

Babcock & Wilcox

a McDermott company

Nuclear Power Division

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August 8, 1985

Mr. Gary G. Zech, Chief
Vendor Program Branch
Division of Quality Assurance,
Vendor & Technical Training Center Program
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington DC 20555

Ref: (a) NRC (Gary G. Zech) letter
to Babcock & Wilcox, UPGD,
(D.E. Guilbert) dated July 12, 1985
(b) NRC Inspection Report No.99900400/85-01

Dear Mr. Zech:

NRC letter, reference (a), forwarded the report of your inspection of our Lynchburg facility on February 4-8, 1985. Your report, reference (b), indicated that, during the inspection, you found areas where it appeared that implementation of our QA program failed to meet certain NRC requirements. These areas were specifically addressed by your attached Appendix A, Notice of Nonconformance.

We have reviewed the information contained in references (a) and (b), and we have attached hereto our responses to each of the identified areas of apparent nonconformance. Our responses include corrective and preventive actions where appropriate.

In addition, please note the following changes in personnel and mailing address:

We are now the Nuclear Power Division of Babcock and Wilcox, A McDermott Company. C.W. Pryor is the Vice President & General Manager and T.R. Stevens is the Quality Assurance Manager. Our new mailing address is P.O. Box 10935, Lynchburg, VA 24506-0935.

Should you have any questions concerning our reply, we will be pleased to discuss them with you.

Sincerely,

Richard Z. Bruce for

C.W. Pryor
Vice President & General Manager
Nuclear Power Division

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Attachments

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I. NRC Nonconformance A

Criterion XVI of Appendix B to 10 CFR 50 states in part "Measures shall be established to assure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective materials and equipment, and nonconformances are promptly identified and corrected."

Babcock & Wilcox (B&W) Quality Assurance Topical Report, BAW-10096A, Rev. 4, Section 16, "Corrective Action," states in part, that "Procedures are established by NPGD to ensure prompt identification and correction of conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances during the design, procurement, fabrication, receipt, installation, and testing of components, systems, and equipment . . ."

Contrary to the above, B&W QA Procedure NPG-1701-01, Rev. 16, "Processing Safety Concerns" does not explicitly require the prompt evaluation of Potential Safety Concerns (PSCs). Since the evaluation of a PSC is an important part of identifying and correcting "conditions adverse to quality," the timeliness of these evaluations should be required by the procedure. An example of a PSC that has not been evaluated in a timely manner is described below.

PSC 5-83: This PSC concerns a potential thermal shock/thermal stress problem with the high pressure injection (HPI) and makeup water system pumps when 40°F water is pumped from the borated water storage tank (BWST). The HPI pumps are a significant safety-related system required following a loss of coolant accident. The temperature transient associated with the 40°F BWST water was not included in the equipment specification for the pumps.

This PSC was identified in January 1983 and entered the PSC file in March 1983; however, the evaluation and disposition had not been completed as of February 8, 1985. PSC 5-83 is applicable to all B&W plants, operating and under construction

B&W-NPD Response to NRC Nonconformance A

A. Background

Preparation of a PSC (Preliminary Report of Safety Concerns) does not necessarily indicate a reportable concern nor even a deviation of any sort. Evaluation of the concern is to assure compliance with 10CFR21 and 10CFR50.55(e) by determining the reportability of safety concerns to the NRC under these regulations. If the evaluation identifies conditions adverse to quality, these are addressed in accordance with 10CFR50 requirements.

Regarding the issue of timeliness, the subject of time between identification of a deviation and notification to the NRC, i.e., the evaluation time span, is discussed on page 9 of NUREG 0302 Rev. 1, a document which provides NRC guidance on the provisions of 10CFR21:

"The rule is silent in regard to the time from when identification of a deviation occurs to the time of notification to the Nuclear Regulatory Commission. At present we consider this time period to be unquantifiable for all facets of the activities regulated by the NRC."

I. B&W-NPD Response to NRC Nonconformance A (Cont'd)

A. Background (Cont'd)

We, too, believe that the evaluation time span is "unquantifiable" since it is highly dependent upon the preliminary assessment of safety significance when a deviation or concern is first identified. This is the case with PSC 5-83.

