UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-325/86-07 and 50-324/86-08

Licensee: Carolina Power and Light Company
P. O. Box 1551
Raleigh, NC 27602

Docket Nos.: 50-325 and 50-324 License Nos.: DPR-71 and DPR-62

Facility Name: Brunswick 1 and 2

Inspection Conducted: February 3-7, 1986

Inspector: J. L. Coley 3-4-86
J. L. Coley Date Signed

Approved by: 3/5/86
J. J. Blake, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection involved 33 inspector-hours on site in the areas of nondestructive examination of recirculation and residual heat removal system piping, overlay welding, and visual inspection of supports.

Results: One violation was identified - Inadequate measures established for control of welding to design base specifications - paragraph 6.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

*P. Howe, Vice President, Brunswick Nuclear Project (BNP)
*J. Chase, Assistant to General Manager - BNP
*W. Pierce, Lead Engineer, Brunswick Engineering Support Unit (BESU)
*L. Wheatley, Inservice Inspection (ISI) Project Specialist - BNP
*R. Poulk, Senior Regulatory Specialist - BNP

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, and office personnel.

Other Organizations

T. Brinkman, General Electric (GE), Level III Examiner
R. Trude, Southwest Research Institute (SwRI), Team Leader

NRC Resident Inspector

*W. Ruland, Senior Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on February 7, 1986, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

The licensee did not idedntify as proprietary any of the materials provided to or reviewed by the inspector during this inspection.

(Open) Violation 324/86-08-01, 325/86-07-01, Inadequate Measures Established for Control of Welding to Design Base Specifications - paragraph 6.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Nondestructive Examination (NDE) of Recirculation (RECIRC) and Residual Heat Removal (RHR) System Piping.

On April 19, 1984, NRC issued Generic Letter 84-11 to all licensees of operating reactors, applicants for operating license, and holders of construction permits for boiling water reactors. This letter addressed a problem that had been identified in inspections conducted at several boiling water reactors (BWRs) wherein intergranular stress corrosion cracking (IGSCC) in large diameter RECIRC and RHR piping had been revealed. These inspections were conducted pursuant to IE Bulletins (IEB) 82-03, Revision 1, and 83-02 and the NRC August 26, 1983 orders. The letter expressed to the Commission's opinion that the results of the above inspections mandated an ongoing program for similar reinspection at all operating BWRs. The Generic Letter also described those actions which licensees should take to provide an acceptable response to the IGSCC concern.

Carolina Power and Light Company's (CP&L) letters of response to Generic Letter 84-11, Serial Nos. NLS-85-390 dated November 1, 1985, and NLS-85-423 dated November 27, 1985, were reviewed by Region II. In these letters, CP&L identified their plans to perform IGSCC inspections and mitigative actions, during the Brunswick 2 reload outage which started on December 1, 1985.

Ninety-four RECIRC and RHR welds were scheduled to be ultrasonically examined prior to induction heat stress improvement (IHSI). Five welds that had received weld overlays as a result of earlier IGSCC examinations were scheduled for UT re-examination. CP&L also scheduled material replacement for 24 IGSCC susceptible welds in the reactor water cleanup (RWCU) system piping. The susceptible 304 stainless steel (SS) piping will be replaced with nuclear grade, 316 SS which has low carbon content and high resistance to IGSCC. In addition, the RWCU primary containment penetration will be modified to eliminate the inaccessible weld of the original flued head penetration design.

UT examinations for the detection of IGSCC were to be performed on these welds immediately before and as soon as practical after the performance of the IHSI measures. General Electric (GE) Apparatus and Engineering Services were selected as the vendor to perform the UT examinations using the enhanced ultra-image automated equipment commonly referred to as the "SMART" System on inspections where physical clearances allow.

