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December 28, 1995

LD-95-057

50-245,336

Mr. Robert M. Gallo, Chief  
Special Inspection Branch  
Division of Inspection and Support Programs  
Office of Nuclear Reactor Regulation  
US Nuclear Regulatory Commission  
Washington, DC 20555-0001

Reference: 1. Letter, R.M.Gallo to C.B.Brinkman, *Request for Information*, 8/21/95.  
2. Letter, C.B.Brinkman to R.M.Gallo, *Request for Information*,  
LD-95-046, 10/04/95.

Subject: Response to Request for Information

Dear Mr. Gallo:

Nonconformances relative to documentation and dimensions of replacement reactor vessel head studs supplied by Combustion Engineering, Inc. (ABB-CE) to Northeast Utilities were identified during receipt inspections performed at the Millstone site in September, 1990. These nonconformances were evaluated by ABB-CE and the studs approved for their intended service in October 1990.

The NRC requested, Reference 1, that ABB-CE review the history of manufacture for these reactor vessel head studs and provide a response to specific quality assurance questions since it was hypothesized that other reactor head studs may have similar non-conforming conditions. ABB-CE has reviewed the quality assurance files associated with the replacement reactor vessel studs provided to Millstone. Reference 2 provided an interim response which questioned the validity of certain assertions in Reference 1.

The attachment to this letter provides ABB-CE responses for the information requested in Reference 1 as subsequently clarified by the NRC staff. Please feel free to call me or Virgil Pagen of my staff at 860-285-4700 if there are any questions.

Very truly yours

Virgil Pagen for

C. B. Brinkman

Director, Nuclear Licensing

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**Reference:**

Letter; R. M. Gallo, NRC, to C. B. Brinkman, ABB-CE, *Request for Information*, dated 8/21/95.

**Introduction:**

The reactor vessel head studs originally supplied by Combustion Engineering, Inc. (ABB-CE) to Millstone-2 were designed with fully-threaded stud ends. A full set of sixty (60) replacement reactor vessel head studs incorporating a revised stud-end thread pattern compatible with a different design stud tensioner was ordered by Northeast Utilities in May 1990. The replacement studs were manufactured by PMC Industries under contract to ABB-CE and shipped directly to Millstone-2 in September 1990.

This attachment provides ABB-CE responses to questions contained in the referenced NRC letter concerning nonconforming conditions relative to documentation and dimensions of replacement reactor vessel head studs supplied to Millstone-2.

**Clarifying Notes:**

ABB-CE would like to clarify the following items discussed in the referenced NRC letter.

The reactor head closure studs supplied by ABB-CE in 1990 under PO# 865216, (Northeast Utilities PO# 877539) were provided to Millstone-2, not Millstone-3 as indicated in the referenced letter. A review of records from 1989 to present confirms that ABB-CE has not supplied replacement reactor vessel head studs to Millstone-3.

The subcontractor used by ABB-CE to manufacture the Millstone-2 reactor vessel head studs was PMC Industries, 29100 Lakeland Blvd., Wickliffe, Ohio, 44092; PCI Energy Services, the subcontractor identified in the referenced NRC letter, was not involved in supplying replacement reactor vessel head studs to Millstone-2. PMC Industries has manufactured original and replacement reactor vessel head studs under contract to ABB-CE for more than 25 years. PMC Industries is the only supplier, other than the ABB-CE manufacturing facility in Chattanooga, TN, that has been used to manufacture standard reactor vessel head closure studs.

Northeast Utilities issued several Non-Conformance Reports (NCRs) to document receipt inspection results concerning the replacement reactor vessel head closure studs. ABB-CE received and resolved NCRs 290-566 and 290-575 in late 1990. NCR 290-566 applied to the reactor head closure studs, P/N: E-18767-650-001-2. NCR 290-575 concerned the reactor head closure stud measuring rods, P/N: E-18767-650-001-3. NCRs 290-235, 290-239 and 290-589 were issued internally at Millstone-2 to track and close results of stud reinspections performed by ABB-CE and PMC Industries in response to NCR 290-566.

**Response to Specific NRC Requests for Information**

**NRC Question:** *What was the role of PCI in this procurement and how did PCI assure compliance with applicable technical and quality requirements?*

**ABB-CE Response:**

As clarified above, PCI Energy Services was not involved in supplying replacement reactor vessel head

studs to ABB-CE.

ABB-CE contracted with PMC Industries for machining, nondestructive examinations, dimensional inspections, phosphate coating and packaging operations for the replacement studs. The stud design was provided by ABB-CE with technical requirements defined within the procurement documents. Raw material, certified to SA-540, Type B24, Class 3, was furnished by ABB-CE to PMC Industries for this contract. The raw material was manufactured by the Timken Company, 1835 Dueber Ave. S.W., Canton, Ohio 44706. Two heats of material were used to manufacture these studs.

