UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-325/94-08 and 50-324/94-08

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: April 11-15, 1994

Inspector: J. L. Coley Jr. 5-12-94
Date Signed

Approved by: 5/12/94
Date Signed
J. J. Blake, Chief
Materials and processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of inservice inspection - review of nondestructive examination procedures and observation of work and work activities (Unit 2) and review of radiographic film for the Residual Heat Removal (RHR) system welds (Unit 2).

Results:

In the areas inspected, violations or deviations were not identified. Two weaknesses were identified. One weakness dealt with the use of penetrameters on a panoramic film exposure of a large diameter pipe weld. The second weakness dealt with an examiner attempting to remove lead shielding without health physics coverage.

Due to decontamination activities to reduce the level of radiation in the reactor drywell, inservice inspection work activities on safety related components were miminal during the inspector's visit. The inspector's review of video tapes of in-vessel visual examinations accomplished this outage on the core shroud, and observation of visual examinations for the core spray

spargers indicated that these activities were well controlled and accomplished in accordance with code requirements, NRC and industry initiatives and licensee commitments.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*K. Ahern, Manager, Work Central
*R. Anderson, Vice President, Brunswick Nuclear Plant
*E. Black, Level III Examiner, Nondestructive Examination (NDE)
*H. Bordeaux, Quality Control (QC)
*M. Bradley, Manager, Nuclear Accessment Department (NAD)
*J. Cowan, Director, Site Operations
*J. Crider, Manager, Inservice Inspection (ISI) and Inservice Test (IST)
*G. Grazio, Manager, Nuclear Engineering Department (NED)
*J. Harness, NAD
*G. Hicks, Manager, Training
*J. Langdon, Supervisor, NDE
*W. Levis, Unit 1 Plant Manager
*R. Lopriore, Manager, Regulatory Affairs
*C. Pardee, Manager, Technical Support
*M. Rogers, NAD
*C. Robertson, Manager, Environmental and Radiation Control
*C. Schacher, NAD
*R. Schlighter, NAD
*D. Stoddard, NAD
*G. Thearling, Senior Specialist Investigator
*J. Titrington, Manager, Unit 2 Operations
*M. Turkal, Licensing
*C. Warren, Plant Manager, Unit 2
*R. Weber, NAD

Other licensee employees contacted during this inspection included engineers, technicians, and administrative personnel.

NRC Resident Inspectors

*P. Byron, Resident Inspector
R. Prevatte, Senior Resident Inspector
M. Janus, Resident Inspector

*Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Inservice Inspection (ISI) Unit 2

The inspector reviewed documents and observed work activities, as indicated below, to determine whether ISI was being conducted in accordance with applicable procedures, regulatory requirements, requirements imposed by NRC/industry initiatives, including the augmented examinations identified in NUREG-0313 and Generic Letter 88-01 (Recommendations for Crack Mitigation and Pipe Examination

Requirements), NRC Bulletin 80-13 (Core Spray Sparger Cracking), NUREG-0619 (Recommendations for Feedwater Crack Mitigation and Schedule for Nozzle Examinations), and General Electric (GE) Service Information Letter (SIL) No. 572 (Cracking in Core Support Shroud). The applicable code for ISI is the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME B&PV) Code, Section XI, 1980 Edition with Addenda through Winter 1981. Unit 2 is presently in the tenth refueling outage, the 2nd 40 month period, and the 2nd ten year ISI interval. For the current outage GE was the contractor for all nondestructive examination work with the exception of radiography which Carolina Power and Light (CP&L) examiners and film interpreters performed.

a. Review of GE NDE Procedures (73052)

The inspector reviewed the procedures listed below to determine whether these procedures were consistent with regulatory requirements and licensee commitments. The procedures were reviewed in the areas of procedure approval, requirements for qualifications of NDE personnel, compilation of required records, and division of responsibility between the licensee and contractor personnel, if applicable. The technical content of the procedures were also reviewed to verify their compliance with Sections V and XI of the ASME B&PV Code.

Procedure No.	Title
GE-PT-100, Rev. 2	Procedure for Color Contrast Liquid Penetrant Examination
GE-MT-100, Rev. 0	Procedure for Magnetic Particle Examination
GE-UT-106, Rev. 2	Procedure for Manual Ultrasonic Examination of Pressure Retaining Welds in Ferritic and Austenitic Piping and Components
GE-UT-208, Rev. 1	Procedure for Automated Ultrasonic Examination of Similar and Dissimilar Piping Welds for IGSCC

The above examination procedures were reviewed in preparation of auditing the applicable in-process examination activities. However, with the exception of GE Procedure No. GE-UT-208, the work activities were not performed because of inadequate coordination in preparing the components for examination. The inspector's review of the examination procedures revealed that they were properly approved, well organized, and delineated the requirements of the applicable Codes in an effective manner.

