.77, Rev. 0, May 1974.
3. 10 CFR 50, Appendix A, GDC 26.
4. WCAP-7308-L-P-A, "Evaluation of Nuclear Hot Channel Factor Uncertainties," June 1988.
5. ~~WCAP-10216-P-A, Rev. 1A, "Relaxation of Constant Axial Offset Control (and) F_Q Surveillance Technical Specification," February 1994.~~ ④

BAW-10163PA “Core Operating Limit Methodology for Westinghouse-Designed PWRs” June 1989.



*For core height of 12 feet

④

Figure B 3.2.1B-1 (page 1 of 1)
K(Z) - Normalized F_Q(Z) as a Function of Core Height

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.1, BASES, HEAT FLUX HOT CHANNEL FACTOR ($F_Q(X,Y,Z)$)

1. Changes are made (additions, deletions, and/or changes) to the ISTS Bases which reflect the plant-specific nomenclature, number, reference, system description, analysis, or licensing basis description.

2. The RAOC-W(Z) methodology and the Specification designator "B" are deleted because they are unnecessary. (Only one Heat Flux Hot Channel Factor Specification is used in the SQN ITS.) This information is provided in NUREG-1431, Rev. 4 to assist in identifying the appropriate Specification to be used as a model for the plant specific ITS conversion, but serves no purpose in a plant specific implementation. In addition, the CAOC-F_{XY} and CAOC-W(Z) methodology Specification Bases (ISTS B 3.2.1A and B 3.2.1C) are not used and are not shown.

3. The ISTS contains bracketed information and/or values that are generic to all Westinghouse vintage plants. The brackets are removed and the proper plant specific information/value is changed to reflect the current licensing basis.

4. The ISTS Bases for LCO 3.2.1, has been updated to reflect the methodology identified in BAW-10163PA “Core Operating Limit Methodology for Westinghouse-Designed PWRs” June 1989.

5. Changes have been made to be consistent with changes made to the Specification.

6. ISTS SR 3.2.1.1 provides two options for controlling the Frequencies of Surveillance Requirements. SQN is proposing to control the Surveillance Frequencies for ITS SR 3.2.1.1 under the Surveillance Frequency Control Program.

7. The Reviewer's Note has been deleted. This information is for the NRC reviewer to be keyed into what is needed to meet this requirement. This Note is not meant to be retained in the final version of the plant specific submittal.

8. Editorial changes made to enhance clarity/consistency.

Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.1, HEAT FLUX HOT CHANNEL FACTOR ($F_Q(X,Y,Z)$)

There are no specific No Significant Hazards Considerations for this Specification.

ATTACHMENT 2

ITS 3.2.2, NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR ($F_{\Delta H}(X,Y)$)

Current Technical Specification (CTS) Markup and Discussion of Changes (DOCs)

POWER DISTRIBUTION LIMITS

3/4.2.3 NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR - $F_{\Delta H}$(X,Y)

LIMITING CONDITION FOR OPERATION

LCO 3.2.2 3.2.3 $F_{\Delta H}$(X,Y) shall be maintained within the limits specified in the COLR.

Applicability APPLICABILITY: MODE 1

ACTION:

Add proposed ACTION A Note M01

ACTION A With $F_{\Delta H}$(X,Y) exceeding the limit specified in the COLR:

a. Within 2 hours either:

~~1. Restore $F_{\Delta H}$(X,Y) to within the limit specified in the COLR, or~~ A02

Required Action A.1 2. Reduce the allowable THERMAL POWER from RATED THERMAL POWER at least RRH~~*~~% for each 1% that $F_{\Delta H}$(X,Y) exceeds the limit, and LA01

ACTION A b. Within the next ~~4~~ 72 hours either: L01

~~1. Restore $F_{\Delta H}$(X,Y) to within the limit specified in the COLR, or~~ A02

Required Action A.2 2. Reduce the Power Range Neutron Flux-High Trip Setpoint in Table 2.2-1 at least RRH~~*~~% for each 1% that $F_{\Delta H}$(X,Y) exceeds that limit, and LA01

ACTION A c. Within 24 hours of initially being outside the limit specified in the COLR, either:

1~~. Restore $F_{\Delta H}$(X,Y) to within the limit specified in the COLR, or~~ A02

Required Action A.3 2. Verify ~~through incore flux mapping~~ that $F_{\Delta H}$(X,Y) is restored to within the limit for the reduced THERMAL POWER allowed by ACTION a.2 or LA02

ACTION C reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next ~~2~~ 6 hours. L02

Add proposed ACTION C M02

~~* RRH is the amount of power reduction required to compensate for each 1% that $F_{\Delta H}$(X,Y) exceeds the limit provided in the COLR per Specification 6.9.1.14.~~ LA01

POWER DISTRIBUTION LIMITS

ACTION: (Continued)

Required Action A.4

d. Within 48 hours of initially being outside the limit specified in the COLR, reduce the Overtemperature Delta T ~~K_1 term in Table 2.2-1~~ by at least TRH~~**~~ for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit, and

LA03

Add proposed Required Action A.5 Note

A03

Required Action A.5

e. Identify and correct the cause of the out-of-limit condition prior to increasing THERMAL POWER above the reduced THERMAL POWER limit required by ACTION a.2 and/or b. and/or c. and/or d., above: subsequent POWER OPERATION may proceed provided that $F_{\Delta H}(X,Y)$ is demonstrated, ~~through incore flux mapping~~, to be within the above limit prior to exceeding the following THERMAL POWER levels:

LA02

Completion Time A.5

1. A nominal 50% of RATED THERMAL POWER,
2. A nominal 75% of RATED THERMAL POWER, and
3. Within 24 hours of attaining greater than or equal to 95% of RATED THERMAL POWER.

~~** TRH is the amount of Overtemperature Delta T K_1 setpoint reduction required to compensate for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit provided in the COLR per Specification 6.9.1.14.~~

LA03

A01

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS

M03

SR NOTE 4.2.3.1 The provisions of Specification 4.0.4 are not applicable.

SR 3.2.2.1
SR 3.2.2.2 4.2.3.2 $F^{M}_{\Delta H}(X, Y)$ shall be evaluated to determine if $F_{\Delta H}(X,Y)$ is within its limit by:

~~a. Using the movable incore detectors to obtain a power distribution map~~ ~~$F^{M}_{\Delta H}(X, Y)$~~ ~~* at any THERMAL POWER greater than 5% of RATED THERMAL POWER.~~

~~b. Satisfying the following relationship:~~

~~$F\Delta HR^{M}(X,Y) \leq BHNOM(X,Y)$~~

~~Where:~~

LA04

$$\cancel{F\Delta HR^{M}(X, Y) = \frac{F^{M}_{\Delta H}(X, Y)}{MAP^{M} \;/\; AXIAL(X, Y)}}$$

~~And BHNOM(X,Y)** represents the nominal design increased by an allowance for the expected deviation between the nominal design and the measurement.~~

~~MAP^{M} is the maximum Allowable Peak** obtained from the measured power distribution.~~

~~AXIAL(X,Y) is the axial shape for $F_{\Delta H}(X,Y)$.~~

c. If the above relationship is not satisfied, then

1. For the location, calculate the % margin to the maximum allowable design as follows:

SR 3.2.2.1

$$\% \ F_{\Delta H} \text{ Margin} = \cancel{\left(1 - \frac{F\Delta HR^{M}(X, Y)}{BHDES(X, Y)}\right) x\ 100\%}$$

LA04

SR 3.2.2.2

$$\% \ f_{1}(\Delta I) Margin = \cancel{\left(1 - \frac{F\Delta HR^{M}(X, Y)}{BRDES(X,\ Y)}\right) x\ 100\%}$$

~~where BHDES (X,Y) and BRDES (X,Y)** represent the maximum allowable design peaking factors which insure that the licensing criteria will be preserved for operation within the LCO limits, and include allowances for calculational and measurement uncertainties.~~

~~* No additional uncertainties are required in the following equations for~~ ~~$F^{M}_{\Delta H}(X, Y)$~~ ~~and $F)HR^{M}(X,Y)$, because the limits include uncertainties.~~

LA04

~~** BHNOM(X,Y), MAP^{M}, BHDES(X,Y), and BRDES(X,Y) data bases are provided for input to the plant power distribution analysis computer codes on a cycle specific basis and are determined using the methodology for core limit generation described in the references in Specification 6.9.1.14.~~

A01

ITS ITS 3.2.2

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS

~~2. Find the minimum margin of all locations examined in 4.2.3.2.c.1 above.~~

~~$F\Delta_H$ min margin = minimum % margin value of all locations examined~~

~~$f_1(\Delta I)$ min margin = minimum % margin value of all locations examined~~

LA04

ACTION A 3. If the $F_{\Delta H}$ min margin in 4.2.3.2.c.2 above is < 0, then within 2 hours reduce the allowable THERMAL POWER from RATED THERMAL POWER by RRH~~*~~% x most negative margin from 4.2.3.2.c.2 ~~and maintain the requirements of Specification 3.2.3; otherwise the Action statements for 3.2.3 apply.~~

LA01

M04

ACTION B 4. If the $f_1(\Delta I)$ min margin in 4.2.3.2.c.2 above is < 0, then within 48 hours reduce the Overtemperature Delta T K1 term in Table 2.2-1 by at least TRH~~**~~% x most negative margin from 4.2.3.2.c.2 ~~and maintain the requirements of Specification 3.2.3; otherwise the action statements for 3.2.3 apply.~~

LA03

M04

SR 3.2.2.1/SR 3.2.2.2 NOTE d. With two measurements extrapolated to 31 EFPD beyond the most recent measurement yielding

$F\Delta HR^M(X,Y) > BHNOM(X,Y)$

either of the following actions shall be taken:

SR 3.2.2.1/SR 3.2.2.2 NOTE a. 1. $F^M_{\Delta H}(X,Y)$ shall be increased over that specified in 4.2.3.2.a by the appropriate factor specified in the COLR, and 4.2.3.2.c.1 repeated, or

SR 3.2.2.1/SR 3.2.2.2 NOTE b. 2. $F^M_{\Delta H}(X,Y)$ shall be evaluated according to 4.2.3.2 at or before the time when the margin is projected to result in the action specified in 4.2.3.2.c.3 or 4.2.3.2.c.4.

SR 3.2.2.1 SR 3.2.2.2 4.2.3.3 $F^M_{\Delta H}(X,Y)$ shall be determined to be within its limit ~~by using the incore detectors to obtain a power distribution map~~:

LA02

SR 3.2.2.1 SR 3.2.2.2

a. Prior to operation above 75% of RATED THERMAL POWER after each fuel loading, and

b. ~~At least once per 31 EFPD.~~

In accordance with the Surveillance Frequency Control Program

LA05

~~thereafter~~

A04

~~* RRH is the amount of power reduction required to compensate for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit provided in the COLR per Specification 6.9.1.14.~~

LA01

~~** TRH is the amount of Overtemperature Delta T K_1 setpoint reduction required to compensate for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit provided in the COLR per Specification 6.9.1.14.~~

LA03

POWER DISTRIBUTION LIMITS

3/4.2.3 NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR - $F_{\Delta H}(X,Y)$

LIMITING CONDITION FOR OPERATION

LCO 3.2.2 3.2.3 $F_{\Delta H}(X,Y)$ shall be maintained within the limits specified in the COLR.

Applicability APPLICABILITY: MODE 1

ACTION:

Add proposed ACTION A Note M01

ACTION A With $F_{\Delta H}(X,Y)$ exceeding the limit specified in the COLR:

a. Within 2 hours either:

1. ~~Restore $F_{\Delta H}(X,Y)$ to within the limit specified in the COLR, or~~ A02

Required Action A.1 2. Reduce the allowable THERMAL POWER from RATED THERMAL POWER at least RRH~~*~~% for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit, and LA01

ACTION A b. Within the next ~~4~~ 72 hours either: L01

1. ~~Restore $F_{\Delta H}(X,Y)$ to within the limit specified in the COLR, or~~ A02

Required Action A.2 2. Reduce the Power Range Neutron Flux-High Trip Setpoint in Table 2.2-1 at least RRH~~*~~% for each 1% that $F_{\Delta H}(X,Y)$ exceeds that limit, and LA01

ACTION A c. Within 24 hours of initially being outside the limit specified in the COLR, either:

1. ~~Restore $F_{\Delta H}(X,Y)$ to within the limit specified in the COLR, or~~ A02

Required Action A.3 2. Verify ~~through incore flux mapping~~ that $F_{\Delta H}(X,Y)$ is restored to within the limit for the reduced THERMAL POWER allowed by ACTION a.2 LA02

ACTION C or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next ~~2~~ 6 hours. L02

Add proposed ACTION C M02

~~* RRH is the amount of power reduction required to compensate for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit provided in the COLR per Specification 6.9.1.14.~~ LA01

A01

POWER DISTRIBUTION LIMITS

ACTION: (Continued)

Required Action A.4

d. Within 48 hours of initially being outside the limit specified in the COLR, reduce the Overtemperature Delta T ~~K_1 term in Table 2.2-1~~ by at least TRH~~**~~ for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit, and

LA03

Add proposed Required Action A.5 Note

A03

Required Action A.5

e. Identify and correct the cause of the out-of-limit condition prior to increasing THERMAL POWER above the reduced THERMAL POWER limit required by ACTION a.2 and/or b. and/or c. and/or d., above; subsequent POWER OPERATION may proceed provided that $F_{\Delta H}(X,Y)$ is demonstrated~~, through incore flux mapping~~, to be within the above limit prior to exceeding the following THERMAL POWER levels:

LA02

Completion Time A.5

1. A nominal 50% of RATED THERMAL POWER,
2. A nominal 75% of RATED THERMAL POWER, and
3. Within 24 hours of attaining greater than or equal to 95% of RATED THERMAL POWER.

~~** TRH is the amount of Overtemperature Delta T K_1 setpoint reduction required to compensate for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit provided in the COLR per Specification 6.9.1.14.~~

LA03

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS

SR NOTE

4.2.3.1 The provisions of Specification 4.0.4 are not applicable.

M03

SR 3.2.2.1
SR 3.2.2.2

4.2.3.2 $F^{M}_{\Delta H}(X,Y)$ shall be evaluated to determine if $F_{\Delta H}(X,Y)$ is within its limit by:

~~a. Using the movable incore detectors to obtain a power distribution map $F^{M}_{\Delta H}(X,Y)$ * at any THERMAL POWER greater than 5% of RATED THERMAL POWER.~~

~~b. Satisfying the following relationship:~~

~~$F\Delta HR^{M}(X,Y) \leq BHNOM\ (X,Y)$~~

~~Where:~~

LA04

~~$F\Delta HR^{M}(X,Y) = \dfrac{F^{M}_{\Delta H}(X,Y)}{MAP^{M}\ /\ AXIAL(X,Y)}$~~

~~And BHNOM (X,Y)** represents the nominal design increased by an allowance for the expected deviation between the nominal design and the measurement.~~

~~MAP^{M} is the maximum Allowable Peak** obtained from the measured power distribution.~~

~~AXIAL (X,Y) is the axial shape for $F_{\Delta H}(X,Y)$.~~

c. If the above relationship is not satisfied, then

1. For the location, calculate the % margin to the maximum allowable design as follows:

SR 3.2.2.1

$\% \ F_{\Delta H}\ Margin =$ ~~$\left(1 - \dfrac{F\Delta HR^{M}(X,Y)}{BHDES(X,Y)}\right) x\,100\%$~~

SR 3.2.2.2

$\% \ f_{1}(\Delta I) Margin =$ ~~$\left(1 - \dfrac{F\Delta HR^{M}(X,Y)}{BRDES(X,\ Y)}\right) x\,100\%$~~

LA04

~~where BHDES(X,Y) and BRDES(X,Y)** represent the maximum allowable design peaking factors which insure that the licensing criteria will be preserved for operation within the LCO limits, and include allowances for calculational and measurement uncertainties.~~

---

* ~~No additional uncertainties are required in the following equations for $F^{M}_{\Delta H}(X,Y)$1 and $F\Delta HR^{M}(X,Y)$, because the limits include uncertainties.~~

LA04

** ~~BHNOM (X,Y), MAP^{M}, BHDES (X,Y), and BRDES (X,Y) data bases are provided for input to the plant power distribution analysis computer codes on a cycle specific basis and are determined using the methodology for core limit generation described in the references in Specification 6.9.1.14.~~

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS

~~2. Find the minimum margin of all locations examined in 4.2.3.2.c.1 above.~~

~~$F_{\Delta H}$ min margin = minimum % margin value of all locations examined~~

~~$f_1(\Delta I)$ min margin = minimum % margin value of all locations examined~~

LA04

ACTION A 3. If the $F_{\Delta H}$ min margin in 4.2.3.2.c.2 above is < 0, then within 2 hours reduce the allowable THERMAL POWER from RATED THERMAL POWER by RRH~~*~~% x most negative margin from 4.2.3.2.c.2 ~~and maintain the requirements of Specification 3.2.3; otherwise the Action statements for 3.2.3 apply.~~

LA01 M04

ACTION B 4. If the $f_1(\Delta I)$ min margin in 4.2.3.2.c.2 above is < 0, then within 48 hours reduce the Overtemperature Delta T K1 term in Table 2.2-1 by at least TRH~~**~~% x most negative margin from 4.2.3.2.c.2 ~~and maintain the requirements of Specification 3.2.3; otherwise the action statements for 3.2.3 apply.~~

LA03 M04

SR 3.2.2.1/SR 3.2.2.2 NOTE d. With two measurements extrapolated to 31 EFPD beyond the most recent measurement yielding

$F\Delta HR^{M} (X,Y) > BHNOM (X,Y)$

either of the following actions shall be taken:

SR 3.2.2.1/SR 3.2.2.2 NOTE a. 1. $F^{M}_{\Delta H}(X,Y)$ shall be increased over that specified in 4.2.3.2.a by the appropriate factor specified in the COLR, and 4.2.3.2.c.1 repeated, or

SR 3.2.2.1/SR 3.2.2.2 NOTE b 2. $F^{M}_{\Delta H}(X,Y)$ shall be evaluated according to 4.2.3.2 at or before the time when the margin is projected to result in the action specified in 4.2.3.2.c.3 or 4.2.3.2.c.4.

SR 3.2.2.1 SR 3.2.2.2 4.2.3.3 $F^{M}_{\Delta H}(X,Y)$ shall be determined to be within its limit ~~by using the incore detectors to obtain a power distribution map~~:

LA02

SR 3.2.2.1 SR 3.2.2.2

a. Prior to operation above 75% of RATED THERMAL POWER after each fuel loading, and

b. ~~At least once per 31 EFPD.~~ In accordance with the Surveillance Frequency Control Program ~~thereafter~~

LA05 A04

~~* RRH is the amount of power reduction required to compensate for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit provided in the COLR per Specification 6.9.1.14.~~

LA01

~~** TRH is the amount of Overtemperature Delta T K_1 setpoint reduction required to compensate for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit provided in the COLR per Specification 6.9.1.14.~~

LA03

DISCUSSION OF CHANGES
ITS 3.2.2, NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR - $F_{\Delta H}(X,Y)$

ADMINISTRATIVE CHANGES

A01 In the conversion of the Sequoyah Nuclear Plant (SQN) Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG - 1431, Rev. 4.0, "Standard Technical Specifications - Westinghouse Plants" (ISTS) and additional Technical Specification Task Force (TSTF) travelers included in this submittal.

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A02 CTS 3.2.3 ACTION a.1, b.1 and c.1 require the restoration of $F_{\Delta H}(X,Y)$ to within the limit specified in the COLR. ISTS LCO 3.0.2 Bases states that correction of the entered Condition is an action that may always be considered upon entering ACTIONS and that the restoration of compliance with the LCO is always an option. This changes the CTS by not specifically stating that restoration of $F_{\Delta H}(X,Y)$ is required.

This change is acceptable because the technical requirements have not changed. ISTS LCO 3.0.2 Bases states that correction of the entered Condition is an action that may always be considered upon entering ACTIONS and that the restoration of compliance with the LCO is always an available Required Action. The convention in the ITS is to not state such "restore" options explicitly unless it is the only action or is required for clarity. In this specific application, Required Action A.1.1 is not the only ACTION and a power reduction should be the focus for restoration of $F_{\Delta H}(X,Y)$ to within the limits. This change is designated as administrative, because it does not result in technical changes to the CTS.

A03 CTS 3.2.3 ACTION e states in part that with $F_{\Delta H}(X,Y)$ exceeding its limit, $F_{\Delta H}(X,Y)$ must be demonstrated to be within its limit prior to exceeding 50% RTP and 75% RTP, and within 24 hours of attaining or exceeding 95% RTP. ITS 3.2.2 Required Action A.5 contains the same requirements. However, ITS 3.2.2 Required Action A.5 is modified by a Note which states "THERMAL POWER does not have to be reduced to comply with this Required Action." This modifies the CTS by adding a Note stating that THERMAL POWER does not have to be reduced to comply with the Required Action.

This change is acceptable, because the requirements have not changed. The Note is included in the ITS to make clear that THERMAL POWER does not have to be reduced to perform the Required Action. For example, if $F_{\Delta H}(X,Y)$ exceeds its limit and, per ITS Required Action A.1, THERMAL POWER is reduced to 60% RTP, THERMAL POWER does not have to be reduced to less than 50% RTP to verify $F_{\Delta H}(X,Y)$ is within its limit to comply with ITS Required Action A.5. However, $F_{\Delta H}(X,Y)$ must still be measured prior to exceeding 75% RTP and within 24 hours of attaining or exceeding 95% RTP. The Note is needed because the ITS contains a Note in ITS 3.2.2 ACTION A that states "Required Actions A.3 and A.5 must be completed whenever Condition A is entered." The ITS 3.2.2 ACTION A Note does not exist in the CTS and could be construed as

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ITS 3.2.2, NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR - $F_{\Delta H}$(X,Y)

requiring THERMAL POWER to be reduced to comply with Required Action A.5. (Addition of the ACTION A Note is discussed in DOC M01.) As a result, the Required Action A.5 Note makes the ITS and CTS actions consistent. This change is designated as administrative, because it does not result in technical changes to the CTS.

A04 CTS 4.2.3.3 requires $F^{M}_{\Delta H}$(X,Y) to be determined prior to operation above 75% of RTP after each fuel loading, and at least once per 31 EFPD. ITS SR 3.2.2.1 and SR 3.2.2.2 Frequency is once after each refueling prior to THERMAL POWER exceeding 75% RTP AND 31 EFPD thereafter. This changes the CTS by adding the word "thereafter" to the Frequency. The removal of the "31 EFPD thereafter" Frequency to the Surveillance Frequency Control Program is discussed in DOC LA05.

CTS 4.2.3.3 is required to be performed prior to operation above 75% RTP after each fuel loading and once per 31 EFPD. Also, although this Frequency is removed to the Surveillance Frequency Control Program, the addition of the word "thereafter" in ITS SR 3.2.2.1 and SR 3.2.2.2 ensures that the 31 EFPD Frequency starts after the first performance of the SR, which is required prior to exceeding 75% RTP after each fuel loading. Therefore, the addition of the word "thereafter" is considered acceptable because the use of ″thereafter″ is essentially the same as the CTS Frequency. This change is designated as administrative, because it does not result in technical changes to the CTS.

MORE RESTRICTIVE CHANGES

M01 CTS 3.2.3 ACTION e states that with $F_{\Delta H}$(X,Y) exceeding its limit "subsequent POWER OPERATION may proceed provided that $F_{\Delta H}$(X,Y) is demonstrated, through incore flux mapping, to be within the above limit prior to exceeding the following THERMAL POWER levels: 1. A nominal 50% of RATED THERMAL POWER, 2. A nominal 75% of RATED THERMAL POWER, and 3. Within 24 hours of attaining greater than or equal to 95% of RATED THERMAL POWER." However, under CTS 3.0.2, these measurements do not have to be completed, if compliance with the LCO is restored. ITS 3.2.2 ACTION A contains a Note which states, "Required Actions A.3 and A.5 must be completed whenever Condition A is entered." ITS 3.2.2 Required Action A.3 requires verification that $F_{\Delta H}$ min margin is >0 24 hours after entry into Condition A. Required Action A.5 requires verification that $F_{\Delta H}$ min margin is >0 prior to THERMAL POWER exceeding 50% RTP and 75% RTP, and within 24 hours after THERMAL POWER is greater than or equal to 95% RTP. This changes the CTS by requiring the verification that $F_{\Delta H}$ min margin is >0 to be made even if $F_{\Delta H}$(X,Y) is restored to within its limit.

