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To:

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***** YELLOW *****

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Description:

Proposed Alternate Approach to Complete Suspension of Crossflow Topical Report Approval

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Project No.: 700
Our ref: LTR-NRC-07-30

June 4, 2007

Subject: Proposed Alternate Approach to Complete Suspension of CROSSFLOW Topical Report Approval

References: 1) Letter, M. J. Case (NRC) to J. A. Gresham (Westinghouse), "Suspension of U.S. Nuclear Regulatory Commission (NRC) Acceptance for Referencing of Westinghouse Electric Company (Westinghouse) Topical Report (TR) CENPD-397-P, Revision-01-P, 'Improved Flow Measurement Accuracy Using CROSSFLOW Ultrasonic Flow Measurement Technology' (TAC NO. MC6424)," March 13, 2007

2) Letter, S. A. Richards (NRC) to I. C. Richard (ABB-CE), "Acceptance for Referencing of CENPD-397-P, Revision-01-P, "Improved Flow Measurement Accuracy Using CROSSFLOW Ultrasonic Flow Measurement Technology" (TAC No. Ma6452)," March 20, 2000

3) Letter J. A. Gresham (Westinghouse) to M. J. Case (NRC), "Feedback Regarding Draft Safety Evaluation for CROSSFLOW Topical Report CENPD-397-P, Revision 1-P," LTR-NRC-07-22, April 12, 2007

4) Letter H. N. Berkow (NRC) to G. Bischoff (Westinghouse), "Final Safety Evaluation for Topical Report WCAP-15996-P Technical Description Manual for the CENTS Code (TAC No. MB6982)," December 1, 2003

5) Letter, D. M. Crutchfield (NRC) to A. E. Scherer (C-E), "Safety Evaluation of Combustion Engineering ECCS Large Break Evaluation Model and Acceptance for Referencing of Related Licensing Topical Reports," July 31, 1986

6) Letter, B. A. Boger (NRC) to E. Hauser (Caldon), "Allegations NRR-2003-A-0003 and NRR-2003-A-0007," February 25, 2005

Dear Mr. Case:

On March 13, 2007 (Reference 1), the Nuclear Regulatory Commission (NRC) issued a draft Safety Evaluation (SE) for Westinghouse Electric Company LLC (Westinghouse) Topical Report (TR) CENPD-397-P, Revision-01-P, "Improved Flow Measurement Accuracy Using CROSSFLOW Ultrasonic Flow Measurement Technology," that would suspend their prior approval (Reference 2) of that TR. The purpose of the NRC letter was to obtain Westinghouse input regarding any potential proprietary content or factual errors in the draft SE. Westinghouse responded on April 12, 2007 (Reference 3) indicating that there was no proprietary content in the draft SE although we had identified some factual errors and statements that could easily lead to misunderstandings. On May 1, 2007, Westinghouse and the CROSSFLOW developer, Advanced Measurement Analysis Group, Inc. (AMAG), met with members of the NRC review staff to discuss our feedback.

On May 2-3, 2007, members of the NRC Differing Professional Opinion (DPO) review panel looking into the proposed action on the CROSSFLOW TR met with Westinghouse and the AMAG at the Applied Research Laboratory of Pennsylvania State University (ARL/PSU). This meeting was held at the request of the DPO review panel and its purpose was to help inform the panel members about the CROSSFLOW technology, operational lessons learned and the vast amount of work that has been undertaken since performance issues were first identified in 2003. The meeting also permitted the review panel to question Westinghouse and AMAG staff directly in areas of particular interest to them.

At both the May 1, 2007 meeting with the NRC review staff and the May 2-3, 2007 meeting with the DPO review panel, Westinghouse offered its opinion that the proposed NRC action to suspend approval of the entire CROSSFLOW TR was unnecessary. The NRC's purpose could be satisfied and licensees would be better served if the SE were to specify those portions of the TR in which there are still open issues to be resolved and, therefore, new and future applications of CROSSFLOW would not reference those portions of the TR at this time. Based on prior Westinghouse experience with similar NRC actions on methodology TRs, there is regulatory precedent for use of this approach. For example, References 4 and 5 are SEs for two safety analysis methodology TRs wherein the NRC opted to disallow the use of a certain element of the methodology while permitting its use in other areas. Reference 4 is for WCAP-15996-P, "Technical Description Manual for the CENTS Code." In this example the NRC disallowed use of a portion of the methodology that was still under review by stating:

> "CEA Ejection Analyses: This review does not give general approval for the application of CENTS simulations of a CEA ejection transient for licensing analyses. The staff will consider and review such requests on a case-by-case basis. This portion of the CENTS code remains under review at this time."

Reference 5 is for CENPD-132-P, Supplement 3, "Calculative Methods for the C-E Large Break LOCA Evaluation Model." In this example the NRC disallowed application of a Combustion Engineering methodology to Westinghouse designed plants by stating:

> "The staff finds the above referenced reports to be acceptable for referencing in licensing applications, with the exception of use of a model to evaluate Westinghouse plants, to the extent specified and under the limitations delineated in the reports and the enclosed NRC evaluation. .... We will review this model for Westinghouse plants when a licensee or applicant declares intent to use the model."

