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10 CFR 50.90

RS-21-007
April 7, 2021

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Braidwood Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

R. E. Ginna Nuclear Power Plant
Renewed Facility Operating License No. DPR-18
NRC Docket No. 50-244

Subject: Application to Address the Issues Identified in Westinghouse Documents NSAL-09-5, Rev.1 and NSAL-15-1, Rev. 0

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (EGC) requests amendments to the Technical Specifications (TS) for Braidwood Station, Units 1 and 2 (Braidwood), Byron Station, Units 1 and 2 (Byron), and R. E. Ginna Nuclear Power Plant (Ginna).

The proposed License Amendment Request (LAR) revises Braidwood, Byron, and Ginna TS to address the issues identified in two Westinghouse communication documents. The proposed changes will address the issues identified in Westinghouse Nuclear Safety Advisory Letter NSAL-09-5, Rev. 1, "Relaxed Axial Offset Control F_Q Technical Specification Actions," by relocating required operating space reductions (power and Axial Flux Difference (AFD) limits) to the Core Operating Limits Report, accompanied by verification for each reload when required. The proposed changes will also address the issues identified in Westinghouse Nuclear Safety Advisory Letter NSAL-15-1, Rev. 0, "Heat Flux Hot Channel Factor Technical Specification Surveillance," by defining TS surveillance requirements for steady-state and transient $F_Q(Z)$ and corresponding actions with which to apply an appropriate penalty factor to measured results.

Attachment 1 provides a discussion of the proposed change. The marked-up TS pages are included in Attachment 2. The marked-up TS Bases changes are provided for NRC information only in Attachment 3.

EGC has determined that there are no significant hazard considerations associated with the proposed change and that the change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

The proposed change has been reviewed by the Braidwood, Byron, and Ginna Plant Operations Review Committee in accordance with the requirements of the EGC Quality Assurance Program.

EGC requests approval of the proposed amendments by April 7, 2022. Once approved, the amendments shall be implemented within 90 days.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the States of Illinois and New York of this application for license amendment by transmitting a copy of this letter and its attachments to the designated State Officials.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Jessie Hodge at (610) 765-5532.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 7th day of April 2021.

Respectfully,

David T. Gudger

David T. Gudger
Sr Manager - Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachments:
1. Evaluation of Proposed Changes
2. Markup of Technical Specifications Pages
3. Markup of Technical Specifications Bases Pages

cc:

NRC Regional Administrator – NRC Region I	w/ attachments
NRC Regional Administrator – NRC Region III	"
NRC Senior Resident Inspector – Braidwood	"
NRC Senior Resident Inspector – Byron	"
NRC Senior Resident Inspector – Ginna	"
NRC Project Manager, NRR – Braidwood and Byron	"
NRC Project Manager, NRR – Ginna	"
A. L. Peterson, NYSERDA	"
Illinois Emergency Management Agency – Division of Nuclear Safety	"

ATTACHMENT 1

Evaluation of Proposed Changes

Braidwood Station Units 1 and 2

Byron Station Units 1 and 2

R. E. Ginna Nuclear Power Plant

Subject: Application to Address the Issues Identified in Westinghouse Documents NSAL-09-5, Rev.1 and NSAL-15-1, Rev. 0

1.0 SUMMARY DESCRIPTION

In accordance with the provisions of Title 10 of the Code of Federal Regulations (10 CFR) 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (EGC) is requesting license amendments to the Technical Specifications (TS) for Renewed Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2 (Braidwood), Renewed Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2 (Byron), and Renewed Facility Operating License No. DPR-18 for the R. E. Ginna Nuclear Power Plant (Ginna). The changes address the issues identified in Westinghouse Nuclear Safety Advisory Letter NSAL-09-5, Rev. 1, "Relaxed Axial Offset Control F_Q Technical Specification Actions," (Reference 1) and Westinghouse Nuclear Safety Advisory Letter NSAL-15-1, Rev. 0, "Heat Flux Hot channel Factor Technical Specification Surveillance," (Reference 2).

Westinghouse proposed a permanent resolution of these NSALs through WCAP-17661-P-A (Reference 5) which revises the Relaxed Axial Offset Control (RAOC) and Constant Axial Offset Control (CAOC) F_Q Surveillance Technical Specifications to address several outstanding issues. EGC has strategically decided not to adopt WCAP-17661-P-A for Byron, Braidwood and Ginna and instead to permanently implement the interim compensatory actions as specified in the NSALs.

2.0 DETAILED DESCRIPTION

2.1 Reason for the Proposed Change

The Technical Specification changes described in this document address issues identified in two Westinghouse Nuclear Safety Advisory Letters NSAL-09-5, Rev. 1 (Reference 1) and NSAL-15-1, Rev. 0 (Reference 2). The first letter notified Westinghouse customers about a potential problem with the Required Actions for Condition B of Standard Technical Specifications 3.2.1B, "Heat Flux Hot Channel Factor (F_Q(Z) (RAOC-W(Z) Methodology)" in NUREG-1431 (Reference 3). This letter notified that for plants that have implemented the RAOC methodology (Reference 4), the Required Actions for Condition B may not be sufficient to restore the transient F_Q, $F_Q^W(Z)$, to within its limit. While these actions are sufficient to recover the F_Q margin when the limiting $F_Q^W(Z)$ occurs away from the middle region of the core, they may not be sufficient when the limiting $F_Q^W(Z)$ occurs in the middle elevations of the core. Revision 1 of NSAL-09-5 provided clarification when the recommended interim actions to address this issue are applicable and how they should be implemented.

The second letter, NSAL-15-1, Rev. 0, notified Westinghouse customers that TS Surveillance Requirement (SR) 3.2.1.2 of TS 3.2.1B, "Heat Flux Hot Channel Factor (F_Q(Z) (RAOC-W(Z) Methodology)" in NUREG-1431 (Reference 3) may not be sufficient to assure that the peaking factor that is assumed in the licensing basis analysis is maintained under all conditions between the frequency of performance of TS SR 3.2.1.2. It has been determined by Westinghouse that there is possibility of decreasing nominal steady-state F_Q, $F_Q^C(Z)$, value while the $F_Q^W(Z)$ is increasing. Therefore, additional surveillance is proposed to monitor the margin of the LCO $F_Q^W(Z)$ limit and make sure it can accommodate the $F_Q^W(Z)$ penalty factor specified in the Core Operating Limits Report (COLR).

