

**Attachment 1 contains Proprietary Information  
Withhold from public disclosure under 10 CFR 2.390  
When separated from Attachment 1, this document is decontrolled**

RS-12-004

10 CFR 50.90

January 9, 2012

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

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:** Response to Request for Additional Information Regarding Technical Specification Change for Minimum Critical Power Ratio Safety Limit

- References:**
1. Letter from Mr. Jeffrey L. Hansen (Exelon Generation Company, LLC (EGC)) to U. S. NRC, "Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit," dated June 7, 2011
  2. Letter from U. S. NRC to Mr. Michael J. Pacilio (EGC), "Quad Cities Nuclear Power Station, Unit 1 – Request for Additional Information Related to Technical Specification Change for Minimum Critical Power Ratio Safety Limit (TAC No. ME6383)," dated August 22, 2011
  3. Letter from Mr. David M. Gullott (EGC) to U. S. NRC, "Additional Information Supporting the Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit," dated September 21, 2011
  4. Letter from Mr. David M. Gullott (EGC) to U. S. NRC, "Supplemental Information Supporting the Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit (TAC No. ME6383)," dated November 2, 2011
  5. Letter from Mr. David M. Gullott (EGC) to U. S. NRC, "Request for Technical Specification Change for Safety Limit Minimum Critical Power Ratio," dated November 22, 2011

6. Letter from U. S. NRC to Mr. Michael J. Pacilio (EGC), "Quad Cities Nuclear Power Station, Units 1 and 2 – Request for Additional Information Related to Technical Specification Change for Safety Limit Minimum Critical Power Ratio (TAC Nos. ME6383 and ME7613)," dated December 19, 2011

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to Appendix A, Technical Specifications (TS), of Renewed Facility Operating License No. DPR-29 for Quad Cities Nuclear Power Station (QCNPS), Unit 1. The proposed change revises the value of the single recirculation loop operation (SLO) safety limit minimum critical power ratio (SLMCPR) in TS Section 2.1.1, "Reactor Core SLs." This proposed change does not affect the QCNPS Unit 1 two recirculation loop operation (TLO) SLMCPR or either of the two SLMCPR limits for Unit 2. This change is needed to support the current cycle of operation (i.e., Cycle 22) for QCNPS Unit 1 for a cycle exposure greater than 6500 MWD/MTU, which is currently scheduled to occur approximately on March 15, 2012.

In Reference 2, the NRC requested that EGC provide additional information in support of their review of Reference 1. The EGC response to this request was provided in Reference 3.

Upon further review of the information provided in Reference 3, it was concluded that additional information would be required to support the NRC's review of the Reference 1 submittal. Specifically, supplemental information was requested associated with NRC Question No. 5 in Reference 2. This supplemental information was provided in Reference 4. In addition, on November 18, 2011, a conference call between NRC and Exelon personnel was held to further discuss computer codes used by Westinghouse for determining SLMCPR limits. Based on this discussion, the NRC requested additional information to support their review, as documented in Reference 6. The requested information is provided in Attachment 1 to this letter.

In Reference 5, Exelon also submitted a license amendment request to change the Quad Cities Unit 2 SLMCPR limits to support Cycle 22 operations scheduled to begin in April 2012. Please note that questions 1 and 3 of the NRC request for additional information (i.e., Reference 6), and the associated responses provided in Attachment 1 to this letter, are also applicable to the Unit 2 license amendment request.

This letter contains the following attachments:

- Attachment 1: Responses to NRC Request for Additional Information on Quad Cities Technical Specification Change for Minimum Critical Power Ratio Safety Limit – Proprietary Version
- Attachment 2: Westinghouse Application for Withholding Proprietary Information from Public Disclosure CAW-12-3343, Affidavit, Proprietary Information Notice and Copyright Notice
- Attachment 3: Responses to NRC Request for Additional Information on Quad Cities Technical Specification Change for Minimum Critical Power Ratio Safety Limit – Non-Proprietary Version

As Attachment 1 contains information proprietary to Westinghouse Electric Company LLC, it is supported by an affidavit (i.e., Attachment 2) signed by Westinghouse, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the NRC and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure. A non-proprietary version of this information is provided in Attachment 3, as noted above.

Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse affidavit should reference CAW-12-3343 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

The information provided in this letter does not affect the conclusions of the No Significant Hazards Consideration or the Environmental Consideration provided in Attachment 1 of Reference 1 or in Attachment 1 of Reference 5.

In accordance with 10 CFR 50.91(b), "State consultation," EGC is providing the State of Illinois with a copy of this letter and its attachment to the designated State Official.

This letter contains no new regulatory commitments. If you have any questions concerning this letter, please contact Joseph A. Bauer at (630) 657-2804.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 9<sup>th</sup> day of January, 2012.

Respectfully,



David M. Gullott  
Manager – Licensing  
Exelon Generation Company, LLC

Attachments:

1. Response to NRC Request for Additional Information on Quad Cities Technical Specification Change for Minimum Critical Power Ratio Safety Limit – Proprietary Version
2. Westinghouse Application for Withholding Proprietary Information from Public Disclosure CAW-12-3343, Affidavit, Proprietary Information Notice and Copyright Notice
3. Response to NRC Request for Additional Information on Quad Cities Technical Specification Change for Minimum Critical Power Ratio Safety Limit – Non-Proprietary Version

**ATTACHMENT 2**

**Westinghouse Electric Company, LLC  
Application for Withholding Proprietary Information from Public Disclosure, CAW-12-3343  
Affidavit  
Proprietary Information Notice and Copyright Notice**



Westinghouse Electric Company  
Nuclear Services  
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Cranberry Township, Pennsylvania 16066  
USA

U.S. Nuclear Regulatory Commission  
Document Control Desk  
11555 Rockville Pike  
Rockville, MD 20852

Direct tel: (412) 374-4643  
Direct fax: (724) 720-0754  
e-mail: greshaja@westinghouse.com  
Proj letter: NF-BEX-12-1

CAW-12-3343

January 3, 2012

APPLICATION FOR WITHHOLDING PROPRIETARY  
INFORMATION FROM PUBLIC DISCLOSURE

Subject: USBWR-11-37 P-Attachment, "Responses to NRC Request for Additional Information on Quad Cities Technical Specification Change for Minimum Critical Power Ratio Safety Limit (TAC Nos. ME6383 and ME7613)" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-12-3343 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Exelon Generation.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-12-3343, and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

A handwritten signature in black ink, appearing to read 'J. A. Gresham', with a long, sweeping underline.

J. A. Gresham, Manager  
Regulatory Compliance

Enclosures

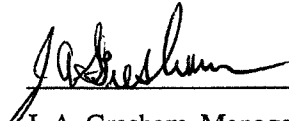
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COMMONWEALTH OF PENNSYLVANIA:

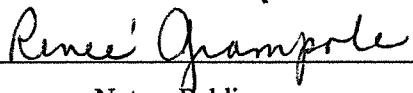
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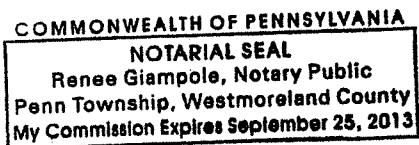
COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared J. A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

  
\_\_\_\_\_  
J. A. Gresham, Manager  
Regulatory Compliance

Sworn to and subscribed before me  
this 3<sup>RD</sup> day of January 2012

  
\_\_\_\_\_  
Notary Public



- (1) I am Manager, Regulatory Compliance, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.
- (2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.
- (3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.
- (4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.
  - (i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.
  - (ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

    - (a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

- (b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.
- (c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.
- (d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.
- (e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.
- (f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

- (a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.
- (b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.
- (c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.



- (d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.
- (e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.
- (f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.
- (iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.
- (iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.
- (v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in USBWR-11-37 P-Attachment, "Responses to NRC Request for Additional Information on Quad Cities Technical Specification Change for Minimum Critical Power Ratio Safety Limit (TAC Nos. ME6383 and ME7613)" (Proprietary), for submittal to the Commission, being transmitted by Exelon letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the review of Quad Cities SLM CPR, and may be used only for that purpose.

This information is part of that which will enable Westinghouse to:

- (a) Support Exelon's use of Westinghouse Fuel at Quad Cities.

- (b) Assist the customer to obtain license change.

