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

Report Nos.: 50-269/95-12, 50-270/95-12 and 50-287/95-12

Licensee: Duke Power Company
422 South Church Street
Charlotte, NC 28242

Docket Nos.: 50-269, 50-270, and 50-287 License Nos.: DPR-38, DPR-47, and DPR-55

Facility Name: Oconee Nuclear Station Units 1, 2 and 3

Inspection Conducted: June 19-23, and July 11, 1995

Inspector: J. L. Coley Jr. 7-14-95
J. L. Coley Jr. Date Signed

Approved by: 7/17/95
J. O. Blake, Chief Date Signed
Materials and Processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of inservice inspection (Inspection Procedure No. 73753) and review of radiographic film (Inspection Procedure No. 57090). The inspector also held discussions with DPC's cognizant engineers, reviewed completed records, and observed work activities in the areas of; erosion/corrosion and resulting pipe replacement activities; and system upgrade activities for the low pressure injection piping. In addition, on July 11, 1995, the inspector visited the Electric Power Research Institute (EPRI) in Charlotte North Carolina to reviewed Duke Power Company's (DPC) examiner performance demonstration records and observed a demonstration of DPC's flaw interpretation techniques delineated in Ultrasonic Examination Procedure No. NDE-600. The review at the EPRI center was the result of examiner/procedure weaknesses observed at the Oconee site.

Enclosure

Results:

In the areas inspected, no violations or deviations were identified.

Relative to ISI, one unresolved item was reported which dealt with apparent ultrasonic examiner and procedural weaknesses (paragraph 2.c.(1)). Radiographic examination activities were observed to be functioning in an excellent manner. Erosion/corrosion, eddy current, and pipe repair and replacement activities appeared to be satisfactory.

One weakness was also observed: clear Saran Wrap type material and clear plastic bags were observed being used extensively for protection of components and for carrying tools and materials in and out of the reactor containment building. Green or yellow bags and protective plastic materials are the standard used by the industry to prevent their inadvertent loss in components, the refueling canal, or the reactor vessel since clear plastic is difficult to detect in water. In addition the yellow plastic material/bags are used to indicate whether the material inside is contaminated or not (paragraph 4).

REPORT DETAILS

1. Persons Contacted

***G. Bibb, Technician, Nondestructive Examination (NDE)
*M. Boyle, General Supervisor, Radiation Protection
*E. Burchfield, Manager, Regulatory Compliance
*T. Coleman, Inservice Inspection (ISI) Coordinator
E. Few, Senior Technical Specialist
*C. Freeman, NDE Supervisor
*#B. Foster, Manager, Safety Assurance
*J. Hampton, Site Vice President
*M. Hipps, Manager, Maintenance
**J. McArdle, Level III, NDE Examiner
*B. Millsaps, Manager, Mechanical Engineering
*D. Nix, Engineer, Safety Assurance
*B. Peele, Station Manager
*G. Rothenberger, Superintendent, Operations
*T. Royal, Mechanical Engineering Supervisor

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

Electric Power Research Institute

L. Becker, Manager, Performance Demonstration Initiative (PDI)
D. Holthaus, Quality Control (QC) Specialist
**C. Latiolais, Manager, PDI Piping and Bolting

NRC Employees

*P. Harmon, Senior Resident Inspector
*L. Keller, Resident Inspector

*Attended preliminary exit interview on June 22, 1995
#Attended exit on June 23, 1995
**Attended exit on July 11, 1995

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

2. Inservice Inspection (ISI) - Unit 3 (Inspection Procedure 73753)

The inspector reviewed documents and records, and observed activities, 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, 1989 Edition (no Addenda). Oconee 3 was in the 15th refueling outage, the first period of the 3rd ten year ISI interval. The current outage is the 1st refueling outage of the 3rd ten year interval.