Both NSALs were evaluated by EGC and were determined to be applicable to Byron, Braidwood, and Ginna plants since they utilize the RAOC methodology. Westinghouse proposed a permanent resolution through WCAP-17661-P-A (Reference 5) which revises the RAOC and CAOC F_Q Surveillance Technical Specifications. EGC has strategically decided to permanently implement the interim compensatory actions from the NSALs for Byron, Braidwood, and Ginna in lieu of adopting the solution proposed in WCAP-17661-P-A. Under this approach, EGC would propose changes to TS 3.2.1, "Heat Flux Hot Channel Factor ($F_Q(Z)$)" which are consistent with the actions of the NSALs with the relocation of the thermal power reduction and AFD limit reductions to the COLR such that margins can be validated for every cycle, similar to what was done for North Anna Power Station Units 1 and 2 (Reference 8). Initial implementation will adopt the bounding conservative values from NSAL-09-5 which will be updated using the RAOC methodology when required.

2.2 Description of the proposed Change for Byron and Braidwood TS

Marked up Technical Specification changes are provided below. Deleted text is struck through and added text is provided in bold and italic font.

2.2.1 Technical Specification LCO 3.2.1 Changes

Current REQUIRED ACTIONS for CONDITION A	A.1	Reduce THERMAL POWER ≥ 1% RTP for each 1% $F_Q^C(Z)$ exceeds limit.
	AND	
	A.2	Reduce Power Range Neutron Flux - High trip setpoints ≥ 1% for each 1% $F_Q^C(Z)$ exceeds limit.
	AND	
	A.3	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% $F_Q^C(Z)$ exceeds limit.
New REQUIRED ACTIONS for CONDITION A	A.1	Reduce THERMAL POWER ≥ 1% RTP for each 1% $F_Q^C(Z)$ exceeds limit.
	AND	
	A.2	Reduce Power Range Neutron Flux - High trip setpoints ≥ 1% for each 1% $F_Q^C(Z)$ exceeds limit.
	AND	
	A.3	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% $F_Q^C(Z)$ exceeds limit.
	AND	
	A.4	***Perform SR 3.2.1.1 and SR 3.2.1.2.***
Current COMPLETION TIME for CONDITION A	A.1	15 minutes
	A.2	72 hours
	A.3	72 hours
New COMPLETION TIME for CONDITION A	A.1	15 minutes
	A.2	72 hours

	A.3	72 hours
	A.4	***Prior to increasing THERMAL POWER above the limit of Required Actions A.1***
Current REQUIRED ACTIONS for CONDITION B	B.1	Reduce THERMAL POWER ≥ 1% RTP for each 1% $F_Q^W(Z)$ exceeds limit.
	AND	
	B.2	Reduce Power Range Neutron Flux - High trip setpoints ≥ 1% for each 1% $F_Q^W(Z)$ exceeds limit.
	AND	
	B.3	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% $F_Q^W(Z)$ exceeds limit.
New REQUIRED ACTIONS for CONDITION B	B.1	Reduce THERMAL POWER ~~≥ 1% RTP for each 1% $F_Q^W(Z)$ exceeds limit~~ ***as specified in the COLR.***
	AND	
	B.2	***Reduce AFD limits as specified in the COLR.***
	AND	
	B.3	Reduce Power Range Neutron Flux - High trip setpoints ≥ 1% for each 1% ~~$F_Q^W(Z)$ exceeds limit~~ ***that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.1.***
	AND	
	B.4	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% ~~$F_Q^W(Z)$ exceeds limit~~ ***that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.1.***
	AND	
	B.5	***Perform SR 3.2.1.1 and SR 3.2.1.2.***
Current COMPLETION TIME for CONDITION B	B.1	4 hours
	B.2	72 hours
	B.3	72 hours
New COMPLETION TIME for CONDITION B	B.1	4 hours
	B.2	***4 hours***
	B.3	72 hours
	B.4	72 hours
	B.5	***Prior to increasing THERMAL POWER and AFD limits above the limits of Required Actions B.1 and B.2.***

2.2.2 Technical Specification SR 3.2.1.2 Changes

Current SR 3.2.1.2

----------NOTES----------

1. 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.
2. If $F_Q^W(Z)$ measurements indicate that the maximum over z $\left[\frac{F_Q^C(Z)}{K(Z)} \right]$ 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 specified in the COLR; 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 $\left[\frac{F_Q^C(Z)}{K(Z)} \right]$ has not increased.
3. Not required to be performed until 12 hours after declaring PDMS inoperable. Performance of SR 3.2.1.4 satisfies the initial performance of this SR after declaring PDMS inoperable.

Verify $F_Q^W(Z)$ is within limit specified in the COLR.

New SR 3.2.1.2

----------NOTES----------

1. 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.

2. If $F_Q^W(Z)$ measurements indicate that ***either*** the maximum over z $\left[\frac{F_Q^C(Z)}{K(Z)} \right]$

   OR

   maximum over z $\left[\frac{\boldsymbol{F_Q^W(Z)}}{\boldsymbol{K(Z)}} \right]$

   has increased since the previous evaluation of $F_Q^C(Z)$ ***or if*** $\boldsymbol{F_Q^W(Z)}$ **is expected to increase prior to next evaluation of** $\boldsymbol{F_Q^C(Z)}$:
   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 specified in the COLR; 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 $\left[\frac{F_Q^C(Z)}{K(Z)} \right]$ ***and maximum over Z*** $\left[\frac{\boldsymbol{F_Q^W(Z)}}{\boldsymbol{K(Z)}}\right]$ has not increased.

3. Not required to be performed until 12 hours after declaring PDMS inoperable. Performance of SR 3.2.1.4 satisfies the initial performance of this SR after declaring PDMS inoperable.

Verify $F_Q^W(Z)$ is within limit specified in the COLR.

