April 7, 2011

Mr. Jeffrey A. Halfinger, Vice President
Technology Development
Babcock and Wilcox Nuclear Energy
109 Ramsey Place
Lynchburg, VA 24501

SUBJECT: REQUEST FOR THE REVIEW OF BABCOCK & WILCOX COMPANY TOPICAL REPORT 08-002089-000, REVISION 0, "INSTRUMENT SETPOINT METHODOLOGY, OCTOBER 2010" (TAC NO. RN6048)

Dear Mr. Halfinger:

By letter dated October 28, 2010, (Agencywide Documents Access and Management System (ADAMS) ML103020473) Babcock & Wilcox Nuclear Energy, Inc. (B&W), submitted Topical Report 08-002089-000, Revision 0, "B&W Instrument Setpoint Methodology," to the U.S. Nuclear Regulatory Commission (NRC) staff for review.

The purpose of this letter is to provide the results of the NRC staff's acceptance review of Topical Report 08-002089-000, B&W Instrument Setpoint Methodology. The acceptance review was performed to determine if there is sufficient technical information in scope and depth to allow the NRC to complete its detailed technical review. The NRC staff identified areas for further discussion (Enclosures 1 and 2) and held teleconference calls with B&W on March 14 and 28, 2011, to discuss the topical report. Supporting information was provided to the NRC staff from B&W on March 25, 2011(ADAMS ML110900680). The NRC has concluded that additional information is required for the NRC staff to complete its detailed review and make an independent assessment regarding the acceptability of Topical Report 08-002089-000, Revision 0, B&W Instrument Setpoint Methodology.

In order to make the application complete, the NRC staff requests that B&W supplement the topical report application with the information identified in the B&W email to the NRC on March 30, 2011 (ADAMS ML110900681). NRC staff looks forward to receiving the supplemental topical report by June 2011, as noted in B&W's email dated March 30, 2011. This will enable the NRC staff to complete its acceptance review. If the Topical Report 08-002089-000, B&W Instrument Setpoint Methodology is subsequently accepted for review, you will be advised of any further information needed to support the NRC Staff's detailed technical review by separate correspondence.

If you have any questions, please contact Jan Mazza at (301) 415-0498 or Joelle Starefos at (301) 415-6091.

Sincerely,

/RA/

Stewart L. Magruder, Branch Chief
Advanced Reactors Branch 2
Advanced Reactor Program
Office of New Reactors

Project No.: 0776

Enclosure:
1. NRC Staff Questions Provided to B&W on March 1, 2011
2. NRC Staff Questions Provided to B&W on March 17, 2011

cc: See DC B&W mPower Mailing List

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ADAMS ACCESSION NO.: ML110900508 **NRO-002**

OFFICE	PM:NRO/ARP/ARB2	PM:NRO/ARP/ARB2	BC:NRO/ARP/ARB2
NAME	JMazza	JStarefos	SMagruder
DATE	04/7/2011	04/11/2011	04/7/2011

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NRC STAFF QUESTIONS PROVIDED TO B&W ON MARCH 1, 2011

B&W mPower Reactor Program
Instrument Setpoint Methodology Topical Report
08-002089-000 N-R0003
October 2010

Regulatory Basis

10 CFR 50.36 (ii)(A), Limiting safety system settings (LSSS) for nuclear reactors are settings for automatic protective devices related to those variables having significant safety functions. Where a limiting safety system setting is specified for a variable on which a safety limit has chosen that automatic protective action will correct the abnormal situation before a safety limit (SL) is exceeded.

To meet the regulatory basis above, setpoint methodology is used to determine the trip setpoint LSSS and allowable value (AV) which is satisfied by providing a large enough allowance between the AV and SL to account for those uncertainties not measured during the surveillance tests (channel operational test (channel functional test), channel calibration test).

Questions on Proposed Methodology

(1) The methodology uses the square-root-summation-of-squares (SRSS) technique to combine instrument loop uncertainties which are statistically and functionally independent and random. Channel Uncertainty (CU) is calculated by SRSS of all instrument channel independent uncertainties from analytical limit (AL) including those uncertainties not measured during the surveillance tests. According to Equations 4.2.3 and 4.2.4, the allowable value (AV) is derived by subtracting AFT from CU. Remnant of CU between AL and AV does not provide enough allowance to protect the SL. However, in Fig. 5 of this report, the allowance between AL and AV, which accounts for those uncertainties (process uncertainties and other uncertainties) not measured during the surveillance tests, is large enough to protect the AL. The applicant is requested to provide an explanation of a discrepancy between Equations 4.2.3/4.2.4 and Fig. 5.

(2) What is the criterion used to determine the Margin in Equations 4.2.3 and 4.2.4?

(3) What specific uncertainties are taken into consideration to calculate AFT and AFT_{TOT}?

(4) Explain why this setpoint methodology does not consider the calibration uncertainty, which is called as as-left tolerance or calibration tolerance.

Enclosure

(5) Consider including typical calculations in appendix to the report for staff review. This is consistent with all previous setpoint methodology documents the NRC staff has evaluated.

NRC STAFF COMMENTS PROVIDED TO B&W ON MARCH 17, 2011

Discrepancy between Figure 5.1 versus Equations (methodology) in 4.2.2-4.2.4

The methodology uses square-root-summation-of-squares (SRSS) technique to combine instrument loop uncertainties which are statistically and functionally independent and random. Channel Uncertainty (CU) is calculated by SRSS of all instrument channel independent uncertainties from analytical limit (AL) including those uncertainties not measured during the surveillance tests. Methodology and figure should have same expressions/equations for each section identified. For example, AFT should be around NTSP not from AV. In addition, ALT should be included in the figure.

For an illustration, see the attached scanned file.

Margins in 4.2.3 and 4.2.4 and in Figure 5.1

What are the specific criteria for determination of Margin of the equations 4.2.3 and 4.2.4?

In Figure 5.1, Margin (Note 1) and Margin (Note 2) appear to be the same. Are they always the same? It is not clear how they are determined.

Identification of LSSS

LSSS should be clearly identified in both methodology and Figure 5.1.

Use of ETC in Figure 5.1

Specific factors should be identified instead of using ETC or etc.

Seismic effect and Accident

Does methodology use seismic effect and accident together?

AFT/AFT_{TOT}

Does module uncertainty in 4.2.1 include sensors?

① Figure 5.1

$$CU = \text{process Uncertainties} + \text{other uncertainties} + \text{Allowable uncertainties}$$

$$= A + B + C$$

② Equations in 4.2.2 / 4.2.3

$$CU = \sqrt{PM^2 + PE^2 + \cdots e_n^2}$$

In general, $\sqrt{a^2+b^2} \neq a+b$

Since $\sqrt{a^2+b^2+2ab} = a+b$

---

① and ② above show a case of $\sqrt{a^2+b^2 \cdots z^2} \neq a+b \cdots +z^2$

Therefore B&W's Figure5.1 and ∈ Equations have conflicts.

DC B&W mPower Mailing List

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