



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

Report Nos.: 50-325/85-30 and 50-324/85-30

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: September 3-6, 1985

Inspector:

James L. Coley Jr.
J. L. Coley

9-27-85
Date Signed

Approved by:

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

9/27/85
Date Signed

SUMMARY

Scope: This routine, unannounced inspection involved 22 inspector-hours on site in the areas of previous enforcement items, inspector followup items, and review of ultrasonic data for automated examinations of weld overlay repairs.

Results: No violations or deviations were identified.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *C. R. Dietz, General Manager, Brunswick Steam Electric Plan (BSEP)
- *J. D. E. Jeffries, Manager, Corporate Nuclear Safety
- *B. E. Hinkley, Manager, Technical Support
- *K. E. Enzor, Director, Regulatory Compliance
- *W. R. Murray, Senior Engineer, Nuclear Licensing
- *W. M. Tucker, Supervisor, Engineering Division
- *L. W. Wheatley, Project Specialist, Inservice Inspection (ISI) Section
- *B. J. Mann, Senior Specialist, ISI Section
- *E. R. Eckstein, Maintenance Engineer, BSEP

Other licensee employees contacted included engineers, technicians, security force members, and office personnel.

NRC Resident Inspector

- *T. Hicks

- *Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on September 6, 1985, 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 identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

3. Licensee Action on Previous Enforcement Matters (92702)

(Closed) Violation 50-325/84-34-01, Failure to Follow Procedure for Selection of Angle Beam Transducer, Performing $1\frac{1}{2}$ V-Path Calibration and Recording Geometric Indications. The licensee response dated January 25, 1985, has been reviewed by Region II and found acceptable. The inspector held discussions with the licensee's cognizant personnel and reviewed documents which implemented the corrective actions. The inspector concluded that the licensee had determined the full extent of the violation, taken action to correct the condition, and developed corrective actions needed to preclude recurrence of similar problems. Corrective actions stated in the licensee response have been implemented.

(Closed) Unresolved Item 50-325/85-10-02, Examination Personnel Not on The Electric Power Research Institute (EPRI) Certification List for Examination of Intergranular Stress Corrosion Cracking (IGSCC). The examiner identified

in this item had been certified in accordance with IE Bulletin 83-02 by challenging the written examinations and passing the practical examination. However, on January 1, 1984, NRC, EPRI, and the Boiling Water Reactors' Owner Group signed a training coordination plan. This plan required all examiners performing examinations for IGSCC to have successfully passed all phases of testing given at EPRI. The coordination plan also required EPRI to provide a list of certified examiners to licensees on request. (CP&L) was not aware that a list of certified examiners was available and verified qualifications of personnel based on certificates provided by the individual examiners. The licensee's corrective actions consisted of the following: CP&L formally requested and is presently receiving current listings of certified examiners from EPRI, the examiner identified as no longer certified by NRC has been removed from all work associated with IGSCC. The inspector concluded that the actions taken by the licensee will preclude recurrence of this problem; IGSCC examinations performed by the examiner prior to this discrepancy being identified are considered to be technically adequate.

(Closed) Unresolved Item 50-325/85-10-04, Examination Personnel Apparently Were Not Adequately Briefed for Job in High Radiation Area. On April 9, 1985, the inspector observed a General Electric (GE) examiner performing a liquid penetrant examination on a weld adjacent to a weld overlay repair. The inspector had been informed by CP&L that the examiner would be examining Weld B32-RECIRC-12"BR-H-4: which was a overlay repaired weld. Discussions with the examiner revealed that he had been instructed to examine weld BR-H-4 and that the weld he was examining was stenciled with the numeral 4. The examiner, however, had a drawing which properly identified the weld as Weld No. 3. The inspector concluded that the individual was improperly briefed for work performed in a high-radiation area; if the inspector had not been present, the examiner would have provided an acceptable examination test report for a weld that he had not examined. CP&L's investigation revealed, however, that the individual had been properly briefed; in fact, his name, the weld number he was to examine, and the type of weld was listed on GE's assignment board. CP&L's corrective action consisted of the following: the individual was released from all work at the Brunswick site, a procedure was developed for indoctrination training which addressed the errors made by the examiner, all GE and CP&L inservice inspection personnel received classroom training on the material covered in the new procedure, and CP&L increased Quality Assurance (QA) surveillance to insure the new procedure had been implemented. The inspector concluded that the licensee had determined the cause of this inspector identified item and developed corrective actions needed to preclude recurrence of a similar problem.

