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Withhold from Public Disclosure in accordance with 10 CFR 2.390. Upon removal of Enclosure A, this Letter is uncontrolled.

10 CFR 50
10 CFR 51
10 CFR 54

RS-14-267

September 11, 2014

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

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Withdrawal and Resubmittal of Information associated with NRC Set 31 RAIs, related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application

References:

1. Letter from Michael P. Gallagher, Exelon Generation Company LLC (Exelon) to NRC Document Control Desk, dated May 29, 2013, "Application for Renewed Operating Licenses."

2. Letter from Lindsay R. Robinson, US NRC to Michael P. Gallagher, Exelon, dated June 30, 2014, "Requests for Additional Information for the Review of the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application, Set 31 (TAC NOS. MF1879, MF1880, MF1881, and MF1882)"

3. Letter from Michael P. Gallagher, Exelon Generation Company LLC (Exelon) to NRC Document Control Desk, dated July 25, 2014, "Response to NRC Request for Additional Information, Set 31, dated June 30, 2014, related to the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, License Renewal Application"

4. Letter from Lindsay R. Robinson, US NRC to Michael P. Gallagher, Exelon, dated September 3, 2014, "Request for Withholding Information from Public Disclosure (TAC Nos. MF1879, MF1880, MF1881, MF1882)"

In Reference 1, Exelon Generation Company, LLC (Exelon) submitted the License Renewal Application (LRA) for the Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2 (BBS). In Reference 2, the NRC requested additional information (Set 31) to support NRC staff review of the LRA.

Within Enclosures A and B of Reference 3, Exelon provided proprietary and non-proprietary versions, respectively, of the response to the Set 31 RAI. However, as described in Reference 4, the NRC staff reviewed this information and concluded that, in some cases, insufficient justification was provided to determine that the information sought to be withheld from public disclosure contains proprietary information.

Based upon this feedback, the Set 31 response has been re-evaluated. Exelon requests withdrawal of the two versions of the response, that was provided in Enclosures A and B of Reference 3.

This letter re-submits the response to the Reference 2 Request for Additional Information as follows:

1. Within Enclosure A – Response to Request for Additional Information containing Proprietary Information, based on Westinghouse letter LTR-PAFM-14-70, Rev. 1, Attachment 1, "Byron and Braidwood Units 1 and 2 License Renewal: NRC Request for Additional Information Response (Proprietary)"

2. Within Enclosure B - Response to Request for Additional Information with Proprietary Information redacted, based on Westinghouse letter LTR-PAFM-14-70, Rev. 1, Attachment 2, "Byron and Braidwood Units 1 and 2 License Renewal: NRC Request for Additional Information Response (Non-Proprietary)"

As Item 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 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 Section 2.390 of the Commission's regulations.

Enclosure C of this letter provides the Westinghouse Application for Withholding Proprietary Information from Public Disclosure CAW-14-4011, accompanying Affidavit, Proprietary Information Notice, and Copyright Notice.

Accordingly, it is requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to the copyright or proprietary aspects of the item listed above or the supporting Westinghouse Affidavit should reference CAW-14-4011 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, Suite 310, 1000 Westinghouse Drive, Cranberry, Pennsylvania 16066.

There are no new or revised regulatory commitments contained in this letter.

If you have any questions, please contact Mr. Al Fulvio, Manager, Exelon License Renewal, at 610-765-5936.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 9-11-2014

Respectfully,

Michael P. Gallagher
Vice President - License Renewal Projects
Exelon Generation Company, LLC

Enclosures: A: Response to Request for Additional Information (Proprietary)
B: Response to Request for Additional Information (Non-Proprietary)
C: Application for Withholding Proprietary Information from Public Disclosure

cc: Regional Administrator – NRC Region III
NRC Project Manager (Safety Review), NRR-DLR
NRC Project Manager (Environmental Review), NRR-DLR
NRC Senior Resident Inspector, Braidwood Station
NRC Senior Resident Inspector, Byron Station
NRC Project Manager, NRR-DORL-Braidwood and Byron Stations
Illinois Emergency Management Agency - Division of Nuclear Safety

Enclosure B

Byron and Braidwood Stations (BBS), Units 1 and 2
License Renewal Application
Response to Request for Additional Information

Non-Proprietary Response

RAI 4.3.4-3a

Notes:

1. The response contained in this Enclosure does not contain proprietary information. Such information has been redacted from this response as evidenced by the blank space within the brackets shown within the response.

