



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

Report Nos.: 50-438/84-18 and 50-439/84-18

Licensee: Tennessee Valley Authority
500A Chestnut Street
Chattanooga, TN 37401

Docket Nos.: 50-438 and 50-439

License Nos.: CPPR-122 and CPPR-123

Facility Name: Bellefonte 1 and 2

Inspection Conducted: September 11 - 14, 1984

Inspector: J. J. Blake
for J. L. Coley

9/27/84
Date Signed

Approved by: J. J. Blake
J. J. Blake, Section Chief
Engineering Branch
Division of Reactor Safety

9/27/84
Date Signed

SUMMARY

Scope: This routine, unannounced inspection entailed 23 inspector-hours on the site in the areas of reactor vessel internals (welding) Unit 1, and independent inspection effort Units 1 and 2.

Results: No violations or deviations were identified.

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REPORT DETAILS

1. Licensee Employees Contacted

- *J. Barnes, Construction QA, Section Supervisor
- *L. Cox, Project Manager
- *K. Lawless, Welding Engineering Unit, Supervisor
- *G. Lyles, Mechanical Engineering Unit, Supervisor
- *P. Mann, Nuclear Licensing, Supervisor
- *M. Rudolphi, Project Manager
- *D. Smith, Assistant Construction Engineer
- *B. Thomas, Quality Manager
- *R. Young, Construction Engineer

Other licensee employees contacted included technicians, and office personnel.

NRC Resident Inspector

- *J. York, Senior Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on September 14, 1984, with those persons indicated in paragraph 1 above. The licensee acknowledged the inspection findings.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Independent Inspection Effort - (92706B) Units 1 and 2

The inspector conducted a general inspection of Units 1 and 2 containments, the auxiliary building and the turbine building. The purpose of the inspection was to observe construction activities in the areas of pipe and support welding, housekeeping, care and preservation of equipment, material storage and control, construction, and preservice inspection progress. In the areas of preservice inspection, all records and personnel were removed from the Bellefonte site on September 12, 1984, in order that the examiners could be utilized for the Sequoyah Unit 2 outage. However, preservice work completed to date consisted primarily of surface examinations on Class 1 piping.

Within the areas examined, no violations or deviations were identified.

6. Reactor Vessel Internals - Unit 1 (55093B)

The inspector reviewed activities pertaining to field welding of reactor vessel internals and the replacement of core support assembly and plenum assembly bolts to ascertain whether these activities were being accomplished in accordance with regulatory requirements, applicable codes, standards and licensee commitments. The applicable code for the installation of bolts and locking devices was the ASME Code, Section XI, (80W81).

a. Welding and Associated Activities of Repair Work on Miscellaneous Tack Welds and Plug Welds

While performing onsite modifications to the Unit 1 reactor internals (Babcock and Wilcox (B&W) field change package 194), defects were noticed in 12 of 20 wide baffle plates adjacent to the narrow baffle plates being modified. Former bolts are used to hold the baffle plates together. Nine of the twelve affected baffle plates have 24 bolts each, and the other three have 48 bolts each, for a total of 360 bolts. The former bolts are prevented from backing out by the use of locking pins, which are secured by tack welding each end to its baffle plate. At 26 of the 360 locations, tack welds were found to be cracked. One of the 26 locking pins had cracked tack welds at each end. Additionally, three pins were welded to bolts, there was a lack of fusion indication on one pin, and one pin had a tungsten inclusion. The apparent cause of these defects is poor workmanship during fabrication at B&W.

B&W's laboratory analyses of three cracked weld samples showed that the cracks were a result of solidification cracking and that the cracked welds were made with Inconel 600 filler metal instead of the required stainless steel 308L. Five 308L welds were analyzed and no evidence of cracks was found.