(Closed) Unresolved Item 50-325, 324/85-15-01,] Recording Areas of Examination as Limited Scans Because Nondestructive Examination Procedures Limit Equipment Selection. The licensee's investigation revealed that although it was possible to get a smaller transducer between the restriction and the area to be examined, the distant amplitude correction curve (DAC) produced by the smaller transducer decayed rapidly. This indicated that the smaller transducer was not a good alternative for the examination. In addition, had the examiner detected a reflection which required recording

the area was too restrictive to obtain the necessary data. The licensee also audited all ultrasonic examination records for this outage and found only three other areas where limited scans had been recorded, in each case the reason was justified. The licensee's actions to resolve this item were satisfactory and this item is considered closed.

(Closed) Unresolved Item 50-325, 324/85-23-04, Unresolved Ultrasonic Reflectors. While conducting ultrasonic verification examinations on the 12 inch recirculation system riser piping Region II inspectors noted ultrasonic signals with amplitudes in excess of the primary reference level. The signals were from reflectors located in what appeared to be longitudinal weld seams in the pipe spool pieces which intersected 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 $\frac{1}{2}$ node and full node. The ultrasonic signals were reported to the licensee who agreed to investigate the source of the reflectors and recommend disposition. On September 5, 1985, the inspector held discussions with the licensee's cognizant personnel concerning the results of their investigation. The licensee reported that the ultrasonic reflectors detected by the inspectors could not be duplicated by General Electric (GE) using a combination of techniques. The inspectors had used a refracted longitudinal wave transducer when these reflectors were detected and had modified their examination techniques after a search by the licensee for the correct calibration block indicated that it had been lost. The correct calibration block, however, was found and used during the GE investigation. In order to resolve this item the inspector had GE calibrate on the correct calibration block using the equipment utilized during their investigation. GE could not duplicate the inspector's calibration because of the difference in the equipment selected to perform the job. However, GE's calibration and examination at $\frac{1}{2}$ node, should have detected any discrepancy in the longitudinal weld seam. The inspector also reviewed the fabrication radiographs for the longitudinal seams: these radiographs were of excellent quality and the welds in question were defect free. In addition the inspector learned from discussions with other Region II inspectors that these reflectors had been seen at other utilities and their cause had been attributed to beam redirection. The inspector concluded that the licensee's actions in resolving this item were adequate and this item is considered closed.

(Closed) Unresolved Item 50-325, 324/85-23-05, Missing Recirculation System Calibration Block. During an independent verification inspection performed by Region II inspectors. The inspectors requested and the licensee was unable to produce calibration block 5B for the examination of the 12 inch piping in the recirculation system. At the conclusion of the inspection, calibration block 5B had not been found. However, the licensee subsequently found the calibration block and this issue is considered closed.

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

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Inspector Followup Items (92701B)

(Closed) Inspector Followup Item 50-325, 324/85-10-01, Inspection of Inconel Battering. This item dealt with an observation made by the inspector when observing GE examiners performing axial scans, from the carbon steel side, of nozzle welds which had been inconel battered. The inspector observed an interface signal from the carbon steel to inconel battering which plotted in the area of interest and could have masked actual defects. The inspector reviewed GE's techniques and found that the GE procedure required the examiners to use a 2.25 MHz shear wave transducer. In the opinion of the inspector and in accordance with instructions and demonstrations given in workshops at the Electric Power Research Institute (EPRI), a refracted longitudinal wave transducer of lower MHz should have been used to penetrate the inconel battering. The licensee had also attended the workshops at EPRI on the inspection of inconel battering and agreed to investigate the problem. The licensee's investigation revealed that a refracted longitudinal wave transducer also produced a interface signal on inconel battering, however, both the shear wave and the refracted longitudinal wave would detect notches in the inconel battering when examining in the circumferential direction. The discontinuities that the examination was primarily interested in were axial cracks located in the inconel battering, which detection required that the examination be performed in the circumferential direction. The licensee concluded that even though some improvement could be observed when using a refracted longitudinal wave transducer, the advantages were lost by the inexperience of examiners in using this multiple wave type transducer and that their best effort would be using the 2.25 MHz shear wave transducer.

