

ORGANIZATION: BABCOCK AND WILCOX FUEL COMPANY
COMMERCIAL NUCLEAR FUEL PLANT
LYNCHBURG, VIRGINIA

REPORT NO.: 99900001/90-01	INSPECTION DATE: October 15-19, 1990	INSPECTION ON-SITE HOURS: 62
CORRESPONDENCE ADDRESS: Mr. R. H. Ihde, President Babcock and Wilcox Fuel Company Post Office Box 10935 Lynchburg, Virginia 24506-0935		
ORGANIZATIONAL CONTACT: Mr. W. T. Engelke, Manager of Quality Assurance TELEPHONE NUMBER: (804) 522-5654		
NUCLEAR INDUSTRY ACTIVITY: Nuclear Fuel assembly supplier for Babcock & Wilcox (B&W) and Westinghouse designed reactors.		
ASSIGNED INSPECTOR: <u>Ramon L. Cilimberg</u> R. L. Cilimberg, Reactive Inspection Section No. 1 (RIS-1)		<u>11/7/90</u> Date
OTHER INSPECTOR(S): L. L. Campbell, RIS-1		
APPROVED BY: <u>Uldis Potapovs</u> Uldis Potapovs, Chief, RIS-1, Vendor Inspection Branch		<u>11-8-90</u> Date
INSPECTION BASES AND SCOPE: A. <u>BASES</u> : 10 CFR Part 50, Appendix B, 10 CFR Part 21 B. <u>SCOPE</u> : To determine if the fabrication, testing, and examination of fuel assembly end fittings at the B&W Fuel Company's Commercial Nuclear Fuel Plant (CNFP) supplied by the Kearsarge Metallurgical Corporation (KMC) are in accordance with nuclear utility and CNFP requirements.		
PLANT SITE APPLICABILITY: Bellefonte 1 and 2, WNP 1 and 3		

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A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 5.0 of CNFP procedure QC-506, "Receiving Inspection-Lower End Fitting Mark C," Revision 1, dated October 27, 1980, CNFP failed to identify excessive raised metal in the form of a burr adjacent to one grid pad bore hole on KMC supplied lower end fitting marked 15273-04. (90-01-01)
2. Contrary to Criterion V of Appendix B to 10 CFR Part 50, CNFP procedure QC-1414, "Retention and Storage of Quality Assurance Records," Revision 4, dated September 13, 1990, does not provide requirements for retention and storage of radiographs and does not identify whether the radiographs and the radiograph reviewer reader sheets are quality records. (90-01-02)

C. UNRESOLVED ITEM:

None

D. STATUS OF PREVIOUS INSPECTION FINDINGS:

None

E. INSPECTION FINDINGS AND OTHER COMMENTS:

1. Entrance and Exit Meetings

The NRC staff informed B&W management representatives of the scope of the inspections during the entrance meeting on October 15, 1990, and summarized the inspection findings during the exit meeting on October 19, 1990.

2. Background

A fuel assembly consists of a fuel bundle and the fuel channel which surrounds it. The fuel bundle contains fuel rods which are spaced and supported by fuel rod spacers and upper and lower end fittings. The lower end fitting is a stainless steel casting

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which positions the fuel rods laterally and transfers the weight of the assembly to the fuel support piece. The upper end fitting is also manufactured from a stainless steel casting and provides alignment and support for the top of the rods within a bundle while aligning and providing a mating surface for the fuel channel.

CNFP presently has 221 Mark C lower and 221 upper end fittings in their warehouse for fuel assemblies procured by the Washington Public Power Supply System (WPPSS) under WPPSS contract No. 48. The investment castings from which the end fittings were machined were supplied to CNFP by KMC in 1980 in accordance with CNFP purchase order (PO) 914196.

The only other fuel assembly end fittings that KMC supplied to CNFP that may be used in a nuclear power plant are at the Tennessee Valley Authority's (TVA) Bellefonte plant. These end fittings were supplied by KMC to CNFP in 1979 in accordance with CNFP PO 919202 per TVA contract 27A.

The NRC inspectors selected the KMC end fitting castings in the warehouse for inspection to determine if the castings were in conformance with CNFP purchase requirements because the documents for the castings could be correlated with the quality exhibited by the end fittings.

3.0 Document Review

- 3.1 The NRC inspectors reviewed the QA data packages for all of the lower end fittings and 27 of the upper end fittings supplied by KMC in accordance with CNFP PO 914196. Each data package included documentation of the chemical analysis, tensile testing, radiograph reviewer reader sheets, heat treat charts, standard inspection guide and check sheets for all end fittings. The data packages also contain independent overchecks by CNFP for the chemical analysis, tensile testing, and acceptance of radiographs.

