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Exelon Nuclear

RS-07-127

September 10, 2007

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

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: Additional Information Supporting Request for Safety Evaluation Revision 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 P. R. Simpson (Exelon Generation Company, LLC) to NRC, "Request for Safety Evaluation Revision Regarding Backup Stability Protection Methodology," dated March 9, 2007

3. Letter from C. Gratton (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 – Request for Additional Information Regarding Clarification of the Backup Stability Protection Methodology Evaluation (TAC Nos. MD4866 thru MD4869)," dated August 23, 2007

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. In Reference 2, Exelon Generation Company, LLC (EGC) requested the NRC to revise the safety evaluation for the Reference 1 amendment to reflect that the immediate scram region is defined

as the area in the power-flow map where the decay ratio is > 0.8, and the controlled entry region is defined as the area in the power-flow map where the decay ration is > 0.8 - cu.

The NRC requested additional information to complete review of this request in Reference 3. In response to this request, EGC is providing the attached information.

Attachment 1 contains information proprietary to Westinghouse Electric Company LLC; it is supported by an affidavit signed by Westinghouse, the owner of the information. The affidavit, provided in Attachment 2, 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 requested that the information be withheld from public disclosure in accordance with 10 CFR 2.390. A non-proprietary version of the information contained in Attachment 1 is also provided in Attachment 2.

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

Respectfully,

Patrick R. Simpson
Manager – Licensing

Attachments:
1. Response to Request for Additional Information (PROPRIETARY)
2. Westinghouse Application for Withholding, Affidavit, and Non-Proprietary Version of Attachment 1

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

ATTACHMENT 2

Westinghouse Application for Withholding, Affidavit, and Non-Proprietary Version of Attachment 1

Westinghouse Electric Company
Nuclear Services
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USA

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

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Our ref: CAW-07-2324

September 4, 2007

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: NF-BEX-07-175, Response to NRC's Request for Additional Information Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2 Regarding Clarification of the Backup Stability Protection Methodology Evaluation (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced response is further identified in Affidavit CAW-07-2324 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 Company, LLC.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-07-2324 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

J. A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Enclosures

cc: Jon Thompson/NRR

CAW-07-2324

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

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 and Plant Licensing

Sworn to and subscribed before me
this 4th day of September 2007

Sharon L. Markle
Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Sharon L. Markle, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Jan. 29, 2011
Member, Pennsylvania Association of Notaries

(1) I am Manager, Regulatory Compliance and Plant Licensing, 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 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 Response to NRC's Request for Additional Information Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2 Regarding Clarification of the Backup Stability Protection Methodology Evaluation (Proprietary), dated September 2007, being transmitted by Exelon Generation Company, LLC letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse for Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2 is responses to NRC's Request for Additional Information.

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

(a) Provide technical information in support of backup stability protection methodology.

(b) Assist 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 information 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

Response to NRC's Request for Additional Information Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2 Regarding Clarification of the Backup Stability Protection Methodology Evaluation (TAC Nos. MD4866 thru MD4869) (Non-Proprietary)

Westinghouse Electric Company
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355

Response to NRC's Request for Additional Information Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2 Regarding Clarification of the Backup Stability Protection Methodology Evaluation

NRC Request 1:

Please document the procedure used to calculate the cycle uncertainty (cu) term used to define the controlled entry region.

Response:

The cycle uncertainty (cu) factor conservatively accounts for variations in [ ]^{a,c} relative to those determined in the cycle design analysis. Sensitivity studies performed by Westinghouse have shown that the predicted decay ratio is most sensitive to variations in [ ]^{a,c}. The procedure for calculating cu utilizes an increase in [ ]^{a,c} to provide a simple, reasonably bounding means of determining the cycle uncertainty factor.

Based on plant operating experience, an increase in [ ]^{a,c} has been determined to be a reasonably bounding value to account for cycle uncertainty. For power / flow statepoints that are reasonably close to the scram exclusion boundary, this increase in [ ]^{a,c}, results in an increase in the calculated decay ratio. The decay ratio uncertainty provides a margin between the scram and controlled entry boundaries that is in reasonable agreement with the original definition of the Interim Corrective Action (ICA) exclusion boundaries.

