ATTACHMENT 2

Technical Basis for NSAL-09-5 Revision 1 and Applicability to Byron, Braidwood, and R.E. Ginna
Non-Proprietary Version for NRC

(NON-PROPRIETARY)

3 pages follow

Technical Basis for NSAL-09-5 Revision 1 and Applicability to Byron, Braidwood, and R.E. Ginna

References:

1. NSAL-09-5, Revision 1, "Relaxed Axial Offset Control FQ Technical Specification Actions"
2. TSD-20-008 (Westinghouse letter NF-CB-20-129), "NSAL-09-5 Justification Letter for Byron, Braidwood, Ginna"
3. NUREG-1431, Revision 4, Vol. 1, "Standard Technical Specifications Westinghouse Plants"
4. CN-GEN-MISC-230, "Evaluation of Interim Action Statement for Transient F_Q Violations in RAOC Plants"
5. WCAP-17661-P-A, Revision 1, "Improved RAOC and CAOC F_Q Surveillance Technical Specifications"
6. "RESPONSE TO PRESSURIZED WATER REACTOR OWNERS GROUP LETTER REGARDING NON-CONSERVATIVE TECHNICAL SPECIFICATIONS AND TIMELY SUBMITTAL OF A LICENSE AMENDMENT REQUEST," (Accession Number ML103210497).
7. WCAP-10217-A, "Relaxation of Constant Axial Offset Control"
8. WCAP-8403, "Topical Report Power Distribution Control and Load Following Procedures"

Exelon is exploring the implementation of the Reference 1 Recommended Actions in the Technical Specifications (TS) of Byron, Braidwood, and R.E. Ginna units. Reference 1 addressed a deficiency in the Westinghouse Standard Technical Specifications (STS), Reference 3, which is representative for the R.E. Ginna TS. Reference 3 would have also been representative for Byron and Braidwood when the Power Distribution Monitoring System (PDMS) is inoperable if the STS were implemented without modifications into the Byron/Braidwood TS. This letter provides the technical basis for the Recommended Actions in Reference 1, as requested in Reference 2.

<u>Background:</u>

While the Byron, Braidwood, and R.E. Ginna plants implemented the same Relaxed Axial Offset Control (RAOC) methodology, there were differences among these plants in the implementation of the Required Actions for Limiting Condition for Operation (LCO) 3.2.1 Condition B. In addition, Byron and Braidwood also concurrently implemented other TS changes accommodating the BEACON ™ Core Monitoring System.

The R.E. Ginna LCO 3.2.1 Action B.1 (Amendment 94) followed Reference 3 by implementing a 1% Axial Flux Difference (AFD) reduction for each 1% of $F_Q^W(z)$ violation. In contrast, Byron (via Amendment 116) and Braidwood (via Amendment 110) implemented for LCO 3.2.1 Required Action B.1 a thermal power reduction of 1% for each 1% that $F_Q^W(z)$ exceeds the limit, without an Axial Flux Difference (AFD) reduction.

For Byron, Braidwood, and R.E. Ginna, LCO 3.2.1 Required Actions B.2 and B.3 implemented reductions of Power Range Neutron Flux High, and Overpower ΔT trip setpoints; note however, that for R.E. Ginna this occurs only if the AFD limits reduction translates into a power reduction (consistent with Reference 3), whereas for Byron and Braidwood the magnitude of trip setpoints adjustment derives directly from the thermal power reduction. The R.E. Ginna LCO 3.2.1 also shows Required Action B.4 (consistent with Reference 3), but the Byron/Braidwood LCO 3.2.1 does not.

In Reference 1 (issued after the above-mentioned TS Amendments), Westinghouse determined that the Required Actions for Condition B of TS 3.2.1B in Reference 3 for plants that have implemented the RAOC methodology may not be sufficient to assure that the peaking factor basis assumed in the licensing basis analysis is maintained under all conditions if the transient heat flux hot channel factor (F_Q) limit is not met. In order to maintain the intent of Reference 3 LCO 3.2.1B Required Action B.1 to restore the "measured" transient heat flux hot channel factor to within the limiting condition for operation (LCO) limit, Westinghouse recommended that conservative interim actions be administratively implemented in addition to those required for Condition B of the F_Q TS 3.2.1B from Reference 3.

The first recommended action in Reference 1 reduced thermal power by **[** **]**^{a,c} $F_Q^W(Z)$ violation for surveillance performed above 75% RTP. The other three recommended actions are similar to Required Actions B.2 through B.4 from LCO 3.2.1B in Reference 3, with the distinction that the Reference 3 thermal power reduction is defined based on the AFD limits whereas the Reference 1 power reduction is driven by the first recommended action. Since the power reduction from the first recommended action in Reference 1 is always larger than the one implied by Action B.1 in LCO 3.2.1B of Reference 3, **[** **]**^{a,c}

Hence, the effective recommendation of Reference 1 is to implement **[** **]**^{a,c} Taken together, these actions constitute a very conservative response to an $F_Q^W(Z)$ violation in order to bound all plants.

Reference 1 was determined to be applicable for Byron and Braidwood despite the corresponding TS LCO 3.2.1 Action B.1 not following Reference 3 because these plants have a RAOC AFD specification (LCO 3.2.3) and because the F_Q^W margin recovered with Reference 1 recommended actions is larger than the margin recovered using Byron/Braidwood LCO 3.2.1 Required Action B.1.

