Westinghouse

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

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

Direct tel: (412) 374-4643
Direct fax: (412) 374-4011
e-mail: greshaja@westinghouse.com

Our ref: LTR-NRC-04-16

March 3, 2004

Subject: Westinghouse Proprietary and Non-Proprietary Responses to the Requests for Additional Information (RAIs) on WCAP-16009-P, "Realistic Large Break LOCA Evaluation Methodology Using the Automated Statistical Treatment Uncertainty Method"

This information is being submitted by Westinghouse Electric Company LLC to Mr. Brian Benney of the U.S. Nuclear Regulatory Commission to support the review of Westinghouse proprietary report WCAP-16009-P, "Realistic Large Break LOCA Evaluation Methodology Using the Automated Statistical Treatment Uncertainty Method."

This submittal contains proprietary information of Westinghouse Electric Company, LLC. In conformance with the requirements of 10 CFR Section 2.790, as amended, of the Commission's regulations, we are enclosing with this submittal an Application for Withholding from Public Disclosure and an affidavit. The affidavit sets forth the basis on which the information identified as proprietary may be withheld from public disclosure by the Commission.

Correspondence with respect to the affidavit or Application for Withholding should reference AW-04-1797 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

cc: B. Benney

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/Enclosures

1. One copy (1) of the Application for Withholding, AW-04-1797 (Nonproprietary) with Proprietary Information Notice and
2. One (1) copy of Affidavit (Nonproprietary).

/Attachments

1. 2 copies of Westinghouse Proprietary Responses to the Requests for Additional Information (RAIs) on WCAP-16009-P, "Realistic Large Break LOCA Evaluation Methodology Using the Automated Statistical Treatment Uncertainty Method"

2. 2 copies of Non-Proprietary Responses to the Requests for Additional Information (RAIs) on WCAP-16009-P, "Realistic Large Break LOCA Evaluation Methodology Using the Automated Statistical Treatment Uncertainty Method"

Attachment 2

Non-proprietary Responses to the Requests for Additional Information (RAIs) on WCAP-16009-P, "Realistic Large Break LOCA Evaluation Methodology Using the Automated Statistical Treatment Uncertainty Method"

WCAP-16009-P Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)

Responses to Request for Additional Information

General Response:

WCAP-16009-P explains the proposed revisions to the uncertainty treatment in the Westinghouse BELOCA methodology. The underlying concept of non-parametric sampling has been previously approved by the USNRC for other nuclear reactor safety calculations, including. realistic large break LOCA analyses performed under the provisions of 10CFR50.46. As in that method, Westinghouse samples the Peak Cladding Temperature (PCT) by performing 59 computer runs. In the original methodology described in Revision 0 of WCAP-16009-P, the maximum local oxidation (MLO) and core-wide oxidation (CWO) are calculated from the case with the limiting (highest) PCT. 59 runs are adequate to claim that the resultant PCT is greater than or equal to the 95th percentile PCT with a confidence of 95%. The claim that the MLO and CWO are satisfied at a high probability assumes that there is a strong correlation between the PCT and oxidation. Nutt and Wallis [1] showed that the non-parametric statistical sampling technique can be used in realistic LOCA applications to bracket the 95th percentile PCT, MLO, and CWO, and satisfy the regulatory requirements with 59 cases.

Westinghouse proposes to adjust our application of the non-parametric method as follows. In order to make a unique uncertainty statement for the three output variables, these variables will be sampled independent of each other. Although there is a strong correlation between them, they are not exclusive functions of each other. For example, the highest maximum local oxidation among the sampled runs may not be obtained from the same case that has the highest PCT. To accommodate this, and to treat the output variables with equal weight without emphasizing one over other, Westinghouse will report the maximum PCT, MLO and CWO values from all 59 cases. [

]^{a,c}

Assuming staff concurrence, Westinghouse will provide the appropriate revisions to the affected text in WCAP-16009-P to reflect this change. The proposed change is minor and does not significantly change either the methodology or the results from WCAP-16009-P. However, this change is considered to be an improvement to the methodology, in that it reflects increased statistical rigor.

Reference [1]:

Nutt, W. T., and Wallis, G. B., "Evaluation of nuclear safety from the outputs of computer codes in the presence of uncertainties," *Reliability Engineering and System Safety* 83 (2004) pp. 57-77.

11. Sensitivity and Uncertainty Analysis

11-1 Technical Basis for Revised Uncertainty Methodology

1) You state that the ASTRUM methodology will "provide a simple, singular statement of uncertainty". Please define clearly what the "singular statement of uncertainty" is about.