This change is acceptable, because it establishes appropriate compensatory measurements for violation of the $F_{\Delta H}$(X,Y) limit. As power is reduced under ITS 3.2.2 Required Action A.1, the margin to the $F_{\Delta H}$(X,Y) limit increases. Therefore, compliance with the LCO could be restored during the power reduction. Verifying that the limit is met as power is increased ensures that the limit continues to be met and does not remain unmeasured for up to 31 EFPD. This change is

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ITS 3.2.2, NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR - $F_{\Delta H}(X,Y)$

designated as a more restrictive change because it imposes requirements in addition to those in the CTS.

M02 CTS 3.2.3 does not contain an Action to follow if ACTIONS a, b, d, and e cannot be met. Therefore, CTS 3.0.3 would be entered, which would allow 1 hour to initiate a shutdown and to be in HOT STANDBY within 7 hours. ITS 3.2.2 ACTION C, states that the plant must be in MODE 2 within 6 hours, if any Required Action and associated Completion Time is not met. This changes the CTS by eliminating the one hour to initiate a shut down and, consequently, allowing one hour less for the unit to be in MODE 2.

The purpose of CTS 3.0.3 is to delineate the ACTION to be taken for circumstances not directly provided for in the ACTION statement and whose occurrences would violate the intent of the Specification. This change is acceptable because it provides an appropriate compensatory measure for the described conditions. If any Required Action and associated Completion Time cannot be met, the unit must be placed in a MODE in which the LCO does not apply. The LCO is applicable in MODE 1. Requiring a shut down to MODE 2 is appropriate in this condition. The one hour allowed by CTS 3.0.3 to prepare for a shut down is not needed, because the operators have had time to prepare for the shut down while attempting to follow the Required Actions and associated Completion Times. This change is designated as more restrictive because it allows less time to shut down than does the CTS.

M03 CTS 4.2.3.1 ″The provisions of Specification 4.0.4 are not applicable″ provides an allowance for entering the next higher MODE of Applicability when the LCO is not met. ITS 3.2.2 has no specific allowance for changing MODES at any time with ITS LCO 3.2.2 not met. ITS LCO 3.0.4 requires in part that, ″When an LCO is not met, entry into a MODE or other specified Condition in the Applicability shall only be made: If either part a. or part b. or part c. is met.″ Part c provides the following allowance, ″When an allowance is stated in the individual value, parameter or other specification.″ ITS 3.2.2 Surveillance Requirements Note will be added to provide the following allowance, ″Not required to be performed until 12 hours after an equilibrium power level has been achieved, at which a power distribution map can be obtained.″ This changes CTS by allowing entry into the MODE of Applicability by only deferring the performance of the Surveillance Requirements instead of deferring compliance with the LCO.

The purpose of CTS 4.2.3.1 is to provide an exception to SR 4.0.4. SR 4.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability. This change is acceptable because ITS provides an allowance to enter the MODE of Applicability at any time ITS LCO 3.2.2 is not met solely based on surveillance performance. SR 3.2.2.1 and SR 3.2.2.2 require using the incore detector system to provide the necessary data to create a power distribution map. To provide the necessary data, MODE 1 needs to be entered, power escalated, stabilized and equilibrium conditions established at some higher power level (~40%-50%). The surveillances cannot be performed in MODE 2. This change is designated as more restrictive because the CTS 4.0.4 MODE change allowance for ″not met″ is now limited to

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the performance of the SRs and does not include the allowance to change MODES with the acceptance criteria not met.

M04 CTS 3.2.3 provides two acceptable alternatives for the $F_{\Delta H}$ min margin and $f_1(\Delta I)$ min margin not met. CTS 4.2.3.2.c.3 states, ″If the $F_{\Delta H}$ min margin in 4.2.3.2.c.2 above is < 0, then within 2 hours reduce the allowable THERMAL POWER from RATED THERMAL POWER by RRH*% x most negative margin from 4.2.3.2.c.2 and maintain the requirements of Specification 3.2.3; otherwise the Action statements for 3.2.3 apply.″ CTS 4.2.3.2.c.4 states, ″ If the $f_1(\Delta I)$ min margin in 4.2.3.2.c.2 above is < 0, then within 48 hours reduce the Overtemperature Delta T K1 term in Table 2.2-1 by at least TRH**% x most negative margin from 4.2.3.2.c.2 and maintain the requirements of Specification 3.2.3; otherwise the action statements for 3.2.3 apply.″ CTS 4.2.3.2.c.3 has been replaced by ITS 3.2.2 Required Actions A.1. Similarly, CTS 4.2.3.2.c.4 has been replaced with ITS 3.2.2 Required Actions B.1. However, in both cases the option for, ″ otherwise, the action statements for 3.2.3 apply ″ has not been retained. This changes the CTS by removing the option to follow the action statement of CTS 3.2.3 for either min margin ($F_{\Delta H}$ or $f_1(\Delta I)$) not met.

The purpose of CTS 4.2.3.2.c.3 and CTS 4.2.3.2.c.4 is to provide acceptable alternatives for the required compensatory actions when either $F_{\Delta H}$ min margin or $f_1(\Delta I)$ min margin is not met. The CTS surveillance requirements for $F_{\Delta H}$ min margin not met requires the reduction of ALLOWABLE THERMAL POWER from RTP by RRH*% x most negative margin from 4.2.3.2.c.2. This requirement is being retained as ITS 3.2.2 Required Action A.1. The CTS surveillance requirements for $f_1(\Delta I)$ min margin not met requires the reduction of the Overtemperature Delta T K1 term in Table 2.2-1 by at least TRH**% x most negative margin from 4.2.3.2.c.2. This requirement is being retained as ITS 3.2.2 Required Action B.1. If the ITS Required Actions are not performed within the allowed Completion Time, Condition C will be entered requiring the Unit to be placed in MODE 2. This change is designated as more restrictive because an acceptable alternative Required Action available in CTS is being removed.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA01 (*Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 3.2.3 provides actions to take within 2 hours when $F_{\Delta H}$(X,Y) is not within limits, and states to reduce the allowable THERMAL POWER and within 4 hours reduce the Power Range Neutron Flux-High Trip Setpoint at least RRH*% for each 1% that $F_{\Delta H}$(X,Y) exceeds the limit provided in the COLR. Similarly, CTS 4.2.3.2.c.3 requires in part to reduce the allowable THERMAL POWER from RATED THERMAL POWER by RRH*% x most negative margin from 4.2.3.2.c.2. CTS NOTE * provides the definition of RRH as the amount of power reduction required to compensate for each 1% that $F_{\Delta H}$(X,Y) exceeds the limit provided in the COLR per Specification 6.9.1.14. ITS 3.2.2 Required Action A.1 requires within 2 hours of discovery that $F_{\Delta H}$ min margin is not within limits, to reduce THERMAL POWER from RTP, and ITS 3.2.2 Required Action A.2 requires within 72 hours to reduce the Power Range Neutron Flux-High Trip Setpoint by ≥ RRH% multiplied times the $F_{\Delta H}$ min margin. This changes the CTS by relocating the definition of RRH to the COLR.

The removal of these details from the Technical Specifications and its relocation into the COLR is acceptable, because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirements to reduce THERMAL POWER from RTP and reduce the Power Range Neutron Flux-High Trip Setpoint by ≥ RRH% for each 1% that $F_{\Delta H}$(X,Y) exceeds its limit. The definition of RRH is already located in the COLR. Also, this change is acceptable because the removed information will be adequately controlled in the COLR requirements provided in ITS 5.6.5, "Core Operating Limits Report." ITS 5.6.5 ensures that the applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems limits, and nuclear limits such transient analysis limits and accident analysis limits) of the safety analyses are met. This change is designated as a less restrictive removal of detail change, because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LA02 (*Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 3.2.3 ACTIONS c.2 and e require $F_{\Delta H}$(X,Y) to be determined to be within its limit through incore flux mapping. Additionally, CTS 4.2.3.3 requires $F^{M}_{\Delta H}(X,Y)$ to be determined to be within its limit by using the incore detectors to obtain a power distribution map. ITS SR 3.2.2.1 and SR 3.2.2.2 collectively verifiy that $F_{\Delta H}$(X,Y) is within its limit. This changes the CTS by moving the manner in which the $F_{\Delta H}$(X,Y) determination is performed to the Bases.

The removal of these details for performing actions and a Surveillance Requirement from the Technical Specifications is acceptable, because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement to determine $F_{\Delta H}$(X,Y) is within its limit. Also, this change is acceptable, because these types of procedural details will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail change, because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LA03 (*Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 3.2.3 Action d requires within 48 hours of $F_{\Delta H}$(X,Y) being outside its limits, to reduce the Overtemperature Delta T K_1 term in Table 2.2-1 by at least TRH** for each 1% that $F_{\Delta H}$(X,Y) exceeds the limit. Similarly, CTS 4.2.3.2.c.4 requires in part to reduce Overtemperature Delta T K1 term in

DISCUSSION OF CHANGES
ITS 3.2.2, NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR - $F_{\Delta H}(X,Y)$

Table 2.2-1 by at least TRH** x most negative margin from 4.2.3.2.c.2. CTS Note ** provides a definition for TRH as the amount of Overtemperature Delta T K_1 setpoint reduction required to compensate for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit provided in the COLR. ITS 3.2.2 Required Action A.4 states when $F_{\Delta H}$ min margin is < 0, reduce the OTΔT setpoint by ≥ TRH multiplied times the $f_1(\Delta I)$ min margin. This changes the CTS by moving the details of the specific variable within OTΔT to be reduced, the location of the K_1 terms, and the definition of TRH to the COLR.

The removal of these details from the Technical Specifications and their relocation into the COLR is acceptable, because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement to reduce the OTΔT setpoint by ≥ TRH multiplied times the $f_1(\Delta I)$ min margin. The specific variable within OTΔT to be reduced, the location of the K_1 terms, and definition of TRH are already located in the COLR. Also, this change is acceptable because the removed information will be adequately controlled in the COLR requirements provided in ITS 5.6.5, "Core Operating Limits Report." ITS 5.6.5 ensures that the applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems limits, and nuclear limits such transient analysis limits and accident analysis limits) of the safety analyses are met. This change is designated as a less restrictive removal of detail change, because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LA04 (*Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 4.2.3.2.a, 4.2.3.2.b, 4.2.3.2.c.1, and 4.2.3.2.c.2, provide details for evaluating $F^M_{\Delta H}(X,Y)$ to determine if $F_{\Delta H}(X,Y)$ is within limits. ITS SR 3.2.2.1 and SR 3.2.2.2 collectively verify that $F_{\Delta H}(X,Y)$ is within limits specified in the COLR. This changes the CTS by moving the details for evaluating $F^M_{\Delta H}(X,Y)$ to determine if $F_{\Delta H}(X,Y)$ is within limits to the TS Bases.

The removal of these details from the Technical Specifications and their relocation into the TS Bases is acceptable, because the procedural steps and further details for making a determination that $F_{\Delta H}(X,Y)$ is within its limits is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement to determine $F_{\Delta H}(X,Y)$ is within its limits specified in the COLR. Also, this change is acceptable, because these types of procedural details will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail change, because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LA05 *(Type 5 – Removal of SR Frequency to the Surveillance Frequency Control Program)* CTS 4.2.3.3 requires, in part, a determination that $F_{\Delta H}(X,Y)$ is within its limits at least once per 31 EFPD. ITS SR 3.2.2.1 and SR 3.2.2.2 collectively require a similar Surveillance and specify the periodic Frequency as, "In accordance with the Surveillance Frequency Control Program." This changes the CTS by moving the specified Frequency for this SR and associated Bases to the Surveillance Frequency Control Program

The removal of these details related to Surveillance Requirement Frequencies from the Technical Specifications is acceptable, because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The existing Surveillance Frequencies are removed from Technical Specifications and placed under licensee control pursuant to the methodology described in NEI 04-10. A new program (Surveillance Frequency Control Program) is being added to the Administrative Controls section of the Technical Specifications describing the control of Surveillance Frequencies. The surveillance test requirements remain in the Technical Specifications. The control of changes to the Surveillance Frequencies will be in accordance with the Surveillance Frequency Control Program. The Program shall ensure that Surveillance Requirements specified in the Technical Specifications are performed at intervals sufficient to assure the associated Limiting Conditions for Operation are met. This change is designated as a less restrictive removal of detail change, because the Surveillance Frequencies are being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L01 (Category 3 – Relaxation of Completion Time) CTS 3.2.3 ACTION b states, in part, that when $F_{\Delta H}$(X,Y) exceeds its limit, reduce the Power Range Neutron Flux - High Trip setpoints by at least RRH*% for each 1% $F_{\Delta H}$(X,Y) exceeds that limit within the next 4 hours. ITS 3.2.2 Required Actions A.2 states with $F_{\Delta H}$(X,Y) not within limit, reduce the Power Range Neutron Flux - High trip setpoints by at least RRH% multiplied times the $F_{\Delta H}$ min margin within 72 hours. This changes the CTS by increasing the time allowed to reduce the trip setpoints.

The purpose of CTS 3.2.3 ACTION b is to lower the Power Range Neutron Flux - High Trip setpoints, which ensures continued operation is at an acceptably low power level with an adequate DNBR margin and avoids violating the $F_{\Delta H}$(X,Y) limit. This change is acceptable, because the Completion Time is consistent with safe operation and recognizes that the safety analysis assumptions are satisfied once power is reduced, and considers the low probability of a DBA occurring during the allowed Completion Time. The revised Completion Time allows the Power Range Neutron Flux - High Trip setpoints to be reduced in a controlled manner without challenging operators, technicians, or plant systems. Following a significant power reduction, a time period of 24 hours is allowed to reestablish steady state xenon concentration and power distribution and to take and analyze a flux map. If it is determined that $F_{\Delta H}$(X,Y) is still not within its limit, reducing the Power Range Neutron Flux - High Trip Setpoints can be accomplished within a few hours. Furthermore, setpoint changes should only be required for extended operation in this condition, because of the risk of a plant trip during the adjustment. This change is designated as less restrictive, because additional time is allowed to lower the Power Range Neutron Flux - High Trip setpoints than was allowed in the CTS.

DISCUSSION OF CHANGES
ITS 3.2.2, NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR - $F_{\Delta H}$(X,Y)

L02 (Category 3 – Relaxation of Completion Time) CTS 3.2.3 ACTION c.2 states, "Verify through incore flux mapping that $F_{\Delta H}$(X,Y) is restored to within the limit for the reduced THERMAL POWER allowed by ACTION a.2 or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next two hours." ITS 3.2.2 ACTION C states, "Required Action and associated Completion Time not met." Required Action C.1 states, "Be in MODE 2" within a Completion Time of "6 hours." This changes the CTS by increasing the time allowed to exit the MODE of Applicability when the Required Actions or associated Completion Times are not met.

The purpose of CTS 3.2.3 ACTION c.2 is to, within 24 hours, either verify $F_{\Delta H}$(X,Y) is restored within limits for the reduced power level or within the next 2 hours, enter MODE 2. Under similar conditions, ITS will require the plant to be placed in a MODE in which the LCO requirements are not applicable. This is done by placing the plant in at least MODE 2 within 6 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience regarding the time required to reach MODE 2 from full power conditions in an orderly manner and without challenging plant systems. This change is acceptable, because the Completion Time is consistent with safe operation and recognizes that the safety analysis assumptions are satisfied once power is reduced. This change is designated as less restrictive, because additional time is allowed to exit the LCO than was allowed in the CTS.

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Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

3.2 POWER DISTRIBUTION LIMITS

3.2.2 Nuclear Enthalpy Rise Hot Channel Factor ($F_{\Delta H}(X,Y)$ ~~$F^N_{\Delta H}$~~) ①

3.2.3 LCO 3.2.2 $F_{\Delta H}(X,Y)$ ~~$F^N_{\Delta H}$~~ shall be within the limits specified in the COLR. ①

Applicability APPLICABILITY: MODE 1.

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME	
DOC M01	A. ------------NOTE------------ 3 Required Actions A.~~2~~ 5 and A.~~3~~ must be completed whenever Condition A is entered. --------------------------------	~~A.1.1 Restore $F^N_{\Delta H}$ to within limit~~.	~~4 hours~~	② ③
ACTION a.2 SR 4.2.3.2.c.3		~~OR~~ A.1.~~2.1~~ Reduce allowable THERMAL POWER ~~to < 50% RTP~~ INSERT 1.	2 ~~4~~ hours	② ④ ⑤
SR 4.2.3.2.c.3	~~$F^N_{\Delta H}$~~ $F_{\Delta H}$ min margin < 0 ~~not within limit.~~	AND		
ACTION b.2		A.~~1.2.~~2 Reduce Power Range Neutron Flux - High trip setpoints ~~to ≤ 55% RTP~~ INSERT 2.	72 hours	⑥ ② ⑤
		AND		
ACTION c.2		A.3 ~~2~~ Perform SR 3.2.2.1	24 hours	②
		AND INSERT 3		③

⑤ **INSERT 1**

ACTION a.2
4.2.3.2.c.3 from RTP by ≥ RRH% multiplied times the $F_{\Delta H}$ min margin.

⑤ **INSERT 2**

ACTION b.2 by ≥ RRH% multiplied times the $F_{\Delta H}$ min margin.

③ **INSERT 3**

ACTION d

A.4 AND	Reduce Overtemperature ΔT trip setpoint by ≥ TRH multiplied times the $F_{\Delta H}$ min margin.	48 hours

CTS

$F_{\Delta H}(X,Y)$

$F_{\Delta H}^{\cancel{N}}$ ①

3.2.2

ACTIONS (continued)

	CONDITION	REQUIRED ACTION	COMPLETION TIME	
ACTION e DOC A03		A.~~3~~ 5 --------------NOTE-------------- THERMAL POWER does not have to be reduced to comply with this Required Action. -------------------------------------		③
ACTION e.1		Perform SR 3.2.2.1.	Prior to THERMAL POWER exceeding 50% RTP	
			AND	
ACTION e.2			Prior to THERMAL POWER exceeding 75% RTP	
			AND	
ACTION e.3	INSERT 4 →		24 hours after THERMAL POWER reaching ≥ 95% RTP	⑥
ACTION c.2 DOC M02	C ~~B~~. Required Action and associated Completion Time not met.	C ~~B~~.1 Be in MODE 2.	6 hours	⑥

⑥ **INSERT 4**

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. $f_1(\Delta I)$ min margin < 0.	B.1 Reduce Overtemperature ΔT trip setpoint by $\geq$ TRH multiplied times the $f_1(\Delta I)$ min margin.	48 hours

4.2.3.2.c.4

CTS

$F_{\Delta H}(X,Y)$

$F^{\cancel{N}}_{\Delta H}$
3.2.2

①

SURVEILLANCE REQUIREMENTS

INSERT 5 ⑦

SURVEILLANCE	FREQUENCY
SR 3.2.2.1 Verify $F^{\cancel{N}}_{\Delta H}$ ~~is within limits specified in the COLR.~~ INSERT 6 $F_{\Delta H}$ min margin > 0	Once after each refueling prior to THERMAL POWER exceeding 75% RTP AND ~~[31 EFPD thereafter~~ ~~OR~~ In accordance with the Surveillance Frequency Control Program~~]~~

4.2.3.2.c.1
4.2.3.3.a
4.2.3.3.b

⑧ ⑧ ⑨ ⑨

INSERT 7 ⑧

⑦ INSERT 5

--NOTE--

4.2.3.1 Not required to be performed until 12 hours after an equilibrium power level has been achieved, at which a power distribution map can be obtained.

INSERT 6

------------------------------NOTE------------------------------

4.2.3.2.d If two measurements extrapolated to 31 EFPD beyond the most recent measurement yield:

$F\Delta HR^{M}(X,Y) > BHNOM(X,Y)$

4.2.3.2.d.1 a. Increase $F_{\Delta H}^{M}(X,Y)$ by the appropriate factor specified in the COLR and reverify $F_{\Delta H}$ min margin > 0; or

4.2.3.2.d.2 b. Repeat SR 3.2.2.1 prior to the time at which the projected $F_{\Delta H}$ min margin will be < 0.

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⑧ INSERT 7

	SURVEILLANCE	FREQUENCY
SR 3.2.2.2	-------------------------------NOTE------------------------------ 4.2.3.2.d If two measurements extrapolated to 31 EFPD beyond the most recent measurement yield: $F\Delta HR^{M}(X,Y) > BHNOM(X,Y)$ 4.2.3.2.d.1 a. Increase $F_{\Delta H}^{M}(X,Y)$ by the appropriate factor specified in the COLR and reverify f_1 (ΔI) min margin > 0; or 4.2.3.2.d.2 b. Repeat SR 3.2.2.2 prior to the time at which the projected f_1 (ΔI) min margin will be < 0. --- 4.2.3.2.c.1 Verify f_1(ΔI) min margin > 0.	4.2.3.3.a Once after each refueling prior to THERMAL POWER exceeding 75% RTP 4.2.3.3.b AND In accordance with the Surveillance Frequency Control Program

3.2 POWER DISTRIBUTION LIMITS

3.2.2 Nuclear Enthalpy Rise Hot Channel Factor (F_ΔH(X,Y) ~~$F^{N}_{\Delta H}$~~) ①

3.2.3 LCO 3.2.2 F_ΔH(X,Y) ~~$F^{N}_{\Delta H}$~~ shall be within the limits specified in the COLR. ①

Applicability APPLICABILITY: MODE 1.

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME	
DOC M01 ACTION a.2 SR 4.2.3.2.c.3	A. ------------NOTE------------ 3 Required Actions A.~~2~~ 5 and A.~~3~~ must be completed whenever Condition A is entered. --------------------------------	~~A.1.1 Restore $F^{N}_{\Delta H}$ to within limit~~.	~~4 hours~~	② ③
		~~OR~~		
		A.1.~~2.1~~ Reduce allowable THERMAL POWER ~~to < 50% RTP~~ INSERT 1.	2 ~~4~~ hours	② ④
SR 4.2.3.2.c.3	~~$F^{N}_{\Delta H}$ not within limit.~~ F_ΔH min margin < 0	AND		⑤
ACTION b.2		A.~~1.2.~~2 Reduce Power Range Neutron Flux - High trip setpoints ~~to ≤ 55% RTP~~ INSERT 2.	72 hours	② ⑥
		AND		⑤
ACTION c.2		A.~~2~~ 3 Perform SR 3.2.2.1	24 hours	②
		AND INSERT 3		③

⑤ **INSERT 1**

ACTION a.2
4.2.3.2.c.3

from RTP by ≥ RRH% multiplied times the $F_{\Delta H}$ min margin.

⑤ **INSERT 2**

ACTION b.2

by ≥ RRH% multiplied times the $F_{\Delta H}$ min margin.

