



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

Report Nos.: 50-325/85-23 and 50-324/85-23

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: July 8 - 12, 1985

Inspectors: R. W. Newsome for 7-30-85
J. L. Coley Date Signed

R. W. Newsome 7-30-85
R. W. Newsome Date Signed

Approved by: J. J. Blake 7/30/85
J. J. Blake, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection entailed 78 inspector-hours on site in the areas of independent inspection effort and Generic Letter 84-11 including review of procedures, data review and evaluation and independent ultrasonic verification examinations.

Results: No violations or deviations were identified.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *P. W. Howe, Vice President, Brunswick Nuclear Project (BNP)
- *C. R. Dietz, General Manager - BNP
- *E. A. Bishop, Assistant to General Manager - BNP
- *B. E. Hinkley, Manager Technical Support - BNP
- *W. M. Tucker, Engineering Supervisor Inservice Inspection (ISI)
- *L. W. Wheatley, ISI Project Specialist - BNP
- *B. L. Mann, Senior ISI Engineer - BNP
- *C. R. Osman, Principal Quality Assurance/Quality Control Specialist -
Corporate
- *A. P. Lowe, Corporate Quality Assurance
- *K. E. Enzor, Director Regulatory Compliance - BNP

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, mechanics, security force members, and office personnel.

NRC Resident Inspectors

- *W. H. Ruland, Senior Resident Inspector
- T. Hicks
- L. Garner

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on July 12, 1985, with those persons indicated in the above paragraph. The inspectors described the areas inspected and discussed in detail the inspection findings listed below. No dissenting comments were received from the licensee.

Unresolved Item 325, 324/85-23-04, Unresolved Ultrasonic Reflectors, paragraph 6.b.(3)

Unresolved Item 325, 324/85-23-05, Missing Recirculation System Calibration Block, paragraph 6.b.(2)

Inspector Followup Item (IFI) 325/85-23-01, Inspectability of Welds Under Overlays Due to Overlay Weld Width, paragraph 6.d

Inspector Followup Item 325/85-23-02, Clarification of UT-43 Procedure Criteria, paragraph 6.a.(2).

Inspector Followup Item 325/85-23-03, Clarification of UT-1.31 Procedure Criteria, paragraph 6.a.(3)

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

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. New unresolved items identified during this inspection are discussed in paragraphs 6.b.(3) and 6.b.(2).

5. Independent Inspection Effort (92706) (Unit 1)

The inspectors conducted a general inspection of the Unit 1 containment and site auxiliary buildings to observe activities such as welding, material handling and control, housekeeping and storage. While conducting the general inspection of welding activities in Unit 1, the inspectors observed the automated remote welding of two overlay welds being deposited on two recirculation piping welds identified as weld numbers 1-B32-12"-AR-C3 and 1-B32-12"-BR-G3. The welding was being accomplished in accordance with the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME B&PV) Code, 1974 Edition with summer 1975 addenda and ASME Section XI, 1977 Edition with summer 1978 addenda. Design criteria is the ASME B&PV Code Section XI, winter 1983 edition and seismic design letter LIC 03671.

Within the areas examined no violations or deviations were identified.

6. Inservice Inspection (ISI) In Accordance with Generic Letter No. 84-11 (Unit 1)

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 recirculation and residual heat removal piping had been revealed. These inspections were conducted pursuant to IE Bulletins 82-03, Revision 1, and 83-02 and the NRC August 26, 1983 orders. The letter expressed the Commission's opinion that the results of the above inspections mandated an ongoing program for similar re-inspection 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 (CP&L) Company's letter of response to Generic Letter 84-11, dated October 9, 1984, was reviewed by Region II. In this letter, CP&L committed to inspect 100% of all nonconforming stainless steel weld joints on Unit 1 that were four inches or greater (except those that had been repaired by weld overlays). CP&L's response also stated that induction heating stress improvement (IHSI) would be performed on selected weld joints in the recirculation (RECIRC) system and in the residual heat removal (RHR) system and that the welds would be ultrasonically UT inspected after heat treatment. General Electric (GE) performed the ultrasonic examinations and Ishikawajima-Harima Heavy Industries Company, LTD (IHI) of Japan performed the IHSI.