2.2.3 Technical Specification Bases 3.2.1 Changes

Several changes to the Bases were made to reflect the changes made in the TS sections as described above. Below is a summary list of key changes:

- Added description of new REQUIRED ACTION A.4 to become consistent with changes in TS 3.2.1 REQUIRED ACTION A.4
- Changes to conform with renumbered Condition B REQUIRED ACTIONS
- Changes to description of REQUIRED ACTION B.1 to become consistent with changes in TS 3.2.1 REQUIRED ACTION B.1
- Added description of new REQUIRED ACTION B.2 to become consistent with changes in TS 3.2.1 REQUIRED ACTION B.2
- Added description of new REQUIRED ACTION B.3 to become consistent with changes in TS 3.2.1 REQUIRED ACTION B.3
- Added description of new REQUIRED ACTION B.4 to become consistent with changes in TS 3.2.1 REQUIRED ACTION B.4
- Added description of new REQUIRED ACTION B.5 to become consistent with changes in TS 3.2.1 REQUIRED ACTION B.5
- Changes to descriptions of SURVEILLANCE REQUIREMENTS to conform with changes in Note 2 in TS 3.2.1 SURVEILLANCE REQUIREMENT 3.2.1.2

2.3 Description of Proposed change for Ginna TS

2.3.1 Technical Specification LCO 3.2.1 Changes

Current REQUIRED ACTIONS for CONDITION B	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.
New REQUIRED ACTIONS for CONDITION B	B.1	***Reduce THERMAL POWER as specified in the COLR.***
	AND	
	B.2	Reduce AFD limits ~~≥ 1% for each 1% $F_Q^W(Z)$ exceeds limit~~ ***as specified in the COLR.***
	AND	
	B.3	Reduce Power Range Neutron Flux - High trip setpoints ≥ 1% for each 1% ~~that the maximum allowable power of the AFD limits is reduced~~ ***that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.1***.
	AND	
	B.4	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% ~~that the maximum allowable power of the AFD limits is reduced~~ ***that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.1***.
	AND	
	B.5	Perform SR 3.2.1.1 and SR 3.2.1.2.
Current COMPLETION TIME for CONDITION B	B.1	4 hours
	B.2	72 hours
	B.3	72 hours
	B.4	Prior to increasing THERMAL POWER above the maximum allowable power of the AFD limits of Required Actions B.1 and B.2.
New COMPLETION TIME for CONDITION B	B.1	***4 hours***
	B.2	4 hours
	B.3	72 hours
	B.4	72 hours
	B.5	Prior to increasing THERMAL POWER ***and AFD limits*** above the ~~maximum allowable power of the AFD~~ limits of Required Actions B.1 and B.2.

2.3.2 Technical Specification SR 3.2.1.2 Changes

Current SR 3.2.1.2

- NOTE -

If measurements indicate that the

maximum over z $\left[\frac{F_Q^C(Z)}{K(Z)} \right]$

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 $\left[\frac{F_Q^C(Z)}{K(Z)} \right]$

has not increased.

Verify $F_Q^W(Z)$ is within limit.

New SR 3.2.1.2

- NOTE -

If measurements indicate that ***either*** the

maximum over z $\left[\frac{F_Q^C(Z)}{K(Z)} \right]$

or the

maximum over z $\left[\frac{\boldsymbol{F_Q^W(Z)}}{\boldsymbol{K(Z)}} \right]$

has increased since the previous evaluation of $F_Q^C(Z)$

or if $\boldsymbol{F_Q^W(Z)}$ **is expected to increase prior to next evaluation of** $\boldsymbol{F_Q^C(Z)}$:

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 ***specified in the COLR***; 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 $\left[\frac{F_Q^C(Z)}{K(Z)} \right]$

and

maximum over z $\left[\frac{\boldsymbol{F_Q^W(Z)}}{\boldsymbol{K(Z)}} \right]$

has not increased.

Verify $F_Q^W(Z)$ is within limit.

2.3.3 Technical Specification Bases 3.2.1 Changes

Several changes to the Bases were made to reflect the changes made in the TS sections as described above. Below is a summary list of key changes:

- Changes to conform with renumbered Condition B REQUIRED ACTIONS
- Changes to description of REQUIRED ACTION B.1 to become consistent with changes in TS 3.2.1 REQUIRED ACTION B.1
- Added description of new REQUIRED ACTION B.2 to become consistent with changes in TS 3.2.1 REQUIRED ACTION B.2
- Changes to description of REQUIRED ACTION B.3 to become consistent with changes in TS 3.2.1 REQUIRED ACTION B.3
- Changes to description of REQUIRED ACTION B.4 to become consistent with changes in TS 3.2.1 REQUIRED ACTION B.4
- Added description of new REQUIRED ACTION B.5 to become consistent with changes in TS 3.2.1 REQUIRED ACTION B.5
- Changes to descriptions of SURVEILLANCE REQUIREMENTS to conform with changes in Note 2 in TS 3.2.1 SURVEILLANCE REQUIREMENT 3.2.1.2

3.0 TECHNICAL EVALUATION

3.1 Technical Evaluation of TS 3.2.1 changes

EGC is currently operating with administrative measures in accordance with NRC Administrative Letter 98-10 (Reference 6). The proposed changes resolve the issues identified in two Westinghouse Nuclear Safety Advisory Letters NSAL-09-5, Rev. 1 (Reference 1) and NSAL-15-1, Rev. 0 (Reference 2). The proposed changes are modifications of an existing section of the TS related to LCO 3.2.1.

New Required Action A.4 for Braidwood and Byron is added for consistency with the NUREG-1431 Standard Technical Specifications for LCO 3.2.1 (Reference 3).

New Required Action B.1 in existing LCO 3.2.1 for Ginna is introduced to implement a power reduction as described in the recommended actions of NSAL-09-5. New Required Action B.2 in existing LCO 3.2.1 for Byron and Braidwood is introduced to adopt the Axial Flux Difference (AFD) limit reductions which is a modified version of Required Action B.1 in the Standard Technical Specifications as specified in NUREG-1431 (Reference 3). With these modifications all three plants, Byron, Braidwood, and Ginna will have consistent Required Actions B.1 and B.2 of power reduction and AFD limit reductions. As pointed out by NSAL-09-5, both actions are needed to recover the required $F_Q^W(Z)$ margin if Condition B is entered.