③ **INSERT 3**

ACTION d

A.4 AND	Reduce Overtemperature ΔT trip setpoint by ≥ TRH multiplied times the $F_{\Delta H}$ min margin.	48 hours

CTS

$F_{\Delta H}(X,Y)$ ①

$F^{\cancel{N}}_{\Delta H}$

3.2.2

ACTIONS (continued)

ACTION e
DOC A03 ③

ACTION e.1

ACTION e.2

ACTION e.3

INSERT 4 ⑥

ACTION c.2
DOC M02 ⑥

CONDITION	REQUIRED ACTION	COMPLETION TIME
	A.~~3~~ 5 --------------NOTE-------------- THERMAL POWER does not have to be reduced to comply with this Required Action. -------------------------------------	
	Perform SR 3.2.2.1.	Prior to THERMAL POWER exceeding 50% RTP AND Prior to THERMAL POWER exceeding 75% RTP AND 24 hours after THERMAL POWER reaching ≥ 95% RTP
C ~~B~~. Required Action and associated Completion Time not met.	C ~~B~~.1 Be in MODE 2.	6 hours

⑥

INSERT 4

4.2.3.2.c.4

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. $f_1(\Delta I)$ min margin < 0.	B.1	Reduce Overtemperature ΔT trip setpoint by ≥ TRH multiplied times the $f_1(\Delta I)$ min margin.	48 hours

SURVEILLANCE REQUIREMENTS

INSERT 5 ⑦

	SURVEILLANCE	FREQUENCY
4.2.3.2.c.1 4.2.3.3.a 4.2.3.3.b	SR 3.2.2.1 Verify ~~$F^{N}_{\Delta H}$~~ ~~is within limits specified in the COLR.~~ INSERT 6 $F_{\Delta H}$ min margin > 0	Once after each refueling prior to THERMAL POWER exceeding 75% RTP ⑧ ⑧ AND ~~[31 EFPD thereafter~~ ⑨ ~~OR~~ ⑨ In accordance with the Surveillance Frequency Control Program ~~]~~

INSERT 7 ⑧

⑦ **INSERT 5**

--NOTE---

4.2.3.1 Not required to be performed until 12 hours after an equilibrium power level has been achieved, at which a power distribution map can be obtained.

INSERT 6

------------------------------NOTE------------------------------ 4.2.3.2.d If two measurements extrapolated to 31 EFPD beyond the most recent measurement yield: $F\Delta HR^M(X,Y) > BHNOM(X,Y)$ 4.2.3.2.d.1 a. Increase $F^M_{\Delta H}(X,Y)$ by the appropriate factor specified in the COLR and reverify $F_{\Delta H}$ min margin > 0; or 4.2.3.2.d.2 b. Repeat SR 3.2.2.1 prior to the time at which the projected $F_{\Delta H}$ min margin will be < 0. --	

⑧ INSERT 7

	SURVEILLANCE	FREQUENCY
SR 3.2.2.2	-------------------------------NOTE------------------------------- 4.2.3.2.d If two measurements extrapolated to 31 EFPD beyond the most recent measurement yield: $F\Delta HR^{M}(X,Y) > BHNOM(X,Y)$ 4.2.3.2.d.1 a. Increase $F_{\Delta H}^{M}(X,Y)$ by the appropriate factor specified in the COLR and reverify f_1 (ΔI) min margin > 0; or 4.2.3.2.d.2 b. Repeat SR 3.2.2.2 prior to the time at which the projected f_1 (ΔI) min margin will be < 0. --- 4.2.3.2.c.1 Verify $f_1(\Delta$I) min margin > 0.	4.2.3.3.a Once after each refueling prior to THERMAL POWER exceeding 75% RTP <u>AND</u> 4.2.3.3.b In accordance with the Surveillance Frequency Control Program

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.2, NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR ($F_{\Delta H}$(X,Y))

1. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

2. ISTS LCO 3.2.2 Required Action A.1.1 states, restore $F^N_{\Delta H}$ to within limit. ITS 3.2.2 will not retain the specific requirement to restore. LCO 3.0.2 Bases states that correction of the entered Condition is an action that may always be considered upon entering ACTIONS. This change is acceptable because the technical requirements have not changed. Restoration of compliance with the LCO is always an available Required Action. The convention in the ITS is to not state such "restore" options explicitly unless it is the only action or is required for clarity. In this specific application, Required Action A.1.1 is not the only ACTION and a power reduction should be the focus for restoration of $F_{\Delta H}$(X,Y)to within the limits. Subsequent Required Actions have been renumbered o reflect this deletion.

3. Required Action A.4 is added to the ITS. CTS 3.2.3 ACTION d requires reduction of the OTΔT setpoint when $F_{\Delta H}$(X,Y) exceeds the limit in the COLR. Subsequent Required Actions have been renumbered o reflect this deletion.

4. The Completion Times for reducing THERMAL POWER upon discovery that $F_{\Delta H}$(X,Y) has exceeded its limit are shortened from 4 hours to 2 hours consistent with the current licensing basis.

5. The amount that THERMAL POWER and the Power Range Neutron Flux – High Trip setpoints are reduced after $F_{\Delta H}$(X,Y) has exceeded its limit are changed to reflect the values in the current licensing basis.

6. ITS Conditions A and B have been changed to reflect the CTS ACTIONs for both $F_{\Delta H}$ and/or $f_1(\Delta I)$ min margins not met.

7. ISTS LCO 3.2.2 does not contain a specific provision for changing MODES if LCO 3.2.2 is not met, other than the generic use of LCO 3.0.4. CTS SR 4.2.3.1 states, ″The provisions of Specification 4.0.4 are not applicable.″ This allowance enables SQN to enter the MODE of Applicability with the Surveillance not met or performed. SQN is retaining the allowance to change the MODE of Applicability with the Surveillance not performed by adding a Surveillance Note to retain the allowance.

8. ISTS SR 3.2.2.1 and SR 3.2.2.2 have been changed to reflect the CTS evaluation of $F_{\Delta H}$ min margin > 0 and $f_1(\Delta I)$ min margin > 0.

9. ISTS SR 3.2.2.1 (and proposed ITS SR 3.2.2.2) provides two options for controlling the Frequencies of Surveillance Requirements. SQN is proposing to control the Surveillance Frequencies under the Surveillance Frequency Control Program.

Improved Standard Technical Specifications (ISTS) Bases Markup and Bases Justification for Deviations (JFDs)

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.2 Nuclear Enthalpy Rise Hot Channel Factor (~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$) ①

BASES

BACKGROUND

The purpose of this LCO is to establish limits on the power density at any point in the core so that the fuel design criteria are not exceeded and the accident analysis assumptions remain valid. The design limits on local (pellet) and integrated fuel rod peak power density are expressed in terms of hot channel factors. Control of the core power distribution with respect to these factors ensures that local conditions in the fuel rods and coolant channels do not challenge core integrity at any location during either normal operation or a postulated accident analyzed in the safety analyses.

~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ is defined as the ratio of the integral of the linear power along the fuel rod with the highest integrated power to the average integrated fuel rod power. Therefore, ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ is a measure of the maximum total power produced in a fuel rod. ①

~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ is sensitive to fuel loading patterns, bank insertion, and fuel burnup. ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ typically increases with control bank insertion and typically decreases with fuel burnup.

~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ is not directly measurable but is inferred from a power distribution map obtained with the movable incore detector system. Specifically, the results of the three dimensional power distribution map are analyzed by a computer to determine ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ INSERT 1 This factor is calculated at least every 31 EFPD. However, during power operation, the global power distribution is monitored by LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," and LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)," which address directly and continuously measured process variables. ① ②

The COLR provides peaking factor limits that ensure that the design basis value of the ~~departure from nucleate boiling (~~DNB~~)~~ is met for normal operation, operational transients, and any transient condition arising from events of moderate frequency. The DNB design basis precludes DNB and is met by limiting the minimum local DNB heat flux ratio to ~~[1.3] using the [W3] CHF~~ the design limit value using an NRC approved critical heat flux correlation. All DNB limited transient events are assumed to begin with an ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ value that satisfies the LCO requirements. ① ①

Operation outside the LCO limits may produce unacceptable consequences if a DNB limiting event occurs. The DNB design basis ensures that there is no overheating of the fuel that results in possible cladding perforation with the release of fission products to the reactor coolant.

② INSERT 1

An $F_{\Delta H}(X,Y)$ evaluation requires obtaining an incore flux map in MODE 1. The incore flux map results provide the measured value ($F_{\Delta H}^{M}(X,Y)$ of $F_{\Delta H}(X,Y)$ for each assembly location (X,Y). The $F_{\Delta H}$ ratio (FDHR) is used in order to determine the $F_{\Delta H}$ limit for the measured and design power distributions. Then,

$$F\Delta HR^{M}(X,Y) = \frac{F_{\Delta H}^{M}(X,Y)}{MAP^{M} / AXIAL^{M}(X,Y)}$$

where MAP^{M} is the maximum allowable peak from the COLR for the measured assembly power distribution at assembly location (X,Y) which accounts for calculational and measurement uncertainties, and $AXIAL^{M}(X,Y)$ is the measured ratio of the peak-to-average axial power at assembly location (X,Y).

BHDES(X,Y) is a cycle dependent design limit to preserve Departure from Nucleate Boiling(DNB) assumed for initial conditions at the time of limiting transients such as a Loss of Flow Accident (LOFA). BRDES(X,Y) is a cycle dependent design limit to preserve reactor protection system safety limits for DNB requirements.

The expression for BHDES(X,Y) is:

$BHDES(X,Y) = F\Delta HR^{d}(X,Y) * MH(X,Y)$

where: $F\Delta HR^{d}(X,Y) = \dfrac{F_{\Delta H}^{d}(X,Y)}{MAP^{d} / AXIAL^{d}(X,Y)}$

- MAP^{d} is the maximum allowable peak from the COLR for the design assembly power distribution at assembly location (X,Y) which accounts for calculational and measurement uncertainties,

- $AXIAL^{d}(X,Y)$ is the design ratio of the peak-to-average axial power at assembly location (X,Y),

- $F_{\Delta H}^{d}(X,Y)$ is the design $F_{\Delta H}$ assembly location (X, Y), and

- MH(X,Y) is the minimum available margin ratio for initial condition DNB at the limiting conditions at assembly location (X,Y).

② INSERT 1 (continued)

The expression for BRDES(X,Y) is:

$BRDES(X,Y) = F\Delta HR^{d}(X,Y) * MH^{s}(X,Y)$

where: $MH^{s}(X,Y)$ is the minimum available margin ratio for steady state DNB at the limiting conditions at assembly location (X,Y).

The reactor core is ″operating as designed″ if the measured steady state core power distribution agrees with prediction within statistical variation. This guarantees that the operating limits will preserve the thermal criteria in the applicable safety analyses. The core is ″operating as designed″ if the following relationship is satisfied:

$F\Delta HR^{M}(X,Y) \leq BHNOM(X,Y)$

where: BHNOM(X,Y) is the nominal design radial peaking factor for an assembly at core location (X,Y) increased by an allowance for the expected deviation between the measured and predicted design power distribution.

BASES

APPLICABLE SAFETY ANALYSES

Limits on ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ preclude core power distributions that exceed the following fuel design limits: ①

a. There must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hottest fuel rod in the core does not experience a DNB condition,

b. During a large break loss of coolant accident (LOCA), peak cladding temperature (PCT) must not exceed 2200°F,

c. During an ejected rod accident, the energy deposition to the fuel must not exceed 280 cal/gm ~~[~~(Ref. 1~~]~~), and ③ ⑧

d. Fuel design limits required by GDC 26 (Ref. 2) for the condition when control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn.

For transients that may be DNB limited, the Reactor Coolant System flow and ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ are the core parameters of most importance. The limits on ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ ensure that the DNB design basis is met for normal operation, operational transients, and any transients arising from events of moderate frequency. The DNB design basis is met by limiting the minimum ~~DNBR to the 95/95 DNB criterion of [1.3] using the [W3] CHF~~ local DNB heat flux ratio to the design limit value using an NRC approved critical heat flux correlation. This value provides a high degree of assurance that the hottest fuel rod in the core does not experience a DNB. ①

The allowable ~~$F^N_{\Delta H}$ limit~~ $F_{\Delta H}(X,Y)$ limits, $F_{\Delta H}$ min margin and $f_1(\Delta I)$ min margin, increase~~s~~ with decreasing power level. This functionality in ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ is included in the analyses that provide the Reactor Core Safety Limits (SLs) of SL 2.1.1. Therefore, any DNB events in which the calculation of the core limits is modeled implicitly use this variable value of ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ in the analyses. Likewise, all transients that may be DNB limited are assumed to begin with an initial ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ as a function of power level defined by the COLR limit equation. ①

The LOCA safety analysis indirectly models ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ as an input parameter. The Nuclear Heat Flux Hot Channel Factor (F_Q(X,Y,Z)) and the axial peaking factors are inserted directly into the LOCA safety analyses that verify the acceptability of the resulting peak cladding temperature ~~[~~(Ref. 3~~]~~). ③ ⑧

The fuel is protected in part by Technical Specifications, which ensure that the initial conditions assumed in the safety and accident analyses remain valid. The following LCOs ensure this: LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," LCO 3.2.4, "QUADRANT POWER TILT RATIO

BASES

APPLICABLE SAFETY ANALYSES (continued)

(QPTR)," LCO 3.1.6, "Control Bank Insertion Limits," LCO 3.2.2, "Nuclear Enthalpy Rise Hot Channel Factor ~~($F^N_{\Delta H}$)~~ $F_{\Delta H}(X,Y)$," and LCO 3.2.1, "Heat Flux Hot Channel Factor (F_Q(~~Z~~ X, Y, Z))."

~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ and F_Q(~~Z~~ X, Y, Z) are indirectly measured periodically using the movable incore detector system. Measurements are generally taken with the core at, or near, steady state conditions. Core monitoring and control under transient conditions (Condition 1 events) are accomplished by operating the core within the limits of the LCOs on AFD, QPTR, and Bank Insertion Limits. ①

~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

~~$F^N_{\Delta H}$ shall be maintained within the limits of the relationship provided in the COLR.~~ ②

INSERT 2

~~The $F^N_{\Delta H}$ limit identifies the coolant flow channel with the maximum enthalpy rise. This channel has the least heat removal capability and thus the highest probability for a DNB.~~ ①

~~The limiting value of $F^N_{\Delta H}$, described by the equation contained in the COLR, is the design radial peaking factor used in the unit safety analyses.~~

~~A power multiplication factor in this equation includes an additional margin for higher radial peaking from reduced thermal feedback and greater control rod insertion at low power levels. The limiting value of is $F^N_{\Delta H}$ allowed to increase 0.3% for every 1% RTP reduction in THERMAL POWER.~~

APPLICABILITY

The ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ limits must be maintained in MODE 1 to preclude core power distributions from exceeding the fuel design limits for DNBR and PCT. Applicability in other modes is not required because there is either insufficient stored energy in the fuel or insufficient energy being transferred to the coolant to require a limit on the distribution of core power. Specifically, the design bases events that are sensitive to ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ in other modes (MODES 2 through 5) have significant margin to DNB, and therefore, there is no need to restrict ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ in these modes. ①

② **INSERT 2**

The LCO states that $F_{\Delta H}(X,Y)$ shall be less than the limits provided in the COLR. This LCO relationship must be satisfied even if the core is operating at limiting conditions. This requires adjustment to the measured $F_{\Delta H}(X,Y)$ to account for limiting conditions and the differences between design and measured conditions. The adjustments are accounted for by comparing $F\Delta HR^{M}(X,Y)$ to the limits BHDES(X,Y) and BRDES(X,Y). Therefore, if the $F_{\Delta H}$ min margin is >0 and $f_1(\Delta I)$ min margin >0 the LCO is satisfied.

BASES INSERT 3 ②

ACTIONS ~~A.1.1~~

~~With $F^N_{\Delta H}$ exceeding its limit, the unit is allowed 4 hours to restore $F^N_{\Delta H}$ to within its limits. This restoration may, for example, involve realigning any misaligned rods or reducing power enough to bring $F^N_{\Delta H}$ within its power dependent limit. When the $F^N_{\Delta H}$ limit is exceeded, the DNBR limit is not likely violated in steady state operation, because events that could significantly perturb the $F^N_{\Delta H}$ value (e.g., static control rod misalignment) are considered in the safety analyses. However, the DNBR limit may be violated if a DNB limiting event occurs. Thus, the allowed Completion Time of 4 hours provides an acceptable time to restore $F^N_{\Delta H}$ to within its limits without allowing the plant to remain in an unacceptable condition for an extended period of time.~~ ④

Condition A is modified by a Note that requires that Required Actions A.~~2~~ 3 and A.~~3~~ 5 must be completed whenever Condition A is entered. ~~Thus, if power is not reduced because this Required Action is completed within the 4 hour time period, Required Action A.2 nevertheless requires another measurement and calculation of $F^N_{\Delta H}$ within 24 hours in accordance with SR 3.2.2.1.~~ INSERT 4 ④

However, if power is reduced below 50% RTP, Required Action A.~~3~~ 5 requires that another determination of ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$ min margin must be ~~done~~ verified prior to exceeding 50% RTP, prior to exceeding 75% RTP, and within 24 hours after reaching or exceeding 95% RTP. ~~In addition, Required Action A.2 is performed if power ascension is delayed past 24 hours.~~ ④ ① ⑤

A.1~~.2.1~~ and A.~~1.2.~~2

If the value of ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$ min margin is not restored to within its specified limit either by adjusting a misaligned rod or by reducing THERMAL POWER, the alternative option is to reduce INSERT 5 THERMAL POWER ~~to < 50% RTP~~ INSERT 6 in accordance with Required Action A.1~~.2.1~~ and reduce the Power Range Neutron Flux - High ~~to ≤ 55% RTP~~ INSERT 7 in accordance with Required Action A.~~1.2.~~2. Reducing allowable RTP ~~to < 50% RTP~~ increases the DNB margin and does not likely cause the DNBR limit to be violated in steady state operation. The reduction in trip setpoints ensures that continuing operation remains at an acceptable low power level with adequate DNBR margin. The allowed Completion Time of ~~4~~ 2 hours for Required Action A.1~~.2.1 is consistent with those allowed for in Required Action A.1.1 and~~ provides an acceptable time to reach the required power level from full power operation without allowing the plant to remain in an unacceptable condition for an extended period of time. ~~The Completion Times of 4 hours for Required Actions A.1.1 and A.1.2.1 are not additive~~. ① ④ ③ ③

---

② INSERT 3

The % $F_{\Delta H}$ margin is based on the relationship between $F\Delta HR^{M}(X,Y)$ and the limit, BHDES (X,Y), as follows:

$$\%\ F_{\Delta H}\ \text{Margin} = \left(1 - \frac{F\Delta HR^{M}(X,\ Y)}{BHDES(X,\ Y)}\right) x\ 100\%$$

If the reactor core is ″operating as designed″, then $F\Delta HR^{M}(X,Y)$ is less than BHDES (X,Y) and calculation of %$F_{\Delta H}$ margin is not required. If the %$F_{\Delta H}$ margin is less than zero, then $F\Delta HR^{M}(X,Y)$ is greater than BHDES (X, Y) and the $F_{\Delta H}(X,Y)$ limits may not be adequate to prevent exceeding the initial DNB conditions assumed for transients such as a LOFA. BHDES (X,Y) represents the maximum allowable design radial peaking factors which ensures that the initial conditions DNB will be preserved for operation within the LCO limits, and includes allowances for calculational and measurement uncertainties. The $F_{\Delta H}$ min margin is the minimum for all core locations examined.

④ INSERT 4

If $F_{\Delta H}$ min margin < 0 is restored to within limits prior to completion of the THERMAL POWER reduction in Required Action A.1, compliance of Required Actions A.3 and A.5 must be met.

④ INSERT 5

from RTP by at least RRH % (where RRH = Thermal power reduction required to compensate for each 1% that $F_{\Delta H}$(X,Y) exceeds its limit) multiplied times the $F_{\Delta H}$ min margin

④ INSERT 6

trip setpoints, as specified in TS Table 3.3.1-1 by ≥ RRH% multiplied times the $F_{\Delta H}$ min margin

④ INSERT 7

by at least RRH% multiplied times the $F_{\Delta H}$ min margin

BASES

ACTIONS (continued)

The allowed Completion Time of 72 hours to reset the trip setpoints per Required Action A.~~1.2.~~2 recognizes that, once power is reduced, the safety analysis assumptions are satisfied and there is no urgent need to reduce the trip setpoints. This is a sensitive operation that may inadvertently trip the Reactor Protection System. ④

A.~~2~~ 3

Once the allowable power level has been reduced ~~to ≤ 50% RTP~~ INSERT 8 per Required Action A.1~~.2.1~~, an incore flux map (SR 3.2.2.1) must be obtained and the ~~measured value of $F^N_{\Delta H}$ verified not to exceed the allowed limit~~ $F_{\Delta H}$ min margin is verified > 0 at the lower power level. The unit is provided ~~20~~ 22 additional hours to perform this task over and above the ~~4~~ 2 hours allowed by ~~either Action A.1.1 or~~ Action A.1~~.2.1~~. The Completion Time of 24 hours is acceptable because of the increase in the DNB margin, which is obtained at lower power levels, and the low probability of having a DNB limiting event within this 24 hour period. Additionally, operating experience has indicated that this Completion Time is sufficient to obtain the incore flux map, perform the required calculations, and evaluate ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$ min margin. ④ ① ③ ①

INSERT 9 ④ ④

A.~~3~~ 5

Verification that ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$ min margin is > 0 ~~is within its specified limits~~ after an out of limit occurrence ensures that the cause that led to the ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$ min margin exceeding its limit is corrected, and that subsequent operation proceeds within the LCO limit. This Action demonstrates that the ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$ min margin limit is ~~within the LCO limits~~ >0 prior to exceeding 50% RTP, again prior to exceeding 75% RTP, and within 24 hours after THERMAL POWER is ≥ 95% RTP. ①

This Required Action is modified by a Note that states that THERMAL POWER does not have to be reduced prior to performing this Action.

INSERT 10 ②

C~~B~~.1 ④

When Required Actions A.1~~.1~~ through A.~~3~~ 5, and B.1, cannot be completed within their required Completion Times, the plant must be placed in a mode in which the LCO requirements are not applicable. This is done by placing the plant in at least MODE 2 within 6 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience regarding the time required to reach MODE 2 from full power conditions in an orderly manner and without challenging plant systems.

④ **INSERT 8**

by at least RRH% multiplied times the $F_{\Delta H}$ min margin

④ **INSERT 9**

A.4

If the value of $F\Delta HR^{M}(X,Y)$ is not restored to within its specified limit, Overtemperarture ΔT K1 (OTΔT K1) term is required to be reduced by at least TRH multiplied times the $F_{\Delta H}$ min margin. The value of TRH is provided in the COLR. Completing Required Action A.4 ensures protection against the consequences of transients since this adjustment limits the peak transient power level which can be achieved during an anticipated operational occurrence. Also, completing Required Action A.4 within the allowed Completion Time of 48 hours is sufficient considering the small likelihood of a limiting transient in this time period.

② INSERT 10

B.1

The %$f_1(\Delta I)$ margin is based on the relationship between $F\Delta HR^M(X,Y)$ and the limit, BRDES (X,Y), as follows:

$$\% \ f_1(\Delta I)Margin = \left(1 - \frac{F\Delta HR^M(X,Y)}{BRDES(X,Y)}\right) x\ 100\%$$

If the reactor core is ″operating as designed″, then $F\Delta HR^M(X,Y)$ is less than BRDES (X,Y) and calculation of %$f_1(\Delta I)$ margin is not required. If the %$f_1(\Delta I)$ margin is less than zero, then $F\Delta HR^M(X,Y)$ is greater than BRDES (X, Y) and the OTΔT setpoint limits may not be adequate to prevent exceeding DNB requirements.

BRDES (X,Y) represents the maximum allowable design radial peaking factors which ensure that the steady state DNBR limit will be preserved for operation within the LCO limits, including allowances for calculational and measurement uncertainties

Required Action B.1 requires the reduction of the OTΔT K1 term by at least TRH multiplied by the $f_1(\Delta I)$ min margin. TRH is the amount of OTΔT K1 setpoint reduction required to compensate for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit provided in the COLR. Completing Required Action B.1 within the allowed Completion Time of 48 hours, restricts $F_{\Delta H}(X,Y)$ such that even if a transient occurred, DNB requirements are met. The $f_1(\Delta I)$ min margin is the minimum % of $f_1(\Delta I)$ margin for all core locations examined.