PMC Industries assured compliance with technical and quality requirements through implementation of their quality assurance program. PMC's QA Manual (Revision 8) was approved by ABB-CE and applied to this contract. PMC Industries did not hold an ASME Certificate; they were approved as a supplier to ABB-CE through satisfactory completion of periodic audits. A routine annual implementation QA audit was performed at their facility on October 23-25, 1989 to requalify PMC Industries as a supplier to ABB-CE. PMC Industries completed in-process inspections and examinations of the replacement studs as required by the contract.

**NRC Question:** *Were the reactor vessel head studs supplied to Millstone-3 produced under CE's ASME quality assurance program? If not, how did CE assure compliance with the applicable technical and quality requirements?*

**ABB-CE Response:**

Yes, the replacement reactor vessel head studs supplied to Millstone-2 were provided under ABB-CE's Quality Assurance Program for Service Related Activities. This program, contained as QAM-100 in the ABB-CE Quality Assurance Manual (QAM), has been surveyed by ASME and is the basis for Certificate of Authorization No. N-2037. The QA Program applies to both ASME Code and non-Code safety-related service work performed by ABB-CE. The QAM edition/revision applicable to this work was 3rd Edition, Revision 2. QAM-100 is currently in its 4th Edition, Revision 2. The measuring rods were processed in accordance with the QA Program but are not considered to be safety-related. Commercially available materials were specified and used for this item.

**NRC Question:** *Did CE perform an evaluation of the dimensional and documentation nonconforming conditions identified by the licensee?*

- a. *What were the results of the evaluation?*
- b. *Did the evaluation address reportability under 10 CFR 21?*
- c. *Did CE notify any other customers of potential deviations?*

**ABB-CE Response:**

- a. ABB-CE reviewed the issues documented in Non-Conformance Reports (NCRs) 290-566 and 290-575 and reinspected the studs at Millstone on September 24 and 25, 1990. The results of that review were documented in the following letters to Northeast Utilities, copies of which have been

provided to the NRC:

NSPT-90-702, dated 9/19/90 (NCR-290-566)

NSPT-90-706, dated 9/21/90 (NCR-290-566)

NSPT-90-713, dated 9/28/90 (NCR-290-566)

NSPT-90-725, dated 10/11/90 (NCR-290-575)

ABB-CE concluded that all studs complied with design requirements and originally approved deviation notices except that four (4) studs had slightly oversized internal closure screw threads, 1-1/2"-6UNC-2B. This attribute is not critical to the function of the stud. Also, during reinspection nine (9) studs could not be fully gauged over their top ends for the 7"-Modified- 8 Pitch Thread. This was due to build-up of the phosphate coating in the thread area. However, as-built data taken prior to coating was available, reviewed and accepted. Additionally, ABB-CE recommended that the nine (9) studs be checked using a sample closure nut to further verify their acceptability; this action was performed and all studs accepted by Northeast Utilities as noted in NCR 290-239.

- b. Dimensional deviations were dispositioned in accordance with Quality Assurance Procedure 7.4, Control of Supplier Nonconformances - Deviation from Contract Requirements process. This procedure requires engineering personnel evaluating the deviation to consider whether it compromises the life, safety, interchangeability, performance or repair parts, and whether the deviation is a reportable deficiency under 10CFR50.55(e). Part 21 reporting requirements were invoked on the purchase order placed with PMC Industries. Also, a Corrective Action Report, No. SC-90-024, was processed to implement remedial and preventative actions with PMC Industries; a copy of this report has been provided to the NRC.
- c. Other customers were not notified because our findings did not support the conclusion of a general quality program breakdown nor did we identify specific safety concerns with the delivered studs.

**NRC Question:** *What changes were made to CE's quality assurance program / procedures to correct the dimensional and documentation problems with reactor head studs supplied to Millstone-3 and to prevent recurrence?*

**ABB-CE Response:**

The following actions were taken to prevent problems on future reactor head closure stud contracts:

- An aggressive audit schedule was established and implemented with PMC Industries. This schedule resulted in audits being performed on March 18-20, 1991, April 8-10, 1992, May 24-26, 1993, May 16-17, 1994 and May 22-23, 1995.
- Customers have been requested to participate in final inspection activities at PMC Industries. This action ensures availability of appropriate inspection equipment and personnel and resolution of questions prior to shipment.
- ABB-CE procurement requirements have been changed to additionally require submittal of as-built inspection data. This data is provided on each stud for review prior to certification and delivery.