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

Report Nos.: 50-269/94-03, 50-270/94-03, and 50-287/94-03

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 1, 2, and 3

Inspection Conducted: January 24-28, 1994

Inspector: J. L. Coley Jr. 2-15-94
J. L. Coley Jr. Date Signed

Accompanying Personnel: J. J. Blake, January 26-28, 1994

Approved by: 2/16/94
J. J. 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 (ISI) - observation of work activities associated with the second ten-year interval inspection of the Unit 3 reactor vessel, observation of manual ultrasonic examinations of welds on the Unit 3 core flood tanks, and review of radiographic film. Corrective actions taken by the licensee on previously open NRC items were also examined.

Results:

In the areas inspected, violations or deviations were not identified. One weakness, identified by the licensee, was that Babcock and Wilcox (B&W) Nuclear Services incorrectly positioned the zero coordinate for the automated reactor inspection system (ARIS II) on the 180 degree coordinate of the reactor vessel instead of the zero degree coordinate. Had this error not been identified prior to removal of the tool all data taken this outage would have been improperly documented, paragraph 2.A.(4).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*D. Cabe, NDE Technical Support
*T. Coleman, Technical Specialist, Compliance Engineering
*D. Dalton, Technical Specialist, Regulatory Compliance
*B. Dolan, Manager, Safety Assurance
*C. Freeman, NDE Supervisor
*G. Moss, NDE Outage Support
*R. Pettit, NDE Outage Support
*T. Royal, Supervisor, Compliance Engineering
*T. Tucker, NDE Level III
*J. Warren, Engineer, Mechanical Maintenance

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

Other Organizations

*A. Richmond, ARIS Project Manager, B&W Nuclear Technologies
H. Stoppelman, Level III Examiner

NRC Resident Inspector

*P. Harmon, Senior Resident Inspector

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

2. Inservice Inspection - Observation of Examination Activities Unit 3 (73753)

Oconee Unit 3 is presently in refueling outage No. 14 which is the last outage in the third period of the second ten-year inspection interval. The applicable code for the ISI examinations of vessel welds and associated piping welds is the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Sections V and XI, 1980 Edition through Winter 1980 Addenda.

The reactor vessel outlet nozzle to vessel welds, nozzle inside radius sections, and the outlet nozzle to pipe welds were performed using the 1989 Edition of the ASME Code with no Addenda.

The licensee had contracted B&W Nuclear Services to perform the second ten-year interval automated ultrasonic examinations of the Unit 3 reactor vessel. B&W used their Automated Reactor Inspection System (ARIS II) to scan the vessel welds and data was collected and analyzed with their accusonex data acquisition and imaging system. Other ISI vessel, piping, and component examinations were performed by the licensee.

A. Observation of the Unit 3 Reactor Vessel Examination Activities for the Second Ten-Year Inspection Interval

The inspector observed ultrasonic data acquisition examinations, observed the site data analysis activities, reviewed examiner certification records, reviewed B&W's remote ultrasonic examination procedure for the reactor vessel (ISI-138, Revision 15), and reviewed B&W's evaluations of completed examination data. These reviews were to determine whether the examination of the Unit 3 reactor vessel was conducted in accordance with the Technical Specifications, the applicable ASME Code, and augmented requirements such as NRC Regulatory Guide 1.150.

(1) Review of Data Acquisition Activities

The inspector observed B&W's examiners and equipment operators acquire ultrasonic data with B&W's Accusonex data acquisition and imaging system for the weld listed below:

Weld No./Item No.	Weld Description
3RPV-W34/B01.021.002	Bottom Head to Shell Weld Circumferential Scan

The examination personnel audited during the above examinations were knowledgeable of the ultrasonic method, procedural requirements, and operation of the test equipment.

(2) Review of Examiner Certifications

The certification and qualification records for the following B&W examiners were reviewed and found to be meet or exceed the recommendations for certification outlined in the Society of Nondestructive Testing (SNT) Document No. SNT-TC-1A.