b. Observation of ISI Work and Work activities Unit 2 (73753)

(1) Observation of the In Vessel Visual Examinations on the Core Spray Spargers

The inspector observed the in-vessel visual inspection of the "A" loop core spray sparger between the 330 degree and 0 degree azimuths and between the 180 degree and 270 degree azimuths. The examination of the core spray spargers is conducted each outage in accordance NRC Bulletin 80-13. The sparger is located in the upper portion of the core shroud and its function is to provide a contained flow path to direct water to the core region in the event of a loss of coolant accident(LOCA). Unit 2 is currently operating with two cracks in the reactor pressure vessel internal core spray piping and spargers. One crack is at the 90 degree azimuth and is located in the piping-to-tee-box circumferential weld. The other crack is in the upper sparger tee-to-arm circumferential weld. These flawed pipe/spargers have been repaired by using brackets/clamps which provide full structural reinforcement to the piping, equivalent to a welded joint.

During the observations made by the inspector two crack like indications were detected by GE. One 1/2 inch indication was located at the 240 degree azimuth, running from the seal weld on the J-Nozzle to the sparger header. The other small indication was located between the 330 degree and 0 degree azimuths but it could not be verified until the rod blades were removed. The licensee reported the confirmed crack to NRR during the inspection conducted by the inspector. NRR was also informed that another indication may be reported when interference is removed and the area cleaned and re-examined.

(2) Review of the Visual Examination Video Tapes of Limited Areas on the Outside Diameter (OD) Surface of the Core Shroud

This inspection was conducted to review the enhanced visual processes used, by GE, during the in-vessel visual inspection of the reactor core support shroud. (The core support shroud is the reactor internal component which surrounds the core and directs coolant flow.) As a result of extensive cracking observed at welds H-2 and H-3 during the examination of the Unit 1 Shroud in 1993, the licensee had committed to repair welds H-2 and H-3 on Unit 2 without inspection because of the similarity in plant operations and environmental conditions. Visual inspections of other welds were to be conducted in accordance with GE's Service Information Letter (SIL) No. 572, Revision 1, dated

October 4, 1993. The GE SIL reviewed background information of the core shroud cracking phenomenon and recommended frequencies for inspection and enhanced visual examination techniques.

For weld No. H-1 the licensee visually examined four ten-degree areas (16 inches in length each) from the OD of the shroud. Four steam dryer hold down lugs adjacent to the H-1 weld were also visually examined. No cracks were observed in the four locations on weld H-1 or on the lugs.

The licensee visually examined a ten degree area (40° to 50°) on weld H-2 since an audit of video tapes taken in refueling outage 9 had detected four small crack like indications in this area. The enhanced visual examination conducted this outage detected crack in this area for the entire 16 inches.

For welds No. H-4, H-5, H-6A, H-6B, and H-7 a 20 degree path (350° to 10°) was visually examined for the OD of the shroud. These examinations revealed two crack-like indications on weld No. H-6A (one was 1/2 inch long and the other was one inch long). The licensee also plans to examine the mid-core region welds (H-4 and H-5) with a ultrasonic scanning devise.

Video tapes of the following areas was reviewed by the inspector:

Item Inspected	Degrees
Weld H-1	75° - 85°
Weld H-1	255° - 265°
Weld H-1	345° - 355°
Weld H-1	255° - 265°
Lug 27	265°
Lug 28	275°
Lug 9	85°
Lug 10	95°

The inspector's review of the above visual examinations did not reveal any conditions that had not been properly reported by GE.

(3) Observation of GE's Automated Smart 2000 Ultrasonic System Intergranular Stress Corrosion Cracking (IGSCC) Examinations

The inspector observed GE examiners calibrate their Smart 2000 digitized ultrasonic data acquisition system and examine portions of the ten inch Core Spray Weld No. 2E21FF-4-FWRN5A. The portion of the examination observed by the inspector was the circumferential scans. These examinations

were being conducted in accordance with NRC Generic Letter 88-01, NUREG 0313, and GE's Ultrasonic Procedure No. GE-UT-208 Revision 1. The calibration and examination activities were conducted by examination personnel who were very knowledgeable of the examination procedure requirements and the operation of the test equipment.

(4) Observation of Work Activities Associated with Liquid Penetrant Examinations

The inspector attempted to observe liquid penetrant examinations in the reactor drywell. These examinations were to be conducted in accordance with GE's Examination Procedure No. GE-PT-100, Revision 2. An attachment weld on the reactor pressure vessel and two feedwater instrument pipe welds were to be examined. However, after being assured that the welds had been walked down and were ready for inspection, the following problems were encountered:

- The attachment weld was not prepared for inspection (considerable dirt, rust, and debris were on this attachment).