The proposed approach has the dual benefit of precluding use of those aspects of the TR with which the NRC review staff has open issues at this time while permitting continued use of TR aspects that the review staff believes offer a viable approach for the implementation of CROSSFLOW for new and future applications. Specifically, given the current NRC stated concerns (Reference 1), Westinghouse proposes new and future CROSSFLOW applications not reference the use of a laboratory derived Velocity Profile Correction Factor (C_o) curve, its associated uncertainty and its extrapolation to plant operating conditions while we work to resolve open issues with the NRC staff. Use of this information, or an update of it, may be re-visited in the future once the open issues are resolved. The specific Sections of the TR that Westinghouse proposes that new applicants not reference are Sections 1.4.3, 2.2.4, 2.3, 4.0, 4.1, 4.2, 4.3, 4.4, 5.6, 5.6.1 and 5.6.2. The attached Table identifies these sections in the larger context of the CROSSFLOW TR Table of Contents (non-proprietary version); other sections of which remain acceptable. Generally, the identified sections address the laboratory calibration and development of the Velocity Profile Correction Factor (C_o) curve and determination of the meter uncertainty which is based in part on the uncertainty assigned to the C_o curve and its extrapolation to plant operating conditions. Again, Westinghouse proposes that the NRC simply suspend the use of this information for new and future applications at this time. In lieu of using the laboratory calibration C_o curve Westinghouse will

calibrate new and future CROSSFLOW applications using plant specific in-situ calibration techniques with independent instruments of appropriate accuracy (not including a second CROSSFLOW meter). Use of in-situ calibration was approved in the original SE (Reference 2) and continues to be recognized as a viable approach in the draft SE, although the review staff would like to see more detailed information on such techniques. Section 3.2 of the draft SE states,

> "In-situ testing of CROSSFLOW could be conducted to determine an installation specific velocity profile correction factor. This approach to calibration could eliminate the NRC staff's concerns about using the laboratory determined velocity profile correction factor."

In order to provide the NRC with the information needed to properly approve the use of in-situ calibration techniques in the short term Westinghouse proposes to replace the information in the suspended TR sections with the relevant information pertaining to an in-situ calibration of the CROSSFLOW meter on plant specific dockets within the Measurement Uncertainty Recapture (MUR) License Amendment Requests (LARs). Allowance of in-situ calibrations will permit the NRC to review the current in-process LARs, supplemented with this new information, and to also review new LARs that include this information. In the longer term, Westinghouse will update the CROSSFLOW TR to include such information as well as other information acquired during its investigations of plant performance problems. As an example, Westinghouse suggests that the NRC could revise the existing SE to incorporate a new Criteria 5 such as the following:

> 5. *Calibration of the CROSSFLOW UFM using either the laboratory derived Velocity Profile Correction Factor (C_o) curve depicted in the topical report or a laboratory scale model is disallowed until such time as sufficient supporting information is provided by Westinghouse re-establishing the viability of this calibration approach. In lieu of laboratory calibration, licensees for new and future applications of the CROSSFLOW technology must calibrate their meter in-situ using an independent flow measurement of appropriate accuracy. Justification for the plant specific in-situ calibration approach employed, including the associated uncertainty, shall be provided as part of the license amendment package requesting a Measurement Uncertainty Recapture (MUR) power uprate. Additionally, for a previously installed and laboratory calibrated CROSSFLOW UFM currently used for power recovery purposes, the licensee must re-calibrate the meter in-situ as described above if it is to be used in support of an MUR power uprate.*

In its letter of February 25, 2005 (Reference 6) closing out allegations brought against the CROSSFLOW UFM system, the NRC made two important points with regard to CROSSFLOW performance,

1. "... the NRC determined that it is an issue of license compliance rather than safety." and
2. "... reasonable assurance does not foreclose the possibility that nonconforming conditions could occur that would result in plant operation above the licensed power level. Plant procedures can provide the means by which nonconforming conditions can be identified and corrected."

These affirmations continue to be applicable today and support Westinghouse's position that complete suspension of the CROSSFLOW TR for a "license compliance rather than safety" issue is not warranted. Resolution of open CROSSFLOW issues can be addressed while permitting use of other aspects of the TR that would allow continued successful implementation of CROSSFLOW for new and future applications at plants that choose to utilize this technology. Further, even when reasonable assurance exists for the acceptable performance of CROSSFLOW or any other specific product, methodology or service, nonconforming conditions and unacceptable performance can occur. In the absence of a

significant safety issue, the NRC correctly pointed out that robust plant procedures provide the means by which nonconforming conditions are identified and corrected. Also of paramount importance, in concert with licensee responsibilities, is consideration of whether there is aggressive vendor investigation, openness with licensees and the NRC along with a commitment to correct any identified issues.

If you have any further questions regarding this matter, please do not hesitate to contact me at (412) 374-4643.

Very truly yours,

James A. Gresham, Manager
Regulatory Compliance and Plant Licensing

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Table 1

CROSSFLOW Topical Report (CENPD-397-P-A, Rev. 1) Table of Contents

Proposed Sections for Suspension

Table 1

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Proposed Sections for Suspension

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3.1.3.2	Transducer Diameter and Acoustic Field	
3.1.3.3	Acoustic Couplant	
3.1.3.4	Mounting/Transducer Support Frame (M/TSF)	
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3.1.4	Signal Conditioning Unit	
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