Further this information has substantial commercial value as follows:

- (a) Westinghouse can use this information to further enhance their licensing position with their competitors.
- (b) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar analyses and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

## **Proprietary Information Notice**

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

## **Copyright Notice**

The reports transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies of the information contained in these reports which are necessary for its internal use in connection with generic and plant-specific reviews and approvals as well as the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, order, or regulation subject to the requirements of 10 CFR 2.390 regarding restrictions on public disclosure to the extent such information has been identified as proprietary by Westinghouse, copyright protection notwithstanding. With respect to the non-proprietary versions of these reports, the NRC is permitted to make the number of copies beyond those necessary for its internal use which are necessary in order to have one copy available for public viewing in the appropriate docket files in the public document room in Washington, DC and in local public document rooms as may be required by NRC regulations if the number of copies submitted is insufficient for this purpose. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

**ATTACHMENT 3**

**Responses to NRC Request for Additional Information on Quad Cities Technical  
Specification Change for Minimum Critical Power Ratio Safety Limit**

**Non-Proprietary Version**

**Responses to NRC Request for Additional Information on  
Quad Cities Technical Specification Change  
for Minimum Critical Power Ratio Safety Limit  
(TAC NOS. ME6383 and ME7613) (Non-Proprietary)**

Westinghouse Electric Company LLC  
1000 Westinghouse Drive  
Cranberry Township, PA 16066

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In Reference 1, Exelon submitted a License Amendment Request (LAR) to change the Quad Cities Unit 1 Safety Limit Minimum Critical Power Ratio (SLMCPR). In Reference 2, Exelon submitted a second License Amendment Request to change the Quad Cities Unit 2 Safety Limit Minimum Critical Power Ratio. In Reference 3, the NRC requested that additional information be provided to support their review of these two LARs. The following information is provided in response to the Reference 3 request.

**RAI-01**

CENPD-300-P-A, Section 1.3 states, “Appendix A to this report provides a brief description of the computer codes used in ABB reload analysis methodology.” The CENPD-300-P-A acceptance letter dated May 24, 1996, states that the staff’s acceptance applies only to the matters described in the report. In Exelon’s submittal dated June 7, 2011, and supplement dated November 2, 2011, you identified several computer codes that are not listed in Appendix A and therefore not considered in the staff’s acceptance of CENPD-300-P-A.

Provide a complete listing of computer codes used in the implementation of CENPD-300-P-A for determining the SLMCPR. Justify your use of these codes for the NRC approved analytical method (i.e., CENPD-300-P-A) listed in the Technical Specifications.

**Response to RAI-01**

All the Critical Power Ratio (CPR) calculations that feed into the SLMCPR determinations are performed with the NRC approved codes, PHOENIX and POLCA addressed in CENPD-390-P-A (Reference 4) and are listed in CENPD-300-P-A (Reference 5). [

] <sup>a,c</sup>

[

] a,c

[

] <sup>a,c</sup>



**RAI-02**

During the conference call on November 18, 2011, your staff stated that you were re-evaluating the MWd/MT threshold below which the Unit 1 SLMCPR was assured to be conservative. Describe how you are establishing this threshold.

**Response to RAI-02**

The same methodology that was used in the original Quad Cities Unit 1 Cycle 22 (QC1 C22) SLMCPR calculation, which resulted in the initial 4,000 MWD/MTU burnup restriction, was followed in performing the reanalysis, which revised this cycle exposure restriction to 6,500 MWD/MTU. The only change when doing the reanalysis was to calculate the SLMCPR at more cycle exposure points near the beginning of cycle than what was done in the original calculation.