The PSC was initiated March 17, 1983, and was entered into the PSC system March 18, 1983. A front-end meeting was held April 5, 1983, to ensure understanding of the concern, determine plant applicability and safety significance and scope the evaluation effort required. At this meeting, the minutes of which are recorded in memo dated April 7, 1983, it was determined that the concern represented a low probability event.

A work plan was then initiated to investigate the specific temperature ramps and the number of thermal cycles that would envelope the concern at each B&W plant, and to determine the type of pump, the manufacturer and other information applicable to each pump in the various plants. This investigation was completed July 25, 1983. The various pump manufacturers were then contacted informally to determine if they believed there was a concern for pump integrity. In a memo of November 7, 1983, B&W documented that the pump vendors indicated that in their opinion, the transient would not seriously affect the pumps.

To more formally document the pump vendors' conclusions, letters were sent to each vendor requesting a written reply. Written responses took some time to collect but were ultimately received from three of the four vendors. These responses reiterated the pump vendors' judgement that there appeared to be no concern due to these transients.

To provide a more definitive and explicit analysis and to complete the evaluation of the PSC, B&W decided to perform in-house thermal stress and fracture mechanics analyses on the pumps. Based on our assessment of the low urgency of these confirmatory analyses, they have been performed on a not-to-interfere basis with our other work. However, the analyses are now complete, and they confirm there is no concern with the pumps. Accordingly, we are in the process of closing out this PSC.

B. Corrective/Preventive Actions

While we believe it is not required nor feasible to quantify an evaluation time span for PSCs, we have recently revised NPG 1707-01 to improve its efficiency and effectiveness and to include provisions that address the timely evaluation of PSCs. The procedure was revised July 1, 1985, to incorporate two new requirements: (1) the preparation and issuance of a monthly status report on the evaluation of PSCs, and (2) the establishment of a PSC Review Board.

I. B&W-NPD Response to NRC Nonconformance A (Cont'd)

B. Corrective/Preventive Actions (Cont'd)

The monthly PSC Status Report incorporates the following information to the extent feasible for each PSC that has been entered into the system and is in the process of evaluation:

1. A preliminary assessment of the safety significance of the concern, including whether the concern is of high or low probability of occurrence.
2. A schedule of action items that will be taken to determine the reportability or other disposition of the concern in accordance with regulatory requirements. (Other dispositions of a concern, other than determining reportability, may for example, consist of advising the purchaser or licensee of the concern to enable the purchaser or licensee to perform an evaluation.)
3. The person or persons responsible for the next scheduled action items in performing the reportability evaluation.
4. The status of the reportability evaluation.

This status report is distributed to the managerial levels of the various departments responsible for the evaluation and disposition of the concern, as well as to the specific individuals who have been assigned action item responsibilities. This provides high visibility to the required action items and ensures that each PSC will be evaluated in a timely manner commensurate with the preliminary assessment that has been made of its safety significance.

The second new requirement in the revised procedure concerns the convening of a Preliminary Safety Concern Review Board (PSCRB). The PSCRB can be convened, based on the judgement and decision of the Manager of Owners Group Engineering Services (OGES), to expedite the evaluation and disposition of specific preliminary safety concerns. Owners Group Engineering Services is the organization within B&W-NPD that has primary responsibility for administration of the procedure for processing preliminary safety concerns and is responsible for the preparation of the evaluation report for each PSC.

The PSCRB addresses the timely evaluation of PSCs by means of the following actions:

- (a) The prompt review of the PSC by the Manager, OGES and the decision by the Manager OGES on the convening of the PSCRB, and
- (b) The review and determinations made by the PSCRB members, which may shorten the evaluation and disposition time span of a particular PSC.

The two new provisions of the procedure described above have been implemented. The first issue of the monthly PSC Status Report was issued July 16, 1985, and the first PSC Review Board was convened to consider a PSC (PSC 7-85) on July 25, 1985.