The KMC and CNFP chemical analysis and tensile test results for each heat number met the requirements of the PO and ASTM specification A351 (CF3M). The radiograph reviewer reader sheets from KMC indicated acceptance with the requirements of the PO, KMC procedure SOP X49, "Operation Radiography," Revision 3, dated

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March 29, 1979, and ASTM E-446, Level 2. The review of the radiographs by CNFP indicated that the radiographs for each of the end fitting castings were acceptable.

3.2 Source Inspection by CNFP

The NRC inspectors reviewed reports of source inspections performed by CNFP during the manufacture of end fitting castings at KMC for CNFP PO 914196. During the weeks of August 11, 1980 and October 6, 1980, the CNFP inspectors performed a 100 percent visual inspection of the lower and upper end fitting castings prior to their release for machining. A total of 221 upper and 221 lower end fitting castings were examined during the two inspections. A summary of the inspection results and the rework and repair of the KMC castings is as follows:

- 3.2.1 Seventy-seven of the castings inspected were found to have thin webs in local areas and were rejected and repaired. The repairs were made by weld buildup in accordance with KMC procedure SP-119, "Weld Repair Procedure-Group 1 Castings, P No. 8," Revision 4, dated October 21, 1977. The weld buildup was ground to meet dimensional requirements.
- 3.2.2 Twenty-nine of the castings were found to have excess cast metal and were ground, reinspected and found acceptable.
- 3.2.3 Six of the castings were found to have incorrect serial numbers vibro-etched on an inside surface of the castings. CNFP researched and traced data to verify actual serial numbers. The incorrect serial numbers were removed by grinding and the correct serial numbers were vibro-etched on the castings.
- 3.2.4 Six of the castings were found to have the marking of machining datum points incorrectly located or missing. The castings were reinspected and the correct datum points established and vibro-etched on the castings.

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3.3 Receiving-Inspection by CNFP

The NRC inspectors reviewed CNFP Receiving-Inspection Report No. 11987 for 197 lower end fittings supplied by KMC on PO 914196 and machined per PO 914376. CNFP performed a 100 percent visual examination and 10 percent dimensional inspection of the lower end fittings to verify that acceptable machining was performed.

4.0 Visual Examination of the End Fittings

The NRC inspectors performed a visual inspection of 79 lower end fittings and 32 upper end fittings that were in the CNFP warehouse for PO 914196. Of the 111 end fittings inspected, one lower end fitting was found to be nonconforming because it exhibited excessive raised metal in the form of a burr adjacent to one grid pad bore hole. This end fitting was not included in the 10 percent sample that was inspected by CNFP to verify machining but it was included in the 100 percent visual examination by CNFP documented in Receiving-Inspection Report No. 11987. (See nonconformance 90-01-01)

Of the 111 end fittings visually inspected by the NRC inspectors, 2 lower end fittings (15301-05, 15310-11) exhibited evidence of considerable grinding although the grinding met CNFP inspection requirements. The NRC inspectors requested the radiographs for these end fittings for review.

CNFP told the NRC inspectors that all of the KMC end fittings in the warehouse would be cleaned and inspected prior to their release for use in fuel bundles.

5.0 Review of Radiographs

The NRC inspectors reviewed radiographs for lower end fitting castings 15301-05 and 15310-11 with CNFP Level II and Level III Radiographic Film Examiners. This review revealed that the required visible penetrameter hole on some radiographs was questionable. CNFP performed radiography on four sections of lower end fitting 15310-11 in accordance with CNFP procedure QC-719, "Standard Radiography of Castings," Revision 0, dated April 13, 1982. A comparison of the CNFP radiographs with the KMC radiographs confirmed acceptable indications at the same locations in the castings and the KMC reader sheets identified acceptable indications for casting 15310-11.

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The KMC radiographs were stored in the CNFP warehouse and were not controlled as quality records while the KMC radiograph reviewer reader sheets were being controlled as quality records. CNFP procedure QC-1414, Revision 4, does not identify whether the radiographs and the radiograph reviewer reader sheet are quality records. (See nonconformance 90-01-02)

F. PERSONS CONTACTED:

#R. A. Alto, Plant Manager
#D. N. Cordrea, Manager of Purchasing
G. W. Day, Level II RT Examiner
*C. Dideon, Manager of Manufacturing Engineering
#W. T. Engelke, Manager of Quality Assurance
*J. T. Ford, Fuel Manufacturing
#*D. V. Ferree, Manager of Fuel Operations
#*K. L. Harris, Manager of Inspection
#E. H. Marshall, Specialist
J. K. Mayberry, Level III RT Examiner
#*W. L. Tibbs, Manager of Data Evaluation

#Attended entrance meeting
*Attended exit meeting

NOV 08 1990

Mr. R. H. Ihde

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In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room.

Sincerely,

Uldis Potapovs, Acting Chief
Vendor Inspection Branch
Division of Reactor Inspection
and Safeguards
Office of Nuclear Reactor Regulation

Enclosures:

- 1. Appendix A - Notice of Nonconformance
- 2. Appendix B - Inspection Report 99900001/90-01

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