

USNRC
TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

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August 16, 1983

U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

BELLEFONTE NUCLEAR PLANT UNIT 1 - REACTOR COOLANT IMPELLER TO SHAFT
MISMATCH - BLRD-50-438/81-61 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector
R. V. Crienjak on September 17, 1981 in accordance with 10 CFR 50.55(e)
as NCRs 1589 and 1596. This was followed by our interim reports dated
October 20 and December 29, 1981, July 2, and November 10, 1982 and
February 7, 1983. Enclosed is our final report.

In our previous reports TVA has combined NCR's 1589 and 1596. Please note
that although we are finalizing NCR 1589 we do not now consider NCR 1596
adverse to the safe operation of the plant. Therefore, we will amend our
records to delete the subject nonconformance as a 10 CFR 50.55(e) item.

If you have any questions concerning this matter, please get in touch with
R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

D S Kammer

for L. M. Mills, Manager
Nuclear Licensing

Enclosure

cc (Enclosure):

Mr. Richard C. DeYoung, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Babcock & Wilcox Company
P.O. Box 1260
Lynchburg, Virginia 24505
Attention: R. J. Ansell

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ENCLOSURE

BELLEFONTE NUCLEAR PLANT UNIT 1 REACTOR COOLANT PUMP IMPELLER TO SHAFT MISMATCH

NCRs 1596 AND 1589

BLRD-50-438/81-61

10 CFR 50.55(e)

FINAL REPORT

Description of Deficiency

NCR 1589

During testing conducted by the pump vendor (Bingham-Willamette, Portland, Oregon, hereafter referred to as Bingham), the impeller for reactor coolant pump 1P1A2 expanded slightly because of thermal effects. To correct this condition, the vendor removed some material from the impeller. The removal of this material resulted in improper dimensional contact for the impeller shaft and restriction sleeve, which prevents acceptable fitup of the impeller to the shaft.

This deficiency does not exist for the other three unit 1 reactor coolant pumps. Proper impeller-shaft fitup has not yet been verified at the plant site for the unit 2 pumps; however, the vendor has confirmed that of the eight Bellefonte reactor coolant pumps (four per unit), only the impeller for pump 1P1A2 was reground. The shaft for unit 2 pump 2P1A1 was returned to the vendor for remachining because it lacked a keyway. This condition was documented by NCR 1388.

NCR 1596

Onsite review of the vendor's data package for reactor coolant pump 1P1A2 revealed discrepancies in the the documentation for posttest inspection. The data package states that the impeller taper was reground and the impeller refit before shipment; but in actuality, the impeller was never refit. These deficiencies resulted from inadequate inspection by TVA's Quality Engineering Branch (QEB) to verify and document proper fitup after regrinding the impeller.

Safety Implications

NCR 1589

The purpose of the pump flywheel is to provide inertia to ensure a slow decrease in coolant flow following a loss of pump power to prevent fuel damage caused by fuel pin departure from nucleate boiling. If the deficient pump was put into service, the loose fit between the shaft and impeller would have prevented adequate flow from being achieved during coastdown. This condition would have prevented the pump from performing its intended safety function, and thereby, adversely affected safe operations of the plant.

B&W investigated this matter with Bingham quality assurance (QA) to determine if the shaft/impeller fitup was performed as described in the QA data package. B&W's investigation verified that there are no discrepancies in the documentation of post-performance test inspection in the QA data package for reactor coolant pump 1P1A2. Therefore, no revised documentation is required.

The events related to this NCR, as determined by B&W's investigation, are as follows:

- A. Following performance testing of pump 1P1A2, the shaft was reground in the area of the impeller taper.
- B. Subsequent to this operation, liquid penetrant examination was performed. This is verified by page 391 of QA data package (B&W document No. 23-1209-01), item 3.
- C. To determine the amount of contact between the shaft and impeller, a trial fitup with "bluing" applied was performed. The degree of contact was sufficient; however, the fitup was done without the restriction bushing in place, thus creating an artificially acceptable assembly. It cannot be determined why this happened.
- D. With the shaft/impeller fit seemingly proper, these parts were disassembled, packaged, and shipped to the plant site.
- E. Upon site assembly, the looseness of the impeller was detected, and the parts were returned to Bingham.
- F. At Bingham, the parts were reworked, properly refit together, packaged, and returned to the plant site.

Consequently, there are no safety implications to Bellefonte, and TVA no longer considers this item to be reportable under 10 CFR 50.55(e).

Corrective Action

The shaft, impeller, and restriction bushing for pump 1P1A2 were returned to the vendor for rematching. At Bingham, the misfit was corrected by rework of the impeller and restriction bushing. The parts were properly refit together and returned to the plant site. At the site, proper fitup was again verified when the impeller and shaft were installed in the pump.

Action Taken to Prevent Recurrence

In this case, TVA's Quality Engineering Branch (QEB) regional office did not inspect the rework of the shaft, nor did they witness the reassembly or fitup of the impeller to the ground shaft. It is customary that the TVA inspector visually examine surfaces to be mated, but QEB missed this notification and thus did not detect that the fitup was done without the restriction bushings being in place.

To prevent similar nonconformances at Bingham in the future, QEB has instructed their regional office to make every effort possible in the future to examine and/or monitor the rework of all bearing parts from Bingham prior to reassembly and shipment to TVA. These increased surveillance activities by QEB should result in the elimination of the type of nonconforming condition identified in these NCRs. Also, as a result of this concern, TVA audited Bingham's QA program and uncovered deficiencies which were reported to NRC as audit 83V-10, deficiency No. 1.