The procedure for determining the cycle uncertainty factor is based on the following observations:

- Variations from a predicted cycle can occur in different ways; control rods can be inserted in order to 'control' fuel leakers, parts of the cycle can be operated with a reduced power or reduced feedwater temperature, etc. In addition, the typical design margin in the cycle design creates a possibility for changes (e.g., control rod patterns) during actual operation such that the [ ]^{a,c}. **Therefore, the exact variation from the predicted cycle is not known when the stability analysis is performed.**
- The [ ]^{a,c} are the main factors that contribute to a decrease in core stability. Since it is possible to create an [ ]^{a,c} without increasing the global mode decay ratio, **the method chosen must be such that the [ ]^{a,c} makes the core decay ratio more limiting.**

Based on the above observations, the method used to derive the cycle uncertainty factor is as follows:

A representative reload cycle design is perturbed to [ ]^{a,c} and concurrently increase the [ ]^{a,c} of the [ ]^{a,c} by [ ]^{a,c}. This perturbation is performed at the limiting cycle exposure and at a limiting stability statepoint (i.e., high power/low flow). A decay ratio calculation is performed and compared to the decay ratio calculated for the unperturbed case. The difference in the calculated decay ratios is then defined as the cycle uncertainty factor, cu.

The cycle uncertainty factor used for the first reloads of SVEA-96 Optima2 in the Exelon reactors was determined as described above. Calculations were made at the limiting exposure in the cycle for [

]^{a,c}. A decay ratio calculation was performed and compared to the decay ratio calculated for the unperturbed case. The difference in the calculated decay ratios was then defined as the cycle uncertainty factor, cu.

Due to the conservative approach for determining the cycle uncertainty factor, the value is considered cycle-independent and is applied generically to the first reloads of SVEA-96 Optima2. Additional information supporting the generic application of the cycle uncertainty factor is provided in response to NRC Request 3.

NRC Request 2:

Please provide the specific values for cu used for the latest reloads in Dresden Nuclear Station, Units 2 and 3 (DNPS) and Quad Cities Nuclear Power Station, Units 1 and 2 (QCNPS).

Response:

Based on the conservative approach described in the response to NRC Request 1, the Westinghouse calculated value of the generic cycle uncertainty factor 'cu' is [ ]^{a,c}. Thus, the RAMONA-3 decay ratio criterion for the calculation of the controlled entry region boundary is defined as 0.8 – [ ]^{a,c}. This decay ratio criterion is applied generically to the first Westinghouse reloads of SVEA-96 Optima2 for the Exelon reactors, and is expected to apply to subsequent reloads.

NRC Request 3:

Please describe which approved codes are used to generate the cycle uncertainty. Include a short description of any benchmark data to support the generic or plant-specific cu values used in DNPS and QCNPS.

Response:

Westinghouse performs RAMONA-3 stability calculations to define Backup Stability Protection (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). The application of RAMONA-3 for stability analyses is documented in the NRC approved topical reports CENPD-294-P-A, "Thermal-Hydraulic Stability Methods for Boiling Water Reactors," and CENPD-295-P-A, "Thermal-Hydraulic Stability Methodology for Boiling Water Reactors". RAMONA-3 also utilizes core physics parameters (3D distributions and cross section dependences) from the Westinghouse steady-state physics code package (PHOENIX/POLCA) described in the NRC approved topical report CENPD-390-P-A. The methodology has been further improved including new versions of the PHOENIX and POLCA codes as well as [

]^{a,c}.

The cycle uncertainty factor was determined generically as described in the response to NRC Request 1. The [ ]^{a,c} utilized in the evaluation of the cycle uncertainty factor has been determined to be a reasonably bounding value based on comparisons of measured [ ]^{a,c} from actual cycle operation against the predicted [ ]^{a,c} from the cycle design. The cycle design is the basis for the determination of the exclusion regions.

Additional information is provided comparing the predicted and actual cycle performance for recent Exelon reactors/operating cycles. The figures below provide a comparison of the

predicted and actual [ ]^{a,c} for the current Quad Cities 2 Cycle 19 with the first reload of SVEA-96 Optima2 (Figure 1), as well as Cycle 20 in Dresden 2 (Figure 2) and Cycle 19 in Dresden 3 (Figure 3). The last two examples are 'near-equilibrium' GE14 cycles.

The variations in [ ]^{a,c} are small in general, and do not exceed the maximum [ ]^{a,c} during the cycle assuming the [ ]^{a,c} conservative adder.

The demonstration also shows that the first reload of SVEA-96 Optima2 behaves in the same general way, with regard to [ ]^{a,c} vs. cycle burnup variation, as the 'near-equilibrium' GE14 cycles. The overall results support the generic applicability of the calculated cycle uncertainty factor.

[ ]a,b,c

[ ] a,b,c