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

Report Nos.: 50-325/91-08 and 50-324/91-08

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: March 4-7, 1991

Inspector: N. Economos 3-27-91
N. Economos Date Signed

Approved by: 4/2/91
J. J. Blake, Chief Date Signed
Materials and Process Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, unannounced inspection was performed as a follow-up to that documented in Report No. 90-53 and was conducted in order to review records of the completed recirculation pipe replacement project in Unit 1 and to finalize the Region's effort in this area. Documents reviewed pertained to preservice inspection of replacement welds, mechanical stress improvement process (MSIP), hydrostatic testing, nonconformance reports (NCRs), postweld heat treatment (PWHT), and repairs.

Results:

The review disclosed that the documentation provided a completed description of the materials, installation, inspection and testing activities associated with the pipe replacement project. In general these records were retrievable, complete and accurate. The inspector noted that numerous errors had occurred as a result of transcribing numerical identifications, and in some cases dimensions of weld sizes, from one record to another. The licensee assured the inspector that a detail review would be conducted to identify and make appropriate corrections.

In conclusion, the licensee's effort in this pipe replacement project was noteworthy in that it was well planned and with sufficient resources committed

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to preparation and training. This resulted in a minimum of field problems and an expeditious completion of the project.

Within the areas inspected deviations or violations were not identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*S. H. Callis, Licensing, On-Site
S. Connelly, Inservice Inspection Coordinator
*K. A. Harris, Regulatory Compliance
*J. A. Holder, Manager Outages and Modifications
R. R. Johnson, Project Manager Recirculation Pipe Replacement (PRR)
*J. W. Spencer, General Manager

NRC Resident Inspector

*R. Prevatte, Senior Resident Inspector

*Attended exit interview

2. Replacement of Recirculation Piping, Unit 1 (2512/13)

a. Preservice Inspection Records Review (73755)

Preservice examination of replacement welds was performed by General Electric's Nuclear Energy Division between December 1990 and January 1991. The Kemper Insurance Company provided Authorized Nuclear Inservice Inspecor (ANII), Services. The contrclling document was QAM-003 Rev. 0, Nuclear Energy Quality Assurance Manual for Preservice and Inservice Inspection. ASME Code Sections V and XI, 1981 were applicable by reference. Examination systems utilized included, GE's Smart UT and the Smart 2000. Manual ultrasonic examination methods were used where weld configuraion and location precluded use of the automatic system. Nondestructive examination (NDE), personnel were qualified in accordance with SNT-TC-1A, 1975/1980 Editions and the applicable EPRI Standard for IGSCC examination.

The scope of the preservice inspeciton (PSI), examination, included all of the forty two (42), recirculation pipe replacement welds. As required by code, these welds underwent both surface and volumetric examinations. Thirty-four welds were ultrasonicly examined before and after the mechanical stress improvement process. These welds included twenty, 12 inch diameter similar metal recirculation pipe welds; ten 12 inch diameter dissimilar recirculation pipe welds and four 10 inch dissimilar core spray welds. Of these the inspector selected at random the following welds for a review of the subject PSI records.

Recirculation Piping

Safe-End to Nozzle Welds

1B11N2E-RPV-FWABA	0.850" x 15.275"	PT, UT
1B11N2D-RPV-FWABA	0.778" x 15.275"	PT, UT
1B11N2C-RPV-FWABA	0.860" x 15.275"	PT, UT
1B11N2H-RPV-FWABA	0.92" x 15.275"	PT, UT

Pipe to Safe-End

1B32FFF-12-FW706	0.70" x 12"ϕ	PT, UT
1B32FFD-12-FW704	0.80" x 12"ϕ	PT, UT
1B32FFK-12-FW710	0.70" x 12"ϕ	PT, UT
1B32FFH-12-FW708	0.80" x 12"ϕ	PT, UT

Core Spray

Safe-End to Nozzle

1B11N5B-RPV-FWRNB16A	0.98" x 16"ϕ	UT

Transistion to Safe-End

1E21FF-8-FW1F 183	0.80" x 10"ϕ	UT

Reactor Water Clean Up

1-G31-1093	Valve to Pipe	0.55" x 6"ϕ	UT
1-G31-1108	Pipe to Pipe	0.50" x 6"ϕ	PT, UT
1-G31-999A	Pipe to Elbow	0.43" x 6"ϕ	PT, UT

The review showed that the examiniations identified numerous nonrelevant geometric indications in the general vicinity of the root of the weld. Each indication had been characterized and plotted. Date reviewed included pre and post MSIP examination results.