The licensee's Electric System Support Department is responsible for the ISI program and furnishes nondestructive examination (NDE) inspection personnel. The site Mechanical/Civil Engineering Group is responsible for implementing the ISI program.

a. ISI Program Review

The inspector reviewed the licensee's Third Ten Year Interval ISI Plan including the plan for the current outage to verify that the plan had been approved by the licensee, services of an Authorized Nuclear Inservice Inspector (ANII) had been procured, administrative procedures had been developed to implement the program, and procedures required to perform test and examinations had been revised to meet the requirements of the "Code of Record" (ASME Section XI, 1989 Edition) for the third ten year interval examinations.

The inspector's review revealed that the above programmatic documentation was in accordance with DPC's Technical Specifications, the applicable ASME Code, correspondence between NRC's Office of Nuclear Reactor Regulations (NRR) and the licensee concerning relief requests and Code cases and requirements imposed by NRC/industry initiatives.

b. Review of Nondestructive Examination (NDE) Procedures

The Inspector reviewed the following procedures to verify that they had been approved by the licensee and the ANII, contained requirements for qualification of personnel and that they had been revised to implement the requirements of the 1989 Edition of Section XI to the ASME Code.

Procedure Reviewed	Title
NDE - 12 Revision 9	General Radiography Procedure for Preservice and Inservice Inspection
NDE - 600 Revision 5	Ultrasonic Examination of Similar Metal Welds in Wrought Ferritic and Austenitic Piping
NDE - 640 Revision 1	Ultrasonic Examination Using Longitudinal Wave and Shear Wave, Straight Beam Techniques

NDE - 670 Revision 0	Ultrasonic Sizing of Planar Flaws in Ferritic and Austenitic Steels with Nominal Thicknesses from 0.2 Inch Through 2.0 Inches
NDE - 701 Revision 2	Multifrequency Eddy Current Examination of Steam Generator Tubing
NDE - 702 Revision 0	Eddy Current Data Screening Program
NDE - 703 Revision 4	Evaluation of Eddy Current Data for Steam Generator Tubing
NDE - 707 Revision 2	Multifrequency Eddy Current Examination of Nonferrous Tubing Sleeves and Plugs Using a Motorized Pancake Coil
NDE - 708 Revision 2	Evaluation of Eddy Current Data for Non Ferrous Tubing, Sleeve and Plugs Using a Motorized Rotating Coil Probe
NDE - 710 Revision 1	Multifrequency Eddy Current Examination of Non Ferrous Sleeve Tubes for Oconee Nuclear Station
NDE - 711 Revision 1	Evaluation of Eddy Current Data of Sleeved Once Thru Steam Generator Tubing

The review of the above procedures revealed that they met the ASME Code and NRC's/Industry initiatives in the areas described above.

c. Observation of ISI Work Activities

The inspector observed work activities, reviewed personnel qualification records, and reviewed certification/calibration records for equipment/materials, as detailed below. The inspector verified: availability of and compliance with approved procedures, compliance with Code requirements, use of knowledgeable personnel, and use of personnel qualified to the proper level. In addition, general inspection quality, including in-process documentation, and inspection results were evaluated.

(1) Manual Ultrasonic Examination (UT)

The inspector observed the in-process examination of the welds listed below. Observations were compared with the inspection attributes of the applicable procedure and the ASME Code to verify the performance of acceptable examinations.

Item Number	Weld ID No.	Weld Configuration
C05.021.047	3-51A-59-6	4 Inch Dia. Pipe Weld
B09.012.010	3-PDA1-53LO	Longitudinal Seam Weld
B09.012.009	3-PDA1-53LI	Longitudinal Seam Weld
B09.011.007	3-PIA1-8	Safe-end to Nozzle Weld

During the 60° examination of Longitudinal Seam Weld No. 3-PDA1-53LO an indication was detected by the UT examiner. When the examiner inspected the applicable weld area from the other surface of the weld the indication was also readily detected. To interpret whether the indication was the result of a flaw in the material the examiner changed the 60° transducer and examined the indication with a 70° transducer. When the 70° transducer was used, the height of the signal dropped to approximately 5 percent of screen height. The examiner informed the inspector that since the signal decreased, in accordance with paragraphs 10.1.a. and 10.2.a of DPC's examination procedure No. NDE-600, the indication was caused by a geometrical condition not a flaw.