BASES

SURVEILLANCE REQUIREMENTS

INSERT 11 ④

~~SR 3.2.2.1~~

~~The value of $F^N_{\Delta H}$ is determined by using the movable incore detector system to obtain a flux distribution map. A data reduction computer program then calculates the maximum value of $F^N_{\Delta H}$ from the measured flux distributions. The measured value of $F^N_{\Delta H}$ must be multiplied by 1.04 to account for measurement uncertainty before making comparisons to the $F^N_{\Delta H}$ limit.~~ ①

~~After each refueling, $F^N_{\Delta H}$ must be determined in MODE 1 prior to exceeding 75% RTP. This requirement ensures that $F^N_{\Delta H}$ limits are met at the beginning of each fuel cycle.~~

~~[The 31 EFPD Frequency is acceptable because the power distribution changes relatively slowly over this amount of fuel burnup. Accordingly, this Frequency is short enough that the $F^N_{\Delta H}$ limit cannot be exceeded for any significant period of operation.~~ ⑥

~~OR~~

INSERT 12 ④

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ ⑦
~~---]~~

REFERENCES

1. Regulatory Guide 1.77, Rev. ~~[~~0~~]~~, May 1974.
2. 10 CFR 50, Appendix A, GDC 26.
3. 10 CFR 50.46.

④ INSERT 11

SR 3.2.2.1 and SR 3.2.2.2 are modified by a Note. It states that, "Not required to be performed until 12 hours after an equilibrium power level has been achieved at which a power distribution map can be obtained." SR 3.2.2.1 and SR 3.2.2.2 require using the incore detector system to provide the necessary data to create a power distribution map. To provide the necessary data, MODE 1 needs to be entered, power escalated, stabilized and equilibrium conditions established at some higher power level. These surveillances could not be satisfactorily performed if the requirement for performance of the Surveillances was included in MODE 2 prior to entering MODE 1.

In a reload core, $F^{M}_{\Delta H}(X,Y)$ could not have previously been measured, therefore, there is a Frequency condition, applicable only for reload cores, that requires determination of these parameters before exceeding 75% RTP. This ensures that some determination of $F^{M}_{\Delta H}(X,Y)$ is made at a lower power level at which adequate margin is available before going to 100% RTP.

④ **INSERT 12**

SR 3.2.2.1 and SR 3.2.2.2

In addition to ensuring via Surveillance that the nuclear enthalpy rise hot channel factor is within its limits when a measurement is taken, there are also requirements to extrapolate trends in $F_{\Delta H}^{M}(X, Y)$ for the last two measurements out to 31 EFPD beyond the most recent measurement. If the extrapolation yields an $F\Delta HR^{M}(X,Y) > BHNOM(X,Y)$, further consideration is required.

The implications of these extrapolations are considered separately for BHDES(X,Y) and BRDES(X,Y) limits. If the extrapolations of $F_{\Delta H}^{M}(X, Y)$ are unfavorable, additional actions must be taken. These actions are to meet the $F_{\Delta H}(X,Y)$ limit with the last $F_{\Delta H}^{M}(X, Y)$ increased by the appropriate factor specified in the COLR or to evaluate $F_{\Delta H}^{M}(X, Y)$ prior to the projected point in time when the extrapolated values are expected to exceed the extrapolated limits. These alternative requirements attempt to prevent $F_{\Delta H}(X,Y)$ from exceeding its limit for any significant period of time without detection using the best available data.

Extrapolation is not required for the initial flux map taken after reaching equilibrium conditions following a refueling outage since the initial flux map establishes the baseline measurement for future trending.

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.2 Nuclear Enthalpy Rise Hot Channel Factor ($F_{\Delta H}(X,Y)$ ~~$F^{N}_{\Delta H}$~~) ①

BASES

BACKGROUND

The purpose of this LCO is to establish limits on the power density at any point in the core so that the fuel design criteria are not exceeded and the accident analysis assumptions remain valid. The design limits on local (pellet) and integrated fuel rod peak power density are expressed in terms of hot channel factors. Control of the core power distribution with respect to these factors ensures that local conditions in the fuel rods and coolant channels do not challenge core integrity at any location during either normal operation or a postulated accident analyzed in the safety analyses.

$F_{\Delta H}(X,Y)$ ~~$F^{N}_{\Delta H}$~~ is defined as the ratio of the integral of the linear power along the fuel rod with the highest integrated power to the average integrated fuel rod power. Therefore, $F_{\Delta H}(X,Y)$ ~~$F^{N}_{\Delta H}$~~ is a measure of the maximum total power produced in a fuel rod. ①

$F_{\Delta H}(X,Y)$ ~~$F^{N}_{\Delta H}$~~ is sensitive to fuel loading patterns, bank insertion, and fuel burnup. $F_{\Delta H}(X,Y)$ ~~$F^{N}_{\Delta H}$~~ typically increases with control bank insertion and typically decreases with fuel burnup.

$F_{\Delta H}(X,Y)$ ~~$F^{N}_{\Delta H}$~~ is not directly measurable but is inferred from a power distribution map obtained with the movable incore detector system. Specifically, the results of the three dimensional power distribution map are analyzed by a computer to determine $F_{\Delta H}(X,Y)$ ~~$F^{N}_{\Delta H}$~~ INSERT 1. This factor is calculated at least every 31 EFPD. However, during power operation, the global power distribution is monitored by LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," and LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)," which address directly and continuously measured process variables. ① ②

The COLR provides peaking factor limits that ensure that the design basis value of the ~~departure from nucleate boiling (~~DNB~~)~~ is met for normal operation, operational transients, and any transient condition arising from events of moderate frequency. The DNB design basis precludes DNB and is met by limiting the minimum local DNB heat flux ratio to the design limit value using an NRC approved critical heat flux ~~[1.3] using the [W3] CHF~~ correlation. All DNB limited transient events are assumed to begin with an $F_{\Delta H}(X,Y)$ ~~$F^{N}_{\Delta H}$~~ value that satisfies the LCO requirements. ① ①

Operation outside the LCO limits may produce unacceptable consequences if a DNB limiting event occurs. The DNB design basis ensures that there is no overheating of the fuel that results in possible cladding perforation with the release of fission products to the reactor coolant.

② **INSERT 1**

An $F_{\Delta H}$(X,Y) evaluation requires obtaining an incore flux map in MODE 1. The incore flux map results provide the measured value ($F^{M}_{\Delta H}(X,Y)$ of $F_{\Delta H}$(X,Y) for each assembly location (X,Y). The $F_{\Delta H}$ ratio (FDHR) is used in order to determine the $F_{\Delta H}$ limit for the measured and design power distributions. Then,

$$F\Delta HR^{M}(X,Y) = \frac{F^{M}_{\Delta H}(X,Y)}{MAP^{M} / AXIAL^{M}(X,Y)}$$

where MAP^{M} is the maximum allowable peak from the COLR for the measured assembly power distribution at assembly location (X,Y) which accounts for calculational and measurement uncertainties, and $AXIAL^{M}(X,Y)$ is the measured ratio of the peak-to-average axial power at assembly location (X,Y).

BHDES(X,Y) is a cycle dependent design limit to preserve Departure from Nucleate Boiling(DNB) assumed for initial conditions at the time of limiting transients such as a Loss of Flow Accident (LOFA). BRDES(X,Y) is a cycle dependent design limit to preserve reactor protection system safety limits for DNB requirements.

The expression for BHDES(X,Y) is:

$BHDES(X,Y) = F\Delta HR^{d}(X,Y) * MH(X,Y)$

where: $F\Delta HR^{d}(X,Y) = \dfrac{F^{d}_{\Delta H}(X,Y)}{MAP^{d} / AXIAL^{d}(X,Y)}$

- MAP^{d} is the maximum allowable peak from the COLR for the design assembly power distribution at assembly location (X,Y) which accounts for calculational and measurement uncertainties,

- $AXIAL^{d}(X,Y)$ is the design ratio of the peak-to-average axial power at assembly location (X,Y),

- $F^{d}_{\Delta H}(X,Y)$ is the design $F_{\Delta H}$ assembly location (X, Y), and

- MH(X,Y) is the minimum available margin ratio for initial condition DNB at the limiting conditions at assembly location (X,Y).

② INSERT 1 (continued)

The expression for BRDES(X,Y) is:

$BRDES(X,Y) = F\Delta HR^{d}(X,Y) * MH^{s}(X,Y)$

where: $MH^{s}(X,Y)$ is the minimum available margin ratio for steady state DNB at the limiting conditions at assembly location (X,Y).

The reactor core is ″operating as designed″ if the measured steady state core power distribution agrees with prediction within statistical variation. This guarantees that the operating limits will preserve the thermal criteria in the applicable safety analyses. The core is ″operating as designed″ if the following relationship is satisfied:

$F\Delta HR^{M}(X,Y) \leq BHNOM(X,Y)$

where: BHNOM(X,Y) is the nominal design radial peaking factor for an assembly at core location (X,Y) increased by an allowance for the expected deviation between the measured and predicted design power distribution.

BASES

APPLICABLE SAFETY ANALYSES

Limits on ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ preclude core power distributions that exceed the following fuel design limits: ①

a. There must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hottest fuel rod in the core does not experience a DNB condition,

b. During a large break loss of coolant accident (LOCA), peak cladding temperature (PCT) must not exceed 2200°F,

c. During an ejected rod accident, the energy deposition to the fuel must not exceed 280 cal/gm ~~[~~(Ref. 1~~]~~), and ③ ⑧

d. Fuel design limits required by GDC 26 (Ref. 2) for the condition when control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn.

For transients that may be DNB limited, the Reactor Coolant System flow and ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ are the core parameters of most importance. The limits on ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ ensure that the DNB design basis is met for normal operation, operational transients, and any transients arising from events of moderate frequency. The DNB design basis is met by limiting the minimum ~~DNBR to the 95/95 DNB criterion of [1.3] using the [W3] CHF~~ local DNB heat flux ratio to the design limit value using an NRC approved critical heat flux correlation. This value provides a high degree of assurance that the hottest fuel rod in the core does not experience a DNB. ① ①

The allowable ~~$F^N_{\Delta H}$~~ ~~limit~~ limits, $F_{\Delta H}$ min margin and $f_1(\Delta I)$ min margin, increase~~s~~ with decreasing power level. This functionality in ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ is included in the analyses that provide the Reactor Core Safety Limits (SLs) of SL 2.1.1. Therefore, any DNB events in which the calculation of the core limits is modeled implicitly use this variable value of ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ in the analyses. Likewise, all transients that may be DNB limited are assumed to begin with an initial ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ as a function of power level defined by the COLR limit equation. ①

The LOCA safety analysis indirectly models ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ as an input parameter. The Nuclear Heat Flux Hot Channel Factor (F_Q(X,Y,Z)) and the axial peaking factors are inserted directly into the LOCA safety analyses that verify the acceptability of the resulting peak cladding temperature ~~[~~(Ref. 3~~]~~). ③ ⑧

The fuel is protected in part by Technical Specifications, which ensure that the initial conditions assumed in the safety and accident analyses remain valid. The following LCOs ensure this: LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," LCO 3.2.4, "QUADRANT POWER TILT RATIO

BASES

APPLICABLE SAFETY ANALYSES (continued)

(QPTR)," LCO 3.1.6, "Control Bank Insertion Limits," LCO 3.2.2, "Nuclear Enthalpy Rise Hot Channel Factor ~~($F^N_{\Delta H}$)~~ $F_{\Delta H}(X,Y)$," and LCO 3.2.1, "Heat Flux Hot Channel Factor (F_Q(~~Z~~ X, Y, Z))." ①

~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ and F_Q(~~Z~~ X, Y, Z) are indirectly measured periodically using the movable incore detector system. Measurements are generally taken with the core at, or near, steady state conditions. Core monitoring and control under transient conditions (Condition 1 events) are accomplished by operating the core within the limits of the LCOs on AFD, QPTR, and Bank Insertion Limits.

~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

~~$F^N_{\Delta H}$ shall be maintained within the limits of the relationship provided in the COLR.~~ ②

INSERT 2

~~The $F^N_{\Delta H}$ limit identifies the coolant flow channel with the maximum enthalpy rise. This channel has the least heat removal capability and thus the highest probability for a DNB.~~ ①

~~The limiting value of $F^N_{\Delta H}$, described by the equation contained in the COLR, is the design radial peaking factor used in the unit safety analyses.~~

~~A power multiplication factor in this equation includes an additional margin for higher radial peaking from reduced thermal feedback and greater control rod insertion at low power levels. The limiting value of is $F^N_{\Delta H}$ allowed to increase 0.3% for every 1% RTP reduction in THERMAL POWER.~~

APPLICABILITY

The ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ limits must be maintained in MODE 1 to preclude core power distributions from exceeding the fuel design limits for DNBR and PCT. Applicability in other modes is not required because there is either insufficient stored energy in the fuel or insufficient energy being transferred to the coolant to require a limit on the distribution of core power. Specifically, the design bases events that are sensitive to ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ in other modes (MODES 2 through 5) have significant margin to DNB, and therefore, there is no need to restrict ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X,Y)$ in these modes. ①

② **INSERT 2**

The LCO states that $F_{\Delta H}(X,Y)$ shall be less than the limits provided in the COLR. This LCO relationship must be satisfied even if the core is operating at limiting conditions. This requires adjustment to the measured $F_{\Delta H}(X,Y)$ to account for limiting conditions and the differences between design and measured conditions. The adjustments are accounted for by comparing $F\Delta HR^{M}(X,Y)$ to the limits BHDES(X,Y) and BRDES(X,Y). Therefore, if the $F_{\Delta H}$ min margin is >0 and $f_1(\Delta I)$ min margin >0 the LCO is satisfied.

BASES INSERT 3 ②

ACTIONS ~~A.1.1~~

~~With $F^N_{\Delta H}$ exceeding its limit, the unit is allowed 4 hours to restore $F^N_{\Delta H}$ to within its limits. This restoration may, for example, involve realigning any misaligned rods or reducing power enough to bring $F^N_{\Delta H}$ within its power dependent limit. When the $F^N_{\Delta H}$ limit is exceeded, the DNBR limit is not likely violated in steady state operation, because events that could significantly perturb the $F^N_{\Delta H}$ value (e.g., static control rod misalignment) are considered in the safety analyses. However, the DNBR limit may be violated if a DNB limiting event occurs. Thus, the allowed Completion Time of 4 hours provides an acceptable time to restore $F^N_{\Delta H}$ to within its limits without allowing the plant to remain in an unacceptable condition for an extended period of time.~~ ④

Condition A is modified by a Note that requires that Required Actions A.~~2~~ 3 and A.~~3~~ 5 must be completed whenever Condition A is entered. ~~Thus, if power is not reduced because this Required Action is completed within the 4 hour time period, Required Action A.2 nevertheless requires another measurement and calculation of $F^N_{\Delta H}$ within 24 hours in accordance with SR 3.2.2.1.~~ INSERT 4 ④

However, if power is reduced below 50% RTP, Required Action A.~~3~~ 5 requires that another determination of ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$ min margin must be ~~done~~ verified prior to exceeding 50% RTP, prior to exceeding 75% RTP, and within 24 hours after reaching or exceeding 95% RTP. ~~In addition, Required Action A.2 is performed if power ascension is delayed past 24 hours.~~ ④ ① ⑤

A.1~~.2.1~~ and A.~~1.2.~~2

If the value of ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$ min margin is not restored to within its specified limit either by adjusting a misaligned rod or by reducing THERMAL POWER, the alternative option is to reduce THERMAL POWER ~~to < 50% RTP~~ INSERT 5 in accordance with Required Action A.1~~.2.1~~ and reduce the Power Range Neutron Flux - High ~~to ≤ 55% RTP~~ INSERT 6 in accordance with Required Action A.~~1.2.~~2. Reducing allowable RTP ~~to < 50% RTP~~ INSERT 7 increases the DNB margin and does not likely cause the DNBR limit to be violated in steady state operation. The reduction in trip setpoints ensures that continuing operation remains at an acceptable low power level with adequate DNBR margin. The allowed Completion Time of ~~4~~ 2 hours for Required Action A.1~~.2.1 is consistent with those allowed for in Required Action A.1.1 and~~ provides an acceptable time to reach the required power level from full power operation without allowing the plant to remain in an unacceptable condition for an extended period of time. ~~The Completion Times of 4 hours for Required Actions A.1.1 and A.1.2.1 are not additive~~. ① ④ ③ ③

② INSERT 3

The % $F_{\Delta H}$ margin is based on the relationship between $F\Delta HR^{M}(X,Y)$ and the limit, BHDES (X,Y), as follows:

$$\% \; F_{\Delta H} \text{ Margin } = \left(1 - \frac{F\Delta HR^{M}(X,\ Y)}{\text{BHDES}(X,\ Y)} \right) \text{x } 100\%$$

If the reactor core is ″operating as designed″, then $F\Delta HR^{M}(X,Y)$ is less than BHDES (X,Y) and calculation of $\%F_{\Delta H}$ margin is not required. If the $\%F_{\Delta H}$ margin is less than zero, then $F\Delta HR^{M}(X,Y)$ is greater than BHDES (X, Y) and the $F_{\Delta H}(X,Y)$ limits may not be adequate to prevent exceeding the initial DNB conditions assumed for transients such as a LOFA. BHDES (X,Y) represents the maximum allowable design radial peaking factors which ensures that the initial conditions DNB will be preserved for operation within the LCO limits, and includes allowances for calculational and measurement uncertainties. The $F_{\Delta H}$ min margin is the minimum for all core locations examined.

④ INSERT 4

If $F_{\Delta H}$ min margin < 0 is restored to within limits prior to completion of the THERMAL POWER reduction in Required Action A.1, compliance of Required Actions A.3 and A.5 must be met.

④ **INSERT 5**

from RTP by at least RRH % (where RRH = Thermal power reduction required to compensate for each 1% that $F_{\Delta H}$(X,Y) exceeds its limit) multiplied times the $F_{\Delta H}$ min margin

④ **INSERT 6**

trip setpoints, as specified in TS Table 3.3.1-1 by ≥ RRH% multiplied times the $F_{\Delta H}$ min margin

④ **INSERT 7**

by at least RRH% multiplied times the $F_{\Delta H}$ min margin

BASES

ACTIONS (continued)

The allowed Completion Time of 72 hours to reset the trip setpoints per Required Action A.~~1.2.~~2 recognizes that, once power is reduced, the safety analysis assumptions are satisfied and there is no urgent need to reduce the trip setpoints. This is a sensitive operation that may inadvertently trip the Reactor Protection System. ④

3

A.~~2~~

allowable

INSERT 8

$F_{\Delta H}$ min margin is verified > 0

22

2

Once the power level has been reduced ~~to ≤ 50% RTP~~ per Required Action A.1~~.2.1~~, an incore flux map (SR 3.2.2.1) must be obtained and the ~~measured value of $F^{N}_{\Delta H}$ verified not to exceed the allowed limit~~ at the lower power level. The unit is provided ~~20~~ additional hours to perform this task over and above the ~~4~~ hours allowed by ~~either Action A.1.1 or~~ Action A.1~~.2.1~~. The Completion Time of 24 hours is acceptable because of the increase in the DNB margin, which is obtained at lower power levels, and the low probability of having a DNB limiting event within this 24 hour period. Additionally, operating experience has indicated that this Completion Time is sufficient to obtain the incore flux map, perform the required calculations, and evaluate ~~$F^{N}_{\Delta H}$~~. ④ ① ③ ①

$F_{\Delta H}$ min margin

INSERT 9 ④

5

A.~~3~~ ④

$F_{\Delta H}$ min margin is > 0

$F_{\Delta H}$ min margin

$F_{\Delta H}$ min margin

>0

Verification that ~~$F^{N}_{\Delta H}$~~ ~~is within its specified limits~~ after an out of limit occurrence ensures that the cause that led to the ~~$F^{N}_{\Delta H}$~~ exceeding its limit is corrected, and that subsequent operation proceeds within the LCO limit. This Action demonstrates that the ~~$F^{N}_{\Delta H}$~~ limit is ~~within the LCO limits~~ prior to exceeding 50% RTP, again prior to exceeding 75% RTP, and within 24 hours after THERMAL POWER is ≥ 95% RTP. ①

This Required Action is modified by a Note that states that THERMAL POWER does not have to be reduced prior to performing this Action.

INSERT 10 ②

C

~~B~~.1 ④

5, and B.1,

When Required Actions A.1~~.1~~ through A.~~3~~ cannot be completed within their required Completion Times, the plant must be placed in a mode in which the LCO requirements are not applicable. This is done by placing the plant in at least MODE 2 within 6 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience regarding the time required to reach MODE 2 from full power conditions in an orderly manner and without challenging plant systems.

④ **INSERT 8**

by at least RRH% multiplied times the $F_{\Delta H}$ min margin

④ **INSERT 9**

A.4

If the value of $F\Delta HR^{M}(X,Y)$ is not restored to within its specified limit, Overtemperarture ΔT K1 (OTΔT K1) term is required to be reduced by at least TRH multiplied times the $F_{\Delta H}$ min margin. The value of TRH is provided in the COLR. Completing Required Action A.4 ensures protection against the consequences of transients since this adjustment limits the peak transient power level which can be achieved during an anticipated operational occurrence. Also, completing Required Action A.4 within the allowed Completion Time of 48 hours is sufficient considering the small likelihood of a limiting transient in this time period.

② **INSERT 10**

B.1

The %$f_1(\Delta I)$ margin is based on the relationship between $F\Delta HR^M(X,Y)$ and the limit, BRDES (X,Y), as follows:

$$\% \ f_1(\Delta I)Margin = \left(1 - \frac{F\Delta \ HR^M(X,Y)}{BRDES(X,Y)} \right) x \ 100\%$$

If the reactor core is ″operating as designed″, then $F\Delta HR^M(X,Y)$ is less than BRDES (X,Y) and calculation of %$f_1(\Delta I)$ margin is not required. If the %$f_1(\Delta I)$ margin is less than zero, then $F\Delta HR^M(X,Y)$ is greater than BRDES (X, Y) and the OTΔT setpoint limits may not be adequate to prevent exceeding DNB requirements.

BRDES (X,Y) represents the maximum allowable design radial peaking factors which ensure that the steady state DNBR limit will be preserved for operation within the LCO limits, including allowances for calculational and measurement uncertainties

Required Action B.1 requires the reduction of the OTΔT K1 term by at least TRH multiplied by the $f_1(\Delta I)$ min margin. TRH is the amount of OTΔT K1 setpoint reduction required to compensate for each 1% that $F_{\Delta H}(X,Y)$ exceeds the limit provided in the COLR. Completing Required Action B.1 within the allowed Completion Time of 48 hours, restricts $F_{\Delta H}(X,Y)$ such that even if a transient occurred, DNB requirements are met. The $f_1(\Delta I)$ min margin is the minimum % of $f_1(\Delta I)$ margin for all core locations examined.

BASES

SURVEILLANCE REQUIREMENTS

INSERT 11 ④

~~SR 3.2.2.1~~

~~The value of $F^N_{\Delta H}$ is determined by using the movable incore detector system to obtain a flux distribution map. A data reduction computer program then calculates the maximum value of $F^N_{\Delta H}$ from the measured flux distributions. The measured value of $F^N_{\Delta H}$ must be multiplied by 1.04 to account for measurement uncertainty before making comparisons to the $F^N_{\Delta H}$ limit.~~ ①

~~After each refueling, $F^N_{\Delta H}$ must be determined in MODE 1 prior to exceeding 75% RTP. This requirement ensures that $F^N_{\Delta H}$ limits are met at the beginning of each fuel cycle.~~

~~[The 31 EFPD Frequency is acceptable because the power distribution changes relatively slowly over this amount of fuel burnup. Accordingly, this Frequency is short enough that the $F^N_{\Delta H}$ limit cannot be exceeded for any significant period of operation.~~ ⑥

~~OR~~

INSERT 12 ④

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ ⑦
~~---]~~

REFERENCES

1. Regulatory Guide 1.77, Rev. ~~[~~0~~]~~, May 1974.
2. 10 CFR 50, Appendix A, GDC 26.
3. 10 CFR 50.46.

④ **INSERT 11**

SR 3.2.2.1 and SR 3.2.2.2 are modified by a Note. It states that, "Not required to be performed until 12 hours after an equilibrium power level has been achieved at which a power distribution map can be obtained." SR 3.2.2.1 and SR 3.2.2.2 require using the incore detector system to provide the necessary data to create a power distribution map. To provide the necessary data, MODE 1 needs to be entered, power escalated, stabilized and equilibrium conditions established at some higher power level. These surveillances could not be satisfactorily performed if the requirement for performance of the Surveillances was included in MODE 2 prior to entering MODE 1.