Proposed Required Actions B.1 through B.5 are a modified version of the interim actions identified in NSAL-09-5. Rev. 1 (Reference 1). NSAL-09-5, Rev. 1 (Reference 1) determined that the previous guidance of reducing THERMAL POWER ≥ 1% RTP for each 1% $F_Q^W(Z)$ exceeding its limit was non-conservative. Therefore, the values will now be confirmed with the values as specified in the COLR. The power and AFD limit reductions are relocated in the COLR, see sample Table 1 below, which will allow for their evaluation using the RAOC methodology (Reference 4) when required. RAOC power distribution analysis will be performed using discrete maximum power levels and reduced AFD bands which will be used to quantify the expected margin improvement through reduction of the

power level and AFD limits. Calculations will confirm that for a given loss of $F_Q^W(Z)$ margin, a specified combination of power reduction and RAOC band changes will recover at least the required $F_Q^W(Z)$ margin deficiency at core elevation Z. The Z elevation will correspond to the limiting elevation with respect to the $F_Q^W(Z)$ limit. The required value will be specified in a new table which will be specified in the COLR. This table will provide the power and AFD limits in relation to the required $F_Q^W(Z)$ margin improvement. As initially implemented, the values in the COLR will match the bounding conservative values from NSAL-09-5 as shown in Table 1. These values will be updated using the RAOC methodology when required.

Table 1

Required Operating Space Reduction when F_Q^W Exceeds Its Limits (Sample Values)

Required $F_Q^W(z)$ Margin Improvement	THERMAL POWER Reduction (% RTP)	Negative AFD Band Reduction (% AFD)	Positive AFD Band Reduction (% AFD)
≤ 1%	≥ 3%	≥ 1%	≥ 1%
> 1% AND ≤ 2%	≥ 6%	≥ 2%	≥ 2%
> 2% AND ≤ 3%	≥ 9%	≥ 3%	≥ 3%
> 3%	≥ 50%	N/A	N/A

The relocation of the operating space to the COLR is based on Generic Letter (GL) 88-16, "Guidance for Technical Specification Changes for Cycle-Specific Parameter Limits," (Reference 7) which states that licensees can modify cycle specific parameters as long as the modifications are evaluated by NRC-approved methodology and consistent with all applicable limits of the plant safety analysis. The relocation of these values in the COLR will permit evaluation and update using RAOC methodology when required.

3.2 Technical Evaluation of SR 3.2.1.2 changes

The note preceding SR 3.2.1.2 for all three plants is changed to add trending of $F_Q^W(Z)$ in addition to $F_Q^C(Z)$. This is required due to the possibility of decreasing nominal $F_Q^C(Z)$ value while the $F_Q^W(Z)$ is increasing. Adding the explicit trending of $F_Q^W(Z)$ resolves this problem and is consistent with the interim changes proposed in NSAL-15-1, Rev. 0 (Reference 2). With this change, the $F_Q^W(Z)$ will be increased by the appropriate factor in the COLR when any of the following conditions are met:

- Increase of maximum over z $\left[\frac{F_Q^C(Z)}{K(Z)}\right]$ since the previous evaluation,
- Increase of maximum over z $\left[\frac{F_Q^W(Z)}{K(Z)}\right]$ since the previous evaluation,
- Expected increase of maximum over z $\left[\frac{F_Q^W(Z)}{K(Z)}\right]$ prior to next evaluation.

The last condition is met if:

$$max\left[\frac{F_Q^C(Z, B_n) * W(Z, B_{n+1})}{K(Z)}\right] > max\left[\frac{F_Q^C(Z, B_n) * W(Z, B_n)}{K(Z)}\right]$$

where, B_n is the burnup when the surveillance is performed and B_{n+1} is the burnup when the next surveillance will be performed.

The specification of the appropriate penalty factor in the COLR, required to accommodate potential increase in $F_Q^W(Z)$ over the surveillance period, allows evaluation of this factor using NRC-approved methodology when required. The values of the appropriate penalty factor are listed in Table 2.6.2.c in the Byron and Braidwood COLRs and Table COLR-2 for Ginna.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The following NRC requirements and guidance document are applicable to the review of the proposed change.

The proposed change has been evaluated to determine whether applicable regulations and requirements continue to be met. EGC has determined that the proposed change does not require any exemptions or relief from the applicable regulatory requirements. The following current applicable regulations and regulatory requirements were reviewed in making this determination:

Criterion 10, “Reactor Design”

The reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.

10 CFR 50.36, Technical Specifications, paragraph (c)(2) states that technical specifications will include limiting conditions for operation. Paragraph (c)(3) states that technical specifications will include surveillance requirements. Both of these paragraphs are applicable to the proposed change.

Section (c)(2)(ii) provides that LCOs must be established for each item meeting one or more criteria. For the power distribution items affected by the proposed change, the following criterion applies:

(b) Criterion 2. A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The association with the relevant design basis accident analysis is described below.

10 CFR 50.46, Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors, establishes acceptable limits for the performance of Emergency Core Cooling System (ECCS), and requirements for the analytical models used to validate the performance. The analyses of ECCS performance use various inputs and assumptions that reflect the conditions and features of a given plant. In accordance with Byron, Braidwood, and Ginna TS 3.2.1.b, Heat Flux Hot Channel Factor ($F_Q(Z)$), the ECCS analysis establishes limits for $F_Q(Z)$, Heat Flux Hot Channel Factor, which is the subject of the proposed TS changes.

The proposed change maintains compliance with these requirements.

4.2 Precedent

The proposed changes to the Braidwood, Byron, and Ginna TS are fundamentally the same as those approved in the following Safety Evaluations. These precedents also address additional issues associated with NSAL-09-5 that are not applicable to Braidwood, Byron, and Ginna. NSAL-15-1, Rev. 0 issues were addressed using Relaxed Axial Offset Control (RAOC) methodology.