The inspector questioned the examiner's interpretation, and the procedural requirements used to derive this interpretation, and was informed that Duke had qualified this method of flaw interpretation at the Electric Power Research Institute during their performance demonstration for Appendix VIII to the ASME Code. However, since Appendix VIII is not presently invoked, the examination procedure was demonstrated to the Authorized Nuclear Inspector as a alternative method of examination in accordance with Paragraph IWA-2240 of Section XI to the ASME Code.

The inspector requested that the examiner scan the area of the weld using a 45° transducer to determined the condition of the ID and to see if the indication was ID connected. This was done and no signal was obtained, which indicated that discontinuity was a planar flaw and not connected to the pipe ID. The examiner then placed a 0° transducer over the flaw and obtained a signal that indicated the flaw was at a depth of 1.75 inches from the outside diameter of the pipe and above the inspection zone of the weld.

Since the flaw could be seen from two pipe surfaces and from the top of the weld, the inspector did not consider the procedure's method of flaw/geometry interpretation satisfactory, particularly when scanning in a circumferential direction. The inspector phoned DPC's Level III Test examiner to ascertain if during the EPRI Procedure Performance Demonstration axial defects scanned in the circumferential direction had been demonstrated using the procedure's flaw/geometric interpretation criteria. The Level III stated that it had and that the qualification records could be reviewed at the EPRI Center in Charlotte, North Carolina. The Level III also stated that he could demonstrate the interpretation criteria techniques if the inspector was interested.

The flaw indication detected above was later found to be outside the inspection zone, but was evaluated and found to be acceptable. However, as stated above this indication was first interpreted as root geometry using only a portion of the procedure's flaw interpretation criteria.

In addition, upon further review of the NDE procedure and discussions with the examiner it was determined that the circumferential scan of the longitudinal weld should have been performed initially with a 45° transducer in lieu of the 60° transducer used in order to insure that the bottom 1/3 of the weld was examined.

Because of the apparent examination and procedural weaknesses observed, and the possibility of similar errors made on other welds by examiners, the inspector requested to see the performance demonstration records and observe a demonstration of the interpretation criteria.

The inspector was subsequently notified by the licensee on July 5, 1995, that on July 11, 1995, the inspector could see the EPRI qualification results and observe a demonstration of the interpretation criteria on flawed samples of different materials, pipe diameters, and thicknesses using different wave mode transducers, and scanning in the axial and circumferential directions. This issue was reported to the licensee as Unresolved Item 50-269,270,287/95-12-01, "Apparent Examiner and Procedural Weaknesses."

While at the Oconee site Certification and qualification records administered in accordance with SNT-TC-1A for nine ultrasonic examiners were reviewed and determined to be adequate. Certification and calibration records for the equipment and materials used in the above examinations observed by the inspector were also reviewed and determined to be satisfactory.

On July 11, 1995, the inspector met with DPC's Level III Examiner at the EPRI NDE Center and reviewed the examiner's performance demonstration records. The records revealed that the examiner in question had experienced problems with the identification of axial cracks, but had subsequently managed to pass the examination with a missed axial crack call. The data also revealed that DPC examiners only demonstrated the use of a 45°or a 38° transducer to detect axial cracks.

The practical demonstration on cracked samples revealed that none of the procedural criteria attributes for interpretation of flaws/geometry could be met in the axial and circumferential scanning directions in every case. In particular the attribute which required the examiner to change from his primary inspection angle to a 70° transducer (if the 70° transducer detected the same reflector at an equal or higher amplitude the indication is consider to be crack if not it is considered to be geometry) did not work reliably when scanning in the axial or circumferential directions. It however, seem to work best in the axial scanning direction.