2. As further explained in the Proprietary Information Notice and Affidavit contained in Enclosure C, the justification for considering certain information proprietary is indicated by means of lower case letters located as a superscript adjacent to the brackets identifying each proprietary item. These lower case letters correspond to Sections (4)(ii)(a) through (4)(ii)(f) of the Affidavit.

RAI 4.3.4-3a

Applicability:

Byron Station (Byron) and Braidwood Station (Braidwood), all units

Background:

License renewal application (LRA) Section 4.3.4 states that the Class 1 components were grouped into transient sections, which is defined as a group of sub-components or locations that experience the same transients. The LRA further states that components that reside in the same transient section can easily be compared with each other to determine the most limiting component (or leading location), which is the location with the highest cumulative usage factor (CUF_{en}) value. The differences in stresses experienced by each component in a transient section are generally the result of the material and geometry differences.

In its response to request for additional information (RAI) 4.3.4-3, by letter dated March 28, 2014, the applicant described its environmentally-assisted fatigue (EAF) screening evaluation for the equipment locations that considered different materials within a transient section. The applicant provided details of its evaluation of the reactor vessel outlet nozzle region as an example to support its methodology description. In its response, the applicant stated that the leading location for this transient section was the safe end location, which is stainless steel, because it produced the highest screening CUF_{en} greater than 1.0.

Issue:

The staff noted that within a transient section that contains components of various materials (e.g., low alloy steel, nickel alloy, stainless steel), the applicant did not provide a basis for selecting a leading location based on the highest CUF_{en} value. The staff noted that the CUF_{en} value of different materials may respond differently when the EAF is being refined in the future. In the example of the reactor vessel outlet nozzle region, the applicant did not provide sufficient justification that the stainless steel component would continue to be the leading location for components made from other materials eliminated during this screening process after the CUF_{en} has been refined for the stainless steel component. The applicant did not justify that the refinement of the higher CUF_{en} of one material would ensure the reduction of CUF_{en} values for another material within the same transient section such that the selected leading location would remain appropriate.

Request:

1. Considering that refinements in CUF_{en} values may not always be equal, especially when evaluating different materials, justify, including any assumptions, that a location made from one material can serve as the leading location for other locations with CUF_{en} values greater than 1.0 within a transient section.

2. Identify the transient section, component, location, and material in which one material and location bound other materials and locations within a transient section.

3. Confirm that this methodology or justification in Request 1 was applied to all instances identified in Request 2. For those instances where the methodology was not used,

provide the different, additional bases for the selection of the leading location for a transient section that considered components of different materials and with CUF_{en} values greater than 1.0.

Exelon Response:

1. The "refinements in CUF_{en} values" referred to in the Request are those that would be incorporated in a detailed evaluation similar to those performed for the qualification of the NUREG/CR-6260 piping components presented in LRA Table 4.3.4-1. These include more detailed transient loading, in some cases more representative of actual plant operating conditions, more detailed finite element analysis models, coupled with stress combinations according to ASME Section III, NB-3200 methods, and application of the modified rate approach to determine integrated F_{en} values. The decisions made in the EAF screening process are based on the expected outcomes of such hypothetical evaluations if they were performed on each location being compared. These influences on the screening process for comparison of locations with different materials in the same transient section are discussed below.

   There are cases when it is possible to justify that a location made from one material can serve as the leading location for other material locations with CUF_{en} greater than 1.0 within a transient section. Justification must consider that CUF_{en} refinements "may not always be equal," which means that analysis refinement may affect the current licensing basis (CLB) CUF and final F_{en} values to different degrees for different materials. Therefore, comparison of screening CUF_{en} results for different material locations within a transient section needed to consider a number of principles to determine leading locations, as described below.