Response:

In the proposed ASTRUM methodology, the uncertainty statement is made about the peak cladding temperature (PCT) as well as the maximum local and core-wide oxidation (MLO and CWO). In ASTRUM, we assert with high confidence that the maximum calculated PCT, MLO, and CWO from the 59 cases will bracket the 95th percentile of all possible values that could be obtained from the Code.

The term "simple, singular statement of uncertainty" was being used on page 11-1 to characterize the Code Scaling, Applicability, and Uncertainty (CSAU) study. The term "singular", which appears multiple times in the RAIs, is not an essential element of the revised uncertainty method. We understand the concerns about the adequacy of the sample size and/or the specific confidence claim when three variables, namely Peak Cladding Temperature (PCT), Maximum Local Oxidation (MLO), and Core-wide Oxidation (CWO), are involved. The responses given to the RAIs below will address these concerns.

i) What is/are the variable(s) about which the statement of uncertainty is made?

Response:

The PCT, local oxidation, and core-wide oxidation are the variables about which the uncertainty statement is made.

ii) Are they all considered random variables? What exactly is the "singular" statement?

Response:

The computer runs are made using certain input randomly sampled from their respective distributions. PCT is a function of these variables. Local and core-wide oxidation are closely correlated to the PCT, but the ability to satisfy the regulatory requirements is not predicated on this fact.

Variables that are functions of random variables are themselves random variables. Thus, the variables about which the uncertainty statement is made are considered random variables. The uncertainty statement is that these computed variables bracket 95% of the overall population with high confidence. The uncertainty statement issue is discussed below with further detail under (2)(ii) response.

iii) How are you quantifying the uncertainty? That is, if you are quantifying uncertainty in terms of probability about a random variable, please give the variable and its associated probability that make up the "simple, singular statement of uncertainty".

Response:

WCAP-16009-P states that a 95/95 (confidence/probability) PCT is calculated using the non-parametric method meaning that the resultant PCT bounds the 95% of population with 95% confidence. Local and core-wide oxidation were originally proposed to be calculated from the same case without a specific uncertainty statement associated with them. However, the concern about the adequacy of the sample size when three variables are considered is acknowledged. These concerns will be addressed under RAI #2, below. The revised quantification of uncertainty can be specifically stated as follows:

"We assert with high confidence that the maximum calculated PCT, MLO and CWO from the 59 cases will bracket the 95th percentile of all possible values that could be obtained from the Code."

iv) Please explain in detail how ASTRUM's "simple, singular statement of uncertainty" meets the requirements of 10CFR 50.46.

Response:

iv) Following is an excerpt from 10CFR50.46, subtitle (a)(1)(i):

"... Comparisons to applicable experimental data must be made and uncertainties in the analysis method and inputs must be identified and assessed so that the uncertainty in the calculated results can be estimated. This uncertainty must be accounted for, so that, when the calculated ECCS cooling performance is compared to the criteria set forth in paragraph (b) of this section, there is a high level of probability that the criteria would not be exceeded. ..."

Using 59 samples, there is a high level of probability that the criteria would not be exceeded. This high probability is ensured by a confidence of 0.95 if PCT is the only variable of interest or other variables, local and core-wide oxidation, are direct functions of it. In an extreme case, if we assume these three variables are completely independent, using 59 samples to bracket 95% of the population would result in a confidence level of at least 0.86. This point is further discussed as part of the response to the following RAI.

Since oxidation is not completely independent of PCT, it is reasonable to assume that the confidence associated with the results from 59 cases is between 86% and 95%. This is considered a high level of confidence, for the purpose of evaluating emergency core cooling system performance for a hypothetical large break LOCA.

2) You state that "ASTRUM relies on a statistical sampling technique". We resort to sampling because of a lack of information. In light of the above discussion, what information is lacking to meet the requirements of 10CFR 50.46 without statistical sampling?

Response:

The statistical sampling is used because of lack of information on true distribution of PCT. In other words, given the input conditions including the plant operating conditions and physical model uncertainties, one cannot claim with complete certainty a PCT answer. However, by sampling from the unknown distribution, one can ascertain with an associated confidence, that a specific percentage of the population is bracketed by the result.