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The Required Action B.1 in LCO 3.2.1B in STS (Reference 3) of AFD reduction proportional to F_Q^W limit violation is sufficient to restore the "measured" transient heat flux hot channel factor to within the limiting condition for operation (LCO) limit if the most limiting elevation is away from the central region of the core (i.e. towards either the top or the bottom of the core). In such cases, the Condition 1 transients have the core operating near the RAOC AFD limits, therefore reduction of the AFD limits will **[** **]**^{a,c} If however the limiting F_Q^W occurs in the middle elevations of the core, the reduction of the AFD limits could have only a limited efficiency in reducing the limiting F_Q^W, and therefore be insufficient to restore the measured $F_Q^W(Z)$ within limits. In the remainder of this letter, "middle-core elevations" designate those elevations Z* where a reduction of AFD limits is not effective in reducing the transient $F_Q(Z^*)$.

For a plant and cycle when transient F_Q occurred at a middle-core elevation for some of the burnup steps during the cycle, Reference 4 analyzed the adequacy of Reference 1 recommended actions for restoring F_Q^W within limits. Specifically, a **[** **]**^{a,c} F_Q^W violation was postulated, followed by implementation of Required Actions consisting of a **[** **]**^{a,c} thermal power reduction and a **[** **]**^{a,c} AFD reduction. These actions are consistent with those required by Reference 1 for a plant that follows the standard TS (Reference 3). A **[** **]**^{a,c} F_Q^W violation was chosen, based on reload analyses validating **[** **]**^{a,c} The transient F_Q margin improvement, when Reference 1 recommended actions are implemented, was calculated using **[**

]^{a,c} Using this analysis procedure, Reference 4 showed that a **[** **]**^{a,c} thermal power reduction and **[** **]**^{a,c} AFD limits reduction recovered more than **[** **]**^{a,c} of margin to the transient F_Q in each of the analyzed cases.

Since this is an issue only when the limiting F_Q^W occurs at middle-core elevations, the efficiency of the actions recommended in Reference 1 in restoring F_Q^W within limits **[**

]^{a,c} Therefore, the choice of a given reactor core to demonstrate the adequacy of the Reference 1 recommended actions is **[** **]**^{a,c} The study performed in Reference 4 met this requirement and was therefore sufficient to support the applicability of the Reference 1 recommended actions to **[** **]**^{a,c} including Byron, Braidwood, and R.E. Ginna.

Another indirect validation of the conservatism of the Reference 1 recommended actions comes from the calculations that illustrated the methodology described in Reference 5. For a **[** **]**^{a,c} core, a **[** **]**^{a,c} relative improvement in the transient F_Q at the most limiting time in the cycle was obtained with a **[** **]**^{a,c} thermal power reduction and a **[** **]**^{a,c} AFD reduction. While the power and AFD reductions in the example presented in Reference 5 **[**

]^{a,c} This example serves to further illustrate with a typical case that the thermal power reduction recommended in Reference 1 is conservative. The Reference 5 case discussed above also **[** **]**^{a,c} of Action B.1 in the Byron/Braidwood LCO 3.2.1, since a **[** **]**^{a,c} power reduction (accompanied additionally by an AFD reduction which is not requested by the Byron/Braidwood TS LCO 3.2.1 Condition B Actions) provides **[** **]**^{a,c} transient F_Q improvement, which is **[** **]**^{a,c} to restore the “measured” transient heat flux hot channel factor to within the LCO) limit following a **[** **]**^{a,c} F_Q^W violation.

In conclusion, the technical basis for Reference 1 (NSAL-09-5, Revision 1) is applicable to any RAOC plants, including Byron, Braidwood, and R.E. Ginna. The same technical basis supports the adequacy of the Reference 1 interim actions in addition to those required for Condition B of TS 3.2.1B in Reference 3. Further consistent with this conclusion, the NRC staff noted in Reference 6 that the Reference 1 approach “provides reasonable assurance that the peaking factor basis assumed in the licensing basis analysis will be met.”

<u>Recommended Actions</u>

As detailed in the Background section, if it is determined that $F_Q^W(Z)$ is not within the LCO limit following a surveillance performed at ≥ 75% RTP, the following actions per Reference 1 will be sufficient to restore the $F_Q^W(Z)$ within the LCO limit for either Byron, Braidwood, or R.E. Ginna:

1. Reduce maximum allowable power by **[** **]**^{a,c} $F_Q^W(Z)$ exceeds the limit, within 4 hours.
   AND
2. Reduce AFD limits ≥ 1% for each 1% $F_Q^W(Z)$ exceeds the limit, within 4 hours.
   AND
3. Reduce Power Range Neutron Flux – High trip setpoints ≥ 1% for each 1% that the maximum allowable power is reduced within 72 hours.
   AND
4. Reduce the Overpower ΔT trip setpoints ≥ 1% for each 1% that the maximum allowable power is reduced, within 72 hours.
   AND
5. Perform SR 3.2.1.1 and SR 3.2.1.2 prior to increasing the THERMAL POWER above the limit of action 1. Note that this action must be completed whenever the $F_Q^W(Z)$ limit is not met following a surveillance performed at ≥ 75% RTP.