	Certifications Reviewed
Examiner	Certification Level
C.A.C.	Level II
K.J.H.	Level III
M.G.H.	Level III
C.E.M.	Level II
D.S.M.	Level I Limited
R.L.R.	Level II
H.W,S.	Level III

The above List of examiners included examiners analyzing data in Lynchburg, Virginia

(3) Review of Ultrasonic Data and Evaluations of Recorded Indications

The inspector observed B&W's Level III examiner review data acquired for the 4 inlet and 2 outlet nozzle-to-reactor vessel welds. These examinations were limited in scope because the level III examiner at the Oconee site only reviewed the data to insure that complete ultrasonic coverage had been obtained and to highlight general areas of concern. The data was then transmitted to B&W analysts in Lynchburg, Virginia for the official review and evaluation of discontinuities.

The nozzle-to-shell welds were examined from the nozzle bore utilizing the contact method, with a 45°(2.25 MHz) shear wave transducer, a 60°(2.25 MHz) shear wave transducer, and a 15°(1 MHz) longitudinal wave transducer. All transducers used to perform these inspections had detected indications in the root of the weld, which is located approximately 3" from the inside surface of the vessel. The initial examinations performed with the 15°(1 MHz) longitudinal wave transducer revealed lengths and throughwall depth measurements for indications in five of the six reactor coolant nozzles that were larger than allowed using the acceptance criteria in Table IWB-3512-1 from Section XI of the ASME Code.

The indications appeared to be slag inclusions caused by failure to properly back grind the root of the welds during fabrication of the vessel. None of the indications recorded this outage had been previously identified. B&W's Level III examiners attributed this discrepancy to examination techniques that were considerably different and less effective during the first interval examinations (contact scanning vs immersion scanning/data acquisition and analysis using the accusonex system vs manual recording/Etc.)

B&W realized that there was considerable beam spread associated with the 15°(1 MHz) transducer when the sound travels to the 7" depth where the indications were located. They therefore elected to re-examine the nozzles with a 15° (2.25 MHz) longitudinal transducer which should reduce the beam spread of the sound wave. These re-examinations were successful and the dimensions of the indications were more realistically sized and subsequently found to be Code acceptable. The inspector reviewed the calculations for the evaluations of each indication in the following nozzle to shell welds:

Component Item No.	Inlet/Outlet Nozzle
B03.090.001A	Outlet - 7 Indications
B03.090.002A	Outlet - 2 Indications
B03.090.003A	Inlet - 5 Indications
B03.090.005A	Inlet - 1 Indications
B03.090.006A	Inlet - 9 Indications

The inspector concluded that the discontinuities had been properly evaluated and met Code requirements. Discussions with the Level III examiner revealed that no other indications had been recorded in the Unit 3 reactor vessel which were as significant in length and throughwall as the indications in the nozzle to shell welds.

(4) Problems Encountered In Positioning the ARIS II Inspection Tool in the Unit 3 Reactor Vessel

During discussions held with B&W's Level III examiner concerning the position of certain reactor coolant nozzles the inspector was informed that the ARIS system had been incorrectly positioned 180° off the reactor vessel's zero coordinate. This discrepancy was not identified until over 50% of the vessel welds had been scanned, and only then by accident when licensee personnel monitoring two visual indications realized that B&W was not on the nozzle they thought they were on.

The inspector then held discussions with the licensee's vessel coordinator to determine how this error had occurred. The vessel coordinator stated that B&W had called licensee personnel when setting the ARIS tool, to find out whether the reactor building zero coordinate and the reactor vessel zero coordinate were the same. B&W was informed that the coordinates were the same and therefore set the tool at the zero position of the containment building. As a result of the discovery of the visual indications B&W was informed that the reactor vessel zero coordinate coincided with the containment zero coordinate for Unit 1, but was 180° off from the reactor building zero coordinate for Units 2 and 3. B&W's scan plans were not affected by the error in positioning the ARIS tool because the reactor vessel is symmetrical. Had this error not been identified prior to removal of the tool however, all data taken this outage would have been improperly documented.

The licensee's vessel coordinator issued a Problem Investigation Process (PIP) Report (No. 3-094-0150). This action was taken to insure that corrective steps are taken to prevent this problem from occurring again at any Duke Power Company facility.

(5) Evaluation of Visual Indications Detected in Vessel Clad

During the vessel examinations cameras on the ARIS II System detected two crack-like indications in the weld clad of the reactor vessel. Supplemental visual examination were performed to verify the suspected surface discontinuities. One indication was observed at the 0° Core Flood Nozzle to shell weld. The indication appeared to propagate transversely across the nozzle-to-shell weld and extended for several inches. The other indication was at weld WR-19 and also appeared to be several inches long. WR-19 joins the reactor vessel flange to the vessel shell plates. The indication was at the 135° vessel coordinate and was 30 inches below the reactor vessel flange face. The indication propagated transversely across the weld.