In a reload core, $F_{\Delta H}^{M}(X,Y)$ could not have previously been measured, therefore, there is a Frequency condition, applicable only for reload cores, that requires determination of these parameters before exceeding 75% RTP. This ensures that some determination of $F_{\Delta H}^{M}(X,Y)$ is made at a lower power level at which adequate margin is available before going to 100% RTP.

④ **INSERT 12**

SR 3.2.2.1 and SR 3.2.2.2

In addition to ensuring via Surveillance that the nuclear enthalpy rise hot channel factor is within its limits when a measurement is taken, there are also requirements to extrapolate trends in $F_{\Delta H}^{M}(X,Y)$ for the last two measurements out to 31 EFPD beyond the most recent measurement. If the extrapolation yields an $F\Delta HR^{M}(X,Y) > BHNOM(X,Y)$, further consideration is required.

The implications of these extrapolations are considered separately for BHDES(X,Y) and BRDES(X,Y) limits. If the extrapolations of $F_{\Delta H}^{M}(X,Y)$ are unfavorable, additional actions must be taken. These actions are to meet the $F_{\Delta H}(X,Y)$ limit with the last $F_{\Delta H}^{M}(X,Y)$ increased by the appropriate factor specified in the COLR or to evaluate $F_{\Delta H}^{M}(X,Y)$ prior to the projected point in time when the extrapolated values are expected to exceed the extrapolated limits. These alternative requirements attempt to prevent $F_{\Delta H}(X,Y)$ from exceeding its limit for any significant period of time without detection using the best available data.

Extrapolation is not required for the initial flux map taken after reaching equilibrium conditions following a refueling outage since the initial flux map establishes the baseline measurement for future trending.

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.2, BASES, NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR ($F_{\Delta H}$(X,Y))

1. Changes are made (additions, deletions, and/or changes) to the ISTS Bases which reflect the plant-specific nomenclature, number, reference, system description, analysis, or licensing basis description.

2. The ISTS 3.2.2 LCO and Action A Bases have been modified to add details associated with the relationship between $F\Delta HR^M$(X,Y) and BHDES(X,Y) in accordance with NRC Safety Evaluation dated April 27, 1997 (ML013320456).

3. The ISTS contains bracketed information and/or values that are generic to all Westinghouse vintage plants. The brackets are removed and the proper plant specific information/value is changed to reflect the current licensing basis.

4. Changes have been made to be consistent with changes made to the Specification.

5. The ISTS 3.2.2 Bases for A.1.1, 2nd paragraph, contains in part, "Required Action A.2 nevertheless requires another measurement and calculation of $F^N_{\Delta H}$ within 24 hours in accordance with SR 3.2.2.1." The last paragraph contains a similar statement, " In addition, Required Action A.2 is performed if power ascension is delayed past 24 hours." SQN is deleting the redundant statement in last paragraph.

6. ISTS SR 3.2.2.1 provides two options for controlling the Frequencies of Surveillance Requirements. SQN is proposing to control the Surveillance Frequencies for ITS SR 3.2.2.1 under the Surveillance Frequency Control Program.

7. The Reviewer's Note has been deleted. This information is for the NRC reviewer to be keyed into what is needed to meet this requirement. This Note is not meant to be retained in the final version of the plant specific submittal.

8. Editorial change made for clarification.

Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.2, NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR ($F_{\Delta H}(X,Y)$)

There are no specific No Significant Hazards Considerations for this Specification.

ATTACHMENT 3

ITS 3.2.3, AXIAL FLUX DIFFERENCE (AFD)

Current Technical Specification (CTS) Markup and Discussion of Changes (DOCs)

A01

3/4.2 POWER DISTRIBUTION LIMITS

3/4.2.1 AXIAL FLUX DIFFERENCE (AFD)

LIMITING CONDITION FOR OPERATION

A02

A02

LCO 3.2.3 3.2.1 The ~~indicated AXIAL FLUX DIFFERENCE (~~AFD~~)~~ in % flux difference units shall be maintained within the limits specified in the COLR.

M01

Applicability APPLICABILITY: MODE 1 ~~above~~ ≥ 50% RATED THERMAL POWER~~*~~ A03

ACTION:

A02

ACTION A

a. With the ~~indicated~~ AXIAL FLUX DIFFERENCE outside of the limits specified in the COLR;

~~1. Either restore the indicated AFD to within the limits within 15 minutes, or~~ L01

2. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 30 minutes ~~and reduce the Power Range Neutron Flux-High Trip setpoints to less than or equal to 55 percent of RATED THERMAL POWER within the next 4 hours.~~ L02

~~b. THERMAL POWER shall not be increased above 50% of RATED THERMAL POWER unless the indicated AFD is within the limits specified in the COLR.~~ A04

~~*See Special Test Exception 3.10.2~~ A03

A01

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS

A02

SR 3.2.3.1

4.2.1.1 The ~~indicated~~ AXIAL FLUX DIFFERENCE shall be determined to be within its limits during POWER OPERATION above 50% of RATED THERMAL POWER by:

A02

a. Monitoring the ~~indicated~~ AFD for each OPERABLE excore channel ~~at least once per 7 days when the AFD Monitor Alarm is OPERABLE~~. In accordance with the Surveillance Frequency Control Program

LA01

L03

b. ~~Monitoring and logging the indicated AXIAL FLUX DIFFERENCE for each OPERABLE excore channel at least once per hour for the first 24 hours and at least once per 30 minutes thereafter, when the AXIAL FLUX DIFFERENCE Monitor Alarm is inoperable. The logged values of the indicated AXIAL FLUX DIFFERENCE shall be assumed to exist during the interval preceding each logging.~~

A02

LCO 3.2.3 Note

4.2.1.2 The ~~indicated~~ AFD shall be considered outside of its limits when at least 2 OPERABLE excore channels are indicating the AFD to be outside the limits.

ⒶA01

SURVEILLANCE REQUIREMENTS (Continued)

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A01

3/4.2 POWER DISTRIBUTION LIMITS

3/4.2.1 AXIAL FLUX DIFFERENCE (AFD)

LIMITING CONDITION FOR OPERATION

LCO 3.2.3

3.2.1 The ~~indicated AXIAL FLUX DIFFERENCE (~~AFD~~)~~ in % flux difference units shall be maintained within the limits specified in the COLR.

A02

M01

Applicability

APPLICABILITY: MODE 1 ~~above~~ ≥ 50% of RATED THERMAL POWER~~*~~.

A03

ACTION:

A02

ACTION A

a. With the ~~indicated~~ AXIAL FLUX DIFFERENCE outside of the limits specified in the COLR;

~~1. Either restore the indicated AFD to within the limits within 15 minutes, or~~

L01

2. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 30 minutes ~~and reduce the Power Range Neutron Flux-High Trip setpoints to less than or equal to 55 percent of RATED THERMAL POWER within the next 4 hours.~~

L02

~~b. THERMAL POWER shall not be increased above 50% of RATED THERMAL POWER unless the indicated AFD is within the limits specified in the COLR.~~

A04

~~* See Special Test Exception 3.10.2~~

A03

A01

ITS ITS 3.2.3

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS

A02

SR 3.2.3.1 4.2.1.1 The ~~indicated~~ AXIAL FLUX DIFFERENCE shall be determined to be within its limits during POWER OPERATION above 50% of RATED THERMAL POWER by:

A02

a. Monitoring the ~~indicated~~ AFD for each OPERABLE excore channel ~~at least once per 7 days~~ In accordance with the Surveillance Frequency Control Program LA01 ~~when the AFD Monitor Alarm is OPERABLE, and~~

~~b.~~ ~~Monitoring and logging the indicated AXIAL FLUX DIFFERENCE for each OPERABLE excore channel at least once per hour for the first 24 hours and at least once per 30 minutes thereafter, when the AXIAL FLUX DIFFERENCE Monitor Alarm is inoperable. The logged values of the indicated AXIAL FLUX DIFFERENCE shall be assumed to exist during the interval preceding each logging.~~

L03

A02

LCO 3.2.3 Note 4.2.1.2 The ~~indicated~~ AFD shall be considered outside of its limits when at least 2 OPERABLE excore channels are indicating the AFD to be outside the limits.

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DISCUSSION OF CHANGES
ITS 3.2.3, AXIAL FLUX DIFFERENCE (AFD)

ADMINISTRATIVE CHANGES

A01 In the conversion of the Sequoyah Nuclear Plant (SQN) Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG - 1431, Rev. 4.0, "Standard Technical Specifications - Westinghouse Plants" (ISTS) and additional Technical Specification Task Force (TSTF) travelers included in this submittal.

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A02 CTS 3.2.1 states "The indicated AXIAL FLUX DIFFERENCE (AFD) shall be maintained within the limits specified in the COLR." CTS 3.2.1 ACTION a provides ACTIONs to take when the indicated AFD is outside the limits. CTS 4.2.1.1 requires a determination that the indicated AFD is within limits. CTS 4.2.1.2 states that the indicated AFD shall be considered outside the limits when at least 2 OPERABLE excore channels are indicating the AFD to be outside the limits. ITS LCO 3.2.3 states "The AFD in % flux difference units shall be maintained within the limits specified in the COLR." ITS LCO 3.2.3 is modified by a Note specifying when AFD is considered to be outside the limits. ITS SR 3.2.3.1 requires verification that AFD is within limits. This changes the CTS by deleting "indicated″ and adding "% flux difference units" to the LCO statement.

The purpose of CTS 3.2.1 is to ensure the AFD remains within the limits specified in the COLR. AFD is the difference in normalized flux signals between the top and bottom excore detectors, therefore, this is a presentation change. This change is designated as administrative because it does not result in a technical change to the CTS.

A03 CTS 3.2.1 Applicability contains a footnote (footnote *) which states "See Special Test Exception 3.10.2." ITS 3.2.3 Applicability does not contain this footnote. This changes the CTS by not including Footnote*.

The purpose of Footnote * is to alert the Technical Specification user that a Special Test Exception exists that may modify the Applicability of this Specification. It is an ITS convention to not include these types of footnotes or cross-references. This change is designated as administrative because it does not result in a technical change to the CTS.

A04 CTS 3.2.1 ACTION b states "THERMAL POWER shall not be increased above 50% of RATED THERMAL POWER unless the indicated AFD is within the limits specified in the COLR." ITS 3.2.3 does not contain a similar requirement. This changes the CTS by eliminating a prohibition contained in the CTS.

This change is acceptable because the requirements have not changed. CTS 3.0.4 and ITS 3.0.4 prohibit entering the MODE of Applicability of a Technical Specification unless the requirements of the LCO are met. CTS 3.2.1 and ITS 3.2.3 are applicable in MODE 1 with THERMAL POWER > 50% RTP (CTS) and ≥ 50 RTP (ITS). Therefore, both the CTS and ITS prohibit exceeding

50% RTP without the LCO requirements being met. CTS 3.2.1 ACTION b is duplicative of CTS 3.0.4 and ITS 3.0.4 and its elimination does not make a technical change to the Specification. This change is designated as an administrative change because it does not result in technical changes to the CTS.

MORE RESTRICTIVE CHANGES

M01 CTS 3.2.1 is applicable in MODE 1 with THERMAL POWER > 50% RTP. ITS 3.2.3 is applicable in MODE 1 with THERMAL POWER ≥ 50% RTP. This changes the CTS by requiring LCO 3.2.3 to be met when THERMAL POWER is equal to 50 % RTP.

The purpose of CTS 3.2.1 is to maintain the AFD within the limits specified in the COLR. When AFD is not within limits, CTS 3.2.1 ACTION a.2, requires reducing THERMAL POWER to less than 50% RTP. This change is acceptable because it aligns the Applicability to the Required Actions. The CTS and ITS Required Action is to reduce THERMAL POWER to less than 50% RTP. When the THERMAL POWER is reduced to this value, it places the core in a condition outside of the Applicability of the LCO. Therefore, changing the Applicability from in MODE 1 with THERMAL POWER > 50% RTP to MODE 1 with THERMAL POWER ≥ 50% RTP has no affect on the LCO. This change is designated as more restrictive because it provides additional requirements to the Applicability.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA01 *(Type 5 – Removal of SR Frequency to the Surveillance Frequency Control Program)* CTS 4.2.1.1.a requires monitoring the indicated AFD for each OPERABLE excore channel at least once per 7days. ITS SR 3.2.3.1 requires a similar Surveillance and specifies the periodic Frequency as, "In accordance with the Surveillance Frequency Control Program." This changes the CTS by moving the specified Frequency for this SR and associated Bases to the Surveillance Frequency Control Program.

The removal of these details related to Surveillance Requirement Frequencies from the Technical Specifications is acceptable, because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The existing Surveillance Frequencies are removed from Technical Specifications and placed under licensee control pursuant to the methodology described in NEI 04-10. A new program (Surveillance Frequency Control Program) is being added to the Administrative Controls section of the Technical Specifications describing the control of Surveillance Frequencies. The surveillance test requirements remain in the Technical Specifications. The control of changes to the Surveillance

DISCUSSION OF CHANGES
ITS 3.2.3, AXIAL FLUX DIFFERENCE (AFD)

Frequencies will be in accordance with the Surveillance Frequency Control Program. The Program shall ensure that Surveillance Requirements specified in the Technical Specifications are performed at intervals sufficient to assure the associated Limiting Conditions for Operation are met. This change is designated as a less restrictive removal of detail change, because the Surveillance Frequencies are being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L01 *(Category 4 – Relaxation of Required Action)* CTS 3.2.1 ACTION a.1 requires with the AXIAL FLUX DIFFERENCE (AFD) outside of the limits, to restore the indicated AFD to within the limits within 15 minutes. ITS 3.2.3 does not include a Required Action to restore the indicated AFD to within the limits within 15 minutes. This changes the CTS by not including a specific requirement to restore the AFD to within limits.

The purpose of CTS 3.2.1 is to maintain the AFD within the limits specified in the COLR. This change is acceptable because the requirement to restore the AFD to within limits has not changed. ITS 3.2.3 allows a Completion Time of 30 minutes to reduce THERMAL POWER to < 50% RTP. During the time that power is being reduced, AFD can be restored to within limits. Per ITS LCO 3.0.2, if the LCO is met prior to expiration of the Completion Time, completion of the Required Actions is not required. This allowance also is provided in CTS 3.0.2. Therefore, restoration of AFD is always an option and a specific ACTION is not required. This change is designated as less restrictive because additional Completion Time is provided that was not provided in the CTS.

L02 *(Category 4 – Relaxation of Required Action)* CTS 3.2.1 ACTION a.2 states that with the indicated AFD outside of the limits specified in the COLR, reduce the Power Range Neutron Flux-High Trip setpoints to less than or equal to 55 percent of RATED THERMAL POWER within the next 4 hours. ITS 3.2.3 ACTION A only requires THERMAL POWER to be reduced to less than 50% RTP. This changes the CTS by eliminating the requirement to reduce the Power Range Neutron Flux – High trip setpoints to ≤ 55 % of RTP within the next 4 hours.

The purpose of CTS 3.2.1 ACTION a.2 is to reduce THERMAL POWER to the point at which the LCO is met if AFD is not restored within its limit. With the AFD meeting the Technical Specification requirements, further actions are not required to ensure that the assumptions of the safety analyses are met. Increases in THERMAL POWER are governed by ITS LCO 3.0.4, which requires the LCO to be met prior to entering a MODE or other specified condition in which the LCO applies. Therefore, power increases are prohibited while avoiding the risk of changing Reactor Trip System setpoints during operation. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

L03 *(Category 7 – Relaxation of Surveillance Frequency)* CTS 4.2.1.1.a requires the monitoring of the indicated AFD for each OPERABLE excore channel at least once per 7 days when the AFD Monitor Alarm is OPERABLE. CTS 4.2.1.1.b requires the monitoring and logging of the indicated AFD for each OPERABLE excore channel at least once per hour for the first 24 hours and at least once per 30 minutes thereafter, when the AFD Monitor Alarm is inoperable. The logged values of the indicated AFD shall be assumed to exist during the interval preceding each logging. This changes the CTS by eliminating all AFD Surveillance Frequencies based on the OPERABILITY of the AFD Monitor Alarm.

The purpose of ITS 3.2.3 is to ensure that AFD is within its limit. This change is acceptable because the remaining Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. Increasing the Frequency of monitoring AFD when the AFD Monitor Alarm is inoperable is unnecessary as inoperability of the alarm does not increase the probability that AFD is outside of its limit. The AFD Monitor Alarm is for indication only. Its use is not credited in any safety analyses. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

3.2 POWER DISTRIBUTION LIMITS

3.2.3~~B~~ AXIAL FLUX DIFFERENCE (AFD) ~~(Relaxed Axial Offset Control (RAOC) Methodology)~~ ①

3.2.1 LCO 3.2.3~~B~~ The AFD in % flux difference units shall be maintained within the limits specified in the COLR. ①

---NOTE---

4.2.1.2 The AFD shall be considered outside limits when two or more OPERABLE excore channels indicate AFD to be outside limits.

Applicability APPLICABILITY: MODE 1 with THERMAL POWER ≥ 50% RTP.

ACTIONS

ACTION A.2

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. AFD not within limits.	A.1 Reduce THERMAL POWER to < 50% RTP.	30 minutes

SURVEILLANCE REQUIREMENTS

4.2.1.1.a

SURVEILLANCE	FREQUENCY
SR 3.2.3.1 Verify AFD within limits for each OPERABLE excore channel.	~~[7 days~~ ③ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~ ③

3.2 POWER DISTRIBUTION LIMITS

3.2.3~~B~~ AXIAL FLUX DIFFERENCE (AFD) ~~(Relaxed Axial Offset Control (RAOC) Methodology)~~ ①

3.2.1 LCO 3.2.3~~B~~ The AFD in % flux difference units shall be maintained within the limits specified in the COLR. ①

--NOTE--

4.2.1.2 The AFD shall be considered outside limits when two or more OPERABLE excore channels indicate AFD to be outside limits.

Applicability APPLICABILITY: MODE 1 with THERMAL POWER ≥ 50% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. AFD not within limits.	A.1 Reduce THERMAL POWER to < 50% RTP.	30 minutes

ACTION A.2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.3.1	Verify AFD within limits for each OPERABLE excore channel.	~~[7 days~~ ③ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~ ③

4.2.1.1.a

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.3, AXIAL FLUX DIFFERENCE (AFD)

1. The type of Methodology (Relaxed Axial Offset Control (RAOC)) and the Specification designator "B" are deleted since they are unnecessary (only one AFD Specification is used in the Sequoyah Nuclear (SQN) Plant ITS.) This information is provided in NUREG-1431, Rev. 4.0, to assist in indentifying the appropriate Specification to be used as a model for the plant specific ITS conversion, but serves no purpose in a plant specific implementation. In addition, the Constant Axial Offset Control (CAOC) methodology Specification (ISTS 3.2.3A) is not used and is not shown.

2. Changes are made (additions, deletions, and/or changes) to the ISTS that reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

3. ISTS SR 3.2.3.1 provides two options for controlling the Frequency of the Surveillance Requirement. SQN is proposing to control the Surveillance Frequency under the Surveillance Frequency Control Program.

Improved Standard Technical Specifications (ISTS) Bases Markup and Bases Justification for Deviations (JFDs)

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.3~~B~~ AXIAL FLUX DIFFERENCE (AFD) ~~(Relaxed Axial Offset Control (RAOC Methodology)~~ ①

BASES

BACKGROUND

The purpose of this LCO is to establish limits on the values of the AFD in order to limit the amount of axial power distribution skewing to either the top or bottom of the core. By limiting the amount of power distribution skewing, core peaking factors are consistent with the assumptions used in the safety analyses. Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in axial power distribution control.

~~RAOC is a calculational procedure that defines the allowed operational space of the AFD versus THERMAL POWER.~~ The AFD limits are selected by considering a range of axial xenon distributions that may occur as a result of large variations of the AFD. Subsequently, power peaking factors and power distributions are examined to ensure that the loss of coolant accident (LOCA), loss of flow accident, and anticipated transient limits are met. Violation of the AFD limits invalidate the conclusions of the accident and transient analyses with regard to fuel cladding integrity. ①

The AFD is monitored on an automatic basis using the unit process computer, which has an AFD monitor alarm. The computer determines the 1 minute average of each of the OPERABLE excore detector outputs and provides an alarm message immediately if the AFD for two or more OPERABLE excore channels is outside its specified limits.

~~Although the RAOC defines limits that must be met to satisfy safety analyses, typically an operating scheme, Constant Axial Offset Control (CAOC), is used to control axial power distribution in day to day operation (Ref. 1). CAOC requires that the AFD be controlled within a narrow tolerance band around a burnup dependent target to minimize the variation of axial peaking factors and axial xenon distribution during unit maneuvers.~~ ①

~~The CAOC operating space is typically smaller and lies within the RAOC operating space. Control within the CAOC operating space constrains the variation of axial xenon distributions and axial power distributions. RAOC calculations assume a wide range of xenon distributions and then confirm that the resulting power distributions satisfy the requirements of the accident analyses.~~ ①

BASES

APPLICABLE SAFETY ANALYSES

The AFD is a measure of the axial power distribution skewing to either the top or bottom half of the core. The AFD is sensitive to many core related parameters such as control bank positions, core power level, axial burnup, axial xenon distribution, and, to a lesser extent, reactor coolant temperature and boron concentration.

The allowed range of the AFD is used in the nuclear design process to confirm that operation within these limits produces core peaking factors and axial power distributions that meet safety analysis requirements.

~~The RAOC methodology (Ref. 2) establishes a xenon distribution library with tentatively wide AFD limits. One dimensional axial power distribution calculations are then performed to demonstrate that normal operation power shapes are acceptable for the LOCA and loss of flow accident, and for initial conditions of anticipated transients. The tentative limits are adjusted as necessary to meet the safety analysis requirements.~~ ①

The limits on the AFD ensure that the Heat Flux Hot Channel Factor X, Y, ② (F_Q(Z)) is not exceeded during either normal operation or in the event of xenon redistribution following power changes. The limits on the AFD also restrict the range of power distributions that are used as initial conditions in the analyses of Condition 2, 3, or 4 events. This ensures that the fuel cladding integrity is maintained for these postulated accidents. ~~The most important Condition 4 event is the LOCA. The most important Condition 3 event is the loss of flow accident. The most important Condition 2 events are uncontrolled bank withdrawal and boration or dilution accidents.~~ ② ⑥ Condition 2 accidents , simulated to begin from within the AFD limits are used to confirm the adequacy of the Overpower ΔT and Overtemperature ΔT trip setpoints.

The limits on the AFD satisfy Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The shape of the power profile in the axial (i.e., the vertical) direction is largely under the control of the operator through the manual operation of the control banks or automatic motion of control banks. The automatic motion of the control banks is in response to temperature deviations resulting from manual operation of the Chemical and Volume Control System to change boron concentration or from power level changes.

Signals are available to the operator from the Nuclear Instrumentation System (NIS) excore neutron detectors (Ref. s ~~3~~ 1 and 2 ② ⑥). Separate signals are taken from the top and bottom detectors. The AFD is defined as the difference in normalized flux signals between the top and bottom excore detectors in each detector well. For convenience, this flux difference is converted to provide flux difference units expressed as a percentage and labeled as %Δ flux or %ΔI.

BASES

LCO (continued)

The AFD limits are provided in the COLR. ~~Figure B 3.2.3B-1 shows typical RAOC AFD limits. The AFD limits for RAOC do not depend on the target flux difference. However, the target flux difference may be used to minimize changes in the axial power distribution.~~ INSERT 1 ⑤ ①

Violating this LCO on the AFD could produce unacceptable consequences if a Condition 2, 3, or 4 event occurs while the AFD is outside its specified limits.

APPLICABILITY

The AFD requirements are applicable in MODE 1 greater than or equal to 50% RTP when the combination of THERMAL POWER and core peaking factors are of primary importance in safety analysis.