Documentation of tests and results including equipment, calibrations and evaluations was satisfactory. The inspector noted that numerous errors had occured while transcribing identification numbers and in some cases dimensions of weld sizes, from one record to another. This observation was brought to managements attention for corrective action.

b. Materials and Equipment Records Review

The inspector reviewed records of certification, calibration, procurement and receipt inspections of the below listed equipment and materials to ascertain whether specific analyses and information presented were consistent with code requirements and industry standards.

Ultransonic Couplant
Ultragel II: #8981 PO #30307-DAL
#9088 #32974-DAL

Magnetic Particle Powder
Red Powder #8A, Batch #89A037 Magnaflux

Liquid Penetrant

Manufacturer	Brand/Type	Batch	Purchased Order
Spotcheck - Penetrant,	SKL-HF/S	#89K01K	#8D.T.547-120
- Developer,	SKD-NF	#89H09K	#8D.T.547-120
- Cleaner,	SKC-NF	#90H07K	#SN700-027

Ultransonic Examination Equipment
° Flaw Detectors
Panametrics, Epock 2002, S/N 398
Krautkramer - Branson, USK-7B S/N 31451-902
USIP-11 S/N 21197-6639

° Transducers
Megasonics
2.25 Mhz .25" x .50" S/N 7062 45°L
S/N 71207 60°L
KB Aerotech 2.20 MHz .25"ϕ S/N L17776 Dual 0°
2.25 MHz .375"ϕ S/N E04875 Round 0°

Harrisonics 3.5 MHz .50"ϕ S/N E4143 70°L

c. Personnel Qualifications

Records of personnel certifications were selected at random and reviewed to ascertain whether training, experience, qualification level and eye/visual acuity were consistent with approved code and industry standards.

Personnel whose records were reviewed are as follows:

Name	Methods	Qual. Level	IGSCC/EPRI
RWA	UT	II	Yes
WMA	PT	II	Yes
	MT	I	Yes
	UT	II	Yes
	VT-1	II	Yes
EPB	PT	III	Yes
	MT	II	Yes
	UT	III	Yes
	VT-1 thru IV	III	Yes

	Name	Methods	Qual. Level	IGSCC/EPRI
(cont'd)	T.B	PT	TRAINEE	No
		MT	TRAINEE	No
		UT	TRAINEE	No
		VT-1	TRAINEE	No
	RDB	PT	II	Yes
		MT	II	Yes
		UT	II	Yes
		VT-1	II	Yes
	TRB	PT	I	No
		UT	I	No
		VT-1	I	No
	GED	PT	III	Yes
		MT	III	Yes
		UT	III	Yes
		VT-III	III	Yes
	ROF	PT	II	Yes
		MT	II	Yes
		UT	II	Yes
		VT-1	II	Yes

	Name	Methods	Qual. Level	IGSCC/EPRI
(cont'd)				
	KCG	PT	II	Yes
		MT	II	Yes
		UT	II	Yes
		VT-1	VT-1	Yes

d. Hydrostatic Examination

System hydrostatic pressure testing was performed on January 25, 1991. The test was performed in accordance with procedure PT-80.1 dated January 15, 1991, Reactor Pressure Vessel Hydrostatic Test. By reference, the applicable code was ASME Section XI (80W81) and plant Technical Specifications 4.0.5, 4.4.8, and 4.4.5.1.1. Specified parameters included:

Heatup Rate

Temperature	-	30°F/hr to a maximum of 207°F
Pressure	-	50 psig/min to a maximum of 1103 psig