   Principles considered when making such a determination were as follows:

   a. Within a transient section, the transient loadings are the same for all components evaluated.
   b. The stresses at a location are a function of the component geometry, material properties, and the transient loading.
   c. The CUF for a location is a function of its input transient stresses and cycles, fatigue curve, and potentially the material allowable (S_m) value (if the K_e penalty (defined in ASME Section III, NB-3228.5) has an impact). With respect to these controlling factors:
      1) Reduced stresses produce reduced usage for all materials
      2) Fewer cycles produce reduced usage for all materials
   d. In a refined analysis, reductions in conservatism applied to the stresses are predominantly achieved by:
      1) Refinement of the modeling method(s) used to calculate stress from the applied loading (e.g., two-dimensional vs. one-dimensional heat transfer). This does not have different proportional effects on different materials.
      2) Refinement of the method used to combine stresses due to different loadings (e.g., addition of stress components before determining stress intensity vs.

addition of stress intensities). This does not have different proportional effects on different materials.

3) Refinement of the loading. In linear analyses, the stresses are proportional to the loadings, so reductions in stress in different materials would be affected proportionally for the same change in transient loading. Inelastic analysis would affect the proportion of stresses when refining the loading in different materials, but it has not been utilized; therefore this principle is still valid.

Therefore, material differences within a transient section would not result in a change in the relative magnitudes of stresses between the leading location and other locations.

e. The F_{en} values for different materials have different ranges for PWR conditions. The largest range is for stainless steel (SS) (2.5-15.3); the next largest range is for Ni alloys (1.0-4.5). The values for carbon and low alloy steel (LAS) are based on the threshold values produced by their equations in NUREG/CR-6583, due to the possible simultaneous values of temperature and DO (Dissolved Oxygen) in PWRs. Thus the differences in screening F_{en} values and possible refined analysis F_{en} values affect the comparison of locations.

Based on these principles, which include no assumptions, material differences impact F_{en} values the most, rather than other factors such as the calculated transient loads, calculated stress, calculated CUF, and modeling methods. The relative amounts of major reductions in stress and resulting fatigue usage from air curves in hypothetical refined analyses are not significantly affected by the material difference. The more variable area of reduction between materials is the F_{en} value. The combination of these effects must be considered in comparisons made in the screening process.

This leads to the following typical bases used for Byron and Braidwood for comparison of screening CUF_{en} for two locations with different materials to determine which is leading:

Basis Number 1

Potential reductions in transient cycles have approximately the same proportional effect on CUF_{en} for different materials within a transient section. Therefore, their application would not change the comparison conclusion for locations with different materials. This basis can be used in conjunction with the other two bases when making screening comparisons.

Basis Number 2

A location can be eliminated if, when compared to another location with a different material:

- its screening CUF_{en} is the same or less, and
- its analysis method (rank) is more conservative, and
- its range of F_{en} potential reduction is greater.

This is because a refined analysis would reduce the CUF of the eliminated location more significantly, based on engineering experience with refined analyses performed for NUREG/CR-6260 locations. For example, refined analysis for NUREG/CR-6260 locations has typically reduced CUF by a factor ranging from about [ ]^{a,c,e} to 15, to

accommodate the F_{en} factors for stainless steel. This is representative of the reduction in analysis method conservatism (rank). The reduction in F_{en} screening values ranges from factors of about 1 to 6, based on the range of 2.5 – 15.3 as discussed in principle e above. Therefore, a component with a greater potential reduction in CUF (as indicated by a more conservative analysis rank) and a greater potential reduction in F_{en} than another location of a different material can be eliminated.

Basis Number 3

A location can be eliminated if, when compared to another location with a different material:

- its screening CUF_{en} is the same or less, and
- its analysis method (rank) is more conservative, and
- its range of Fen potential reduction is less, provided the range of potential F_{en} reduction is further evaluated and still results in a lower CUF_{en}.

Evaluating the potential F_{en} reductions for each material will remove the uncertainty associated with the F_{en} penalty factor, leaving the CUF_{en} and the analysis rank as the controlling factors. One way this can be accomplished would be to confirm that even when each location's minimum material F_{en} is applied to their respective CLB CUF, the CUF_{en} for the component to be eliminated is still less than that of the other location. This eliminates the uncertainty that a component with a more conservative analysis rank could possibly be the leading location due to the different F_{en} reductions for each material.

In a case where these bases above cannot be demonstrated in comparing locations with different materials in the same transient section, it may be necessary to retain both as leading locations for further consideration.