On July 8, 1985, the inspectors arrived at the Brunswick site to examine documents, activities, and records as indicated below to determine whether ISI was being conducted in accordance with applicable procedures, regulatory requirements and licensee commitments. The applicable code for ISI is the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME B&PV) Code, Section XI, 1977 edition with addenda through summer 1978.

a. Review of Procedures (73052B)

- (1) The following procedures were reviewed in the areas of procedure approval and qualification of NDE personnel:

<u>Procedure ID</u>	<u>Title</u>
UT-1.31 (R4)	Procedure for Manual Ultrasonic Examination of Weld Overlayed Austenitic Piping
UT-43 (R0)	*Procedure for Ultrasonic Examination of Pipe Welds Using Automated Equipment

NOTE: The licensee pointed out that procedure UT-43 was used to provide supplemental enhanced data. However, since the procedure is being used to obtain and report data relative to need for repair of cracks, the inspectors considered that the procedure needed some clarification to obtain the best results. Comments and recommendations were made by the inspectors during their review and are described in paragraph 6.a.(2) below.

The inspectors audited procedures UT-43 and UT 1.31 to ascertain whether they had been reviewed and approved in accordance with the licensee's established QA procedures. The procedures were also reviewed for technical adequacy and conformance with ASME, Section XI Appendix III, Section V Article 5 and other license commitments/requirements in the following areas: type of apparatus used; extent of coverage of weldment; calibration requirements; search units; beam angles; DAC curves; reference level for

monitoring discontinuities; method for demonstrating penetration; limits for evaluating and recording indications; recording significant indications; and acceptance limits.

(2) The inspectors noted that procedure UT-43 appeared to be deficient in the following respects:

- Paragraph 1.2 does not specify applicable material.
- Paragraph 4.1.2(A) needs clarification as to the maximum transducer size that can be used on a pipe having a diameter of less than 10".
- Paragraph 4.2.1(b) does not specify the ultrasonic wave mode to be used for examination.
- Paragraph 6.4.2(a) needs clarification relative to gain setting used while scanning is being conducted. Present wording allows examination to be performed at a gain setting which could be less than that established as the primary reference level.

The licensee agreed to review this procedure in the areas listed above and make changes as necessary. Pending review of the procedure changes by NRC this item will be identified as IFI 325/85-23-02, Clarification of UT-43 Procedure Criteria.

(3) During the review of ultrasonic procedure UT 1.31 the inspectors noted deficiencies in the areas listed below:

- Paragraph 3.4.3 of the procedure requires that scanning be performed with the instruments gain set at a level such that the noise level from the item under examination is at 10% of full screen height. Signals from IGSCC are typically low amplitude and reducing examination sensitivity below the calibration reference level could result in using a gain setting too low to detect IGSCC.
- Paragraph 3.5.1 needs additional guidance relative to the flatness of the scanning surface.
- Paragraph 4.2.3(b) needs clarification with regard to which calibration reflector is to be used for each specific examination and criteria relative to what ultrasonic signals need to be presented along the horizontal sweep of the ultrasonic instrument.
- Paragraph 5.4.2 has an incorrect reference identified.

The licensee agreed to review the procedure in the areas indicated above and make clarifications as required. Pending NRC review of the clarifications, this item will be identified as IFI 325/85-23-03, Clarification of UT 1.31 Procedure Criteria.

b. Observation of Work and Work Activities (73753B)

The inspectors performed independent ultrasonic examinations of welds inspected previously by the licensee's contractor and reviewed certification records of equipment and materials which had been and will be utilized during the required ISI examinations during this outage. The reviews conducted by the inspectors are documented below.

- (1) The inspectors conducted ultrasonic verification examinations using Region II equipment and 45° angle beam longitudinal wave transducers on portions of the Class 1 circumferential pipe welds listed below. The examinations were performed to evaluate the technical adequacy of the procedure being used by the licensee's contractor to perform ISI ultrasonic examinations. The inspectors also assessed the validity of the information reported by the ultrasonic examiners who had evaluated the results produced by the semi-automated ultrasonic system being utilized for these ultrasonic inspections.