The requirements of 10CFR50.46 can be met without statistical sampling by using conservative deterministic analyses.

i) Probability is a real number in the interval from zero to one. How does the ASTRUM methodology compute the probability (i.e. a real number in the interval from zero to one) which shows "with a high probability that none of the criteria (i.e. note plural) of paragraph 50.46(b) will be exceeded".

Response:

In the proposed methodology, the 95/95 (confidence/probability) statement was made for PCT only, and it still holds for one variable. If two additional variables, namely local oxidation and core-wide oxidation are also considered as sampled variables, we maintain that the probability is still 0.95 but the confidence level may decrease, if the three variables are not strongly correlated. Since the local and core-wide oxidations are highly correlated with the PCT, a high confidence is still maintained (it may be slightly lower than 95%). If there were perfect correlation among the three variables, the 95/95 result could have been claimed for each of the three. With a strong correlation among the three variables, Westinghouse maintains that the confidence level is high and the probability is still 95%, which meets the 10CFR50.46 criteria.

ii) If the ASTRUM methodology appeals to the statement in Reg. Guide 1.157 that "since the other criteria are strongly dependent on peak cladding temperature, explicit consideration of the probability of exceeding the other criteria may not be required if it can be demonstrated that meeting the temperature criterion at the 95% probability level ensures with equal or greater probability that the other criteria will not be exceeded.", how are you demonstrating this? That is, the current ASTRUM methodology is predicated on a sample of 59 runs for a 95/95 PCT one-sided tolerance limit (i.e. a single criterion); 58 runs would be insufficient; 60 runs would either increase the population fraction or level of confidence or both. Therefore, there is a limited amount of information in 59 runs. In view of this how can you claim compliance with the above statement with regard to all the criteria based on 59 runs? What is the probability (a real number between 0 and 1) that "the other criteria" will not be exceeded?

Response:

ii) Assume that v is the probability of interest for each variable. Further assume that v = 0.95 and that the sample size is 59 runs. As Nutt and Wallis (2004) show, the joint confidence that can be stated depends on the pair-wise correlations among the three output variables. In the limiting case of perfect pair-wise positive correlations between all output variables, the joint confidence is identical to the confidence for a single output variable,

$$\beta = 1 - v^N = 1 - 0.95^{59} \approx 0.95 \qquad (1)$$

At the other extreme of complete lack of correlation between variables the joint confidence is,

$$\beta = (1 - v^N)^3 = (1 - 0.95^{59})^3 \approx 0.86 \qquad (2)$$

More generally, the joint confidence relationship for three outputs, using conditional probabilities, is

$$\beta = 1 - 3v^N + (v\psi_2^1)^N + (v\psi_3^1)^N + (v\psi_3^2)^N - (v\psi_2^1\psi_3^{12})^N \qquad (3)$$

The ψ are conditional probabilities read as, for example, the probability that variable 2 brackets its 95th percentile value ("succeeds") given that 1 has done so and, in the last term, the probability that variable 3 succeeds given that both 1 and 2 have succeeded.

Nutt and Wallis (2004) provide some empirical evidence that these conditional probabilities are near unity, specifically, about 98 percent. Figure 12-36 shows that similar results are also obtained with Westinghouse methodology. Substituting conditional probabilities of 0.98 into (3), along with N=59 and v=0.95 yields a joint confidence of β=0.89. Although the correlations and conditional probabilities are very close to unity, when three output variables (PCT, local and core-wide oxidation) are considered, one cannot make a 95/95 statement about all three, if the sample size is 59. However, this sample size is sufficient to ensure a high level of probability, specifically the confidence level of all three variables bracketing 95% of their populations is greater than 0.86 and realistically is around 0.89.

Reference:
Nutt, W. T., and Wallis, G. B., "Evaluation of nuclear safety from the outputs of computer codes in the presence of uncertainties," *Reliability Engineering and System Safety* 83 (2004) pp. 57-77.

11-2 Technical Basis for Additional Parameters Considered in Uncertainty Analysis

11-2-1 Break Type and Size

1) The ASTRUM methodology assigns equal frequency (50%) to DECLG and split breaks based on "a series of sensitivity runs that compared split and guillotine breaks". It is concluded "that the most limiting split break and the most limiting double-ended guillotine break have comparable PCTs for both 3-loop and 4-loop plants." as justification for the 50/50 split.

i) What do you mean by "most limiting"? The largest? What are the random variables in these calculations?