2. All of the bounding locations compared for Byron and Braidwood Units 1 and 2 with different materials and CUF_{en} > 1.0 within a transient section are summarized below, along with related screening information:

Reactor Vessel Transient Section:

Location	Material	Analysis Ranking	CUF_{en}
Outlet nozzle safe end region:			
Safe end – Leading Location	SS	[ ]^{a,c,e}	1.688
Weld	Ni alloy	[ ]^{a,c,e}	< 1*
Nozzle body	LAS	[ ]^{a,c,e}	< 1*

* See response to Request 3 for additional discussion

Pressurizer Transient Section:

Location	Material	Analysis Ranking	CUF_{en}
Surge nozzle Structural Weld Overlay (SWOL) – Leading Location	SS	[ ]^{a,c,e}	14.329
Lower Head at Heater Penetration	LAS	[ ]^{a,c,e}	2.108
Upper Shell	LAS	[ ]^{a,c,e}	2.435
Instrument nozzle	SS	[ ]^{a,c,e}	3.469
Heater well	SS	[ ]^{a,c,e}	2.394
Spray nozzle body	LAS	[ ]^{a,c,e}	2.015

Unit 1 Replacement Steam Generator (RSG) Transient Section:

Location	Material	Analysis Ranking	CUF_{en}
Primary Head/Tubesheet Juncture – Leading Location	LAS	[ ]^{a,c,e}	2.16
Tubes	Ni alloy	[ ]^{a,c,e}	3.9 (0.97)*
Primary Head Drain Hole	LAS	[ ]^{a,c,e}	2.234
Inlet & Outlet Nozzle, Nozzle	LAS	[ ]^{a,c,e}	2.062
Inlet & Outlet Nozzle, Weld	Ni alloy**	[ ]^{a,c,e}	1.842**
Inlet & Outlet Nozzle, Safe End	SS	[ ]^{a,c,e}	1.535

* Value reduced with further detailed screening evaluation

** Considering the materials adjoining the Ni alloy weld, the screening evaluation conservatively applied the Stainless Steel F_{en} to the CLB CUF to obtain the screening CUF_{en}.

Unit 2 Original Steam Generator (OSG) Transient Section:

Location	Material	Analysis Ranking	CUF_{en}
Primary Manway (pad/shell) - Drain hole in Channel Head – Leading Location	CS	[ ]^{a,c,e}	1.723
Primary Chamber Drain – Leading Location	Ni alloy	[ ]^{a,c,e}	2.69
Divider Plate (drain hole)	Ni alloy	[ ]^{a,c,e}	1.54
Divider Plate (fillet weld)	Ni alloy	[ ]^{a,c,e}	1.61
Tubes	Ni alloy	[ ]^{a,c,e}	1.02
Tube/Tubesheet Weld	Ni alloy	[ ]^{a,c,e}	2.39
Tubesheet and Shell Junction	LAS	[ ]^{a,c,e}	1.053

RCP and Class 1 Piping Transient Sections – all locations in scope of the screening evaluation are stainless steel, and therefore this RAI does not apply.

3. Justification of the leading location selection in each transient section from locations with screening CUF_{en} > 1.0 and different materials presented in the response to Request 2 is discussed below. Each transient section containing different materials is evaluated using the principles and bases described in the response to Request 1 and from the methodology provided in response to RAI 4.3.4-5, contained in Exelon letter RS-14-266, dated September 11, 2014, to form the basis for the determination of leading locations.

   Note that in these discussions, the degree of conservatism in the CLB stress analysis method for the equipment locations was characterized by Rank from 1 to 3, where Rank 1 is least conservative and Rank 3 is most conservative. Therefore, given that all other factors are equal, a component with a ranking of 1 would be selected as the leading indicator for all other components in the same transient section which are ranked as 2 and 3. These stress analysis method ranking levels were uniquely applied to the equipment instead of the ranking presented in the response to RAI 4.3.4-5, due to the fact the stress analyses were all performed in accordance with ASME Section III, NB-3200. These ranking levels are a subpart of the level 5 ranking of Step 4 of the methodology presented in the response to Request 2 of RAI 4.3.4-5. The use of the 5 ranking levels presented in that response was used for piping and piping components only. For the equipment locations, the specific rank was determined within each transient section by relative comparison of the stress and fatigue evaluation details for the locations considered, accounting for stress analysis method, stress concentration application methods, stress combination methods, and degrees of transient grouping. For example, Rank 1 employed the most detailed stress analysis and combination methods, and little to no transient grouping. Rank 2 would utilize less detailed finite element stress analysis and some transient grouping. A Rank 3 location would employ interaction analysis or very simplified finite element methods with hand-calculations for stress analysis and treatment of discontinuities, and substantial transient grouping.