<u>Weld ID</u>	<u>System</u>	<u>Scan Performed</u>
1-B32-12"-BR-F2	Recirculation	Circumferential
1-B32-12"-BR-F3	Recirculation	Circumferential
1-B32-12"-BR-H2	Recirculation	Circumferential
1-B32-12"-BR-J2	Recirculation	Circumferential

The information reported by the ultrasonic examiners who evaluated the semi-automated (SMART) system appeared to be superior to the manual ultrasonic examination data taken on these particular welds by the licensee and the inspectors. Limiting factors effecting manual examinations are weld crown configuration and inability to maintain couplant.

- (2) Prior to starting the ultrasonic verification examinations, the inspectors requested the use of the licensee's ultrasonic calibration block 5B, in order to calibrate their ultrasonic equipment. The licensee was unable to produce the calibration block requested and immediately started conducting an in-depth search for the missing block. The calibration block had not been located by the termination of this NRC inspection. Pending resolution of the problems associated with the loss of a calibration block this item will be identified as unresolved item 325, 324/85-23-05, Missing Recirculation System Calibration Block.

- (3) While conducting the ultrasonic verification examinations of the four welds listed above, the inspectors noted ultrasonic signals with amplitudes in excess of the primary reference level. The signals were coming from reflectors located in what appeared to be longitudinal weld seams in the pipe spool pieces which intersected with the circumferential welds being inspected. Additional investigation of the longitudinal weld seams by the inspectors indicated that the ultrasonic reflectors continued for some distance along and parallel to the intersecting longitudinal seam welds. The reflectors were noted when scanning at 1/2 node and full node. These ultrasonic signals were reported to the licensee who agreed to investigate the source of the ultrasonic reflectors and recommend disposition, following determination of their source. Pending completion of the licensee's investigation and review of the findings by NRC, this item will be identified as unresolved item 325, 324/85-23-04, Unresolved Ultrasonic Reflectors.
- (4) The following listed ultrasonic equipment and materials certification records were reviewed:

Ultrasonic Instruments

<u>Manufacturer</u>	<u>Serial No.</u>
Krautkramer Branson	27276-1088

Ultrasonic Transducers

<u>Size</u>	<u>Frequency</u>	<u>Serial No.</u>
.50" x .50"	2.25 MHz	E 30031

c. Inservice Inspection, Data Review and Evaluation, Unit 1 (73755)

Records of completed nondestructive examinations were selected and reviewed to ascertain whether: the methods, techniques and extent of the examinations complied with the applicable NDE procedures; findings were properly recorded and evaluated by qualified personnel; programmatic deviations were recorded as required; personnel, instruments, calibration blocks, and NDE materials (penetrants, couplants) were designated. Records selected for this review were as follows:

<u>Weld ID</u>	<u>NDE Method</u>
1-B32-12"-AR-C2	Automated UT
1-B32-12"-AR-C3	Automated UT
1-B32-12"-AR-D3	Automated UT
1-B32-12"-AR-D4	Automated UT
1-B32-12"-AR-J3	Automated UT
1-B32-12"-AR-E3	Automated UT
1-B32-12"-AR-D2	Automated UT

- d. During discussions with licensee personnel, on the first day of this inspection, the licensee informed the inspectors of a condition relative to the width of the overlay welds which, if not addressed, might have a significant impact on future ISI ultrasonic inspections of the welds repaired by overlays. General Electric (GE), the licensee's contractor for the inspections being performed on the overlay welds, had informed the licensee that the overlay welds being deposited in accordance with NuTech instructions (NuTech Engineers, Inc., has design responsibility for overlay welding for the licensee), do not have sufficient width in the axial direction to allow ultrasonic examination of the circumferential butt weld under the overlays should examination of these welds become necessary at a later date. The overlaid circumferential butt welds will require a more extensive examination in future outages if the overlay life is to be extended beyond the next cycle. In addition, ASME B&PV Code Section XI ISI examination criteria still apply to the circumferential piping butt welds. This situation is further compounded by two associated problems. The first being that the overlay welds have a variety of thicknesses depending on the applicable design criteria for the particular overlay. Second, at the present time the zone of inspection has not been established for the circumferential butt weld and the associated base material that is covered by the overlay weld.

At the conclusion of this inspection the licensee was still attempting to resolve the above listed problems. Pending further investigation and recommendations by the licensee, and NRC review of those recommendations, this item will be identified as Inspector Followup Item 325/85-23-01, Inspectability of Welds Under Overlays Due To Overlay Weld Width.

Within the areas examined no violations or deviations were identified.