Cooldown Rate

Temperature	-	30°F in any one hour
Pressure	-	50 psig/minute
Holding time	-	Insulated piping, 4 hrs
Test Pressure	-	>1088 but <1103 psig

A review of the package disclosed that the specified parameters had been met in that pressure stabilized at approximately 0600 on January 25, 1991 and was held, according to a computer printout, between 1094.1 and 1095.9 psig until 1200 of the same day. The ANII had reviewed and approved to subject package. Certification records of five VT-2 level II examiners who had witnessed this test were reviewed and found to be in order.

e. Mechanical Stress Improvement Process

This treatment/process on selected replacement welds was performed under modification No. 89-083, by SMC O'Donnell Inc under contract by the licensee. Welds selected for this treatment included the following:

Number	System	Weld Joint Description
10	RCR	N2 Nozzle to Safe-End
10	RCR	Safe-End to Riser Pipe
2	RCR	Riser Pipe to Reducer
8	RCR	Rise Pipe to Sweepolet
2	CS	N5 Nozzle to Safe-End
2	CS	Safe-End to Transition Piece

The inspector reviewed the approved specification/procedure, (designated as proprietary) parameters and the results achieved which indicated that the recommended objectives i.e. physical changes and/or stress state had been obtained.

f. Postweld Heat Treatment

This area was addressed in terms of procedures review and work observation in earlier reports on the pipe replacement project. During this inspection, the inspector reviewed the Postweld Heat Treatment (PWHT) history of twelve butter-clad weldments i.e., nozzles N2A through N2K and N5A-N5B. Strip charts showed that temperatures ranged from a minimum of 1100°F to a maximum of 1192°F and total soaking time ranged between one hour, 15 minutes to one hour, 33 minutes. There were two nonconformance report issued in this area, S-292 1036W-10 Rev. 10 and S-292 1036W-015. The first was issued to document that two thermocouples had exceeded their maximum temperature limitation of 800°F by 84°F at the thermal sleeve of N2B recirculation nozzle butter/clad weld. The latter was issued to document temporary loss of power when some power cables caught fire inside the drywell area. This resulted in an uncontrolled and unmonitored rampdown on nozzle butter/clad weld. In both instances GE's engineering determined that neither of the two nozzles had been damaged by these thermal transients.

g. Weld Repairs

Surface indications on the base matal of nozzle N2D required excavation followed by weld repair. The work was performed through weld repair request No. BWP1-001. Welding was performed per weld procedure specification 3.3.1W using the TIG process and ER80S filler metal, preheat and postweld thermal treatments were required. A review of quality control records and NDE results showed the repair had been performed successfully.

h. Conclusion

The licensee's effort in this pipe replacement project was noteworthy in that it was well planned and with sufficient resources committed to preparation and training. This resulted in a minimum of field problems and an expeditious completion of the project.

Within the areas inspected deviations or violations were not identified.

3. (Closed) IFI 324/89-01-04 Completion of CAC and MSIV GL-88-14 Testing for Brunswick Unit 2

The inspector reviewed the licensee's records of corrective action(s) taken to address this issue. These included special procedure SP-89-024 Rev. 1, Generic Letter 88-14 Testing, this procedure was implemented during February of 1990. Design Calculation 88B0250 which utilize data obtained from SP-89-034 above, to demonstrated that the MSIV accumulators will perform their safety related function upon assumed loss of normal instrument air. Calculations, using leak rates obtained from above procedure verified that leak rates were not sufficient to prevent the accumulators from performing their safety related functions. Periodic testing procedure PT-20.9, CAC Accumulator Leak Test, is now performed during every scheduled refueling outage of Unit 2 to monitor field conditions.

4. Exit Interview

The inspection scope and results were summarized on March 8, 1991, with those persons indicated in paragraph 1. The inspectors 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.

(Closed) IFI 324/89-01-04 Completion of CAC and MSIV GL 88-14 Testing for Brunwick Unit 2.