Reactor Vessel Transient Section:

The outlet nozzle safe end region consists of:

- Safe end – SS, Rank [ ]^{a,c,e} - Leading Location
- Weld – Ni Alloy, Rank [ ]^{a,c,e}
- Nozzle body – LAS, Rank [ ]^{a,c,e}

The fatigue resulting from the CLB stress at the RV outlet nozzle to safe end weld region was addressed for all three adjoining materials. A more detailed screening evaluation of the weld using the Ni alloy NUREG/CR-6909 fatigue curve and maximum screening F_{en} resulted in a $CUF_{en} < 1.0$. The nozzle controlling location in the LAS material was shown to have a screening $CUF_{en} < 1.0$; therefore, it can be concluded that an evaluation of the stress at the weld using the LAS fatigue curve and F_{en} would be enveloped, and therefore also be below 1.0. The leading stainless steel safe end location remained as the only material at this location with a $CUF_{en} > 1.0$. Based on these screening comparisons, a refined analysis of the stresses in the RV Outlet nozzle to safe end weld region would continue to demonstrate that the RV Outlet nozzle stainless steel safe end is the leading location. The basis for this conclusion is the original screening criteria, as described in the response to RAI 4.3.4-5, Step 3(i), and does not require the bases in response to Request 1.

Pressurizer Transient Section:

- Surge nozzle SWOL – SS, Rank [ ]^{a,c,e} – Leading Location
- Lower Head at Heater Penetration – LAS, Rank [ ]^{a,c,e}
- Upper Shell – LAS, Rank [ ]^{a,c,e}
- Instrument nozzle – SS, Rank [ ]^{a,c,e}
- Heater well – SS, Rank [ ]^{a,c,e}
- Spray nozzle body – LAS, Rank [ ]^{a,c,e}

Evaluation of SS locations:

The Instrument nozzle and Heater well are both SS, and therefore a consistent material comparison can be made with the SS leading location at the Surge nozzle SWOL. The analysis method rank comparison justifies the surge nozzle SWOL with a rank of [ ]^{a,c,e} as leading within the SS locations when compared to the Instrument nozzle and heater well, both with a rank of [ ]^{a,c,e}. The basis of this conclusion is the original screening criteria, as described in the response to RAI 4.3.4-5, Step 4 and does not require the bases in response to Request 1.

Evaluation of LAS locations:

The Lower Head at Heater Penetration is Rank [ ]^{a,c,e}
The Upper Shell and Spray nozzle body are Rank [ ]^{a,c,e}

a. In the case of the LAS locations, the screening maximum F_{en} is also the minimum F_{en} that can be obtained from the F_{en} equation due to the PWR environmental

conditions. The basis for this is presented in the response to RAI 4.3.4-5, Step 3(i). Therefore, there is no significant F_{en} reduction possible for LAS locations.

b. The comparison of the potential reductions in F_{en} that may be obtained in a refined analysis for each material, and corresponding rank between these LAS locations, and the leading SS location based on CLB CUF values is presented in the following table:

Pressurizer Transient Section Comparisons:

Location	Rank	Material	CLB CUF	Min F_{en}	(CLB CUF) X (Min F_{en})
Surge nozzle SWOL	[ ]^{a,c,e}	SS	0.9336	2.547	2.378
Lower Head at Heater Pen	[ ]^{a,c,e}	LAS	0.8586	2.455	2.108
Upper Shell	[ ]^{a,c,e}	LAS	0.992	2.455	2.435
Spray nozzle body	[ ]^{a,c,e}	LAS	0.821	2.455	2.015

Summary of evaluations:

a. Even if refined analysis of the SS surge nozzle SWOL location could reduce the overall F_{en} to the minimum value for SS, its effect would result in a CUF_{en} of approximately the same value as the Upper Shell LAS location, and it would still be greater than the others, based on application to CLB CUF values of the minimum F_{en} values. Therefore, further stress basis comparisons of the SS surge nozzle SWOL location are necessary, as described in basis number 3 in the response to Request 1, to confirm the leading location.