1. Letter from V. Sreenivas, U.S. Nuclear Regulatory Commission (NRC), to David A. Heacock (Virginia Electric and Power Company), "North Anna Power Station, Unit Nos. 1 and 2 – Issuance of Amendments to Revise Technical Specifications to Address Issues Identified in Westinghouse NSAL-09-5, Revision 1, and NSAL-15-1, Rev. 0 (CAC Nos. MF7186 and MF7187)," dated October 17, 2016, (Agencywide Documents Access and Management System (ADAMS) Accession Number ML16252A478).

2. Letter from Richard V. Guzman, NRC, to David A Heacock (Dominion Nuclear), "Millstone Power Station, Unit No. 3 – Issuance of Amendment Adopting Dominion Core Design and Safety Analysis Methods and Addressing the Issues Identified in Three Westinghouse Communication Documents (CAC No. MF6251)." dated July 28, 2016, (ADAMS Accession Number ML16131A728).

4.3 No Significant Hazards Consideration

An evaluation of the proposed change has been performed in accordance with 10 CFR 50.91(a)(1) regarding no significant hazards considerations using the standards in 10 CFR 50.92(c). A discussion of these standards as they relate to these amendments request follows:

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

Response: No.

The proposed change for resolution of Westinghouse notification documents Westinghouse Nuclear Safety Advisory Letter NSAL-09-5, Rev. 1, "Relaxed Axial Offset Control F_Q Technical Specification Actions," and Westinghouse Nuclear Safety Advisory Letter NSAL-15-1, Rev. 0, "Heat Flux Hot channel Factor Technical Specification Surveillance," is intended to address deficiencies identified within the existing Braidwood, Byron, and Ginna Technical Specifications (TS) and to return them to their as-designed function. Operation in accordance with the revised TS ensures that the assumptions for initial conditions of key parameter values in the safety analyses remain valid and does not result in actions that would increase the probability of consequences of any accident previously evaluated.

Therefore, the proposed change does not involve a significant increase in the probability or the consequences of any accident previously evaluated.

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

Response: No.

Operation in accordance with the revised TS and its limits precludes new challenges to Systems, Structures, or Components that might introduce a new type of accident. All design and performance criteria will continue to be met and no new single failure mechanisms will be created. The proposed change for resolution of Westinghouse notification documents NSAL-09-5, Rev. 1 and NSAL-15-1, Rev. 0 does not involve the alteration of plant equipment or introduce unique operational modes or accident precursors. It thus does not create the potential for a different kind of accident.

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

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

Response: No.

Operation in accordance with the revised TS and its limits preserves the margins assumed in the initial conditions for key parameters assumed in the safety analysis. This ensures that all design and performance criteria associated with the safety analysis will continue to be met and that the margin of safety is not affected.

Therefore, the proposed amendments do not involve a significant reduction in a margin of safety.

Based on the above, EGC concludes that the proposed amendments do not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c) and, accordingly, a finding of no significant hazards consideration is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the approval of the proposed change will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendments would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendments do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendments meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendments.

6.0 REFERENCES

1. Westinghouse Nuclear Safety Advisory Letter, NSAL-09-5, Rev. 1, “Relaxed Axial Offset Control F_Q Technical Specification Actions,” September 23, 2009.

2. Westinghouse Nuclear Safety Advisory Letter, NSAL-15-1, Rev. 0, “Heat Flux Hot Channel Factor Technical Specification Surveillance,” February 3, 2015.

3. NUREG-1431, Revision 4, Vol. 1, “Standard Technical Specifications Westinghouse Plants”

4. WCAP-10216-P-A, Revision 1A, “Relaxation of Constant Axial Offset Control – F_Q Surveillance Technical Specification,” February 1994.

5. WCAP-17661-P-A, Revision 1, “Improved RAOC and CAOC F_Q Surveillance Technical Specifications”, February 2019.

6. NRC Administrative Letter 98-10, “Dispositioning of Technical Specifications that are Insufficient to Assure Plant Safety,” December 29, 1998.

7. NRC Generic Letter 88-16, “Guidance for Technical Specification Changes for Cycle-Specific Parameter Limits”, October 4, 1988.

8. Letter from V. Sreenivas, U.S. Nuclear Regulatory Commission (NRC), to David A. Heacock (Virginia Electric and Power Company), “North Anna Power Station, Unit Nos. 1 and 2 – Issuance of Amendments to Revise Technical Specifications to Address Issues Identified in Westinghouse NSAL-09-5, Revision 1, and NSAL-15-1, Rev. 0 (CAC Nos. MF7186 and MF7187),” dated October 17, 2016, (Agencywide Documents Access and Management System (ADAMS) Accession Number ML16252A478)

ATTACHMENT 2

Markup of Technical Specifications Pages

Braidwood Station Units 1 and 2

Byron Station Units 1 and 2

R. E. Ginna Nuclear Power Plant

Revised Technical Specifications Pages (red texts)

TS Pages

Braidwood	3.2.1-1
	3.2.1-2
	3.2.1-4
Byron	3.2.1-1
	3.2.1-2
	3.2.1-4
Ginna	3.2.1-2
	3.2.1-4

3.2 POWER DISTRIBUTION LIMITS

3.2.1 Heat Flux Hot Channel Factor ($F_Q(Z)$)

LCO 3.2.1 $F_Q(Z)$, as approximated by $F_Q^C(Z)$ and $F_Q^W(Z)$, shall be within the limit specified in the COLR.

APPLICABILITY: MODE 1.