~~For AFD limits developed using RAOC methodology, the value of the AFD does not affect the limiting accident consequences with THERMAL POWER < 50% RTP and for lower operating power MODES.~~ ①

ACTIONS

A.1

As an alternative to restoring the AFD to within its specified limits, Required Action A.1 requires a THERMAL POWER reduction to < 50% RTP. This places the core in a condition for which the value of the AFD is not important in the applicable safety analyses. A Completion Time of 30 minutes is reasonable, based on operating experience, to reach 50% RTP without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.3.1

This Surveillance verifies that the AFD, as indicated by the NIS excore channel, is within its specified limits. ~~[The Surveillance Frequency of 7 days is adequate considering that the AFD is monitored by a computer and any deviation from requirements is alarmed.~~ ③

~~OR~~

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ ④
~~--]~~ ③

① INSERT 1

The AFD limits resulting from analysis of core power distributions relative to the initial condition peaking limits comprise a power-dependant envelope of acceptable AFD values. During steady-state operation, the core normally is controlled to a target AFD within a narrow (approximately ± 5% AFD) band. However, the limiting AFD values may be somewhat greater than the extremes of the normal operating band.

BASES

REFERENCES

1. UFSAR, Section 4.3.2. ~~WCAP-8403 (nonproprietary), "Power Distribution Control and Load Following Procedures," Westinghouse Electric Corporation, September 1974.~~ ②

2. BAW 10163P-A, Core Operating Limit Methodology for Westinghouse-Designed PWRs, June 1989. ~~R. W. Miller et al., "Relaxation of Constant Axial Offset Control: F_Q Surveillance Technical Specification," WCAP-10217(NP), June 1983.~~ ②

~~3. FSAR, Chapter [15].~~ ②

1

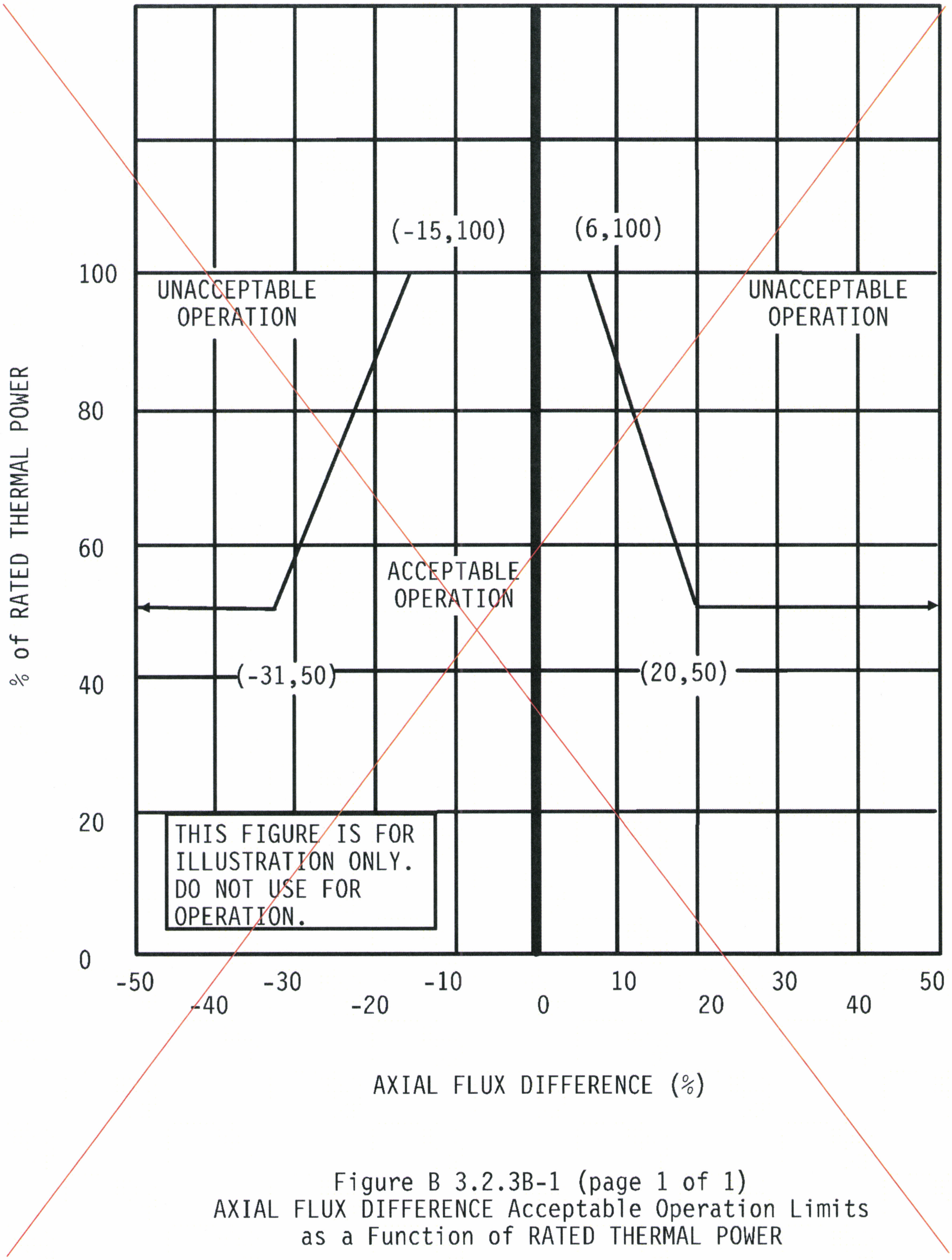


Figure B 3.2.3B-1 (page 1 of 1)
AXIAL FLUX DIFFERENCE Acceptable Operation Limits
as a Function of RATED THERMAL POWER

5

② ①

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.3~~B~~ AXIAL FLUX DIFFERENCE (AFD) ~~(Relaxed Axial Offset Control (RAOC Methodology)~~ ①

BASES

BACKGROUND

The purpose of this LCO is to establish limits on the values of the AFD in order to limit the amount of axial power distribution skewing to either the top or bottom of the core. By limiting the amount of power distribution skewing, core peaking factors are consistent with the assumptions used in the safety analyses. Limiting power distribution skewing over time also minimizes the xenon distribution skewing, which is a significant factor in axial power distribution control.

~~RAOC is a calculational procedure that defines the allowed operational space of the AFD versus THERMAL POWER.~~ The AFD limits are selected by considering a range of axial xenon distributions that may occur as a result of large variations of the AFD. Subsequently, power peaking factors and power distributions are examined to ensure that the loss of coolant accident (LOCA), loss of flow accident, and anticipated transient limits are met. Violation of the AFD limits invalidate the conclusions of the accident and transient analyses with regard to fuel cladding integrity. ①

The AFD is monitored on an automatic basis using the unit process computer, which has an AFD monitor alarm. The computer determines the 1 minute average of each of the OPERABLE excore detector outputs and provides an alarm message immediately if the AFD for two or more OPERABLE excore channels is outside its specified limits.

~~Although the RAOC defines limits that must be met to satisfy safety analyses, typically an operating scheme, Constant Axial Offset Control (CAOC), is used to control axial power distribution in day to day operation (Ref. 1). CAOC requires that the AFD be controlled within a narrow tolerance band around a burnup dependent target to minimize the variation of axial peaking factors and axial xenon distribution during unit maneuvers.~~ ①

~~The CAOC operating space is typically smaller and lies within the RAOC operating space. Control within the CAOC operating space constrains the variation of axial xenon distributions and axial power distributions. RAOC calculations assume a wide range of xenon distributions and then confirm that the resulting power distributions satisfy the requirements of the accident analyses.~~ ①

BASES

APPLICABLE SAFETY ANALYSES

The AFD is a measure of the axial power distribution skewing to either the top or bottom half of the core. The AFD is sensitive to many core related parameters such as control bank positions, core power level, axial burnup, axial xenon distribution, and, to a lesser extent, reactor coolant temperature and boron concentration.

The allowed range of the AFD is used in the nuclear design process to confirm that operation within these limits produces core peaking factors and axial power distributions that meet safety analysis requirements.

~~The RAOC methodology (Ref. 2) establishes a xenon distribution library with tentatively wide AFD limits. One dimensional axial power distribution calculations are then performed to demonstrate that normal operation power shapes are acceptable for the LOCA and loss of flow accident, and for initial conditions of anticipated transients. The tentative limits are adjusted as necessary to meet the safety analysis requirements.~~ ①

The limits on the AFD ensure that the Heat Flux Hot Channel Factor (F_Q(X, Y, Z)) is not exceeded during either normal operation or in the event of xenon redistribution following power changes. The limits on the AFD also restrict the range of power distributions that are used as initial conditions in the analyses of Condition 2, 3, or 4 events. This ensures that the fuel cladding integrity is maintained for these postulated accidents. ~~The most important Condition 4 event is the LOCA. The most important Condition 3 event is the loss of flow accident. The most important Condition 2 events are uncontrolled bank withdrawal and boration or dilution accidents.~~ ② ② Condition 2 accidents, simulated to begin from within the AFD limits are used to confirm the adequacy of the Overpower ΔT and Overtemperature ΔT trip setpoints. ⑥

The limits on the AFD satisfy Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The shape of the power profile in the axial (i.e., the vertical) direction is largely under the control of the operator through the manual operation of the control banks or automatic motion of control banks. The automatic motion of the control banks is in response to temperature deviations resulting from manual operation of the Chemical and Volume Control System to change boron concentration or from power level changes.

Signals are available to the operator from the Nuclear Instrumentation System (NIS) excore neutron detectors (Refs. ~~3~~ 1 and 2). ② ⑥ Separate signals are taken from the top and bottom detectors. The AFD is defined as the difference in normalized flux signals between the top and bottom excore detectors in each detector well. For convenience, this flux difference is converted to provide flux difference units expressed as a percentage and labeled as %Δ flux or %ΔI.

BASES

LCO (continued)

The AFD limits are provided in the COLR. ~~Figure B 3.2.3B-1 shows typical RAOC AFD limits. The AFD limits for RAOC do not depend on the target flux difference. However, the target flux difference may be used to minimize changes in the axial power distribution.~~ ⑤ ① INSERT 1

Violating this LCO on the AFD could produce unacceptable consequences if a Condition 2, 3, or 4 event occurs while the AFD is outside its specified limits.

APPLICABILITY

The AFD requirements are applicable in MODE 1 greater than or equal to 50% RTP when the combination of THERMAL POWER and core peaking factors are of primary importance in safety analysis.

~~For AFD limits developed using RAOC methodology, the value of the AFD does not affect the limiting accident consequences with THERMAL POWER < 50% RTP and for lower operating power MODES.~~ ①

ACTIONS

A.1

As an alternative to restoring the AFD to within its specified limits, Required Action A.1 requires a THERMAL POWER reduction to < 50% RTP. This places the core in a condition for which the value of the AFD is not important in the applicable safety analyses. A Completion Time of 30 minutes is reasonable, based on operating experience, to reach 50% RTP without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.2.3.1

This Surveillance verifies that the AFD, as indicated by the NIS excore channel, is within its specified limits. ~~[The Surveillance Frequency of 7 days is adequate considering that the AFD is monitored by a computer and any deviation from requirements is alarmed.~~ ③

~~OR~~

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~-----------------------------------REVIEWER'S NOTE-----------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ ④
~~---]~~ ③

① INSERT 1

The AFD limits resulting from analysis of core power distributions relative to the initial condition peaking limits comprise a power-dependant envelope of acceptable AFD values. During steady-state operation, the core normally is controlled to a target AFD within a narrow (approximately ± 5% AFD) band. However, the limiting AFD values may be somewhat greater than the extremes of the normal operating band.

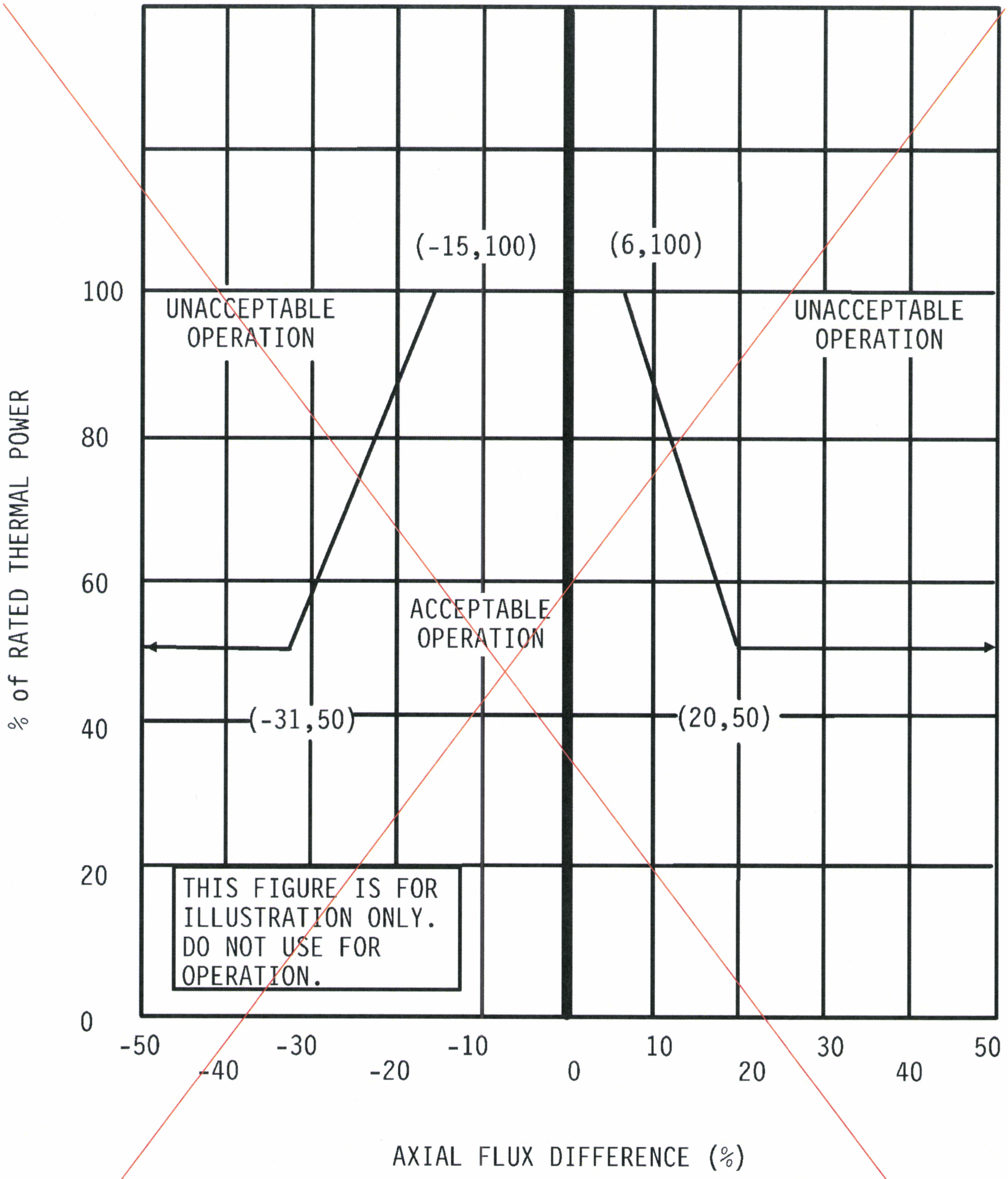
BASES

REFERENCES

1. UFSAR, Section 4.3.2. ~~WCAP-8403 (nonproprietary), "Power Distribution Control and Load Following Procedures," Westinghouse Electric Corporation, September 1974.~~ ②

2. BAW 10163P-A, Core Operating Limit Methodology for Westinghouse-Designed PWRs, June 1989. ~~R. W. Miller et al., "Relaxation of Constant Axial Offset Control: F_Q Surveillance Technical Specification," WCAP-10217(NP), June 1983.~~ ②

~~3.~~ ~~FSAR, Chapter [15].~~ ②



⑤

Figure B 3.2.3B-1 (page 1 of 1)
AXIAL FLUX DIFFERENCE Acceptable Operation Limits
as a Function of RATED THERMAL POWER

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.3 BASES, AXIAL FLUX DIFFERENCE (AFD)

1. The type of Methodology (Relaxed Axial Offset Control (RAOC)) and the Specification designator "B" are deleted since they are unnecessary (only one AFD Specification is used in the Sequoyah Nuclear (SQN) Plant ITS.) This information is provided in NUREG-1431, Rev. 4.0, to assist in indentifying the appropriate Specification to be used as a model for the plant specific ITS conversion, but serves no purpose in a plant specific implementation. In addition, the Constant Axial Offset Control (CAOC) methodology Specification (ISTS B 3.2.3A) is not used and is not shown.

2. Changes are made (additions, deletions, and/or changes) to the ISTS Bases that reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

3. ISTS SR 3.2.3.1 Bases provides two options for controlling the Frequency of Surveillance Requirement. SQN is proposing to control the Surveillance Frequency under the Surveillance Frequency Control Program. Additionally, the Frequency description which is being removed will be included in the Surveillance Frequency Control Program.

4. The Reviewer's Note has been deleted. This information is for the NRC reviewer to be keyed into what is needed to meet this requirement. This Note is not meant to be retained in the final version of the plant specific submittal.

5. ISTS 3.2.3 Bases contains Figure B 3.2.3B-1. This Figure is located in the Sequoyah Nuclear Plant (SQN) COLR. Therefore, this figure is not included in the Bases for ITS 3.2.3.

6. Editorial changes made to enhance clarity/consistency.

Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.3, AXIAL FLUX DIFFERENCE (AFD)

There are no specific No Significant Hazards Considerations for this Specification.

ATTACHMENT 4

ITS 3.2.4, QUADRANT POWER TILT RATIO (QPTR)

Current Technical Specification (CTS) Markup and Discussion of Changes (DOCs)

POWER DISTRIBUTION LIMITS

3/4.2.4 QUADRANT POWER TILT RATIO

LIMITING CONDITION FOR OPERATION

be ≤ A02

LCO 3.2.4 3.2.4 The QUADRANT POWER TILT RATIO shall ~~not exceed~~ 1.02.

A03

Applicability APPLICABILITY: MODE 1 above 50% of RATED THERMAL POWER~~*~~

ACTION:

not within limit A04

ACTION A, ACTION B a. With the QUADRANT POWER TILT RATIO ~~determined to exceed 1.02 but less than or equal to 1.09~~:

12 hours L01

ACTION A 1. Calculate the QUADRANT POWER TILT RATIO at least once per ~~hour~~ until:

A05

~~a)~~ ~~Either the QUADRANT POWER TILT RATIO is reduced to within its limit,~~ or

ACTION B b) THERMAL POWER is reduced to less than 50% of RATED THERMAL POWER.

or equal to A06

after each QPTR determination M01

2. Within 2 hours~~:~~

a) ~~Either reduce the QUADRANT POWER TILT RATIO to within its limit, or~~ A05

ACTION A b) Reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.02 ~~and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours~~. L02

~~3.~~ ~~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 less than or equal to 55% of RATED THERMAL POWER within the next 4 hours~~.

Add proposed Required Actions A.3, A.4, A.5, and A.6 and proposed ACTION B

L03

~~4.~~ ~~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 for 12 hours or until verified acceptable at 95% or greater RATED THERMAL POWER.~~

~~*See Special Test Exception 3.10.2.~~ A03

POWER DISTRIBUTION LIMITS

ACTION: (Continued)

ACTION A, ACTION B — b. With the QUADRANT POWER TILT RATIO ~~determined to exceed 1.09 due to misalignment of either a shutdown or control rod~~: not within limit A04

ACTION A — 1. Calculate the QUADRANT POWER TILT RATIO at least once per ~~hour~~ 12 hours until: L01

~~a) Either the QUADRANT POWER TILT RATIO is reduced to within its limit,~~ or A05

ACTION B — b) THERMAL POWER is reduced to less than or equal to 50% of RATED THERMAL POWER. A06

ACTION A — 2. Reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.02 within ~~30 minutes~~ 2 hours. L04

~~3. 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 less than or equal to 55% of RATED THERMAL POWER within the next 4 hours~~.

~~4. 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 for 12 hours or until verified acceptable at 95% or greater RATED THERMAL POWER.~~ L03

ACTION A, ACTION B — 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~~: not within limit A04

ACTION A — 1. Calculate the QUADRANT POWER TILT RATIO at least once per ~~hour~~ 12 hours until: L01

~~a) Either the QUADRANT POWER TILT RATIO is reduced to within its limit,~~ or A05

ACTION B — b) THERMAL POWER is reduced to less than or equal to 50% of RATED THERMAL POWER. A06

POWER DISTRIBUTION LIMITS

ACTION: (Continued)

~~2. 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 less than or equal 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 for l2 hours or until verified at 95% or greater RATED THERMAL POWER.~~ L03

~~d. With the indicated QUADRANT POWER TILT RATIO not confirmed as required by Surveillance Requirement 4.2.4.2, reduce THERMAL POWER to less than 75 percent RATED THERMAL POWER within 6 hours.~~ L05

~~e. With the QUADRANT POWER TILT RATIO not monitored as required by Surveillance Requirement 4.2.4.1, reduce THERMAL POWER to less than 50 percent of RATED THERMAL POWER within the next 6 hours.~~ L05

SURVEILLANCE REQUIREMENTS

Add proposed SR 3.2.4.1 Notes 1 and 2 L06

SR 3.2.4.1 4.2.4.1 The QUADRANT POWER TILT RATIO shall be determined to be within the limit above 50% of RATED THERMAL POWER by:

In accordance with the Surveillance Frequency Control Program LA01

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~~. L07

Add proposed SR 3.2.4.2 Note L08

SR 3.2.4.2 4.2.4.2 The QUADRANT POWER TILT RATIO shall be determined to be within the limit when above

SR 3.2.4.2 Note 75 percent of RATED THERMAL POWER with one Power Range Channel inoperable by using the

SR 3.2.4.2 movable incore detectors ~~to confirm that the normalized symmetric power distribution, obtained from the 4 pairs of symmetric thimble locations or from performance of a full core map, is consistent with the indicated QUADRANT POWER TILT RATIO at least once per 12 hours~~. LA02

In accordance with the Surveillance Frequency Control Program LA01

POWER DISTRIBUTION LIMITS

3/4.2.4 QUADRANT POWER TILT RATIO

LIMITING CONDITION FOR OPERATION

---

be ≤ A02

LCO 3.2.4 3.2.4 The QUADRANT POWER TILT RATIO shall ~~not exceed~~ 1.02.

A03

Applicability APPLICABILITY: MODE 1 above 50% of RATED THERMAL POWER~~*~~

ACTION:

not within limit A04

ACTION A, ACTION B a. With the QUADRANT POWER TILT RATIO ~~determined to exceed 1.02 but less than or equal to 1.09~~:

12 hours L01

ACTION A 1. Calculate the QUARANT POWER TILT RATIO at least once per ~~hour~~ until either:

A05

~~a) The QUADRANT POWER TILT RATIO is reduced to within its limit,~~ or

ACTION B b) THERMAL POWER is reduced to less than 50% of RATED THERMAL POWER.

or equal to A06

after each QPTR determination M01

2. Within 2 hours ~~either~~:

A05

a) ~~Reduce the QUADRANT POWER TILT RATIO to within its limit, or~~

ACTION A b) Reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.02 ~~and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours.~~ L02

~~3. 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 less than or equal to 55% of RATED THERMAL POWER within the next 4 hours.~~

Add proposed Required Actions A.3, A.4, A.5, and A.6 and proposed ACTION B

L03

~~4. 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 for 12 hours or until verified acceptable at 95% or greater RATED THERMAL POWER.~~

~~* See Special Test Exception 3.10.2.~~ A03

POWER DISTRIBUTION LIMITS

ACTION: (Continued)

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

not within limit A04

ACTION A 1. Calculate the QUADRANT POWER TILT RATIO at least once per ~~hour~~ until ~~either~~:

12 hours L01

~~a) The QUADRANT POWER TILT RATIO is reduced to within its limit,~~ or

A05

ACTION B b) THERMAL POWER is reduced to less than 50% of RATED THERMAL POWER.

or equal to A06

ACTION A 2. Reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.02 within ~~30 minutes~~.