The DPC Level III examiner stated that, this was the first outage which utilized the version of NDE-600 demonstrated at the EPRI NDE Center. The Level III examiner also stated that the following actions would be taken to clarify the procedural requirements, improve performance, and insure ISI examinations of welds have been performed satisfactorily:

- The procedure will be revised to specify that all of the flaw interpretation criteria will be attempted as far as practical, but that each attribute does not have to be met to be considered a flaw or a geometric indication.

- Geometric/flaw interpretation criteria given in paragraphs 10.1 and 10.2 of procedure NDE-600 will be re-worded to define the applicability of each of the interpretation criteria attributes when scanning in the axial or the circumferential directions. Since most of the attributes given for interpretation are for circumferential indications scanned in the axial direction.

- All examination data which recorded geometry or flaws during the Oconee summer 1995 outage of Unit 3 will be reviewed by the Level III examiner to insure the evaluations/interpretations were performed properly and that the correct transducer was used.

- Additional training will be held on the procedures requirements and the procedural clarifications delineated above.

The effectiveness of the licensee's corrective actions will be verified during subsequent inspections. In the mean time this item will remain an unresolved issue.

(2) Review of Radiographic (RT) Film for ISI, Modifications, and System Upgrade Piping Welds (Inspection Procedures 73753 and 57090) Unit 3

The inspector examined the RT film and associated records for the welds listed below to determine whether they had been processed, examined, evaluated, dispositioned, and maintained in accordance with the licensee's approved procedure. The inspector also reviewed the radiographs to determine if the licensee's enhanced preventive maintenance actions taken to improve the effectiveness of the film processor at Oconee had resulted in a reduction of film artifacts. Several previous NRC inspection reports had addressed concern that film artifacts noted on radiographs were becoming a problem. In addition, the Senior Resident Inspector requested that the inspector review the radiographs for the Low Pressure Injection Upgrade Piping because of the frequency of reported weld rejects. The procedure used by the licensee for the RT examination process on modification and system upgrade piping was DPC's Procedure No. NDE-10, Revision 18. The procedure used by the licensee for ISI RT of piping welds was DPC Procedure No. NDE-12, Revision 9.

Radiographic Film Reviewed

Weld ID No.	Size	Area of Inspection
3-51A-59-87	4"Dia.X 0.674" THK.	Modification Weld
3-51A-59-88	4"Dia.X 0.674" THK.	Modification Weld
3-51A-59-89	4"Dia.X 0.674" THK.	Modification Weld
3-51A-59-90	4"Dia.X 0.674" THK.	Modification Weld
3-51A-121-16	4"Dia.X 0.674" THK.	Modification Weld
3-51A-121-17	4"Dia.X 0.674" THK.	Modification Weld
3-51A-121-18	4"Dia.X 0.674" THK.	Modification Weld
3-51A-121-19	4"Dia.X 0.674" THK.	Modification Weld
3-51A-121-21	4"Dia.X 0.674" THK.	Modification Weld
3-01A-23-9	24"Dia.X 0.969"THK.	ISI Piping Weld
3-53B-39-12	14"Dia.X 0.250"THK.	System Upgrade
3-53B-39-78	14"Dia.X 0.250"THK.	System Upgrade
3-53B-39-2	14"Dia.X 0.250"THK.	System Upgrade
3-53B-39-77	14"Dia.X 0.250"THK.	System Upgrade

3-53B-39-110	14"Dia.x 0.250"THK.	System Upgrade
3-53B-39-5	14"Dia.X 0.250"THK.	System Upgrade
3-53B-39-109	14"Dia.X 0.250"THK.	System Upgrade

The inspector's review of the above radiographs revealed that excellent radiographic quality had been achieved. The film had been interpreted, evaluated, and disposition correctly. Film artifacts noted on the radiographic interpretation records were minor and did not represent a problem for interpretation. In addition, the licensee uses two film in each film cassette package. Both radiographs for each film segment in the welds listed above had achieved sufficient radiographic quality that either film could be used for acceptance of the welds. Therefore, eliminating concern for the cases where artifacts were noted because they were only on one film. The inspector also went to the field office and performed an inspection of the preventive maintenance practice for the processor. The inspector found the rollers in the processor to be clean and in excellent condition. The licensee appears to have taken sufficient corrective action. If this corrective action is maintained, film artifacts should not affect film interpretation.