II. NRC Nonconformance B

Criterion VII of Appendix B to 10 CFR 50 states, in part, that "Measures shall be established to assure that purchased material, equipment and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents."

Contrary to the above, B&W failed to ensure that adequate measures were in place to assure that purchased components conform to procurement documents, resulting in certain components (Lambda Power Supplies) not being of adequate configuration or quality to assure (a) the function of the sub-supplier's product or (b) the proper output voltage characteristics for a certain range of input power and environmental conditions that are important to the B&W system function.

Hardware problems were identified in October 1983 in Site Problem Report SPR 13-16-337. System reliability, functional ability, and/or performance characteristics have been shown to be affected by the lack of capacitor "C26" or diode "CR6," or both. The fact that the Lambda Power Supplies components are a continuing problem is supported by Bellefonte Unit 1 Site Problem Reports SPR 13-15-0683, dated November 9, 1984, and SPR 13-15-700, dated December 20, 1984. This problem is also evident in Bellefonte Unit 2 Site Problem Report SPR 13-16-33, Revision 5, dated October 26, 1984.

B&W-NPD Response to Nonconformance B

A. Background

Subsequent to the NRC Inspection, B&W has performed additional analysis of the Lambda power supply concerns reported on the various Site Problem Reports from the Bellefonte site. We conclude that there are three separate and distinct areas of concern:

- Questions on power supply component configuration (SPR 13-16-337, revision 0, of October 7, 1983 and SPR 13-16-337, revision 3, of September 19, 1984)
- Problems with original equipment power supplies as initially supplied to Bellefonte (SPR 13-16-337, revision 3, of September 19, 1984; SPR 13-16-337, revision 5, of October 22, 1984 (referred to in above Nonconformance as SPR 13-16-33, Revision 5, dated October 16, 1984); and SPR 13-15-683, revision 0, of November 6, 1984)
- Problems with repaired or replacement power supplies returned to the Bellefonte site by the Bailey Controls Co. (SPR 13-15-700, revision 0, of December 14, 1984)

II. B&W-NPD Response to Nonconformance B (Cont'd)

A. Background (Cont'd)

It is correct that in reponse to SPR 13-16-337, revision 0, Lambda engineering personnel stated that the power supplies should have both the CR6 diode and the C26 capacitor to insure proper operation. However, further investigation has shown Lambda's statement to be true for the current design Lambda power supplies, but that for power supplies manufactured before December, 1976, which used a different design regulator circuit, CR6 and C26 are not required for the power supply to function properly. All of the Lambda power supplies reported on SPRs 13-16-337, revision 0 and revision 3, to be missing CR6 and C26 were manufactured prior to December 1976 and are therefore in the correct configuration.

The original equipment power supplies were shipped to the Bellefonte site in 1977 and 1978 as part of the original NIRPS, ESFAS, and ECI/NNI systems supplied by Bailey Controls Co. (BCCo). These systems were in storage at the Bellefonte site for over six years before TVA began system checkout tests. It was during these tests that the various Lambda power supply problems (including corrosion of transformers, damaged electrolytic capacitors, and improper voltage regulation) were discovered. These Lambda power supplies operated properly during the original factory testing of the systems, and we have not been notified of any abnormal failure of similar power supplies at B&W operating reactor sites which are energized and kept in a carefully controlled environment. B&W has concluded that the transformer corrosion is the result of prolonged storage of the equipment at the Bellefonte site in an unenergized state and in areas with insufficient humidity control. B&W has determined that the electrical malfunctions in these power supplies are most likely the result of immediate application of full line voltage to the power supplies after prolonged unenergized storage.

SPR 13-15-700, revision 0, reports problems with eight power supplies which had been returned to BCCo for repair or replacement. These problems were discovered during inspection of the repaired material on receipt at the Bellefonte site. As reported in our March 11, 1985 letter to Mr. Gary G. Zech, Chief, NRC Vendor Program Branch, we conducted an audit of BCCo on February 4-6, 1985, and found that BCCo had not fully implemented the requirements of their QA program for the control of their suppliers in the case of Lambda Electronics. Further, it was determined during this audit and subsequent reviews that the problems with the repaired or replaced power supplies occurred because of inadequate test and inspection of the power supplies at BCCo.