2 hours L04

~~3. 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 less than or equal to 55% of RATED THERMAL POWER within the next 4 hours.~~

~~4. 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 for 12 hours or until verified acceptable at 95% or greater RATED THERMAL POWER.~~

L03

ACTION A, ACTION B 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~~:

not within limit A04

ACTION A 1. Calculate the QUADRANT POWER TILT RATIO at least once per ~~hour~~ until ~~either~~:

12 hours L01

~~a) The QUADRANT POWER TILT RATIO is reduced to within its limit,~~ or

A05

ACTION B b) THERMAL POWER is reduced to less than 50% of RATED THERMAL POWER.

or equal to A06

A01

POWER DISTRIBUTION LIMITS

ACTION: (Continued)

~~2.~~ ~~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 less than or equal 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 for 12 hours or until verified at 95% or greater RATED THERMAL POWER.~~

L03

~~d.~~ ~~With the indicated QUADRANT POWER TILT RATIO not confirmed as required by Surveillance Requirement 4.2.4.2, reduce THERMAL POWER to less than 75 percent RATED THERMAL POWER within 6 hours.~~

L05

~~e.~~ ~~With the QUADRANT POWER TILT RATIO not monitored as required by Surveillance Requirement 4.2.4.1, reduce THERMAL POWER to less than 50 percent of RATED THERMAL POWER within the next 6 hours.~~

L05

SURVEILLANCE REQUIREMENTS

Add proposed SR 3.2.4.1 Notes 1 and 2 — L06

SR 3.2.4.1 — 4.2.4.1 The QUADRANT POWER TILT RATIO shall be determined to be within the limit above 50% of RATED THERMAL POWER by:

In accordance with the Surveillance Frequency Control Program — LA01

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.~~

L07

Add proposed SR 3.2.4.2 Note — L08

SR 3.2.4.2 — 4.2.4.2 The QUADRANT POWER TILT RATIO shall be determined to be within the limit when above

SR 3.2.4.2 Note — 75 percent of RATED THERMAL POWER with one Power Range channel inoperable by using the

SR 3.2.4.2 — movable incore detectors ~~to confirm that the normalized symmetric power distribution, obtained from 4 pairs of symmetric thimble locations or from performance of a full core map, is consistent with the indicated QUADRANT POWER TILT RATIO at least once per 12 hours.~~

LA02

In accordance with the Surveillance Frequency Control Program — LA01

DISCUSSION OF CHANGES
ITS 3.2.4, QUADRANT POWER TILT RATIO (QPTR)

ADMINISTRATIVE CHANGES

A01 In the conversion of the Sequoyah Nuclear Plant (SQN) Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG - 1431, Rev. 4.0, "Standard Technical Specifications - Westinghouse Plants" (ISTS) and additional Technical Specification Task Force (TSTF) travelers included in this submittal.

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A02 CTS 3.2.4 states "The QUADRANT POWER TILT RATIO shall not exceed 1.02." ITS LCO 3.2.4 states "The QPTR shall be ≤ 1.02. This changes the CTS by requiring the QPTR to be less than or equal to 1.02.

This change is acceptable because nothing has changed. This is a presentation change for clarity. Stating that the QPTR shall be less than or equal to 1.02 is clearer than stating that it shall not exceed. This change is designated as an administrative change because it does not result in a technical change to the CTS.

A03 CTS 3.2.4 Applicability contains a footnote (footnote *) that states "See Special Test Exceptions 3.10.2." ITS 3.2.4 Applicability does not contain this footnote. This changes the CTS by not including the footnote reference.

The purpose of CTS 3.2.4 footnote * is to alert the user that a Special Test Exception exists which may modify the Applicability of the Specification. It is an ITS convention to not include these types of footnotes or cross-references. This change is designated as an administrative change since it does not result in a technical change to the CTS.

A04 CTS 3.2.4 ACTION a states "With the QUADRANT POWER TILT RATIO determined to exceed 1.02 but less than or equal to 1.09." CTS 3.2.4 ACTION b states "With the QUADRANT POWER TILT RATIO determined to exceed 1.09 resulting from misalignment of either a shutdown or control rod." CTS 3.2.4 ACTION c states "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." ITS 3.2.4 ACTION A states "QPTR not within limit." This changes the CTS by specifying that action must be taken when the QPTR is not within limits. (See DOCS L02, L03, and L04 for changes to the compensatory measures.)

The purpose of CTS 3.2.4 is to provide compensatory actions when the QPTR exceeds 1.02. ITS 3.2.4 continues to provide compensatory actions when the QPTR exceeds 1.02. This change is a presentation change. This change is designated as an administrative change since it does not result in technical changes to the CTS.

DISCUSSION OF CHANGES
ITS 3.2.4, QUADRANT POWER TILT RATIO (QPTR)

A05 CTS 3.2.4 ACTION a.1.a) states that with QPTR greater than 1.02 and less than or equal to 1.09, calculate the QUADRANT POWER TILT RATIO at least once per hour until either QUADRANT POWER TILT RATIO is reduced to within its limit or THERMAL POWER is reduced to less than 50% of RTP. CTS 3.2.4 ACTION a.2.a) states within 2 hours, either QUADRANT POWER TILT RATIO is reduced to within its limit or reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.02 and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours. CTS 3.2.4 ACTION b.1.a) states that with QPTR greater than 1.09 due to misalignment of either a shutdown or control rod, calculate the QUADRANT POWER TILT RATIO at least once per hour until either QUADRANT POWER TILT RATIO is reduced to within its limit or THEMAL POWER is reduced to less than 50% of RTP. CTS 3.2.4 ACTION c.1.a) states that with QPTR greater than 1.09 due to causes other than the misalignment of either a shutdown or control rod, calculate the QUADRANT POWER TILT RATIO at least once per hour until either QUADRANT POWER TILT RATIO is reduced to within its limit or THERMAL POWER is reduced to less than 50% of RTP. ITS 3.2.4 does not contain a Required Action stating QPTR must be reduced to within its limit. This changes the CTS by not specifically stating that the restoration of QUADRANT POWER TILT RATIO is required.

This change is acceptable because the technical requirements have not changed. Restoration of compliance with the LCO is always an available Required Action. The convention in the ITS is to not state such "restore" options explicitly unless it is the only action or is required for clarity. This change is designated as an administrative change since it does not result in technical changes to the CTS.

A06 CTS 3.2.4 LCO APPLICABLITY is MODE 1 above 50% RTP. CTS 3.2.4 ACTION a.1.b, ACTION b.1.b and ACTION c.1.b state, in part, to calculate the QUADRANT POWER TILT RATIO at least once per hour until either QUADRANT POWER TILT RATIO is reduced to within limit, or THERMAL POWER is reduced to less than 50% of RTP. ITS 3.2.4 LCO APPLICABILITY is MODE 1 with THERMAL POWER >50% RTP. ITS 3.2.4 CONDITION B states that when the Required Action and associated Completion Time are not met to reduce THERMAL POWER to ≤ 50% RTP. This changes the CTS requirement of reducing power and exiting the MODE of APPLICABILITY to a value of < 50% RTP and allow stopping at a value of 50% RTP.

This change is acceptable because the technical requirements have not changed. LCO 3.0.2 states that that when a Required Action to restore variables within limits is not met, a shutdown may be required to place the unit in a MODE or condition in which the Specification is not applicable. In this case, both CTS and ITS require a reduction of power to exit the MODE of APPLICABILITY when compliance with the LCO is not met within the prescribed amount of time. Once the MODE of APPLICABILITY for LCO 3.2.4 is exited(>50%), the new power level(50%) is no longer controlled by this specification. This change is designated as an administrative change since it does not result in technical changes to CTS LCO 3.2.4.

DISCUSSION OF CHANGES
ITS 3.2.4, QUADRANT POWER TILT RATIO (QPTR)

MORE RESTRICTIVE CHANGES

M01 CTS 3.2.4 ACTION a.2.b states in part, within 2 hours, reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.02. ITS 3.2.4 Required Action A.1 has a similar requirement to reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > 1.02. The Completion Time for ITS 3.2.4 Required Action A.1 is 2 hours after each QPTR determination. This changes the CTS by specifically requiring a power reduction, if applicable, after each QPTR determination.

The purpose CTS 3.2.4 ACTION a.2.b is to commence a power level reduction to ensure that core power distributions that violate fuel design criteria are minimized. The maximum allowable power level initially determined by ITS 3.2.4 Required Action A.1 may be affected by subsequent determinations of QPTR. However, any increases in QPTR would require additional power reductions within 2 hours of each QPTR determination, if necessary to comply with the decreased maximum allowable power level. This change is designated as more restrictive because it adds required actions to the CTS.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA01 *(Type 5 – Removal of SR Frequency to the Surveillance Frequency Control Program)* CTS 4.2.4.1 states, in part, the QPTR shall be determined at least once per 7 days by calculating the ratio. CTS 4.2.4.2 states, in part, the QPTR shall be determined, at least once per 12 hours, by using the movable incore detectors. ITS SR 3.2.4.1 and SR 3.2.4.2 require similar Surveillances and specify the periodic Frequencies as, "In accordance with the Surveillance Frequency Control Program." This changes the CTS by moving the specified Frequencies for these SRs and associated Bases to the Surveillance Frequency Control Program.

The removal of these details related to Surveillance Requirement Frequencies from the Technical Specifications is acceptable, because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The existing Surveillance Frequencies are removed from Technical Specifications and placed under licensee control pursuant to the methodology described in NEI 04-10. A new program (Surveillance Frequency Control Program) is being added to the Administrative Controls section of the Technical Specifications describing the control of Surveillance Frequencies. The surveillance test requirements remain in the Technical Specifications. The control of changes to the Surveillance Frequencies will be in accordance with the Surveillance Frequency Control Program. The Program shall ensure that Surveillance Requirements specified in the Technical Specifications are performed at intervals sufficient to assure the associated Limiting Conditions for Operation are met. This change is designated as a less restrictive removal of detail change, because the Surveillance Frequencies are being removed from the Technical Specifications.

LA02 *(Type 3 – Removing Procedural Details for Meeting TS Requirements or Reporting Requirements)* CTS 4.2.4.2 states, in part, that the QPTR shall be determined to be within the limit by using the movable incore detectors to confirm that the normalized symmetric power distribution, obtained from the 4 pairs of symmetric thimble locations or from performance of a full core map, is consistent with the indicated QUADRANT POWER TILT RATIO. ITS SR 3.2.4.2 requires verifying QPTR is within limit using the movable incore detectors. This changes the CTS by moving the procedural details for meeting the Surveillance to the Bases.

The removal of these details, which are related to system design, from the Technical Specifications, is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide protection of public health and safety. The ITS still retains the requirement that the QPTR is verified to be within the limits using the movable incore detectors. The details relating to system design do not need to appear in the specification in order for the requirement to apply. Additionally, this change is acceptable because the removed information will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail change because information relating to system design is being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L01 *(Category 3 – Relaxation of Completion Time)* CTS 3.2.4 ACTIONS a.1, b.1, and c.1 require calculating the QPTR at least once per hour. ITS 3.2.4 ACTION A (Required Action A.2 and associated Completion Time) require, in part, that when the QPTR is not within limit to determine QPTR once per 12 hours. This changes the CTS by requiring the determination of QPTR to be done once per 12 hours instead of once per hour.

The purpose of CTS 3.2.4 ACTIONS a.1, b.1, and c.1 is to verify QPTR until it is brought to within limit or reactor power has been lowered to less than or equal to 50% RTP. This action is taken because with the QPTR not within limit, the core power distribution is not within the analyzed assumptions, and critical parameters such as F_Q (X, Y, Z) and $F_{\Delta H}$ (X,Y) may not be within their limits. In addition to ITS 3.2.4 Required Action A.2 Completion Time the other Required Actions and associated Completion Times of Condition A are consistent with safe operation, considering the OPERABILITY status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. In addition to reducing reactor power by greater than or equal to 3% for each 1% QPTR exceeds 1.02, ITS 3.2.4 requires a determination of QPTR once per 12 hours. Additionally, ITS 3.2.4 requires measurement of F_Q (X, Y, Z) and $F_{\Delta H}$ (X,Y) within 24 hours and every 7 days thereafter to verify that those parameters are within limit. Furthermore, ITS 3.2.4 requires the safety analyses to be reevaluated to ensure that the results remain valid. Assuming that these actions are successful, ITS 3.2.4 allows indefinite operation with QPTR out of its limit and allows the excore nuclear detectors to be normalized to eliminate the indicated QPTR. This ensures the core is operated within the safety analyses. This change is designated as less restrictive because less stringent Completion Times are being applied in the ITS than were applied in the CTS.

L02 *(Category 4 – Relaxation of Required Action)* CTS 3.2.4 ACTION a.2.b) requires that when QPTR is in excess of 1.02 but less than or equal to 1.09, to reduce THERMAL POWER at least 3% from RATED THERMAL POWER for each 1% of indicated QUADRANT POWER TILT RATIO in excess of 1.02 and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours. ITS 3.2.4 Required Action A.1 includes the requirement to reduce the THERMAL POWER, but does not include a requirement to reduce the Power Range Neutron Flux-High Trip Setpoints. This changes the CTS by eliminating the requirement to reduce the Power Range Neutron Flux-High Trip Setpoints.

The purpose of CTS 3.2.4 ACTION a.2.b) is to reduce THERMAL POWER to increase the margin to the core power distribution limits. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while provided time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the OPERABILITY status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. With THERMAL POWER reduced by 3% from RTP for each 1% QPTR is greater than 1.02, further actions are not required to ensure that THERMAL POWER is not increased. Power increases are administratively prohibited by the Technical Specification while avoiding the risk of changing Reactor Trip System setpoints during operation. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

L03 *(Category 4 – Relaxation of Required Action)* CTS 3.2.4 ACTION a.3 states "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 less than or equal to 55% of RATED THERMAL POWER within the next 4 hours." CTS 3.2.4 ACTION b.3 and b.4 contain the same compensatory actions as CTS ACTION a.3 but requires the QPTR to be within limits within 2 hours. CTS 3.2.4 ACTIONS a.4, b.4, and c.3 state "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 for 12 hours or until verified acceptable at 95% or greater RATED THERMAL POWER."

DISCUSSION OF CHANGES
ITS 3.2.4, QUADRANT POWER TILT RATIO (QPTR)

ITS 3.2.4 Required Action A.3 requires performance of SR 3.2.1.1, SR 3.2.1.2, SR 3.2.1.3, SR 3.2.2.1, SR 3.2.2.2 within 24 hours after achieving equilibrium conditions from a THERMAL POWER reduction per Required Action A.1 and once per 7 days thereafter. ITS 3.2.4 Required Action A.4 requires reevaluation of the safety analyses and confirmation that the results remain valid for duration of operation under this condition prior to increasing THERMAL POWER above the limit of Required Action A.1. ITS 3.2.4 Required Action A.5 requires normalization of excore detectors to restore QPTR to within limit prior to increasing THERMAL POWER above the limit of Required Action A.1. ITS 3.2.4 Required Action A.6 requires performance of SR 3.2.1.1, SR 3.2.1.2, SR 3.2.1.3, SR 3.2.2.1, SR 3.2.2.2 within 24 hours after achieving equilibrium conditions at RTP not to exceed 48 hours after increasing THERMAL POWER above the limit of Required Action A.1. Additionally, ITS 3.2.4 Required Action A.5 contains two Notes and ITS 3.2.4 Required Action A.6 contains one Note. ITS 3.2.4 Required Action A.5 Note 1 states "Perform Required Action A.5 only after Required Action A.4 is completed." ITS 3.2.4 Required Action A.5 Note 2 states "Required Action A.6 shall be completed whenever Required Action A.5 is performed." ITS 3.2.4 Required Action A.6 Note states "Perform Required Action A.6 only after Required Action A.5 is completed." Furthermore, ITS 3.2.4 ACTION B states that with a Required Action and associated Completion Time (of Condition A) not met, reduce THERMAL POWER to ≤ 50% RTP within 4 hours. This changes the CTS by eliminating requirements to be ≤ 50% RTP within a specified time of exceeding the LCO and substituting compensatory measures in ITS 3.2.4 ACTION A, which if not met, results in a reduction in power per ITS 3.2.4 ACTION B.

The purpose of the CTS actions is to lower reactor power to less than 50% when QPTR is not within its limit and cannot be restored to within its limit within a reasonable time period. In addition, the Power Range Neutron Flux-High Trip setpoints are reduced to ≤ 55% to ensure that reactor power is not inadvertently increased without QPTR within its limit. This action is taken because with QPTR not within limit, the core power distribution is not within the analyzed assumptions, and critical parameters such as F_Q (X, Y, Z) and $F_{\Delta H}$ (X,Y) may not be within their limits. A QPTR not within limit may not be an unacceptable condition if the critical core parameters such as F_Q (X, Y, Z) and $F_{\Delta H}$ (X,Y) are within their limits. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while provided time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the OPERABILITY status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. ITS 3.2.4 requires measurement of F_Q (X, Y, Z) and $F_{\Delta H}$ (X,Y) within 24 hours and every 7 days thereafter to verify that those parameters are within limit. In addition, ITS 3.2.4 requires the safety analyses to be reevaluated to ensure that the results remain valid. Assuming that these actions are successful, ITS 3.2.4 allows indefinite operation with QPTR out of its limit and allows the excore nuclear detectors to be normalized to eliminate the indicated QPTR. This ensures the core is operated within the safety analyses. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

L04 *(Category 3 – Relaxation of Completion Time)* CTS 3.2.4 ACTION b.2, applies when QPTR is greater than 1.09 due to misalignment of either a shutdown or control rod, requires a THERMAL POWER reduction from RATED THERMAL POWER for each 1% of indicated QPTR in excess of 1.02 within 30 minutes. ITS 3.2.4 Required Action A.1 requires a THERMAL POWER reduction of 3% from RTP for each 1% QPTR exceeds 1.02 within 2 hours. This changes the CTS by allowing 2 hours to perform the required power reduction.

The purpose of CTS 3.2.4 is to provide appropriate compensatory actions for QPTR greater than that assumed in the safety analyses. This change is acceptable because the completion Time is consistent with safe operation under the specified Condition, considering other indications available to the operator, a reasonable time for restoring compliance with the LCO, and the low probability of a DBA occurring during the restoration period. Under the ITS, a QPTR of 1.09 would require THERMAL POWER to be reduced to ≤ 79% RTP. This will provide sufficient thermal margin to account for the radial power distribution. In addition, the 2 hour time limit is consistent with the CTS time allowed when QPTR is > 1.02 but ≤ 1.09. This change is designated as less restrictive because additional time is allowed to decrease power than was allowed in the CTS.

L05 *(Category 4 – Relaxation of Required Action)* CTS 3.2.4 ACTION d states "With the indicated QUADRANT POWER TILT RATIO not confirmed as required by Surveillance Requirement 4.2.4.2, reduce THERMAL POWER to less than 75 percent RATED THERMAL POWER within 6 hours." CTS 3.2.4 ACTION e states "With the QUADRANT POWER TILT RATIO not monitored as required by Surveillance Requirement 4.2.4.1, reduce THERMAL POWER to less than 50 percent of RATED THERMAL POWER within the next 6 hours." ITS 3.2.4 does not contain these ACTIONS. This changes the CTS by not requiring RTP to be reduced to less than 75 percent, within 6 hours, when the QPTR is not confirmed and not requiring RTP to be reduced to less than 50 percent, within 6 hours, when the QPTR is not monitored.

The purpose of CTS 3.2.4 ACTIONs d and e is to provide compensatory actions to take when Surveillance 4.2.4.1 has not been met or Surveillance 4.2.4.2 have not been performed. ITS 3.2.4 does not contain these ACTIONS since ITS SR 3.0.1 and SR 3.0.3 provide guidance on missed and not performed Surveillances. ITS SR 3.0.1 states, in part, that failure to meet a Surveillance is a failure to meet the LCO. Therefore, the compensatory actions for ITS LCO 3.2.4 would be entered. Additionally, ITS SR 3.0.1 states, in part, that failure to perform a Surveillance shall be failure to meet the LCO, but allows an exception as provided in SR 3.0.3. ITS SR 3.0.3 allows a delayed entry into the LCO to perform the Surveillance. If the Surveillance is not performed in this time period, then the LCO must be declared not met and the compensatory actions for ITS LCO 3.2.4 entered. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

DISCUSSION OF CHANGES
ITS 3.2.4, QUADRANT POWER TILT RATIO (QPTR)

L06 *(Category 6 – Relaxation of Surveillance Requirement Acceptance Criteria)* CTS 4.2.4.1.a states, in part, that the QPTR shall be determined to be within the limit by calculating the ratio at least once per 7 days. ITS SR 3.2.4.1 requires the same determination, but includes two Notes. ITS SR 3.2.4.1 Note 1 states when the input from one Power Range Neutron Flux channel is inoperable, the remaining three power range channels can be used for calculating QPTR as long as THERMAL POWER is less than or equal to 75% RTP. ITS SR 3.2.4.1 Note 2 states that SR 3.2.4.2 may be performed in lieu of this Surveillance. This changes the CTS by allowing use of three Power Range Neutron Flux channels for calculating the QPTR and by allowing the movable incore detectors to be used to determine QPTR instead of the excore detectors.

The purpose of CTS 4.2.4.1.a is to periodically verify that QPTR is within limit. This change is acceptable because it has been determined that the relaxed Surveillance Requirement acceptance criteria are sufficient for verification that the parameters meet the LCO. When one or more Power Range Neutron Flux channels are inoperable, tilt monitoring becomes degraded. With only one Power Range Neutron Flux channel inoperable, QPTR can still be verified by calculation as long as three Power Range Neutron Flux channels are OPERABLE and THERMAL POWER is less than or equal to 75% RTP. The movable incore detector system provides a more accurate indication of QPTR than the excore detectors. In fact, the movable incore detector system is used to calibrate the excore detectors. Therefore, allowing the use of the movable incore detector system or excore detector is appropriate. This change is designated as less restrictive because less stringent Surveillance Requirements are being applied in the ITS than were applied in the CTS.

L07 *(Category 6 – Relaxation of Surveillance Requirement Acceptance Criteria)* CTS 4.2.4.1.a states that the QPTR shall be determined to be within the limit by calculating the ratio at least once per 7 days when the alarm is OPERABLE. CTS 4.2.4.1.b states that the QPTR shall be determined to be within the limit by calculating the ratio at least once per 12 hours during steady state operation when the alarm is inoperable. ITS SR 3.2.4.1 requires verification that the QPTR is within limits every 7 days. This changes the CTS by eliminating the requirement to verify the QPTR more frequently when the QPTR alarm is inoperable.

The purpose of CTS 4.2.4.1.a and 4.2.4.1.b is to periodically verify that the QPTR is within limit. This change is acceptable because the Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. Increasing the frequency of QPTR verification when the QPTR alarm is inoperable is unnecessary as inoperability of the alarm does not increase the probability that the QPTR is outside its limit. The QPTR alarm is for indication only. It use is not credited in any of the safety analyses. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

L08 *(Category 6 – Relaxation of Surveillance Requirement Acceptance Criteria)* CTS 4.2.4.2 states, in part, that the QPTR shall be determined to be within the limit when above 75 percent of RATED THERMAL POWER with one Power Range Channel inoperable by using the movable incore detectors. ITS

SR 3.2.4.2 requires determination of the QPTR by use of the movable incore detectors. Additionally, ITS SR 3.2.4.2 contains a Note which states "Not required to be performed until 12 hours after input from one or more Power Range Neutron Flux channels are inoperable with THERMAL POWER > 75% RTP." This changes the CTS by not requiring the Surveillance to be performed until 12 hours after input from one or more Power Range Neutron Flux channels are inoperable.

The purpose of CTS 4.2.4.2 is to verify that the QPTR is within limit using the movable incore detectors. This change is acceptable because the Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. When one or more Power Range Neutron Flux channels are inoperable, tilt monitoring becomes degraded. Therefore, the movable incore detector system provides a more accurate indication of QPTR than the excore detectors. The ITS SR 3.2.4.2 allowance, for not requiring performance of the Surveillance for 12 hours after input when one or more Power Range Neutron Flux channels are inoperable with THERMAL POWER > 75% RTP, is required to allow time for the movable incore detectors to perform the initial measurement of the QPTR before the Surveillance is declared not met. This change is designated as less restrictive because less stringent Surveillance Requirements are being applied in the ITS than were applied in the CTS.