In response to the Senior Resident Inspector's concern regarding the low pressure injection piping, the inspector's review revealed that lack of fusion had been found in some of these welds since the licensee was upgrading portions of this system. The welds in question had never previously been radiographed. However, the lack of fusion was identified in the weld root area of pipe to valve welds and was being systematically corrected by grinding the ID diameter of the piping. The inspector reviewed the upgrade film and determined that the licensee was evaluating the welds correctly and taking the appropriate correct action. The inspector also observed the repair activities in the plant and no problems were identified. As of June 20, 1995, the repair activities on the low pressure injection piping had only been by grinding.

Certification and qualification records were reviewed for 12 radiographic examiners and found to be adequate. Calibration was also verified to be satisfactory for DPC's densitometer No. 018454 and film strip No. 059260.

(3) Eddy Current Examination of Unit 3, A and B Steam Generator Tubing, Sleeves and Plugs

This outage the licensee will examine 100 Percent of the tubes in both "A" and "B" Steam Generators using a .510" bobbin coil. In addition a select sample of special interest tubes, sleeves, expanded lane/wedge, and roll plugs

will be examined using coils such as the rotating pancake coil, the Plus Point rotating pancake coil, and a .410" bobbin.

Controlling documents/code by reference, included ASME Code Section XI, 1989 Edition, DPC's Oconee's Technical Specification, Regulatory Guide 1.83 (July 1975), and Code Cases N-401 and N-402. Acquisition activities are performed by DPC using DPC, Babcock and Wilcox (B&W) and Zetec examiners. The analysis of data was performed off site at the McGuire Nuclear facility.

The inspector observed eddy current examiners perform bobbin coil examinations of tubes on Rows 123, 124, and 125 in the "B" Steam Generator. Eddy current procedures were also reviewed to determine if any procedure had been revised since the previous NRC review reported in Inspection Report No. 95-35 dated November 30, 1995. Certification and qualification records for twelve DPC examiners, ten B&W examiners and one Zetec examiner were reviewed. The inspector's review of the eddy current examination activities revealed that they were performed in a satisfactory manner using current procedures and sufficiently qualified personnel.

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

3. Review of Erosion\Corrosion (E/C) Examination and Repair Activities

Upon arriving at the Oconee facility the inspector discovered that the licensee had detected ultrasonic thickness readings during their in-process E/C examinations which required piping immediately downstream of both Unit 3 feedwater pumps to be replaced (Inspection location Nos. 3FDW42 and 3FDW43). The inspector subsequently reviewed the licensee's E/C activities to insure that these activities were being performed in accordance with the licensee's approved procedures and that proper sample expansion was considered. The inspector discovered that this outage the licensee had selected 82 inspection locations to examine for material lost due to E/C. The inspector's review of examination data sheets for the completed inspection locations revealed that the licensee was adhering to their program in a conservative manner.

For the feedwater system the inspector found that the licensee had examined the other two units during their previous outage and had not discovered any problem with these units. However, the previous examination of the Unit 3 feedwater piping required that it be re-examined this outage because of noted pipe wall thickness reductions. The inspector also noted that the data sheets for inspection locations Nos. 3C0003 and 3C0006 had some erratic thickness reading. The licensee stated that they were in the process of re-examining these locations. The inspector also went in the plant and observed the piping which had

there was anything unusual about its configuration that had made it more susceptible to erosion/corrosion than the piping in the other two Units. In addition the inspector went to the fab shop to see what preps had been made on the replacement piping. The inspector found that the licensee was applying good judgement in their control of the E/C program.