(Closed) Inspector Followup Item 50-325/85-10-03, Surface Finish on Overlay Cladding. During a liquid penetrant examination of a weld overlay the inspector noted that the overlay had ridges that would made the subsequent ultrasonic (UT) examination very difficult to perform. Since the overlay had been UT examined during a previous outage, the inspector reviewed the previous UT data for this weld and four additional weld overlays made during this time period. The inspector discovered that the UT examiner during the previous examinations had commented on each report that the surface condition was a limiting factor. The licensee issued engineering evaluation report (EER) No. 85-0123 to investigate this item. As a result of the licensee investigation surface conditioning and additional welding was required. The licensee also had GE revise their UT procedure (UT 1.31 Revision 6) to require a surface smooth enough to allow search unit movement on the entire examination surface. The inspector concluded that the licensee implemented sufficient corrective action to correct the present condition and to prevent the reoccurrence of a similar condition.

(Closed) Inspector Followup Item 50-325, 324/85-15-02, Circumferential Scans on Weld Metal for Axial Defects Should be Performed with Refracted Longitudinal Wave Transducers. On May 10, 1985, Region II was notified by CP&L that throughwall cracks had been detected visually on four welds. The welds had been ultrasonically examined during the October, 1984 outage and found free of intergranular stress corrosion cracking (IGSCC). The licensee also reported that GE could not detect the leaking indications utilizing the inspection techniques delineated in their examination procedure. On May 13, 1985, the inspector arrived at the Brunswick site with Region II independent inspection equipment to determine why the GE procedure, examiners, and equipment would not detect crack that extended completely through the pipe wall. The inspector reviewed the GE procedure and their examination data and discovered that GE had used a 2.25 MHz shear wave transducer. The inspector considered this transducer a poor selection when scanning circumferentially through weld metal. The inspector examined weld 1B32-RECIRC-AR-12"-D3, which was one reported crack welds, using a shear wave and a refracted longitudinal wave transducer. The shear wave did not see the defect, however, the refracted longitudinal wave transducer could see the indication at $\frac{1}{2}$ V path and at full V path. The inspector recommended the licensee investigate this problem and consider using refracted longitudinal wave transducers when examining through stainless steel weld metal. The licensee investigation revealed that the refracted longitudinal wave transducer was a larger transducer and the physical size of transducer limited its use on weld reinforcements. However, the licensee also examined the welds using the GE automated "SMART" machine and found that when scanning in the circumferential direction for axial defects, this instrument was superior. The primary reason for the SMART machines' success was its ability to pump couplant under the transducer on irregular surfaces. The inspector verified that the SMART machine report substantially more indications of axial cracks than the inspectors could detect using manual refracted longitudinal wave transducers. The inspector's verification examinations were documented in Inspection Report 50-325, 324/85-23. This item is considered closed.

(Open) Inspector Followup Item 50-325/85-23-01, Inspectability of Welds Under Overlay Weld Repairs Due to Weld Width. This is a generic issue that cannot be solved until industry or NRC determine the inspection zone for the various types of weld overlays. Present overlay widths on mini-overlay welds do not allow for full coverage of the pipe weld under the overlay.

(Closed) Inspector Followup Item 50-325/85-23-02, Clarification of UT-43 Procedure Criteria. The licensee revised Procedure UT-43 to clarify the procedure criteria in the areas where the inspectors had concern. The licensee's corrective actions were reviewed by the inspector and this issue is considered closed.

(Closed) Inspector Followup Item 50-325/85-23-03, Clarification of UT-1.31 Procedure Criteria. The licensee revised Procedure UT-1.31 to clarify the procedure criteria in the areas where the inspectors had concern. The licensee's corrective actions were reviewed by the inspector and this issue is considered closed.

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

6. Data Review of General Electric's Smart Examinations on Weld Overlays (73755B)

The inspector reviewed data taken by the General Electric (GE) "SMART" machine on the original weld overlays to determine if this instrument could produce superior results to those obtained when scanning manually. The GE "SMART" machine was used as a supplemental examination tool and manual examinations were performed for the official records. Examination data for the following welds were reviewed by the inspector:

- 1B32-RECIRC-28-A-14
- 1B32-RECIRC-28-A-15
- 1B32-RECIRC-28-B-8
- 1B32-RECIRC-12-AR-E-2
- 1B32-RECIRC-12-BR-H-4

The inspector's review of the "SMART" data revealed that it was meaningless for evaluation at this time. GE had used a A-Scan module when they were examining the welds and their evaluations were based on the A-Scan presentation which were not recorded. However, the "SMART" data will be valuable in subsequent outages for comparing changes in its recorded information. GE is presently scheduled to fully qualify the "SMART" machine at the Electric Power Research Institute, Nondestructive Examination Center, in Charlotte, N.C. on September 23, 1985. The qualification will include recording of the A-Scan presentation.

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