August 13, 2008

MEMORANDUM TO: Gregory Cranston, Chief
Reactor Systems Branch
Office of Nuclear Reactor Regulation

FROM: Benjamin T. Parks */RA/*
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SUBJECT: STAFF POSITION REGARDING THE USE OF METHODS DESCRIBED IN ABB/WESTINGHOUSE TOPICAL REPORT CENPD-300-P-A, "REFERENCE SAFETY REPORT FOR BOILING WATER REACTOR RELOAD FUEL," FOR SAFETY LIMIT MINIMUM CRITICAL POWER RATIO DETERMINATIONS

1.0 INTRODUCTION

The methods contained in NRC-approved licensing topical report (LTR) CENPD-300-P-A, "Reference Safety Report for Boiling Water Reactor Reload Fuel," (Reference 1) have recently been applied for the analysis of the safety limit minimum critical power ratio at plants with cores comprised of fuel from mixed vendors, two-year operating cycles and extended power uprates (EPU). These applications concern the Dresden Nuclear Power Station (DNPS), Units 2 and 3, and the Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2 (References 2-5). The staff's safety evaluation of these applications is contained in References 6-9.

In its evaluation of the plant specific method applications, the NRC staff considered the technical adequacy of the method itself, and the licensee's approach to compliance with the limitations/restrictions contained in the safety evaluation appended to the LTR. Each licensee must comply with, among the others, Limitation/Restriction 7, which states,

> The ABB/CE methodology for determining the operating limit minimum critical power ratio (OLMCPR) for non-ABB/CE fuel as described in CENPD-300-P and additional submittals is acceptable only when each licensee application of the methodology identifies the value of the conservative adder to the OLMCPR. The correlation applied to the experimental data to determine the value of the adder must be shown to meet the 95/95 statistical criteria. In addition, the licensee's submittal must include the justification for the adder and reference the supporting documentation.

Individual compliance with Limitation/Restriction 7 for Exelon application to DNPS and QCNPS is evaluated in References 6-9. In this memorandum, these plants are considered for a case-study perspective on the application of CENPD-300-P-A to BWRs that utilize current operational enhancements such as power uprates, expanded operating domains, and extended cycles.

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In each of References 6-9, the staff considered not only the conservative adder required by the limitation/restriction, but also the technical basis for the limitation/restriction, and the supporting methodology assumptions and inputs that make compliance with Limitation/Restriction 7 an acceptable licensing approach when referencing CENPD-300-P-A. In References 6-9, the staff discusses the licensee's compliance with Limitation/Restriction 7, as well as the licensee's approach to provide sufficient safety margin to assure the NRC staff reasonably that the safety limit will perform its intended function. These approaches should be considered by the reactor systems reviewer during a review of the application of CENPD-300-P-A for safety limit minimum critical power ratio calculations.

2.0 COMPLIANCE WITH LIMITATION/RESTRICTION 7 OF CENPD-300-P-A

The staff previously interpreted Limitation/Restriction 7 to be a core- and cycle-specific notification requirement, stating in each of References 6-9, "Therefore, the use of the [USAG14 correlation] must be reviewed and approved on a plant- and cycle-specific basis." Because the USAG14 correlation is not NRC-approved, its use, and its conservative multiplier, must be identified each cycle.

Conceivably, if the conservative multiplier, and its justification, has not changed from previous cycles, the NRC has already approved its use, and merely the notification and reference to the approval for use at each plant would suffice to satisfy Limitation/Restriction 7. *Note that this requirement is imposed by the staff's safety evaluation for CENPD-300-P-A*, and the staff's opinion regarding the approval status of CENPD-300-P-A is not changing at this time. As this is a matter of documentation provided to the NRC, the cycle-specific Core Operating Limits Report would be an appropriate place to make this notification.

The above statement should also not be construed as imposing a new condition or limitation under the auspices of an operating reactor safety evaluation. The statement interprets the necessary action to address licensee compliance with Limitation/Restriction 7 of the CENPD-300-P-A safety evaluation.

