

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

84 MAY 18 A 8:48 May 16, 1984

BLRD-50-438/82-35
BLRD-50-439/82-32

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 UNITS 1 AND 2 - OPERATIONAL DEFECTS IN HIGH-PRESSURE INJECTION NOZZLES AND THERMAL SLEEVES - BLRD-50-438/82-35, BLRD-50-439/82-32 - SIXTH INTERIM REPORT

The subject deficiency was initially reported to NRC-OIE Inspector Don Quick on April 29, 1982 in accordance with 10 CFR 50.55(e) as NCR BLN NEB 8206. This was followed by our interim reports dated June 1 and July 28, 1982 and March 1, April 11 and November 1, 1983. Enclosed is our sixth interim report. We expect to submit our next report by November 30, 1984. We consider 10 CFR Part 21 applicable to this deficiency.

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

DS 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

Records Center
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
Atlanta, Georgia 30339

Babcock & Wilcox Company
Attention: Mr. H. B. Barkley
P.O. Box 1260
Lynchburg, Virginia 24505

ENCLOSURE

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2
OPERATIONAL DEFECTS IN HIGH-PRESSURE INJECTION NOZZLES AND THERMAL SLEEVES
NCR BLN NEB 8206
BLRD-50-438/82-35, BLRD-50-439/82-32
10 CFR 50.55(e)
SIXTH INTERIM REPORT

Description of Deficiency

Recent inspections at several B&W operating plants revealed defects in the makeup/High Pressure Injection (HPI) nozzles and their thermal sleeves and in the makeup piping upstream of these nozzles. The nozzles are located on each reactor coolant cold leg between the reactor coolant pump and reactor vessel. The nozzles and sleeves are supplied by B&W under the Nuclear Steam Supply System (NSSS) contract. The defects include:

- . through-wall circumferential crack at the welded joint between the nozzle safe end and the first check valve upstream of the safe end
- . loose thermal sleeves
- . missing or worn thermal sleeve retaining buttons

The loose thermal sleeves and missing or worn retaining buttons remove the mechanical restraints which were designed to avoid exposing the nozzle and pipe to a thermal shock condition by preventing sleeve movement in the upstream direction.

Although the degraded components at the affected plants were the same, the resulting damage was not identical. Accordingly, B&W is investigating this concern to determine its cause and to determine if it has generic implications for other B&W plants, including Bellefonte. The Bellefonte nozzle configuration is similar to that at the affected plants except that it is a one-piece construction while the nozzles for the affected plants have a welded safe end. B&W has notified TVA of no similar potential deficiencies in the past for other Bellefonte NSSS nozzles. There are no implications for other TVA plants.

Interim Progress

Interim report No. 5 outlined TVA's remaining concerns about the adequacy of the sleeve rerolling for the life of the plant. B&W's responses are documented in B&W letter D-4941 dated January 27, 1984. Letter D-4941 resolves TVA's concern about sleeve bypass flow due to gaps between the sleeve and the nozzle bore. The gaps are on the inboard end of the thermal sleeve, not on the outboard end where bypass flow must be limited. Tests performed by B&W on a 177 fuel assembly (FA) plant mock-up (stainless steel thermal sleeve and nozzle) demonstrated that no bypass flow around the inboard end of the sleeve occurred. B&W believes the result would be similar, and perhaps better (due to shorter rolled joint interface load loss time during an HPI event) for the Bellefonte 205 FA design because the 205 FA design utilizes a thinner Inconel nozzle and stainless steel thermal sleeves.

To resolve TVA's concern about maintaining the thermal sleeve/nozzle interface load through the complete set of design-life transients. we have requested B&W' response to the following comment:

Considering the fact that B&W did not perform design-life cycle thermal testing for the 177 FA plant configuration, the assurances presented in D-4698 do not fully validate a 40-year design life for maintenance of thermal sleeve attachment. This is a concern because a graduated loss of the rolled-interface residual stress field is expected as thermal-transient-induced stress cycles accumulate during plant operation. In D-4698, B&W acknowledges a 10-percent load loss due to the initial HPI event but presents no firm evidence regarding the magnitude of load loss for additional thermal cycles. B&W should provide a quantitative evaluation supporting maintenance of the interface residual stress field for the design life thermal transient.

TVA will submit a final report on this deficiency upon resolution of our remaining concerns.