Response:

The phrase "most limiting" is referring to the break with the highest peak cladding temperature (PCT). The sensitivity studies referred to in this discussion were a deterministic set of transient calculations, in which the break flow rate was varied for each break type. The break flow rate was varied for split and guillotine breaks by varying the break flow area, using the modeling shown in Figures 11-2 through 11-5. The most limiting split and guillotine transients from those sensitivity studies are summarized below (see Table 11-1 for the complete run matrix):

Plant Type	Break Type	Break Area	Break Discharge Coefficient (CD)	PCT (°F)
[				
				]a,c

The only parameters varied in these studies were break type and break flow rate. It can be seen that the limiting split and limiting guillotine breaks for the 3-loop and one of the 4-loop plants are very similar, with the split slightly higher. For the other 4-loop plant the limiting guillotine is limiting.

Had other random variables been sampled, the limiting break type and/or flow rate could be different. Therefore, it is considered appropriate to vary all of the parameters at the same time.

ii) ***Fig 11-1 is proffered as evidence for these conclusions. Please clarify the following editorial issues: The figure title refers to 3- and 4- Loop PWRs, while the labels for both figures say four-loop plant. The open and closed symbols, which distinguish split and guillotine breaks, are not distinguishable in the submitted figures.***

Response:

Enclosed are corrected Figures 11-1(a) and 11-1(b), which show the reflood (limiting) PCTs for representative 3-loop and 4-loop PWRs. We inadvertently imported the 4-loop blowdown PCT plot from Section 22-6 of WCAP-12945-P-A, instead of the 3-loop reflood PCT plot. This was noted by Westinghouse during the closed meeting held on August 5, 2003, and the correct figures were submitted as part of the proprietary presentation material [Reference: LTR-NRC-03-39, letter from H.A. Sepp (Westinghouse) to the Document Control Desk (U.S.NRC), dated July 23, 2003]. We will correct these plots in the final version of WCAP-16009-P to be consistent with this submittal.

a,c

Figure 11-1(a). Split vs. DECLG Reflood PCT for 3-Loop PWR a,c

Figure 11-1(b). Split vs. DECLG Reflood PCT for 4-Loop PWR

iii) ***In Table 11-1 what is the difference between PCT_1, PCT_2 and PCT_3? In this table what is meant by "Break Area Fraction Or (C_D)"? In what sense are you using "Or"?***

Response:

Table 11-1 is identical to Table 22-6-2 of WCAP-12945-P-A. That methodology calculates the final PCT uncertainty distribution by a combination of response surface equations and Monte Carlo sampling. It requires that three separate time periods be considered; blowdown (PCT_1), early reflood (PCT_2), and late reflood (PCT_3). Since response surfaces are not used in the ASTRUM methodology, this terminology is no longer relevant.

"Break Area Fraction" is the appropriate title for the split breaks, while "CD" is the appropriate title for the guillotine breaks. "Or" is used in this context.

iv) ***The PCT in a LOCA is a function of break flow rate which in turn in the ASTRUM methodology is dependent on the random variables – break type, size and discharge coefficient. How can you uniquely infer a density distribution for break type (i.e. probability of 0.50) from the limiting PCT? In principle, this is an inverse problem and does not have a unique solution. How would you counter my claim that the probability of a DECLG is 0.1 and a split break is 0.9?***

Response:

A large break LOCA is a hypothetical design basis accident, used for setting the ECCS performance requirements. The use of a 50/50 probability for break type is a simplifying assumption, which results in the effective break size (CD*A) being biased towards middle to high values (Figure 12-29). If the break size distribution were uniform (i.e., all break sizes are equally probable), a less conservative result might be obtained. This modest conservatism is considered acceptable, in order to avoid postulating a more complicated distribution.

The regulatory requirement for the use of realistic LOCA methods is to satisfy the ECCS acceptance criteria at a high level of probability. The most limiting split break case and the most limiting guillotine break case from a sample size of 59, with an assumed 50/50 probability on break type, will both be at a high level of probability.

v) ***If the break-type frequency is truly 50/50, why bother considering it? PCT will be a function of break size and discharge coefficient only. Please note and comment on the following:***

To take into account the uncertainty in the Break Type and Size in a LOCA analysis with COBRA/TRAC you need to sample from a bivariate probability distribution P(Break Type, CD).

This distribution can be written as

P(Break Type, CD) = P(CD| Break Type) * P(Break Type).

ASTRUM makes the following assumptions:

a) ***P(DECLG) = P(split break) = 0.5,***

b) ***P(CD|Break Type) = P_M(CD), That is, the probability of the discharge coefficient is independent of the break type and is given by the distribution (Fig. 1-2) based on the Marviken data.***

Thus, there is no distinction in the uncertainty analysis with regard to break type; the only distinction is with regard to the deterministic modeling.