It should be noted further that the NRC considers CPR correlations to be methods that are subject to staff review. In light of current NRR practice regarding generic methods, a licensing action may be deemed unacceptable if it uses unapproved methods without appropriate justification (Reference 10). In an extreme case, the NRC could reject applications referencing unapproved CPR correlations such as USAG14 based solely on the procedures contained in LIC-109, "Acceptance Review Procedures." In light of the fact that CENPD-300-P-A was approved with Limitation/Restriction 7, however, the NRC staff should not reject applications of CENPD-300-P-A referencing an unapproved CPR correlation for legacy fuel, provided that Limitation/Restriction 7 is adequately addressed.

3.0 PLANT-SPECIFIC DEPARTURE FROM NRC-APPROVED METHODOLOGY

As a result of its evaluation of the licensing actions requested in References 2-5, the staff concluded that the SLMCPR determination presented in CENPD-300-P-A relied on mixed-core assumptions that were inappropriate for plants that operate on extended cycles at uprated conditions. In order to provide reasonable assurance that the SLMCPR was determined using methods that were both technically and statistically applicable to these operating enhancements, which require improved definitions of safety margin, the licensee proposed an alternative approach to account for the SLMCPR of the legacy fuel.

The alternative approach proposed by the licensee modifies the approach approved in CENPD-300-P-A, which requires the use of an explicitly analyzed SLMCPR for new, SVEA-96 fuel, and provides a different SLMCPR for the legacy, Global Nuclear Fuels (GNF) fuel. The difference proposed by the licensee eliminates the legacy fuel SLMCPR, and adopts the SVEA-96 SLMCPR core-wide. As documented in References 6-9, this approach is acceptable because it increases the GNF SLMCPR in a sufficiently conservative manner to account for the fact that it has been determined using assumptions that may be invalid for extended-cycle, power uprated plants.

This alternative approach, which has been adopted by Exelon Generation at DNPS and QCNPS, is acceptable as noted above; however, the staff's conclusions in this regard are based on the differences in SLMCPR characteristics of SVEA-96 and GNF fuel. To the extent that the Westinghouse transition, mixed-core fuel loadings at DNPS and QCNPS are not representative of all possible configurations that could exist for other potential Westinghouse fuel transitions, these conclusions are arguably plant- and cycle-specific.

It should be noted once again that the staff's evaluations presented in References 6-9 do not impose any new conditions or limitations on the licensee; they merely evaluate the acceptability of the application of the generic method, CENPD-300-P-A, and its use for SLMCPR evaluations in the plant-specific manners requested in References 2-5. The NRC staff's statements contained in References 6-9 provide the technical basis for the finding that the licensee's proposed license amendments were acceptable. The staff routinely evaluates plant-specific applications of generically approved methods; it is not uncommon for the NRC staff to find that generically approved methods are not applicable to plants operating in certain conditions, even beyond those delineated in a given method's conditions, restrictions, and/or limitations.

The additional discussion contained References 6-9 is provided, not to impose limitations on the NRC's plant-specific approval, but to note the slight change in evaluation method from that originally proposed, and its acceptability. This discussion was required to document, internally, the staff's technical basis for requesting additional assurance beyond that provided in the generic LTR, and the approach taken by the licensee to provide that assurance.

Because the licensee has departed from the generic, NRC-approved approach for the CENPD-300-P-A SLMCPR evaluations, the auspices of 10 CFR 50.59 could conceivably require the NRC review of SLMCPR evaluations that rely on Westinghouse methods and conservatively apply the higher, SVEA-96 SLMCPR to the co-resident GNF fuel. The Reactor Systems Branch position in this regard is that Exelon's transition SLMCPR evaluations that pertain to the second SVEA transition cycles at DNPS and QCNPS would screen out of the 10 CFR 50.59 process.

As set forth in 10 CFR 50.59(c)(2)(vii), a license amendment is required for changes, tests, or experiments that result in a departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases or in the safety analyses. However, 10 CFR 50.59(a)(2) defines *departure from a method of evaluation described in the FSAR as updated used in establishing the design bases or in the safety analyses* as either (i) changing any of the elements of the method described in the FSAR (as updated) unless the results of the analysis are conservative or essentially the same; or (ii) changing from a method described in the FSAR to another method unless that method has been approved by NRC for the intended application.