Improved Standard Technical Specifications (ISTS) Markup and Justification for Deviations (JFDs)

3.2 POWER DISTRIBUTION LIMITS

3.2.4 QUADRANT POWER TILT RATIO (QPTR)

3.2.4

LCO 3.2.4 The QPTR shall be ≤ 1.02.

Applicability

APPLICABILITY: MODE 1 with THERMAL POWER > 50% RTP.

ACTIONS

ACTION a,
ACTION b,
ACTION c
DOC M01

DOC L03

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. QPTR not within limit.	A.1 Reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > ~~1.00~~ 1.02.	2 hours after each QPTR determination ②
	AND	
	A.2 Determine QPTR.	Once per 12 hours
	AND	
	A.3 Perform SR 3.2.1.1, SR 3.2.1.2, ~~and SR 3.2.2.1.~~ SR 3.2.1.3, SR 3.2.2.1 and SR 3.2.2.2.	24 hours after achieving equilibrium conditions from a THERMAL POWER reduction per Required Action A.1 ① AND Once per 7 days thereafter
	AND	

ACTIONS (continued)

	CONDITION	REQUIRED ACTION	COMPLETION TIME	
DOC L03		A.4 Reevaluate safety analyses and confirm results remain valid for duration of operation under this condition.	Prior to increasing THERMAL POWER above the limit of Required Action A.1	
		AND		
DOC L03		A.5 -------------NOTES------------- 1. Perform Required Action A.5 only after Required Action A.4 is completed. 2. Required Action A.6 shall be completed whenever Required Action A.5 is performed. ------------------------------------- Normalize excore detectors to restore QPTR to within limit.	Prior to increasing THERMAL POWER above the limit of Required Action A.1	
		AND		
DOC L03		A.6 ---------------NOTE-------------- Perform Required Action A.6 only after Required Action A.5 is completed. ------------------------------------- Perform SR 3.2.1.1, SR 3.2.1.2, ~~and SR 3.2.2.1.~~ SR 3.2.1.3, SR 3.2.2.1 and SR 3.2.2.2.	Within 24 hours after achieving equilibrium conditions at RTP not to exceed 48 hours after increasing THERMAL POWER above the limit of Required Action A.1	①

ACTIONS (continued)

	CONDITION	REQUIRED ACTION	COMPLETION TIME
ACTION a, ACTION b, ACTION c	B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to ≤ 50% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE		FREQUENCY	
4.2.4.1 DOC L06	SR 3.2.4.1	------------------------------NOTES----------------------------- 1. With input from one Power Range Neutron Flux channel inoperable and THERMAL POWER ≤ 75% RTP, the remaining three power range channels can be used for calculating QPTR. 2. SR 3.2.4.2 may be performed in lieu of this Surveillance. --- Verify QPTR is within limit by calculation.	~~[7 days~~ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~	③ ③

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE		FREQUENCY	
4.2.4.2, DOC L08	SR 3.2.4.2	---NOTE--- Not required to be performed until 12 hours after input from one or more Power Range Neutron Flux channels are inoperable with THERMAL POWER > 75% RTP. --- Verify QPTR is within limit using the movable incore detectors.	~~[12 hours~~ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~	③ ③

3.2 POWER DISTRIBUTION LIMITS

3.2.4 QUADRANT POWER TILT RATIO (QPTR)

3.2.4

LCO 3.2.4 The QPTR shall be ≤ 1.02.

Applicability

APPLICABILITY: MODE 1 with THERMAL POWER > 50% RTP.

ACTIONS

ACTION a,
ACTION b,
ACTION c
DOC M01

DOC L03

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. QPTR not within limit.	A.1	Reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > ~~1.00~~ 1.02.	2 hours after each QPTR determination ②
	AND		
	A.2	Determine QPTR.	Once per 12 hours
	AND		
	A.3	Perform SR 3.2.1.1, SR 3.2.1.2, ~~and SR 3.2.2.1.~~ SR 3.2.1.3, SR 3.2.2.1 and SR 3.2.2.2.	24 hours after achieving equilibrium conditions from a THERMAL POWER reduction per Required Action A.1 AND Once per 7 days thereafter ①
	AND		

ACTIONS (continued)

	CONDITION	REQUIRED ACTION	COMPLETION TIME
DOC L03		A.4 Reevaluate safety analyses and confirm results remain valid for duration of operation under this condition.	Prior to increasing THERMAL POWER above the limit of Required Action A.1
		AND	
DOC L03		A.5 -------------NOTES------------- 1. Perform Required Action A.5 only after Required Action A.4 is completed. 2. Required Action A.6 shall be completed whenever Required Action A.5 is performed. ------------------------------------- Normalize excore detectors to restore QPTR to within limit.	Prior to increasing THERMAL POWER above the limit of Required Action A.1
		AND	
DOC L03		A.6 ---------------NOTE-------------- Perform Required Action A.6 only after Required Action A.5 is completed. ------------------------------------- Perform SR 3.2.1.1, SR 3.2.1.2, ~~and SR 3.2.2.1.~~ SR 3.2.1.3, SR 3.2.2.1 and SR 3.2.2.2.	Within 24 hours after achieving equilibrium conditions at RTP not to exceed 48 hours after increasing THERMAL POWER above the limit of Required Action A.1 ①

ACTIONS (continued)

	CONDITION	REQUIRED ACTION		COMPLETION TIME
ACTION a, ACTION b, ACTION c	B. Required Action and associated Completion Time not met.	B.1	Reduce THERMAL POWER to ≤ 50% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE		FREQUENCY	
4.2.4.1 DOC L06	SR 3.2.4.1	------------------------------NOTES----------------------------- 1. With input from one Power Range Neutron Flux channel inoperable and THERMAL POWER ≤ 75% RTP, the remaining three power range channels can be used for calculating QPTR. 2. SR 3.2.4.2 may be performed in lieu of this Surveillance. -- Verify QPTR is within limit by calculation.	~~[7 days~~ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~	③ ③

SURVEILLANCE REQUIREMENTS (continued)

		SURVEILLANCE	FREQUENCY	
4.2.4.2, DOC L08	SR 3.2.4.2	-------------------------------NOTE------------------------------ Not required to be performed until 12 hours after input from one or more Power Range Neutron Flux channels are inoperable with THERMAL POWER > 75% RTP. --- Verify QPTR is within limit using the movable incore detectors.	~~[12 hours~~ ~~OR~~ In accordance with the Surveillance Frequency Control Program ~~]~~	③ ③

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.4, QUADRANT POWER TILT RATIO (QPTR)

1. Changes are made to be consistent with changes made to Specification 3.2.1 and 3.2.2.

2. Changes are made (additions, deletions, and/or changes) to the ISTS that reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

3. ISTS SR 3.2.4.1 and SR 3.2.4.2 provide two options for controlling the Frequencies of Surveillance Requirements. SQN is proposing to control the Surveillance Frequencies under the Surveillance Frequency Control Program.

Improved Standard Technical Specifications (ISTS) Bases Markup and Bases Justification for Deviations (JFDs)

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.4 QUADRANT POWER TILT RATIO (QPTR)

BASES

BACKGROUND

The QPTR 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 power density at any point in the core must be limited so that the fuel design criteria are maintained. Together, LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," LCO 3.2.4, and LCO 3.1.6, "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 fuel 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 (Ref. 1),

b. During a loss of forced reactor coolant flow accident, there must be at least 95% probability at the 95% 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 energy deposition to the fuel must not exceed 280 cal/gm (Ref. 2), and ①

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. 3).

The LCO limits on the AFD, the QPTR, the Heat Flux Hot Channel Factor (F_Q(X, Y, Z)), the Nuclear Enthalpy Rise Hot Channel Factor ~~($F^N_{\Delta H}$)~~ ($F_{\Delta H}$(X, Y)), and control bank insertion are established to preclude core power distributions that exceed the safety analyses limits. ①

The QPTR limits ensure that ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) and F_Q(X, Y, Z) remain below their limiting values by preventing an undetected change in the gross radial power distribution. ①

BASES

APPLICABLE SAFETY ANALYSES (continued)

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

The QPTR satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

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 $F_Q(X, Y, Z)$ and ~~$(F^N_{\Delta H})$~~ $F_{\Delta H}(X, Y)$ is possibly challenged. ①

APPLICABILITY

The QPTR limit must be maintained in MODE 1 with THERMAL POWER > 50% RTP to prevent core power distributions from exceeding the design limits.

Applicability in MODE 1 ≤ 50% 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 ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X, Y)$ and $F_Q(X, Y, Z)$ LCOs still apply, but allow progressively higher peaking factors at 50% RTP or lower. ①

ACTIONS

A.1

With the QPTR exceeding its limit, a power level reduction of 3% RTP for each 1% by which the QPTR exceeds ~~1.00~~ 1.02 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. ①

The maximum allowable power level initially determined by Required Action A.1 may be affected by subsequent determinations of QPTR. Increases in QPTR would require power reduction within 2 hours of QPTR determination, if necessary to comply with the decreased maximum allowable power level. Decreases in QPTR would allow increasing the maximum allowable power level and increasing power up to this revised limit.

BASES

ACTIONS (continued)

A.2

After completion of Required Action A.1, 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. A 12 hour Completion Time is sufficient because any additional change in QPTR would be relatively slow.

A.3

The peaking factors F_Q(X, Y, Z)~~, as approximated by $F_Q^C(Z)$ and $F_Q^W(Z)$,~~ and ① ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) are of primary importance in ensuring that the power distribution remains consistent with the initial conditions used in the safety analyses. Performing SRs on ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) and F_Q(X, Y, Z) within the Completion Time of ① 24 hours after achieving equilibrium conditions from a Thermal Power reduction per Required Action A.1 ensures that these primary indicators of power distribution are within their respective limits. Equilibrium conditions are achieved when the core is sufficiently stable at intended operating conditions to support flux mapping. A Completion Time of 24 hours after achieving equilibrium conditions from Thermal Power reduction per Required Action A.1 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 ③ not within their limits, the Required Actions of the applicable LCOs ~~these Surveillances~~ 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 ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) and F_Q(X, Y, Z) with changes in power ① distribution. Relatively small changes are expected due to either burnup and xenon redistribution or correction of the cause for exceeding the QPTR limit.

A.4

Although ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) and F_Q(X, Y, Z) are of primary importance as initial conditions in ① 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

ACTIONS (continued)

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 Required Action A.1, the reactor core conditions are consistent with the assumptions in the safety analyses.

A.5

If the QPTR is still exceeding ~~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 shall be ~~are~~ normalized to restore QPTR to within limits prior to increasing THERMAL POWER to above the limit of Required Action A.1. Normalization is accomplished in such a manner that the indicated QPTR following normalization is near ~~1.00~~ 1.02. This is done to detect any subsequent significant changes in QPTR. ⑥ ⑥ ①

Required Action A.5 is modified by two Notes. Note 1 states that the QPTR shall not be ~~is not~~ restored to within limits by excore detector normalization until after the re-evaluation of the safety analysis has determined that core conditions at RTP are within the safety analysis assumptions (i.e., Required Action A.4). Note 2 states that if Required Action A.5 is performed, then Required Action A.6 shall be performed. Required Action A.5 normalizes the excore detectors to restore QPTR to within limits, which restores compliance with LCO 3.2.4. Thus, Note 2 prevents exiting the Actions prior to completing flux mapping to verify peaking factors, per Required Action A.6. These Notes are intended to prevent any ambiguity about the required sequence of actions. ②

A.6

Once the flux tilt is restored to within limits (i.e., Required Action A.5 is performed), it is acceptable to return to full power operation. However, as an added check that the core power distribution is consistent with the safety analysis assumptions, Required Action A.6 requires verification

BASES

ACTIONS (continued)

that F_Q(X, Y, Z)~~, as approximated by $F^C_Q(Z)$ and $F^W_Q(Z)$,~~ and ~~$F^N_{\Delta H}$~~ $F_{\Delta H}(X, Y)$ are within their specified limits within 24 hours of achieving equilibrium conditions at RTP. As an added precaution, if the core power does not reach equilibrium conditions at RTP within 24 hours, but is increased slowly, then the peaking factor surveillances must be performed within 48 hours after increasing THERMAL POWER above the limit of Required Action A.1. These Completion Times are intended to allow adequate time to increase THERMAL POWER to above the limit of Required Action A.1, while not permitting the core to remain with unconfirmed power distributions for extended periods of time. ①

Required Action A.6 is modified by a Note that states that the peaking factor surveillances may only be done after the excore detectors have been normalized to restore QPTR to within limits (i.e., Required Action A.5). The intent of this Note is to have the peaking factor surveillances performed at operating power levels, which can only be accomplished after the excore detectors are normalized to restore QPTR to within limits and the core returned to power.

B.1

If Required Actions A.1 through A.6 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 ~~<~~ ≤ 50% 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. ①

SURVEILLANCE REQUIREMENTS

SR 3.2.4.1

SR 3.2.4.1 is modified by two Notes. Note 1 allows QPTR to be calculated with three power range channels if THERMAL POWER is ≤ 75% RTP and the input from one Power Range Neutron Flux channel is inoperable. Note 2 allows performance of SR 3.2.4.2 in lieu of SR 3.2.4.1.

This Surveillance verifies that the QPTR, as indicated by the Nuclear Instrumentation System (NIS) excore channels, is within its limits. ~~[The Frequency of 7 days takes into account other information and alarms available to the operator in the control room.~~ ④

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~OR~~ ④

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~--------------------------------REVIEWER'S NOTE--------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ ⑤
~~--]~~ ④

For those causes of ~~QPT~~ QPTR that occur quickly (e.g., a dropped rod), there typically are other indications of abnormality that prompt a verification of core power tilt. ⑥

SR 3.2.4.2

This Surveillance is modified by a Note, which states that it is not required until 12 hours after the input from one or more Power Range Neutron Flux channels are inoperable and the THERMAL POWER is > 75% RTP.

With an NIS power range channel 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 3.2.4.2 at a Frequency of 12 hours provides an accurate alternative means for ensuring that any tilt remains within its limits.~~ ④

~~OR~~ ④

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~--------------------------------REVIEWER'S NOTE--------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ ⑤
~~--]~~ ④

BASES

SURVEILLANCE REQUIREMENTS (continued)

For purposes of monitoring the QPTR when one power range channel 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 two sets of four thimble locations with quarter core symmetry. The two sets of four symmetric thimbles is a set of eight unique detector locations. These locations are C-8, E-5, E-11, H-3, H-13, L-5, L-11, and N-8 ~~for three and four loop cores~~. ②

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, incore monitoring of QPTR can be used to confirm that QPTR is within limits.

With one NIS channel 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 result 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% of the tilt shown by the most recent flux map data.

REFERENCES

1. 10 CFR 50.46.
2. Regulatory Guide 1.77, Rev ~~[~~0~~]~~, May 1974. ②
3. 10 CFR 50, Appendix A, GDC 26.

B 3.2 POWER DISTRIBUTION LIMITS

B 3.2.4 QUADRANT POWER TILT RATIO (QPTR)

BASES

BACKGROUND

The QPTR 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 power density at any point in the core must be limited so that the fuel design criteria are maintained. Together, LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," LCO 3.2.4, and LCO 3.1.6, "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 fuel 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 (Ref. 1),

b. During a loss of forced reactor coolant flow accident, there must be at least 95% probability at the 95% 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 energy deposition to the fuel must not exceed 280 cal/gm (Ref. 2), and ①

d. The control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn (Ref. 3).

The LCO limits on the AFD, the QPTR, the Heat Flux Hot Channel Factor (F_Q(X, Y, Z)), the Nuclear Enthalpy Rise Hot Channel Factor ~~($F^N_{\Delta H}$)~~ ($F_{\Delta H}$(X, Y)), and control bank insertion are established to preclude core power distributions that exceed the safety analyses limits. ①

The QPTR limits ensure that ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) and F_Q(X, Y, Z) remain below their limiting values by preventing an undetected change in the gross radial power distribution. ①

BASES

APPLICABLE SAFETY ANALYSES (continued)

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

The QPTR satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

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(X, Y, Z) and ~~($F^N_{\Delta H}$)~~ $F_{\Delta H}$(X, Y) is possibly challenged. ①

APPLICABILITY

The QPTR limit must be maintained in MODE 1 with THERMAL POWER > 50% RTP to prevent core power distributions from exceeding the design limits.

Applicability in MODE 1 ≤ 50% 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 ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) and F_Q(X, Y, Z) LCOs still apply, but allow progressively higher peaking factors at 50% RTP or lower. ①

ACTIONS

A.1

With the QPTR exceeding its limit, a power level reduction of 3% RTP for each 1% by which the QPTR exceeds ~~1.00~~ 1.02 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. ①

The maximum allowable power level initially determined by Required Action A.1 may be affected by subsequent determinations of QPTR. Increases in QPTR would require power reduction within 2 hours of QPTR determination, if necessary to comply with the decreased maximum allowable power level. Decreases in QPTR would allow increasing the maximum allowable power level and increasing power up to this revised limit.

BASES

ACTIONS (continued)

A.2

After completion of Required Action A.1, 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. A 12 hour Completion Time is sufficient because any additional change in QPTR would be relatively slow.

A.3

The peaking factors F_Q(X, Y, Z)~~, as approximated by $F_Q^C(Z)$ and $F_Q^W(Z)$,~~ and ① ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) are of primary importance in ensuring that the power distribution remains consistent with the initial conditions used in the safety analyses. Performing SRs on ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) and F_Q(X, Y, Z) within the Completion Time of ① 24 hours after achieving equilibrium conditions from a Thermal Power reduction per Required Action A.1 ensures that these primary indicators of power distribution are within their respective limits. Equilibrium conditions are achieved when the core is sufficiently stable at intended operating conditions to support flux mapping. A Completion Time of 24 hours after achieving equilibrium conditions from Thermal Power reduction per Required Action A.1 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 ③ not within their limits, the Required Actions of the applicable LCOs ~~these Surveillances~~ 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 ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) and F_Q(X, Y, Z) with changes in power ① distribution. Relatively small changes are expected due to either burnup and xenon redistribution or correction of the cause for exceeding the QPTR limit.

A.4

Although ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) and F_Q(X, Y, Z) are of primary importance as initial conditions in ① 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

BASES

ACTIONS (continued)

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 Required Action A.1, the reactor core conditions are consistent with the assumptions in the safety analyses.

A.5

If the QPTR is still exceeding ~~has exceeded~~ the 1.02 limit and a re-evaluation of the safety ⑥
analysis is completed and shows that safety requirements are met, the
excore detectors shall be ~~are~~ normalized to restore QPTR to within limits prior to ⑥
increasing THERMAL POWER to above the limit of Required Action A.1.
Normalization is accomplished in such a manner that the indicated QPTR
following normalization is near 1.02 ~~1.00~~. This is done to detect any ①
subsequent significant changes in QPTR.

Required Action A.5 is modified by two Notes. Note 1 states that the
QPTR shall not be ~~is not~~ restored to within limits by excore detector normalization until after the re-evaluation of the ②
safety analysis has determined that core conditions at RTP are within the safety analysis assumptions (i.e., Required Action A.4). Note 2 states that if Required Action A.5 is performed, then Required Action A.6 shall be performed. Required Action A.5 normalizes the excore detectors to restore QPTR to within limits, which restores compliance with LCO 3.2.4. Thus, Note 2 prevents exiting the Actions prior to completing flux mapping to verify peaking factors, per Required Action A.6. These Notes are intended to prevent any ambiguity about the required sequence of actions.

A.6

Once the flux tilt is restored to within limits (i.e., Required Action A.5 is performed), it is acceptable to return to full power operation. However, as an added check that the core power distribution is consistent with the safety analysis assumptions, Required Action A.6 requires verification

BASES

ACTIONS (continued)

that F_Q(X, Y, Z)~~, as approximated by $F^C_Q(Z)$ and $F^W_Q(Z)$,~~ and ~~$F^N_{\Delta H}$~~ $F_{\Delta H}$(X, Y) are within their specified limits within 24 hours of achieving equilibrium conditions at RTP. As an added precaution, if the core power does not reach equilibrium conditions at RTP within 24 hours, but is increased slowly, then the peaking factor surveillances must be performed within 48 hours after increasing THERMAL POWER above the limit of Required Action A.1. These Completion Times are intended to allow adequate time to increase THERMAL POWER to above the limit of Required Action A.1, while not permitting the core to remain with unconfirmed power distributions for extended periods of time. ①

Required Action A.6 is modified by a Note that states that the peaking factor surveillances may only be done after the excore detectors have been normalized to restore QPTR to within limits (i.e., Required Action A.5). The intent of this Note is to have the peaking factor surveillances performed at operating power levels, which can only be accomplished after the excore detectors are normalized to restore QPTR to within limits and the core returned to power.

B.1

If Required Actions A.1 through A.6 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 ~~<~~ ≤ 50% 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. ①

SURVEILLANCE REQUIREMENTS

SR 3.2.4.1

SR 3.2.4.1 is modified by two Notes. Note 1 allows QPTR to be calculated with three power range channels if THERMAL POWER is ≤ 75% RTP and the input from one Power Range Neutron Flux channel is inoperable. Note 2 allows performance of SR 3.2.4.2 in lieu of SR 3.2.4.1.

This Surveillance verifies that the QPTR, as indicated by the Nuclear Instrumentation System (NIS) excore channels, is within its limits. ~~[The Frequency of 7 days takes into account other information and alarms available to the operator in the control room.~~ ④

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~OR~~ ④

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~--------------------------------REVIEWER'S NOTE--------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ ⑤
~~--]~~ ④

For those causes of ~~QPT~~ QPTR that occur quickly (e.g., a dropped rod), there typically are other indications of abnormality that prompt a verification of core power tilt. ⑥

SR 3.2.4.2

This Surveillance is modified by a Note, which states that it is not required until 12 hours after the input from one or more Power Range Neutron Flux channels are inoperable and the THERMAL POWER is > 75% RTP.

With an NIS power range channel 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 3.2.4.2 at a Frequency of 12 hours provides an accurate alternative means for ensuring that any tilt remains within its limits.~~ ④

~~OR~~ ④

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

~~--------------------------------REVIEWER'S NOTE--------------------------------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~ ⑤
~~--]~~ ④

SURVEILLANCE REQUIREMENTS (continued)

For purposes of monitoring the QPTR when one power range channel 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 two sets of four thimble locations with quarter core symmetry. The two sets of four symmetric thimbles is a set of eight unique detector locations. These locations are C-8, E-5, E-11, H-3, H-13, L-5, L-11, and N-8 ~~for three and four loop cores~~. ②

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, incore monitoring of QPTR can be used to confirm that QPTR is within limits.

With one NIS channel 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 result 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% of the tilt shown by the most recent flux map data.

REFERENCES

1. 10 CFR 50.46.
2. Regulatory Guide 1.77, Rev ~~[~~0~~]~~, May 1974. ②
3. 10 CFR 50, Appendix A, GDC 26.

JUSTIFICATION FOR DEVIATIONS
ITS 3.2.4 BASES, QUADRANT POWER TILT RATIO (QPTR)

1. Changes are made to be consistent with changes made to the Specification.

2. Changes are made (additions, deletions, and/or changes) to the ISTS Bases that reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

3. ISTS 3.2.4 Bases Required Action A.3 refers to the Required Actions of the referenced Surveillances. There are no Required Actions in the ITS 3.2.1 or ITS 3.2.2 Surveillances. This reference has been corrected to refer to the Required Actions of the applicable LCOs.

4. ISTS SR 3.2.4.1 and SR 3.2.4.2 Bases provide two options for controlling the Frequencies of Surveillance Requirements. SQN is proposing to control the Surveillance Frequencies under the Surveillance Frequency Control Program. Additionally, the Frequency description which is being removed will be included in the Surveillance Frequency Control Program.

5. The Reviewer's Note has been deleted. This information is for the NRC reviewer to be keyed into what is needed to meet this requirement. This Note is not meant to be retained in the final version of the plant specific submittal.

6. Typographical/grammatical error corrected.

Specific No Significant Hazards Considerations (NSHCs)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 3.2.4, QUADRANT POWER TILT RATIO

There are no specific No Significant Hazards Considerations for this Specification.