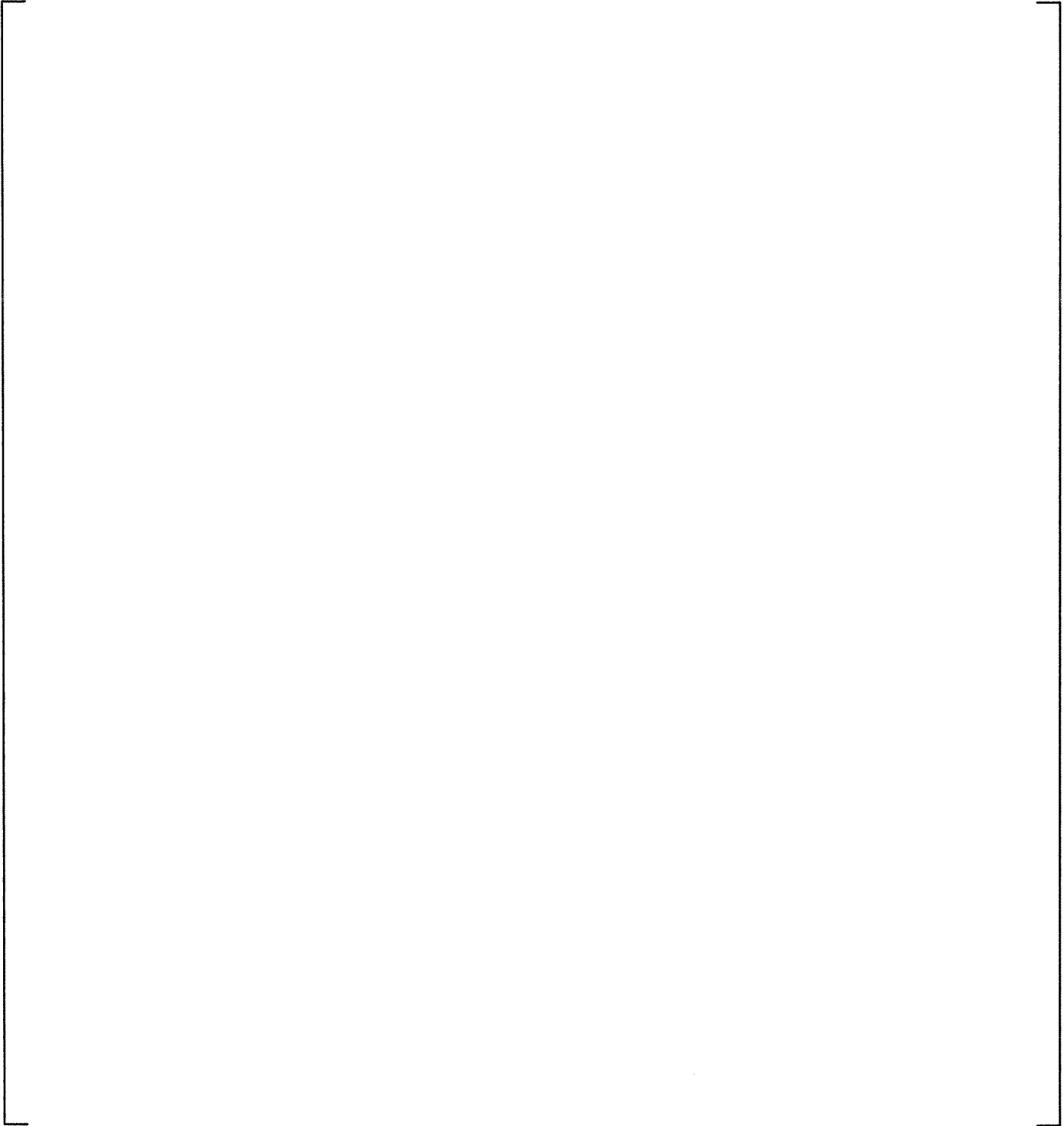
[

] <sup>a,c</sup>

In summary, no methodology or design input changes nor any reductions in calculational margin were implemented in this new analysis, only additional cycle exposure points were analyzed to determine a more precise cycle exposure threshold where the SLO SLMCPR exceeds the current Technical Specification limit. The dual loop operation (DLO) SLMCPR does not change from the current Technical Specification limit of 1.11; therefore, this value does not require modification from what is currently in the Technical Specifications.

Figure RAI-02-1 - QCNPS, Unit 1, Cycle 22 – Confirmation of Current Technical Specification Limit

a,c



### **RAI-03**

The CENPD-300-P-A acceptance letter dated May 24, 1996, states that the staff finds the report and related documents to be acceptable to the extent specified and under the limitations delineated in the NRC evaluation.

Confirm that your implementation of CENPD-300-P-A for your June 6 and November 22, 2011, submittals continue to meet these conditions and limitations as described in your June 15, 2005 (ADAMS Accession No. ML060620352) submittal.

### **Response to RAI-03**

The above referenced NRC Safety Evaluation, dated May 24, 1996, addressing CENPD-300-P, specified eight limitations and restrictions, listed below. These limitations and restrictions continue to be met for the Quad Cities Unit 1 and Unit 2 reload analyses; however, none of the limitations and restrictions directly affect the development of the SLMCPR limits, as noted for each item.