ACTIONS

CONDITION		REQUIRED ACTION	COMPLETION TIME
A. $F_Q^C(Z)$ not within limit.	A.1	Reduce THERMAL POWER ≥ 1% RTP for each 1% $F_Q^C(Z)$ exceeds limit.	15 minutes
	AND		
	A.2	Reduce Power Range Neutron Flux-High trip setpoints ≥ 1% for each 1% $F_Q^C(Z)$ exceeds limit.	72 hours
	AND		
	A.3	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% $F_Q^C(Z)$ exceeds limit.	72 hours
	AND		
	A.4	Perform SR 3.2.1.1 and SR 3.2.1.2.	Prior to increasing THERMAL POWER above the limit of Required Action A.1

(continued)

ACTIONS (continued)

CONDITION		REQUIRED ACTION	COMPLETION TIME
B. $F_Q^W(Z)$ not within limit.	B.1	Reduce THERMAL POWER as specified in the COLR. ~~≥ 1% RTP for each 1% $F_Q^W(Z)$ exceeds limit.~~	4 hours
	AND		
	B.2	Reduce AFD limits as specified in the COLR.	4 hours
	AND		
	B.3~~2~~	Reduce Power Range Neutron Flux-High trip setpoints ≥ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.1. ~~$F_Q^W(Z)$ exceeds limit.~~	72 hours
	AND		
	B.4~~3~~	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.1. ~~$F_Q^W(Z)$ exceeds limit.~~	72 hours
	AND		
	B.5	Perform SR 3.2.1.1 and SR 3.2.1.2	Prior to increasing THERMAL POWER and AFD limits above the limits of Required Actions B.1 and B.2.
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.2.1.2 —— NOTES —— 1. 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. 2. If $F_Q^W(Z)$ measurements indicate that either the maximum over z $\left[\frac{F_Q^C(Z)}{K(Z)}\right]$ OR maximum over z $\left[\frac{F_Q^W(Z)}{K(Z)}\right]$ has increased since the previous evaluation of $F_Q^C(Z)$ or if $F_Q^W(Z)$ is expected to increase prior to the next 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 specified in the COLR; 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 $\left[\frac{F_Q^C(Z)}{K(Z)}\right]$ and maximum over z $\left[\frac{F_Q^W(Z)}{K(Z)}\right]$ has not increased. ——	(continued)

3.2 POWER DISTRIBUTION LIMITS

3.2.1 Heat Flux Hot Channel Factor ($F_Q(Z)$)

LCO 3.2.1 $F_Q(Z)$, as approximated by $F_Q^C(Z)$ and $F_Q^W(Z)$, shall be within the limit specified in the COLR.

APPLICABILITY: MODE 1.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. $F_Q^C(Z)$ not within limit.	A.1	Reduce THERMAL POWER ≥1% RTP for each 1% $F_Q^C(Z)$ exceeds limit.	15 minutes
	AND		
	A.2	Reduce Power Range Neutron Flux-High trip setpoints ≥1% for each 1% $F_Q^C(Z)$ exceeds limit.	72 hours
	AND		
	A.3	Reduce Overpower ΔT trip setpoints ≥1% for each 1% $F_Q^C(Z)$ exceeds limit.	72 hours
	AND		
	A.4	Perform SR 3.2.1.1 and SR 3.2.1.2.	Prior to increasing THERMAL POWER above the limit of Required Action A.1
B. $F_Q^W(Z)$ not within limit.	B.1	Reduce THERMAL POWER as specified in the COLR. ~~≥1% RTP for each 1% $F_Q^W(Z)$ exceeds limit.~~	4 hours
	AND		
	B.2	Reduce AFD limits as specified in the COLR.	4 hours

(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. (continued)	AND		
	B.~~3~~2	Reduce Power Range Neutron Flux-High trip setpoints ≥ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.1. ~~$F_Q^W(Z)$ exceeds limit.~~	72 hours
	AND		
	B.~~4~~3	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.1. ~~$F_Q^W(Z)$ exceeds limit.~~	72 hours
	AND		
	B.5	Perform SR 3.2.1.1 and SR 3.2.1.2.	Prior to increasing THERMAL POWER and AFD limits above the limits of Required Actions B.1 and B.2.
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.2.1.2 ————NOTES———— 1. 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. 2. If $F_Q^W(Z)$ measurements indicate that either the maximum over z $\left[\frac{F_Q^C(Z)}{K(Z)} \right]$ OR maximum over Z $\left[\frac{F_Q^W(Z)}{K(Z)}\right]$ has increased since the previous evaluation of $F_Q^C(Z)$ or if $F_Q^W(Z)$ is expected to increase prior to the next 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 specified in the COLR; 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 $\left[\frac{F_Q^C(Z)}{K(Z)} \right]$ and maximum over Z $\left[\frac{F_Q^W(Z)}{K(Z)}\right]$ has not increased. ————————	(continued)

B.1 Reduce THERMAL POWER as specified in the COLR.

AND

2

as specified in the COLR.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
- NOTE - Required Action B.5~~4~~ shall be completed whenever this Condition is entered.		4 hours
B. $F_Q^W(Z)$ not within limit.	B.1 ~~Reduce AFD limits ≥ 1% for each 1% $F_Q^W(Z)$ exceeds limit.~~	4 hours
	AND	
	3	
	B.2 Reduce Power Range Neutron Flux - High trip s setpoints ≥ 1% for each 1% that the ~~maximum allowable power of the AFD limits is reduced.~~	4 hours
	AND	
	4	
	B.3 Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% that the ~~maximum allowable power of the AFD limits is reduced.~~	72 hours
	AND	
	5	
	B.4 Perform SR 3.2.1.1 and SR 3.2.1.2.	Prior to increasing THERMAL POWER and AFD limits ~~allowable power of the AFD limits~~ of Required Actions B.1 and B.2.
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 2.	6 hours

THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.1.