b. Considering analysis rank, when CLB conservatisms are removed in refined analysis, significantly more reduction in CLB CUF value is expected for the Rank [ ]^{a,c,e} Lower Head at Heater Penetration location, than for the Rank [ ]^{a,c,e} Surge nozzle SWOL location. Therefore, the Lower Head at Heater Penetration location is eliminated consistent with basis number 3 in the response to Request 1.

c. Considering analysis rank, when CLB conservatisms are removed in refined analysis, even more reduction in CLB CUF value is expected for the Rank [ ]^{a,c,e} Upper Shell and Spray nozzle body locations, than for the Rank [ ]^{a,c,e} Surge nozzle SWOL location. Therefore, the Upper Shell and Spray nozzle body locations are eliminated consistent with basis number 3 in the response to Request 1, utilizing the stress analysis method ranking described earlier in this response and in the response to Request 2 of RAI 4.3.4-5.

Therefore, the Surge nozzle SWOL SS location can be concluded as the leading location for the pressurizer. This conclusion from the discussion above is consistent with application of basis number 3 in the response to Request 1.

Unit 1 RSG Transient Section:

- Primary Head/Tubesheet Juncture – LAS, Rank [ ]^{a,c,e} – Leading Location
- Tubes – Ni alloy, Rank [ ]^{a,c,e}
- Primary Head Drain Hole – LAS, Rank [ ]^{a,c,e}
- Inlet & Outlet Nozzle, Nozzle – LAS, Rank [ ]^{a,c,e}
- Inlet & Outlet Nozzle, Weld – Ni alloy, Rank [ ]^{a,c,e}
- Inlet & Outlet Nozzle, Safe End – SS, Rank [ ]^{a,c,e}

Evaluation of Ni alloy locations:

The Tubes location was re-evaluated for the effect of the NUREG/CR-6909 fatigue curve for Ni alloys, and then a detailed stress basis comparison was performed. Although the stress calculation methodology was similar to the other Rank [ ]^{a,c,e} Ni alloy locations, the fatigue calculation methodology was significantly more conservative due to transient grouping. To preclude a more detailed evaluation to quantify the degree of conservatism, an evaluation maintaining the CLB conservative grouping and using 60-year projected cycles demonstrated $CUF_{en} < 1.0$, therefore confirming that refined analysis would eliminate this location from consideration. The basis for this conclusion is the original screening criteria, as described in the response to RAI 4.3.4-5, Step 3(ii), and does not require the bases in the response to Request 1.

The Inlet & Outlet Nozzle Weld is discussed below with the SS locations, since the screening evaluation conservatively considered the SS F_{en} and resulting CUF_{en}.

Evaluation of LAS locations:

An analysis rank comparison concludes that the Primary Head/Tubesheet Juncture (Rank [ ]^{a,c,e}) is the leading LAS location, since its screening CUF_{en} value (2.16) is greater than the Inlet & Outlet Nozzle LAS location (CUF_{en} 2.062, Rank [ ]^{a,c,e}), and is only slightly less than the Primary Head Drain Hole (CUF_{en} 2.234, Rank [ ]^{a,c,e}). The fact that the Primary Head/Tubesheet Juncture CUF_{en} is slightly less than the Primary Head Drain Hole CUF_{en} is not a concern due to the analysis rank differences and the capability of obtaining a considerably greater reduction in the Primary Head Drain Hole CUF_{en} value when performing refined analysis. Therefore the CLB CUF values for the latter two locations could be reduced much further than the Primary Head/Tubesheet Juncture CLB CUF, based on the degrees of analysis conservatism, and can be eliminated among the LAS materials. This conclusion is consistent with the original screening criteria, as described in the response to RAI 4.3.4-5, Step 4, and does not require the bases in the response to Request 1.