The applicable codes, regulatory requirements and licensee commitments for the examinations were the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV), Sections V and XI (77S78), the Coordination Plan between NRC, the Electric Power Research Institute (EPRI), and the Boiling Water Reactors Owners Group (BWROG) for Training and Qualification Activities of NDE Personnel, and Code Case N335.

a. Review of Procedures (73052B)

The inspector reviewed GE procedures pertaining to the UT examination of stainless steel for IGSCC to ascertain whether these procedures were consistent with regulatory requirements and licensee commitments. The following procedures were reviewed:

- Procedure No. UT1.43, Rev. 5, Procedure for Ultrasonic Examination of Pipe Welds Using Automatic Equipment

- Procedure No. UT1.30, Rev. 12, Procedure for Ultrasonic Examination of Austenic Metal Welds for IGSCC

- Procedure No. UT1.35, Rev. 3, Procedure for Ultrasonic Planar Flaw Sizing

- Procedure No. NDE-49, Rev. 0, Zero Reference Location and Data Recording for Nondestructive Examination

The above procedures were reviewed to determine if the following procedure elements were properly implemented:

- The type of apparatus to be used including frequency range, linearity, and signal attenuation accuracy requirements were specified.

- The extent of coverage (beam angles, scanning surface, scanning rate and directions) and methods of scanning were specified and consistent with the ASME Code.

- Calibration requirements, methods, and frequency including type, size, geometry, and material of calibration blocks as well as location and size of calibration reflectors within the block were clearly specified and consistent with the applicable ASME Code.

- The sizes and frequencies of search units were specified and consistent with the ASME Code, Code Case N335, and had been demonstrated on qualification specimens at EPRI, NDE Center.

- Beam angle or angles were specified and consistent with the ASME Code, Code Case N335 and had been demonstrated on qualification specimens at EPRI, NDE Center.

- Methods of compensation for the distance traversed by the ultrasonic beam as it passes through the material were specified and consistent with the ASME Code.

- The reference level for monitoring discontinuities was defined and the scanning gain setting specified. These values met or exceeded the ASME Code.

- Methods of demonstrating penetration were established.

- Levels or limits for evaluation and recording of indications were specified. These values met or exceeded the ASME Code.

- Methods of recording significant indications were established and the reporting requirements were in accordance with requirements established by the licensee.

- Acceptance limits were specified or referenced and were in accordance with the ASME Code, Section XI.

In addition to the meeting code requirements delineated above, GE's procedures incorporated inspection parameters described in EPRI's Module 17, Revision 1, "Generic Procedure for Detection and Discrimination of IGSCC." This module was utilized for GE's personnel qualification at the EPRI NDE Center during September 1985.

b. Observation of NDE Activities (73753)

The inspector observed work activities and reviewed documentation to ascertain whether personnel equipment and materials were properly qualified and/or certified; approved NDE procedures were available and were being followed; specified NDE equipment that had been qualified at the EPRI NDE Center during personnel and procedure qualifications was being used; NDE personnel were knowledgeable of examination methods and operation of the NDE equipment; NDE personnel with the proper level of qualification and certification were performing the various examination activities including designation of NDE method/technique to be used, equipment calibration, examination, and interpretation/evaluation/acceptance of test results. The following examinations/evaluations/calibrations were observed by the inspectors in the evaluation of the examination processes:

(1) SMART System calibration and in-process examination of weld No. 2B32-RR-28"-A3.

(2) SMART System Post-IHSI examination of Weld No. 2B32-RR-12" AR-D-3, reviewed video tape of examinations and discussed evaluations with GE Level III examiner during review process.

(3) SMART System Pre-IHSI examination of weld No. 2B32-RR-28"-B-5, reviewed video tape of examination and discussed evaluations with GE Level III examiner during review process.

The calibrations/examinations/evaluations delineated above were observed to determine if the examination activities were consistent with the approved procedures in the following areas:

- The type of apparatus used, including frequency range as well as linearity and signal attenuation accuracy.