SURVEILLANCE		FREQUENCY
SR 3.2.1.2	- NOTE - If $F_Q^W(Z)$ measurements indicate that either the maximum over Z $\left[\frac{F_Q^C(Z)}{K(Z)}\right]$ or maximum over Z $\left[\frac{F_Q^W(Z)}{K(Z)}\right]$ has increased since the previous evaluation of $F_Q^C(Z)$ or if $F_Q^W(Z)$ is expected to increase prior to the next 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 specified in the COLR; 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 $\left[\frac{F_Q^C(Z)}{K(Z)}\right]$ and maximum over Z $\left[\frac{F_Q^W(Z)}{K(Z)}\right]$ has not increased. - Verify $F_Q^W(Z)$ is within limit.	Once after each refueling prior to THERMAL POWER exceeding 75% RTP AND

(continued)

ATTACHMENT 3

Markup of Technical Specifications Bases Pages

Braidwood Station Units 1 and 2

Byron Station Units 1 and 2

R. E. Ginna Nuclear Power Plant

Revised Technical Specifications Pages (red texts)

TS Bases Pages

Braidwood	3.2.1-5
	3.2.1-6
	3.2.1-10
	3.2.1-11
Byron	3.2.1-5
	3.2.1-6
	3.2.1-10
Ginna	3.2.1-6
	3.2.1-7
	3.2.1-10

ACTIONS

A.1, A.2, and A.3

Reducing THERMAL POWER by ≥ 1% RTP for each 1% by which $F_Q^C(Z)$ exceeds its limit, maintains an acceptable absolute power density. The Completion Time of 15 minutes provides an acceptable time to reduce power in an orderly manner and without allowing the unit to remain in an unacceptable condition for an extended period of time.

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.

Reduction in the Overpower ΔT trip setpoints (value of K_4) 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.

A.4

Verification that $F_Q^C(Z)$ 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 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.

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 THERMAL POWER ~~by ≥ 1% RTP for each 1% by which $F_Q^W(Z)$ exceeds its limit~~ as specified in the COLR within the allowed Completion Time of 4 hours, maintains an acceptable absolute power density such that even if a transient occurred, core peaking factors are not exceeded.

ACTIONS (continued)

B.2
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 limits as specified in the COLR 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.

B.~~2~~3
A reduction of the Power Range Neutron Flux-High trip setpoints by ≥ 1% for each 1% by which ~~$F_Q^W(Z)$ exceeds the limit~~ the maximum allowable THERMAL 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 and AFD limits in accordance with Required Actions B.1 and B.2.

B.~~3~~4
Reduction in the Overpower ΔT trip setpoints (value of K_4) by ≥ 1% for each 1% by which ~~$F_Q^W(Z)$ exceeds the limit~~ the maximum allowable THERMAL 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 and AFD limits in accordance with Required Actions B.1 and B.2.

B.5
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 and AFD limits above the limit imposed by Required Actions B.1 and B.2, ensures that core conditions during operation at higher power levels and future operation are consistent with safety analyses assumptions.

C.1
If the Required Actions of A.1 through A.~~3~~4 or B.1 through B.~~3~~5 are not met within their associated Completion Times, the unit must be placed in a MODE or condition in which the LCO requirements are not applicable. This is done by placing the unit in at least MODE 2 within 6 hours. The 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 (continued)

$F_Q^W(Z)$ evaluations are not applicable for the following axial core regions, measured in percent of core height:

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

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

If the top and bottom exclusion zones are reduced to 8%, then $F_Q^W(Z)$ evaluations are not applicable for the following axial core regions, measured in percent of core height:

c. Lower core region, from 0 to 8% inclusive; and

d. Upper core region, from 92 to 100% inclusive.

Typically, 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. However, the top and bottom exclusion zones can be reduced to 8% if the predicted transient peak $F_Q(Z)$ is located within the top and bottom 8% to 15% of the core. The reduction of the top and bottom exclusion zones from 15% to 8% of the core still meets the $F_Q^C(Z)$ measurement uncertainty of 5%.

This Surveillance has been modified by three Notes. Note 2 may require that more frequent surveillances be performed. If $F_Q^W(Z)$ is evaluated, an evaluation of the expressions below is required to account for any increase to $F_Q^M(Z)$ that may occur and cause the $F_Q(Z)$ limit to be exceeded before the next required $F_Q(Z)$ evaluation.

If the two most recent $F_Q(Z)$ evaluations show an increase in any of the expressions

~~maximum over z $\left[\frac{F_Q^C(Z)}{K(Z)}\right]$,~~

- Increase of maximum over z $\left[\frac{F_Q^C(z)}{K(z)}\right]$ since the previous evaluation

- Increase of maximum over z $\left[\frac{F_Q^W(z)}{K(z)}\right]$ since the previous evaluation,
- Expected increase of maximum over z $\left[\frac{F_Q^W(z)}{K(z)}\right]$ prior to the next evaluation

it is required to meet the $F_Q(Z)$ limit with the last $F_Q^W(Z)$ increased by ~~the greater of the factor of 1.02 or by~~ an appropriate factor specified in the COLR (Ref. 7), or to evaluate $F_Q(Z)$ more frequently, each 7 EFPD.

The last condition is met if:

$$max\left[\frac{F_Q^C(Z,B_n)*W(Z,B_{n+1})}{K(z)}\right] > max\left[\frac{F_Q^C(Z,B_n)*W(Z,B_n)}{K(z)}\right]$$

Where B_n is burnup when the surveillance is performed and B_{n+1} is the burnup when the next surveillance will be performed.

ACTIONS

A.1, A.2, and A.3

Reducing THERMAL POWER by ≥ 1% RTP for each 1% by which $F_Q^C(Z)$ exceeds its limit, maintains an acceptable absolute power density. The Completion Time of 15 minutes provides an acceptable time to reduce power in an orderly manner and without allowing the unit to remain in an unacceptable condition for an extended period of time.

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.

Reduction in the Overpower ΔT trip setpoints (value of K_4) 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.

A.4

Verification that $F_Q^C(Z)$ 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 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.

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 THERMAL POWER ~~by ≥ 1% RTP for each 1% by which $F_Q^W(Z)$ exceeds its limit~~ as specified in the COLR within the allowed Completion Time of 4 hours, maintains an acceptable absolute power density such that even if a transient occurred, core peaking factors are not exceeded.

B.2

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 trasient occurs. Reducing the AFD limits as specified in the COLR 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.

ACTIONS (continued)

B.3~~2~~

A reduction of the Power Range Neutron Flux-High trip setpoints by ≥ 1% for each 1% by which ~~$F_Q^W(Z)$ exceeds the limit,~~ the maximum allowable THERMAL 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 and AFD limits in accordance with Required Actions B.1 and B.2.