Evaluation of SS locations:

a. An analysis rank comparison indicates that refined analysis for the Inlet & Outlet Nozzle Weld and Inlet & Outlet Nozzle Safe End locations would reduce the CLB CUF values for these locations (Rank [ ]^{a,c,e}) more significantly than refined analysis would for the Primary Head/Tubesheet Juncture (Rank [ ]^{a,c,e}).

b. The capability of reducing the screening F_{en} of 15.348 for SS is much greater than reducing the screening F_{en} of 2.455 for LAS, since the latter is the minimum value of the NUREG/CR-6583 equation based on PWR environment, but the minimum F_{en} for SS is 2.547. This F_{en} reduction consideration is also applicable for the Inlet & Outlet Nozzle Weld if evaluated with Ni alloy properties, since the F_{en} range for Ni alloys is also greater than for LAS.

c. Given that the screening CUF_{en} values for the SS locations are lower than that of the Primary Head/Tubesheet Juncture, and that the potential reductions of conservatism in analysis method and F_{en} are much greater for the SS screening locations due to the difference in analysis method ranking, the SS locations can be eliminated, and the Primary Head/Tubesheet Juncture remains as the leading location. This is consistent with basis number 2 in the response to Request 1.

Therefore, the Primary Head/Tubesheet Juncture remains as the leading location.

Unit 2 OSG Transient Section:

- Primary Manway (pad/shell) - Drain hole in Channel Head – CS, Rank [ ]^{a,c,e} – Leading Location
- Primary Chamber Drain – Ni alloy, Rank [ ]^{a,c,e} – Leading Location
- Divider Plate (drain hole) –Ni alloy, Rank [ ]^{a,c,e}
- Divider Plate (fillet weld) –Ni alloy, Rank [ ]^{a,c,e}
- Tubes - Ni alloy, Rank [ ]^{a,c,e}
- Tube/Tubesheet Weld –Ni alloy, Rank [ ]^{a,c,e}
- Tubesheet and Shell Junction – LAS, Rank [ ]^{a,c,e}

CS locations:

Only one location - Primary Manway (pad/shell), Drain hole in Channel Head, Rank [ ]^{a,c,e} (CUF_{en} = 1.723)

Ni alloy locations:

Rank [ ]^{a,c,e} locations:

- Primary Chamber Drain CUF_{en} = 2.69
- Divider Plate (drain hole) CUF_{en} = 1.54
- Divider Plate (fillet weld) CUF_{en} = 1.61

Among the Ni alloy Rank [ ]^{a,c,e} locations, a common stress basis comparison can be made based on CUF_{en} to conclude that the Primary Chamber Drain leads,

based on the original screening criteria, as described in the response to RAI 4.3.4-5, Step 4, and does not require the bases in the response to Request 1.

Rank [ ]^{a,c,e} locations:

- Tubes CUF_{en} = 1.02
- Tube/Tubesheet Weld CUF_{en} = 2.39

Among the Ni alloy Rank [ ]^{a,c,e} locations, a common stress basis comparison can be made based on screening CUF_{en} to conclude that the Tube/Tubesheet Weld leads, based on the original screening criteria, as described in the response to RAI 4.3.4-5, Step 4.

Between the Ni alloy Rank [ ]^{a,c,e} and Rank [ ]^{a,c,e} leading locations, since the Tube/Tubesheet Weld has a lower screening CUF_{en}, and, based on stress analysis ranking, its CUF could be reduced significantly more than the Primary Chamber Drain by removing analysis conservatism, the Tube/Tubesheet Weld can be eliminated from the Ni alloy leading location consideration. This is consistent with the original screening criteria, as described in the response to RAI 4.3.4-5, Step 4 and does not require the bases in response to Request 1.

Therefore, the Primary Chamber Drain is concluded to be the Ni alloy leading location.

LAS locations:

Only One location - Tubesheet and Shell Junction, Rank [ ]^{a,c,e} CUF_{en} = 1.053

Comparison of CS, Ni alloy, LAS leading locations:

Unit 2 Original Steam Generator (OSG) Transient Section Comparisons:

Location	Rank	Material	CUF	Screening F_{en}	CUF_{en}
Primary Manway (pad/shell) - Drain hole in Channel Head– Leading Location	[ ]^{a,c,e}	CS	0.99	1.74	1.723
Primary Chamber Drain– Leading Location	[ ]^{a,c,e}	Ni alloy	0.594	4.524	2.69
Tubesheet and Shell Junction	[ ]^{a,c,e}	LAS	.429	2.455	1.053

A comparison based on analysis ranking and CUF_{en} indicates that the Tubesheet and Shell Junction can be eliminated as a candidate for leading location, since its analysis rank is [ ]^{a,c,e} compared to [ ]^{a,c,e} for the other two locations, and its screening CUF_{en} is less. As a rank [ ]^{a,c,e} location, there should be sufficient conservatism in the CLB to remove and demonstrate CUF_{en} below 1.0. This is consistent with basis number 2 in the response to Request 1.