The heart of the matter is that for a fixed CD the choice of break type affects the PCT. Therefore, the split between the two break types will affect the distribution of PCT which forms the basis for the upper one-sided tolerance limit. You have not demonstrated that a 50/50 split in the break type has any connection to reality.

Response:

As discussed in the response to iv above, the 50/50 split is a simplifying assumption that is made for practicality. The most limiting split break case and the most limiting guillotine break case from a sample size of 59, with an assumed 50/50 probability on break type, will both be at a high level of probability.

The break type sampling does affect the deterministic modeling, as noted by the reviewer. It also affects the break size, and the flow split to the break. For a double-ended guillotine break, the total flow area is, by definition, two times the pipe area. There is no direct flow communication between the two ends of the break. For a split break, the total flow area is between [ ][a,c], and there is direct flow communication at the common pressure point prior to the break.

11-2-1-1,2 Modeling of Breaks

1) ***In a specific application of the ASTRUM methodology is the table of the pressure in the BREAK component generated for the containment at hand or is the table a generic table?***

Response:

The pressure in the BREAK component is calculated on a plant-specific basis, for the containment at hand.

2) ***Please show the frequency distribution of measured flow / predicted flow given by the Marviken data and on which the cumulative frequency distribution (Fig. 1-2) is***

based. Is there any correlation with break size (break type?)? How is the "predicted flow" computed?

Response:

The development of the cumulative frequency distribution shown in Figure 1-2 is described in detail in Section 25-2 of WCAP-12945-P-A. The histogram of measured flow / predicted flow used to develop Figure 1-2 is shown in Figure 25-2-9 of that reference.

The parameters varied in the Marviken data were nozzle length and diameter, initial subcooling, and initial pressure. The conditions for each test are shown in Table 16-4-2 of WCAP-12945-P-A. Comparisons of the predictions to the data did not show any significant differences in predictive capability for variations in nozzle geometry or test conditions.

The break flow predictions were obtained as follows (figure numbers correspond to WCAP-12945-P-A):

- Each test was modeled as shown in Figure 16-4-3
- [

]a,c

11-2-2 Time in Cycle

1) ***An ASTRUM analysis assumes that a LOCA is equally probable over the fuel residence time in a burn cycle. Thus, the time at which the LOCA occurs is distributed uniformly over the cycle length. ASTRUM samples the "cycle burnup" from a uniform distribution. What is meant by "cycle burnup"? Burnup and time-in-cycle are not the same thing; depending on reactor operation the same time-in-cycle can result in very different burnups. How do you take this variance into account in light of the basic assumption of a uniform distribution in time?***

Response:

"Cycle burnup" refers to the core average burnup accumulated during the current cycle. Typical values at end of cycle are on the order of 20000 MWD/MTU. If a fresh fuel rod operated at an average relative power of 1.35 over that cycle, it would have accumulated a burnup of 27000 MWD/MTU.

The most economical way to operate a PWR in the US is in "base load" mode, where 100% power is maintained throughout the cycle. In base load, burnup and time in cycle are directly related.

If a plant "load follows", or varies power based on grid demand, the two will not be as closely linked. While US PWRs have the capability to load follow, this is not a common practice due to the economics. However, the practice of doing a power coastdown at the end of cycle is fairly common. A power coastdown involves a gradual reduction in thermal and electrical power, as the core reactivity decreases. This can take place over a period of up to several weeks, and will slightly affect the relationship between time in cycle and burnup.

Mid-cycle power reductions for maintenance, scrams, etc. can also cause some differences between burnup and time in cycle. However, these are generally of limited duration.

The main parameters affected by time in cycle or burnup are initial stored energy and decay heat. For the purposes of determining initial stored energy and decay heat, we are assuming that the reactor is operating at full power throughout the cycle. With this assumption, time in cycle and burnup are equivalent. The distinction between the two to allow for those times when the reactor is not at full power does not materially affect the uncertainty analysis.

2) ***You say "The average- and low-power rods are assumed to be at a burnup of 10,000 MWD/MTU." In principle, how can an average and a low value be the same?***

Response:

The WCOBRA/TRAC modeling of a PWR divides the core into four hydraulic channels. One is the hot assembly channel, which contains the hot rod and a hot assembly average rod. Another is the low power channel, which contains all of the fuel rods in the assemblies on the core periphery. The last two are average channels. One of these contains all of the rods in the in-board assemblies that are located under guide tube positions. The other contains all of the rods in the remaining in-board assemblies. A more detailed example of this modeling is given in the "Vessel Section 3" description starting on page 12-3.