B.4~~3~~

Reduction in the Overpower ΔT trip setpoints (value of K_4) by ≥ 1% for each 1% by which ~~$F_Q^W(Z)$ exceeds the limit,~~ the maximum allowable THERMAL 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 and AFD limits in accordance with Required Actions B.1 and B.2.

B.5

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 and AFD limits above the limit imposed by Required Actions B.1 and B.2, ensures that core conditions during operation at higher power levels and future operation are consistent with safety analyses assumptions.

C.1

If the Required Actions of A.1 through A.3, or B.1 through B.3, are not met within their associated Completion Times, the unit must be placed in a MODE or condition in which the LCO requirements are not applicable. This is done by placing the unit in at least MODE 2 within 6 hours. The 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 (continued)

$F_Q^W(Z)$ evaluations are not applicable for the following axial core regions, measured in percent of core height:

a. Lower core region, from 0 to 15% inclusive; and
b. Upper core region, from 85 to 100% inclusive.

If the top and bottom exclusion zones are reduced to 8%, then $F_Q^W(Z)$ evaluations are not applicable for the following axial core regions, measured in percent of core height:

e. Lower core region, from 0 to 8% inclusive; and
f. Upper core region, from 92 to 100% inclusive.

Typically, 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. However, the top and bottom exclusion zones can be reduced to 8% if the predicted transient peak $F_Q(Z)$ is located within the top and bottom 8% to 15% of the core. The reduction of the top and bottom exclusion zones from 15% to 8% of the core still meets the $F_Q^C(Z)$ measurement uncertainty of 5%.

This Surveillance has been modified by three Notes. Note 2 may require that more frequent surveillances be performed. If $F_Q^W(Z)$ is evaluated, an evaluation of the expression below is required to account for any increase to $F_Q^M(Z)$ that may occur and cause the $F_Q(Z)$ limit to be exceeded before the next required $F_Q(Z)$ evaluation.

If the two most recent $F_Q(Z)$ evaluations show an increase in any of the expressions

~~maximum over z~~ ~~$\left[\frac{F_Q^C(Z)}{K(Z)}\right]$~~ ,

- Increase of maximum over z $\left[\frac{F_Q^C(z)}{K(z)}\right]$ since the previous evaluation,
- Increase of maximum over z $\left[\frac{F_Q^W(z)}{K(z)}\right]$ since the previous evaluation,
- Expected increase of maximum over z $\left[\frac{F_Q^W(z)}{K(z)}\right]$ prior to the next evaluation

it is required to meet the $F_Q(Z)$ limit with the last $F_Q^W(Z)$ increased by ~~the greater of the factor of 1.02 or by~~ an appropriate factor specified in the COLR (Ref. 7), or to evaluate $F_Q(Z)$ more frequently, each 7 EFPD.

The last condition is met if:

$$max\left[\frac{F_Q^C(Z,B_n) * W(Z,B_{n+1})}{K(z)}\right] > max\left[\frac{F_Q^C(Z,B_n) * W(Z,B_n)}{K(z)}\right]$$

Where B_n is burnup when the surveillance is performed and B_{n+1} is the burnup when the next surveillance will be performed.

A.4

Verification that $F_Q^C(Z)$ 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 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.

Condition A is modified by a Note that requires Required Action A.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 A.1, even when Condition A is exited prior to performing Required Action A.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.

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 THERMAL POWER as specified in the COLR within the allowed Completion Time of 4 hours, maintains an acceptable absolute power density such that even if a transient occurred, core peaking factors are not exceeded.

B.2~~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 limits as specified in the COLR ~~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 (Ref. 5).

The percent that $F_Q(Z)$ exceeds its transient limit is calculated based on the following expression:

$$\left\{\left[\underset{\text{over z}}{\text{maximum}}\left[\frac{F_Q^C(Z) * W(z)}{\frac{CFQ}{P} * K(z)}\right]\right] - 1\right\} * 100 \text{ for } P > 0.5$$

$$\left\{\left[\underset{\text{over z}}{\text{maximum}}\left[\frac{F_Q^C(Z) * W(z)}{\frac{CFQ}{0.5} * K(z)}\right]\right] - 1\right\} * 100 \text{ for } P \leq 0.5$$

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, B.4 and B.5.

B.~~2~~3

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 and ~~as a result of reducing~~ AFD limits in accordance with Required Actions B.1 and B.2.

B.~~3~~4

Reduction in the Overpower ΔT trip setpoints value of K4 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 and ~~as a result of reducing~~ AFD limits in accordance with Required Actions B.1 and B.2.

B.~~4~~5
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 and AFD limits above ~~the maximum allowable power~~ limits imposed by Required Actions B.1 and B.2 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~~5 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 and AFD limits above the limit of Required Actions B.1 and B.2, even when Condition B is exited prior to performing Required Action B.45. 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.

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 61 core elevations. $F_Q^W(Z)$ evaluations are not applicable for the following axial core regions, measured in percent of core height:

a. Lower core region, from 0 to 8% inclusive and

b. Upper core region, from 92 to 100% inclusive.

The top and bottom 8% 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. If F_Q^W (Z) is evaluated, an evaluation of the expression below is required to account for any increase to $F_Q^M(Z)$ that may occur and cause the $F_Q(Z)$ limit to be exceeded before the next required $F_Q(Z)$ evaluation.

If the two most recent $F_Q(Z)$ evaluations show an increase in any of the expressions ~~maximum over z [F_Q^C(Z) / K(Z)]~~,

- Increase of maximum over z $\left[\frac{F_Q^C(z)}{K(z)}\right]$ since the previous evaluation,
- Increase of maximum over z $\left[\frac{F_Q^W(z)}{K(z)}\right]$ since the previous evaluation,
- Expected increase of maximum over z $\left[\frac{F_Q^W(z)}{K(z)}\right]$ prior to the next evaluation

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 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.

The last condition is met if:

$$max\left[\frac{F_Q^C(Z,B_n) * W(Z,B_{n+1})}{K(z)}\right] > max\left[\frac{F_Q^C(Z,B_n) * W(Z,B_n)}{K(z)}\right]$$

Where B_n is burnup when the surveillance is performed and B_{n+1} is the burnup when the next surveillance will be performed.