- a. Acceptability of this topical report is subject to review findings of the other relevant topical reports cited in the topical report, and all conditions set forth therein are applicable to this topical report. Furthermore, acceptability of reload analysis is subject to conditions cited in the methodology topical reports.

This limitation does not apply to the SLMCPR analysis. No other findings are applicable to the SLMCPR analysis.

- b. ABB/CE's uncertainty analysis approach is not generically acceptable since the acceptability is highly application dependent. The Operating Limit MCPR must be calculated with Method A.

This limitation does not apply to the SLMCPR analysis. This limitation was for the treatment of establishing the uncertainties to calculate the Operating Limit MCPR with Methods B and C described in CENPD-300-P-A.

- c. The use of ANS79 decay heat curve is not acceptable for LOCA analysis. For compliance with Appendix K, ABB/CE must use 1.2 times the ANS71 as stated in the current 10 CFR Part 50, Appendix K.

This limitation does not apply to the SLMCPR analysis. This limitation is for the LOCA analysis.

- d. No evaluation of validity of sample analyses was performed. Furthermore, the approval recommended in this report does not imply any endorsement of analyses nor of the quantified uncertainties set forth in Appendix D. Therefore, no reference should be made to Appendix D as demonstration in support of any future reload.

This limitation does not apply to the SLMCPR analysis. The Quad Cities Unit 1 C22 SLMCPR analysis does not make any reference to Appendix D.

- e. At the minimum, each reload safety evaluation report should contain all the items referred to in Appendix B of the topical report.

This limitation does not apply to the SLMCPR analysis. The SLMCPR is not a reload safety evaluation report.

- f. ABB/CE must use 110% of vessel design pressure for the peak reactor vessel pressure limit unless otherwise governed by a plant specific licensing basis.

This limitation does not apply to the SLMCPR analysis. This limitation is for the peak vessel pressure limit analysis.

- g. The ABB/CE methodology for determining the operating limit maximum critical power ratio (OLMCPR) for non-ABB/CE fuel as described in CENPD-300-P and additional submittals (References 1, 3, 4, 5 and 6 [from the CENPD-300-P NRC Safety Evaluation]) 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 appropriate supporting documentation.

This limitation does not apply to the SLMCPR analysis as there are no non-ABB/CE fuel assemblies loaded into the QCNPS Unit 1 Cycle 22 core or QCNPS Unit 2 Cycle 22 core. This was previously noted in "Quad Cities Unit 1 Cycle 22 SLMCPR (Proprietary)" page 2 of 17 in Attachment 3 of Reference 1 and "Quad Cities Unit 2 Cycle 22 SLMCPR (Proprietary)" page 3 of 21 in Attachment 4 of Reference 2.

- h. For the rotated fuel assembly analysis ABB/CE stated its intent to vary gap sizes to reduce conservatism in the analysis accompanied by uncertainty analyses to establish the impact. Since the acceptability of this approach depends upon the validity of the uncertainty analysis, which has not been validated this approach is not acceptable.

This limitation does not apply to the SLMCPR analysis. This limitation is for the rotated bundle accident analysis.

## References

1. Letter from Mr. Jeffrey L. Hansen (Exelon Generation Company, LLC(EGC)) to U. S. NRC, "Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit," dated June 7, 2011
2. Letter from Mr. David M. Gullott (EGC) to U. S. NRC, "Request for Technical Specification Change for Safety Limit Minimum Critical Power Ratio," dated November 22, 2011
3. Letter from Joel S. Wiebe (NRC) to Mr. Michael J. Pacilio (EGC), "Quad Cities Nuclear Power Station, Units 1 and 2 – Request for Additional Information Related to Technical Specification Change for Safety Limit Minimum Critical Power Ratio (TAC Nos. ME6383 and ME7613)," dated December 19, 2011
4. CENPD-390-P-A, "The Advanced PHOENIX and POLCA Codes for Nuclear Design of Boiling Water Reactors," December 2000

5. CENPD-300-P-A, Revision 0, "Reference Safety Report for Boiling Water Reactor Reload Fuel," July 1996
6. Letter from Mr. David M. Gullott (EGC) to U. S. NRC, "Supplemental Information Supporting the Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit (TAC No. ME6383)," dated November 2, 2011
7. WCAP-16081-P-A, "10X10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2," March 2005