B. Corrective Action

Power supply deficiencies are being repaired by BCCo as the power supplies are returned to BCCo by TVA.

II. B&W-NPD Response to Nonconformance B (Cont'd)

C. Preventive Measures

Supplemental guidance has been prepared for insertion into the appropriate BCCo system instruction manuals to eliminate the confusion on the proper configuration of current generation power supplies, and those manufactured prior to December, 1976.

To prevent recurrence of the problems due to power supply storage, the instruction book supplement mentioned above also includes guidance on energizing the power supplies periodically during storage and on slowly applying power after storage to allow the electrolytic capacitors to re-form.

BCCo has put in place test and inspection procedures for repaired or replaced power supplies which will eliminate the problems encountered on the returned power supplies. This closes the concern expressed in our March 11, 1985, letter to Mr. Gary G. Zech.

III. NRC Nonconformance C

B&W Administrative Manual Procedure NPG-0402-01 states, in part, that "...Only certified computer programs (full, conditional, interim, not required, see NPG-0902-06 and NPG-0903-13), and computer programs specifically exempted by NPG-0902-06 shall be used for engineering calculations which are performed to provide final results for licensing or final design of hardware to be used in a licensed facility. Other programs may be used for preliminary, exploratory, or sensitivity, but any results so obtained must be independently demonstrated to be correct if the results are to be used for licensing or final design of hardware to be used in a licensed facility, or if verification is required by contract."

Contrary to the above, the calculation of reactor protection system (RPS) setpoints, as demonstrated in calculation number 32-1150653-00, Oconee 1, Cycle 9, RPS Set Point Calculations, do not contain information to demonstrate the accuracy of the noncertified setpoint calculations (personal computer computations). Thus, the calculations are found to be in nonconformance with the above requirements regarding the use and verification of safety-related, noncertified computer calculations.

B&W-NPD Response to Nonconformance C

A. Background

Although the subject computer program was not verified within calculation file number 32-1156653-00, the calculation itself had undergone an independent review which verified the RPS setpoint calculations independent of the personal computer program that had been used. This review was documented by the independent reviewer signature on each page of the file in conformance with calculation procedure NPG-0402-01.

B. Corrective Action

The independent verification of the personal computer program used in calculation 32-1156653-00 was completed on March 28, 1985, and released as calculation file 32-1150681-00, "Power/Imbalance/Flow Program."

C. Preventive Measures

Calculation procedure NPG-0402-01 was revised on April 1, 1985, to specifically add the requirements that the independent demonstration of the accuracy of results obtained from personal computer programs be included or referenced in the calculation file. Appropriate personnel were trained in the requirements of the revised procedure.

IV. NRC Nonconformance D

Paragraph VII.I of B&W Administrative Manual Procedure NPG-0902-06, Rev. 9, states, in part, that "A certification statement [for a computer code] indicates that an orderly plan of testing has been executed ... so that reasonable assurance can be given that with proper input, as defined in the User Manual, the program will execute and produce results as defined in the User Manual."

Contrary to the above, B&W did not perform sufficient testing of the T3PIPE computer code to give reasonable assurance that the stress indices used in the ASME code Section III equations, and therefore showing the results of these equations, are correct.

B&W-NPD Response to Nonconformance D

A. Background

The T3PIPE computer program has been revised over the years to take into consideration revised stress indices, as a result of ASME Code Addenda, as well as additional engineering requests for added program capability. In addition, all problems or errors we have discovered with this program have been specific and no general error has been found. This nonconformance was based on the fact that errors had been discovered, and corrections made, in the past.

B. Corrective Action

Although we believe that the testing of T3PIPE was sufficient to assure its accuracy, we have initiated a general review of the certification of T3PIPE. This review will include:

- Recheck of all ASME Code indices in T3PIPE
- Review of all certification file calculations
- Performance of any new calculations considered necessary to supplement the certification file

This review will be completed by November 1, 1985.

C. Preventive Measures

Any necessary preventive measures will be determined upon completion of the above review.