- The two feedwater welds which were located in a high radiation area still had lead shielding attached to them. When the GE examiner saw that lead would have to be removed in order the perform his inspection, he attempted to borrow a pocket knife to cut the ty-raps. The inspector stopped this effort because there was no health physics technician, in the area and the ALARA briefing given to the inspector did not mention that lead shield would be removed. The licensee also issued an Adverse Condition Report (No. 94-00491) on this reported condition.

Although no examinations were performed from the above efforts, considerable time was lost, and radiation dose received, because of poor job coordination of work in high radiation areas. This concern was expressed to senior plant management in the inspector's exit meeting.

Within the areas examined, no violation or deviation was identified

3. Review of Radiographic Film and Associated Records Unit 2 (57090)

The inspector reviewed the radiographs listed below to determine whether they were prepared, evaluated, and maintained in accordance with CP&L's approved radiographic procedure (No. RT-101, Rev. 15) and Sections III and V of the 1986 Edition to the ASME Code. Radiographs in each film package were also reviewed to determine whether the following examination parameters had been correctly adhered to: film quality;

penetrameter type, size, placement, and sensitivity; film density and density variation; film identification; and weld coverage. Radiographs for the following Class 2 Residual Heat Removal welds were examined:

Weld Identification	Pipe Thickness and Size
2-E11-663	.237" X 4" Diameter
2-E11-662	.237" X 4" Diameter
2-E11-607	.500" X 20" Diameter
2-E11-636	.375" X 16" Diameter
2-E11-616	.375" X 16" Diameter
2-E11-615	.375" X 16" Diameter
2-E11-637	.375" X 16" Diameter

During the review of the above radiographs, the inspector observed a weakness in the licensee's method of qualifying film when using the panoramic film exposure technique. The licensee was performing single exposure panoramic radiography on the above large diameter piping in accordance with their approved NDE procedure. The procedure required that penetrameters be placed in four equal quadrants of the pipe. Each of the above large diameter welds joined a pipe to a valve which had different thicknesses. The license had triple loaded each film cassette in order to achieve the varying densities in the weld and the adjacent base metal materials. The inspector's review revealed that for two consecutive quadrants on weld No. 2-E11-616 the density varied in the area of interest more than minus 15% from the density obtained through the body of the applicable penetrameters in that quadrant. The density variation limit established by the ASME Code is -15 +30%. The inspector also found at least one quadrant on Weld Nos. 2-E11-637 and 2-E11-615 which could not meet the minus 15 density requirements with the penetrameters within that quadrant.

The inspector held discussions with the NDE supervisor and the Level III film interpreter to determine how they justified this density variation. The discussions revealed that it was CP&L's position that since all of the films were shot with a single exposure the lightest penetrameter in any quadrant could be used to qualify all the film. The licensee also produced a 1981 Code Interpretation (V-81-14) which affirmed this position.

The licensee, however, subsequently informed the inspector that they intended to address the inspector's concern by re-examining Weld No. 2-E11-616 which had two consecutive quadrants where penetrameters in those quadrants would not qualify the radiographic film. The other two welds would be acceptable to Code criteria when dividing the pipe circumference into three equal portions as directed by the Code. For long term corrective action the licensee informed the inspector that their Radiographic Procedure (No. 101 Rev. 15) would be revised to implement paragraph T-277.1(c) of the 1986 Edition of Section V to the ASME Code. This paragraph would allow a penetrameters to be placed on the weld provided the identification number(s) or lead letter "F" is not

in the area of interest. The placement of the penetrameter on the weld would allow more variation in allowable radiographic density.

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

4. Exit Interview

The inspection scope and results were summarized on April 15, 1994 with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

5. Acronyms and Initialisms

ASME	-	American Society of Mechanical Engineers
B&PV	-	Boiler and Pressure Vessel
CP&L	-	Carolina Power and Light Company
GE	-	General Electric
ID	-	Inside Diameter
IGSCC	-	Intergranular Stress Corrosion Cracking
ISI	-	Inservice Inspection
IST	-	Inservice Testing
LOCA	-	Loss of Coolant Accident
MT	-	Magnetic Particle Testing
NAD	-	Nuclear Assessment Department
NED	-	Nuclear Engineering Department
NDE	-	Nondestructive Examination
No.	-	Number
Nos.	-	Numbers
NRC	-	Nuclear Regulatory Commission
NRR	-	Nuclear Reactor Regulation
OD	-	Outside Diameter
PT	-	Liquid Penetrant Testing
QC	-	Quality Control
Rev.	-	Revision
RHR	-	Residual Heat Removal
SIL	-	Service Information Letter
UT	-	Ultrasonic Testing