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

4. Independent Inspection Observations

During routine trips to the refueling floor the inspector noted that clear Saran Wrap type material and clear plastic bags were being used extensively in the reactor containment building for protection of components and for carrying tools and materials in out of the building. Green or yellow bags and protective plastic materials are the standard used by the nuclear industry to prevent their inadvertent lost in components, the refueling canal, or the reactor vessel since clear plastic materials are difficult to detect and retrieve in water. In addition, the industry uses the green and yellow plastic materials/bags to indicate whether the materials inside are contaminated or not.

On the refueling floor the licensee had a foreign material exclusion (FME) barrier and control point set-up around the reactor vessel to control materials entering though this barrier. However, the refueling canal only had a 4" kickplate around it and there is a floor above the refueling floor at Oconee. Materials could be blown from this upper floor over the FME barrier and into the reactor vessel or refueling canal. The licensee stated that they had been using clear plastic instead of green or yellow materials since the plant was constructed and that chemistry verifications had not detected any chloride intrusion, which would result if plastic material had inadvertently entered the system. The licensee also stated that their good housekeeping practices would minimize the chance for materials inadvertently entering the reactor coolant system.

The inspector reiterated that nuclear industry position was also based on previous experience (good and bad) and good work practice and for years the nuclear industry has used green and yellow materials for FME control purposes. This is done because, the yellow or green materials can be easily seen visually in water and contaminated materials can be easily identified when every worker knows that they are required to be wrapped in yellow plastic materials or bags. In addition, paragraph 104.7.3(11) of DPC's Nuclear System Directive No. 104 entitled: " Housekeeping, Material Condition and Foreign Material Exclusion," states in part that, for temporary covers: clear plastic will not be used near the fuel pools, refueling canal and reactor cavity since detection and retrieval are very difficult. The inspector expressed concern that DPC's other two nuclear plants had interpreted the same procedure to mean that no clear plastic would be allowed and that industry standards would be followed. This issue was initially reported to the licensee as an unresolved item until NRC management could be consulted by the

inspector. The inspector returned to the Region II Office on July 5, 1995, and after consulting with management, a conference telephone call was initiated between NRC Regional Project Management, the inspector, and DPC's Manager of Safety Assurance. During this call the licensee stated that, they now realize that they are an outlier in control of plastic materials (bags/sealing materials) and that they intended to conform to industry practice. The licensee also stated that they will immediately start sealing and wrapping components with yellow or green plastic material and that they are buying new bags and plastic wrap for this purpose. However, the licensee stated that they may not have all clear wrap removed by the next refueling outage in October, 1995, because of the volume of components involved.

After discussing this matter with the licensee and hearing their position for corrective action, Region II Project Management elected to report this issue as a weakness for which immediate action is being taken. Completion of the licensee's corrective actions will be monitored during subsequently inspections by regional and resident personnel.

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

5. Exit Interview

The inspection scope and results were summarized on June 22, 23, and July 11, 1995, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed below. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

(Open) Unresolved Item No. 50-269,270,287/95-12-01, "Apparent Examiner and Procedural Weaknesses," paragraph 2.c.(1)

6. Acronyms and Initialisms

ANII - Authorized Nuclear Inservice Inspector
ASME - American Society of Mechanical Engineers
B&PV - Boiler and Pressure Vessel
Dia. - Diameter
DPC - Duke Power Company
E/C - Erosion/Corrosion
EPRI - Electric Power Research Institute
FME - Foreign Material Exclusion
FW - Feedwater System
ID - Inside Diameter
ISI - Inservice Inspection
LPI - Low Pressure Injection System
NDE - Nondestructive Examination
No. - Number
Nos. - Numbers
NRC - Nuclear Regulatory Commission

NRR	-	Nuclear Reactor Regulation
ONS	-	Oconee Nuclear Station
PDI	-	Performance Demonstration Initiative
RII	-	NRC Region II
RT	-	Radiographic Test
SG	-	Steam Generator
THK.	-	Thickness
TS	-	Technical Specification
UT	-	Ultrasonic Test