- The extent of coverage (beam angles, scanning surface, scanning rate and directions) as well as the scanning technique.

- Calibration, methods and frequency including the type, size, geometry and material of identified calibration blocks as well as location and size of calibration reflectors within the block were clearly determined and recorded.

- The sizes and frequencies of search units.

- Beam angle or angles.

- Methods of compensation for the distance traversed by the ultrasonic beam as it passes through the material including distance - amplitude correction curves, electronic distance - amplitude correction.

- The reference level for monitoring discontinuities was as defined and the scanning gain setting was as specified.

- Methods of demonstrating penetration.

- Levels or limits for evaluation and recording of indications.

- Method of recording significant indications.

- Acceptance limits were determined.

- The examination personnel were thoroughly familiar with the inspection system, its application, operation and its limitations.

Review of NDE Records (73755B)

The inspector reviewed records associated with the qualification and certification of personnel and equipment, examination results and data sheets, calibration data sheets, weld profile data, examination evaluation data, records on extent of examinations, records on disposition of findings, re-examination data after IHSI, and records identifying NDE materials such as couplant and certified marking materials. The records were reviewed in part to determine if personnel and equipment utilized by GE to perform the examinations had been qualified/certified in accordance with SNT-TC-1A and the most recent certification effort administered by the EPRI NDE Center in accordance with the "Coordination Plan for NRC/EPRI/BWROG Training and Qualification Activities of NDE Personnel." The records were also reviewed to determine if the data files were complete, technically adequate and within the previously established acceptance criteria.

Records for the following welds were reviewed:

- Weld No. 2B32-RR-12"-AR-D-3 Post-IHSI
- Weld No. 2B32-RR-28"-B-5 Pre-IHSI

Within the areas examined, no violation or deviation was identified.

6. Overlay Welding (55050) Units 1 and 2.

The inspector reviewed CP&L's welding specifications, work procedures, plant modification 85-030 for overlay welding, welders qualification records, filler material certifications, completed and in-processing overlay weld records, and audited welding activities by direct observation, to determine whether welding specifications, procedures, production equipment, personnel, and the established licensee quality control systems are adequate for the production of sound welds. The applicable codes and licensee commitments are the ASME Boiler and Pressure Vessel (B&PV) Code Section IX, 1980 Edition with Addenda's through Winter 1981, the American National Standards Institute B31.1, 1967 Edition, and the Nutech Design Base Welding Specification No. CPL-21-101, Rev. 3, for Brunswick Steam Electric Plant, Units 1 and 2.

The inspector observed the following in-process overlay welding on the Unit 2 RECIRC system piping:

Weld Joint Nos.	Layer No.	Position
2-B32-753-12BR-G-3	Layers IV & V	5G
2-B32-751-12AR-E-3	Layers IV & V	5G
2-B32-748-12AR-C-3	Layers II & III	5G
2-B32-770-28B-5	Layers I & II	2G
2-B32-744-12AR-A-3	Layer V	5G

During the inspectors surveillance of the above work, welding parameters identified in the Nutech Design Base Welding Specification No. CPL-21-101, Rev. 3, were observed being followed by machine operator for each specified welding position. Welding, however, was intended to be performed under CP&L quality welding program using CP&L's Welding Procedure Specification (WPS-8BV12, Rev. 3). The inspector compared the two documents and found that CP&L WPS document had broader welding parameters than the Nutech Design Base document. As a result of this difference, the inspector held discussions with CP&L's Lead Engineer in the Brunswick Engineering Support Unit (BESU) to determine whether CP&L had justification for exceeding the design base document. The licensee could not provide justification for the broader parameters other than explanation that WPS-8BV12 was developed by CP&L as a welding procedure with parameter broad enough to weld the design critical overlay welding on the recirculation system piping and also as a possible fix for the less critical service water system piping, which had suffered

material loss as a result of material erosion. The licensee also provided the inspector with site memoranda for Units 1 and 2 which forwarded Nutech's specification to the field for information. CP&L, however, has committed to weld the RECIRC system weld overlays under the Brunswick Construction Unit's Quality Welding Program using Power Cutting Inc. Welders qualified to CP&L's Welding Procedure Specification 8BU12. Failure of CP&L to assure that measures established in their welding procedure specification was controlled within design base criteria is in violation of 10 CFR 50, Appendix B, Criterion IX, and was identified to the licensee as violations 324/86-08-01 and 325/86-07-01, Inadequate Measures Established for Control of Welding to Design Base Specifications.