Shop records show that the Bellefonte Unit 1 core basket lock pin welds were made during the same time period and in the same shop bay as that for another job which utilizes 1/16" Inconel 600 weld rod. The 308L weld rod being used for the Bellefonte lock pin welds was also 1/16". It is hypothesized that several pieces of the Inconel rod were inadvertently used on the Bellefonte Unit 1 core basket. The Unit 2 internals were examined visually and with an alloy separator and no reportable indications were found. B&W also conducted a visual inspection of internal locking pins on other contracts fabricated during the same general period as Bellefonte Units 1 and 2. No Inconel welds were found. The inspector reviewed TVA's program for the identification and repair of the above welds and performed an independent 5X visual examination of the completed work. Documents and procedures reviewed by the inspector during the audit of this activity consisted of the following:

- TVA's Quality Control Procedure BNP-QCP-10.36, Revision 1
- Nonconforming Condition Report No. NCR-1617
- Nonconforming Condition Report No. NCR-2180
- Nonconforming Condition Report No. NCR-2267
- Nonconforming Condition Report No. NCR-2464
- Nonconforming Condition Report No. NCR-3401
- Construction Deficiency Report (50.55(e)) No. CDR-50-438/83-23
- Sequence Control Chart SCC-1NC-M553
- Sequence Control Chart SCC-1NC-M606
- Sequence Control Chart SCC-1NC-M637
- Sequence Control Chart SCC-1NC-M639
- Sequence Control Chart SCC-1NC-M643
- Sequence Control Chart SCC-1NC-M646
- Sequence Control Chart SCC-1NC-M647
- Sequence Control Chart SCC-1NC-M655
- Sequence Control Chart SCC-1NC-M694

In addition to the above, the following completed repair weld records were reviewed:

<u>Weld Numbers</u>	<u>SCC No.</u>
INCO - 00544	M637
INCO - 00569	M637
INCO - 00922	M637
INCO - 00902	M637
INCO - 00976	M637
INCO - 01069	M639
INCO - 61551	M643
INCO - 64451	M643
INCO - 00810	M651
INCO - 01035	M651
INCO - 00984	M651
INCO - 00613	M651
INCO - 00575	M655

INCO - 00605	M655
Plug weld - Position 1, Hole 1, Weld 1140	M694
Plug weld - Position 1, Hole 4, Weld 1142	M694
Plug weld - Position 1, Hole 5, Weld 1144	M694

Within the areas examined, no violations or deviations were observed.

b. Replacement of Core Support Assembly and Plenum Assembly Bolts

The inspector observed the installation, torquing and ultrasonic testing of bolts in the column weld mount to upper grid. This work was being performed by Babcock and Wilcox as a result of previous ultrasonic testing in several B&W plants which revealed stress assisted intergranular cracking of bolts made of A-286(SA-453 Gr 660 Class A) stainless steel. To minimize the possibility of stress corrosion cracking, stresses in the fasteners should be as low as practical without jeopardizing joint integrity and a material less susceptible to corrosion attack should be used for bolting material. Therefore, the bolts in the core support assembly (CSA) and the plenum assembly (PA) made from A-286 material were being replaced with bolts made from Inconel X-750 HTH material.

Ultrasonic testing witnessed by the inspector was to measure the bolts in a preload and a residual load condition using the pulse-overlap technique. The inspector reviewed the following instructions, procedures, and records during the review of this process:

- Field Change Procedure, FCP-264
- Babcock and Wilcox Ultrasonic Procedure, ISI-163, Revision 11
- Personnel qualification records
- Equipment certification records
- Inspection results

Within the areas inspected, no violations or deviations were observed.

c. Visual (5X) Examination of Arc Strikes Reported on Quality Control Investigation Report No. 35,843

During the inspector's review of records in item (a) above, the inspector observed a Quality Control Investigation Report (QCIR) No. 35,843 which reported arc strikes adjacent to the instrument nozzles which were welded to the flow distributor. Both are part of the reactor vessel internals. The QCIR disposition was to accept as is, based on the determination that the indications were not strikes, but an accepted industry practice whereby the gas tungsten arc welding (GTAW) arc is initiated leading into the weld joint or extinguished leading away from the weld joint. The licensee had not performed

examinations, however, to determine if the indications had initiated cracks as a result of the arc creating this surface condition. During the inspector's examination of the reactor internals, the condition was examined under 5X magnification. No cracks were observed by the inspector. The instrument nozzles which the QCIR referred to was the incore instrument guide tubes.

Within the areas examined, no violations or deviations were observed.