The limiting treatment that the licensee applied to the SLMCPR remains sufficiently conservative to support the reload of SVEA-96 fuel and operation of DNPS and QCNPS cores with two loadings of SVEA-96 fuel and a single loading of GNF fuel. This is because the GNF

fuel will retain the conservatively higher SLMCPR of the SVEA-96 fuel, and because all of the GNF fuel will be twice-burnt. Based on current operating strategies and fuel loadings, the staff concedes that not only is twice-burnt fuel less reactive than once-burnt fuel, it is also loaded, as a matter of practice, in less limiting, peripheral positions in the core. Hence, the conservative treatment applied to once-burnt GNF fuel remains acceptably conservative for twice-burnt GNF fuel.

Moreover, the licensee is not proposing to change the method described in the FSAR, and the results of the analyses for the SLMCPR remain conservative in the case of the GNF fuel safety limit, and are expected to remain essentially the same in the case of the Westinghouse safety limit.

4.0 CONCLUSION

The Reactor Systems Branch Staff position in regards to current application of CENPD-300-P-A to BWR SLMCPR evaluations is (1) provided the use of a particular non-NRC approved CPR correlation for legacy fuel is applied for a particular plant, and the application (i.e., the conservative adder and the justification for the adder) has not changed, an identification of the adder, statement that its application has not changed, and reference to its plant-specific approval, all in the cycle-specific Core Operating Limits Report, will satisfy Limitation/Restriction 7 of the CENPD-300-P-A safety evaluation, and (2) 10 CFR 50.59 would permit Exelon to have SLMCPR evaluations performed at QCNPS and at DNPS for upcoming fuel cycles, in accordance with CENPD-300-P-A, and by applying the more conservative SVEA-96 SLMCPR to the co-resident GNF fuel without NRC review and approval. Item (2) should be considered on an application-specific basis for its acceptability at other plants.

The Reactor Systems Branch opinion relies on the assumption that the SVEA-96 SLMCPR does not increase above the limit currently contained in a given plant's TS 2.1.1.2, Safety Limit Minimum Critical Power Ratio. Should that value no longer bound the cycle-specific analysis, a license amendment would be required to increase the plant TS Safety Limit Minimum Critical Power Ratio in accordance with 10 CFR 50.59(c)(1)(i) and 10 CFR 50.90.

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3. Jury, K., Exelon Generation Company, letter to US Nuclear Regulatory Commission, "Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," Docket 50-254, January 16, 2007, ADAMS Accession Number ML070230535.

4. Simpson, P., Exelon Generation Company, letter to US Nuclear Regulatory Commission, "Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," Dockets 50-237 and 50-249, July 10, 2007, ADAMS Accession Number ML072290549.

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7. Williams, J., US Nuclear Regulatory Commission, letter to Crane, C., Exelon Generation Company, "Quad Cities Nuclear Power Station, Unit 1 – Issuance of Amendment RE: Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," Docket 50-254, May 2, 2007, ADAMS Accession Number ML071100359.

8. Gratton, C., US Nuclear Regulatory Commission, letter to Pardee, C., Exelon Generation Company, "Dresden Nuclear Power Station, Units 2 and 3 – Issuance of Amendments Regarding Safety Limit Minimum Critical Power Ratio," Dockets 50-237 and 50-249, November 6, 2007, ADAMS Accession Number ML072290549.

9. Wiebe, J., US Nuclear Regulatory Commission, letter to Pardee, C., Exelon Generation Company, "Quad Cities Nuclear Power Station, Units 1 and 2 – Issuance of Amendment RE: Minimum Critical Power Ratio Safety Limit," Dockets 50-254 and 50-265, February 28, 2008, ADAMS Accession Number ML080280231.

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6. Honcharik, J., US Nuclear Regulatory Commission, letter to Crane, C., Exelon Generation Company, "Dresden Nuclear Power Station, Unit 3 – Issuance of Amendment RE: Minimum Critical Power Ratio Safety Limit," Docket 50-249, November 7, 2006, ADAMS Accession Number ML062990294.

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