> Although the Primary Chamber Drain produced a greater screening CUF_{en} in the initial screening step, the Primary Manway (pad/shell)-Drain hole in Channel Head location was also retained for additional analysis due to the material difference and the similar analysis ranking. This is because the Primary Chamber Drain screening CUF_{en} was a bounding value for the materials associated with the same stress location. The CLB usage factor evaluation was based on stresses at the boundary of the Ni alloy weld and CS head. Therefore, in the CLB it was conservative to use the lower fatigue curve of the CS, which is the basis for the CUF. (The CS/LAS fatigue curve is lower than the NUREG/CR-6909 curve for nickel alloys, thus providing fewer allowable cycles for a given alternating stress. Therefore, the 0.594 usage factor was retained for EAF screening purposes for application of the nickel alloy F_{en}.) However, quantification of the effect of a fatigue curve adjustment to reflect the Ni alloy material and application of the applicable Ni alloy F_{en} requires more detailed analysis.

Therefore, both the Primary Manway (pad/shell) - Drain hole in Channel Head, and the Primary Chamber Drain locations were retained as leading locations for the Unit 2 OSGs.

As presented above, the methodology or justification described RAI 4.3.4-5 and in the response to Request 1 was applied to all instances identified in the response to Request 2, considering components of different materials and with CUFen values greater than 1.0. Also provided are any additional considerations necessary for the selection of the leading location for a transient section.

Enclosure C

Application for Withholding Proprietary Information from Public Disclosure

Supporting the following Set 31 RAI Response

RAI 4.3.4-3a

Notes:

1. The Proprietary version of the response is contained in Enclosure A.

2. This Enclosure consists of this cover page and seven pages associated with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure.

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CAW-14-4011

September 9, 2014

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-PAFM-14-70, Revision 1, Attachment 1, "Byron and Braidwood Units 1 and 2 License Renewal: NRC Request for Additional Information Response" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-14-4011 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.

In order to provide responses to information requests that refer to licensee CLB information, LRA information, or other publicly available documents such as NRC NUREG publications, such information may be mentioned within the context of a response discussing how that information is used as part of a Westinghouse proprietary methodology. This mention of public information within the context of a proprietary response does not affect the public status of that information

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse Affidavit should reference CAW-14-4011, and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 3 Suite 310, Cranberry Township, Pennsylvania 16066.

Very truly yours,

James A. Gresham, Manager
Regulatory Compliance

Enclosures

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared James 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:

James A. Gresham, Manager
Regulatory Compliance

Sworn to and subscribed before me
this 9th day of September 2014

Notary Public

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Anne M. Stegman, Notary Public
North Huntingdon Twp., Westmoreland County
My Commission Expires Aug. 7, 2016
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

(1) I am Manager, Regulatory Compliance, 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 constitute Westinghouse policy and provide 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.

(iii) 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.

(iv) 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.

(v) 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.

(vi) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in LTR-PAFM-14-70, Revision 1, Attachment 1 "Byron and Braidwood Units 1 and 2 License Renewal: NRC Request for Additional Information Response" (Proprietary), for submittal to the Commission, 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 is that associated with NRC letter REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE BYRON STATION, UNITS 1 AND 2, AND BRAIDWOOD STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION, SET 31 (TAC NOS. MF1879, MF1880, MF1881, AND MF1882), and may be used only for that purpose.

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

(i) Perform environmental fatigue screening with consideration for different materials within the same transient section.

(ii) Utilize the Westinghouse Reference Fatigue Database

(b) Further this information has substantial commercial value as follows:

(i) Westinghouse plans to sell the use of the information to its customers for the purpose of performing environmental fatigue screening evaluations with consideration of different materials within the same transient section.

(ii) 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 environmental fatigue screening 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 non-proprietary versions of documents furnished to the NRC in connection with NRC letter REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE BYRON STATION, UNITS 1 AND 2, AND BRAIDWOOD STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION, SET 31 (TAC NOS. MF1879, MF1880, MF1881, AND MF1882), and may be used only for that purpose.

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).

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