Today's fuel management strategies include the use of low leakage, or ultra-low leakage, loading patterns. These loading patterns place depleted fuel assemblies (e.g., twice burned) on the core periphery. This reduces neutron leakage, and improves fuel utilization. Most of the assemblies on the core periphery will have a burnup of at least 40,000 MWD/MTU at the start of the cycle. Because of their depletion and their location, these assemblies operate at below average power levels.

The in-board average channels will contain a mix of fresh and burned assemblies. Typically, these assemblies will start the cycle with burnup levels of zero for the fresh assemblies, about 20,000-30,000 MWD/MTU for once-burned assemblies, and about 40,000 or so for twice-burned assemblies.

The assumption of 10,000 MWD/MTU for the burnup of the rods in the average and low power channels is based primarily on stored energy considerations. As the cladding creeps down toward the pellet, the gap conductance increases, and the fuel initial stored energy is reduced. Use of a low burnup is therefore somewhat conservative.

3) ***Table 11-5 lists time-in-cycle as a plant parameter that is sampled in the uncertainty analysis. Where in Tables 1-7 through 1-11 is a description of the associated uncertainty distribution?***

Response:

Section 1-2 provides a comparison between the ASTRUM methodology and the methodology previously approved in WCAP-12945-P-A. Tables 1-7 through 1-11 summarize the uncertainty distributions previously approved in WCAP-12945-P-A. This can be seen in the references to these tables in the text, located on pages 1-14 and 1-16. (Note that Table 1-9 is referenced in Table 1-8, but not in the text.)

The additional parameters sampled in ASTRUM are listed at the bottom of page 1-16.

Westinghouse

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

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

Direct tel: (412) 374-4643
Direct fax: (412) 374-4011
e-mail: greshaja@westinghouse.com

Our ref: AW-04-1797

March 3, 2004

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: Westinghouse Proprietary and Non-Proprietary Responses to the Requests for Additional Information (RAIs) on WCAP-16009-P, "Realistic Large Break LOCA Evaluation Methodology Using the Automated Statistical Treatment Uncertainty Method" (Proprietary)

Reference: Letter from J. A. Gresham to the Document Control Desk, LTR-NRC-04-16, dated March 3, 2004.

The Application for Withholding is submitted by Westinghouse Electric Company LLC (Westinghouse), pursuant to the provisions of Paragraph (b) (1) of Section 2.790 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary material for which withholding is being requested is identified in the proprietary version of the subject report. In conformance with 10 CFR Section 2.790, Affidavit AW-04-1797 accompanies this Application for Withholding, setting forth the basis on which the identified proprietary information may be withheld from public disclosure.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.790 of the Commission's regulations.

Correspondence with respect to this Application for Withholding or the accompanying affidavit should reference AW-04-1797 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: B. Benney

bcc: J. A. Gresham (ECE 4-7A) 1L
R. Bastien, 1L, 1A (Nivelles, Belgium)
C. Brinkman, 1L, 1A (Westinghouse Electric Co., 12300 Twinbrook Parkway, Suite 330, Rockville, MD 20852)
RCPL Administrative Aide (ECE 4-7A) (Letter and affidavit only)

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 3rd day
of March, 2004

Notary Public

Notarial Seal
Sharon L. Fiori, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires January 29, 2007
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 2.790 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 2.790 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 2.790, 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 the Westinghouse Proprietary Responses to the Requests for Additional Information (RAIs) on WCAP-16009-P, "Realistic Large Break LOCA Evaluation Methodology Using the Automated Statistical Treatment Uncertainty Method" being transmitted by Westinghouse letter (LTR-NRC-04-16) and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted for use by Westinghouse proposes a method for satisfying 10 CFR 50.46 analysis requirements for best-estimate LOCA methodology, and is expected to be applicable to licensees that utilize this methodology.

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

(a) Analyze postulated LOCA events on a best-estimate basis, and support licensees in meeting the requests the requirements of 10 CFR 50.46.

(b) Assist customers to obtain license changes resulting from improved large break LOCA margins.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for purposes of demonstrating compliance with the requirements of 10 CFR 50.46.

(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 engineering analyses and evaluations 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 2.790 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 2.790(b)(1).

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