As noted by the inspector above, welding operators have apparently been instructed to follow the narrow parameters of the Nutech WPS, therefore; this violation specifically addresses a procedure discrepancy and not the soundness of in-process or completed welding.

Within the area examined, no violation or deviation was identified except as noted above.

7. Visual Examination of Supports - Unit 2 (57050)

a. Procedure Review

The inspector reviewed CP&L's procedure for administrative control of inservice in operation activities (Engineering Procedure ENP-16), various visual examination procedures, periodic test procedures, audit procedures, and training procedures to determine whether the licensee's quality program for visual examination met the applicable ASME Code requirements delineated in paragraph 5 above.

The following procedures were reviewed:

Procedure No.	Title
- NDEP-611,	VT-1, Visual Examination of Nuclear Power Plant Components
- NDEP-612,	VT-2, Visual Examination of Nuclear Power Plant Components
- NDEP-613,	VT-3, Visual Examination of Nuclear Power Plant Components
- NDEP-614,	VT-4, Visual Examination of Nuclear Power Plant Components

- Periodic Test, PT-91.0.23, RHR (E11), Class 2, Loop B, VT-3/VT-4 Examination of Components Supports

- Procedure for Site Orientation Indoctrination/Training for Visual Examiners

- QAP-305, Inservice Inspection Surveillance Program

The above procedures were reviewed to determine whether the procedures were approved in accordance with the licensee's quality assurance program and contained information or referenced a general inspection procedure or supplementary instruction sufficient to assure that the following parameters were specified and controlled within the limits permitted by the applicable code:

- Examination Method - direct visual, remote visual or translucent visual

- Application - hydrostatic testing, fabrication procedure, visual examination of welds, leak testing, etc.

- Equipment - special illumination, instruments, optical aids, and measuring devices

- Surface Condition - type of surface condition acceptable and method or tool for achieving proper surface condition

- Procedure Criteria - sequence of performing examination and inspection criteria to be used in the examinations

- Reporting - data to be tabulated

- Acceptance Criteria - review of data and evaluation of indications

b. Observation of the Effectiveness of Visual Examination Activities by Independent Re-examination of Completed Work

The inspector re-examined eight representative component supports on the core spray system (PT-91.0.23), loop B to determine through direct observation whether the visual examinations conducted by CP&L have been performed by qualified personnel in accordance with approved procedures. The following component supports were re-examined and the data taken by the inspection was later composed to the initial visual examination data taken by CP&L:

Support Nos.	Type of Support
2E21-6PG22(19-130)	Pipe Guide
2E21-40SS107(18A-901)	Snubber
2E21-40SS106(18A-900)	Snubber
2E21-40FS90(18A-11236)	Fixed Support
2E21-40PG1(18A-55/400)	Pipe Guide
Penx227B(18A-210)	Link Seal Support Guide
Penx223B	Anchor Support
Core Spray Pump 2B	Fix Support

The above supports were examined to determine whether applicable drawings and instructions clearly specify the test procedure to be used and a copy of the procedure was available; personnel were qualified to perform the design task, test attribute were as specified in the applicable test procedure and measurements taken by the licensee were consistent with those taken by the inspector, defects evaluated in accordance with test procedure, correct acceptance criteria used, and inspection results were reported in the prescribed manner.

Within the areas examined, no violation or deviation was identified.