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U. S. Nuclear Regulatory Commission
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Dresden Nuclear Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Clarification Regarding Backup Stability Protection Methodology

References:

1. Letter from M. Banerjee (NRC) to C. M. Crane (Exelon Generation Company, LLC), "Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2 – Issuance of Amendment Re: Transition to Westinghouse Fuel and Minimum Critical Power Ratio Safety Limits (TAC Nos. MC7323, MC7324, MC7325 and MC7326)," dated April 4, 2006

2. Letter from R. C. Jones (NRC) to D. B. Ebeling-Koning (ABB Combustion Engineering Nuclear Fuel), "Acceptance for Referencing of ABB/CE Topical Report CENPD-295-P: Thermal Hydraulic Stability Methodology for Boiling Water Reactors (TAC No. M93648)," dated February 22, 1996

3. Letter from R. C. Jones (NRC) to D. B. Ebeling-Koning (ABB Combustion Engineering Nuclear Fuel), "Acceptance for Referencing of ABB/CE Topical Report CENPD-294-P: Thermal Hydraulic Stability Methods for Boiling Water Reactors (TAC No. M92883)," dated February 22, 1996

4. Letter from P. R. Simpson (Exelon Generation Company, LLC) to NRC, "Request for License Amendment Regarding Transition to Westinghouse Fuel," dated June 15, 2005

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In Reference 1, the NRC issued license amendments for Dresden Nuclear Power Station (DNPS), Units 2 and 3, and Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2. The license amendments support the transition to Westinghouse SVEA-96 Optima2 fuel.

During a conference call with the NRC on May 2, 2006, Exelon Generation Company, LLC (EGC) provided clarification regarding the Westinghouse methodology used for backup stability protection (BSP) calculations. As a result of the conference call, EGC agreed to provide information to summarize the Westinghouse methodology for BSP calculations.

Westinghouse performs RAMONA-3 stability calculations to define BSP exclusion regions that would be used in the event the Oscillation Power Range Monitor becomes inoperable. There are two exclusion regions (i.e., the immediate scram region and the controlled entry region). Intentional entry into these regions is prohibited by plant procedures. If the scram region is inadvertently entered, the operator action is to immediately scram the reactor. If the controlled entry region is inadvertently entered, the operator action is to immediately exit the region.

The Westinghouse BSP methodology generates exclusion region boundaries in terms of power/flow conditions that result in predetermined decay ratios. Westinghouse includes conservative decay ratio adders to account for cycle variability and the accuracy of the methodology.

The immediate scram region is defined by a RAMONA-3 decay ratio > 1.0 - cu - σ, and the controlled entry region is defined by a RAMONA-3 decay ratio > 0.8 - cu. The term "cu" accounts for cycle uncertainty, and the term "σ" accounts for the standard deviation of RAMONA-3 predictions against benchmark plant decay ratio measurements.

The cycle uncertainty factor is not specifically defined in the Westinghouse stability methodology. As indicated in the NRC safety evaluation for CENPD-295-P-A, "Thermal-Hydraulic Stability Methodology for Boiling Water Reactors" (i.e., Reference 2), the decay ratio acceptance criterion for core-wide instabilities is 0.8. Although the cycle uncertainty factor is not required by the NRC safety evaluation, the factor was introduced as an additional conservatism in the application of the Westinghouse methodology to the DNPS and QCNPS units. The cycle uncertainty factor conservatively accounts for variations in assembly power distributions relative to that assumed in the cycle design analysis. Therefore, this parameter is dependent on the cycle design. For QCNPS Unit 2 Cycle 19, the cycle uncertainty factor was calculated to be 0.123. The cycle uncertainty factor was determined by perturbing the Westinghouse cycle design in a manner that increased the assembly radial peaking factor. Sensitivity studies performed by Westinghouse have shown that the predicted decay ratio is most sensitive to variations in radial peaking. An increase in radial peaking factor of 0.1 was chosen as a reasonable upper bound to account for cycle uncertainty.

The "σ" factor is the standard deviation between the predicted decay ratios and measured or observed decay ratios from actual plant stability tests or events. The value for the "σ" factor is provided in equation 7-3 of topical report CENPD-294-P-A, "Thermal-Hydraulic Stability Methods for Boiling Water Reactors." The NRC approved CENPD-294-P-A in Reference 3, and its applicability to DNPS and QCNPS is discussed in References 1 and 4. Figure 7.2-2 of CENPD-294-P-A presents comparisons between actual plant data and predicted results. The

data are from stability tests at the Leibstadt, Ringhals 1, Oskarshamn 3, and Forsmark 3 units, as well as the 1992 stability event at Columbia Generating Station.

There are no regulatory commitments contained in this letter. Should you have any questions related to this letter, please contact Mr. Kenneth M. Nicely at (630) 657-2803.

Respectfully,

Keith R. Jury

Keith R. Jury
Director – Licensing and Regulatory Affairs

cc: NRC Senior Resident Inspector
NRC Regional Administrator, Region III