Both indications had been detected during the circumferential and axial scans with the ultrasonic system. The ultrasonic system displayed the indications as multiple spot indications in the weld clad metal only. Subsequent re-examinations of the indications with the sound beam directed normal to the length of the indications also sized the indications entirely within the weld clad material. The weld clad is applied to the interior surface of the reactor to prevent corrosion and to maintain primary water clarity. The thickness of the weld clad is not included when calculating the wall thickness of the reactor vessel. Therefore the visual indications were determined to be acceptable base on paragraphs IWB-3130 and IWB-3200 of Section XI to the ASME Code. These paragraphs allow supplemental surface or volumetric examination to be performed in order to evaluate visual ISI indications.

B. Observation of Manual Ultrasonic Examination Activities Unit 3 (73753)

The inspector observed DPC examiners perform portions of the 60° manual ultrasonic examination on the upper head to shell weld for the "A" Core Flood Tank and the lower head to shell weld for the "B" Core Flood Tank. The welds were examined and evaluated in accordance with DPC Ultrasonic Examination Procedure No. NDE-620. The examinations were observed to determine whether the examination personnel were knowledgeable of procedural requirements, the examination method, operation of the test equipment, and properly evaluated the indications in accordance with the appropriate acceptance criteria. The inspector also reviewed the examination records which included representative plots of the indications in the weld and evaluations of the recorded indications. The following welds and weld areas were observed:

Weld ID and Item No.	Area of Weld Observed
3-CFTA-UH-SHL C01.020.001	Upper Head to Shell 14 Ft. to 22 Ft.
3-CFTB-LH-SHL C01.020.005	Lower Head to Shell 5 FT. to 22 Ft.

The examinations recorded indications in the welds on both tanks that did not meet ASME Code acceptance criteria for volumetric indications. These indications will be analyzed in accordance with Paragraph IWB-3620 of Section XI of the ASME Code, to determine their acceptance for continued operation. Previous examination records were also reviewed by the licensee to determine why these indications had not been recorded during the first ten-year interval. The licensee discovered that the previous inspection only required that a percentage of the weld be inspected and the portions examined were not the areas where the unacceptable indications were recorded this outage.

Certification and qualification records for the above examiners were also reviewed by the inspector.

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

3. Review of Radiographic (RT) Film for ISI, Plant Modifications and Replacement Piping Welds Unit 3 (73753 and 57090)

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 procedure used by the licensee for the RT examination process on piping modification or replacement welds was Duke Power Company Procedure No. NDE-10, Revision 18. The procedure used by the licensee for ISI RT of welds was Duke Power Company Procedure No. NDE-12, Revision 8.

Radiographic Film Reviewed

Weld ID No.	Pipe Size	Procedure Used
3-51A-121-13	4"Dia.X 0.531" THK.	NDE-10
3-51A-140-29	2"Dia.X 0.344" THK.	NDE-10
3-51A-66-37	4"Dia.X 0.674" THK.	NDE-10
3-51A-66-31	4"Dia.X 0.674" THK.	NDE-10
3-51A-59-76	4"Dia.X 0.531" THK.	NDE-10
3-48-11A	6"Dia.X 0.432" THK.	NDE-12
3-03A-147	6"Dia.X 0.432" THK.	NDE-12
3-03-48-12	24"Dia.X 1.218" THK.	NDE-12
3-03-46-6A	6"Dia.X 0.432" THK.	NDE-12
03-46-5A	24"Dia.X 1.218" THK.	NDE-12

The inspector's review of RT film revealed that the licensee had met minimum code requirements. However, roller marks from the film processor and other film artifacts in the area of interest on radiographs lead to discussions with the licensee concerning methods for improving film processing activities. The inspector also noted that minimal weld coverage was being obtained with an offset technique which projected welds on the extreme end of radiographic film.

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

4. Licensee Action of Previous Inspection Findings (92701 & 92702)

(Closed) Inspector Followup Item No. 50-287/91-05-03, "Incomplete MT Records"

This item had reported that the Code Inspector and the ISI Coordinator had signed off magnetic particle (MT) records that were incomplete. The inspector had not considered the omitted data to be safety significant and attributed the cause to inattention to detail. To close this item the inspector reviewed completed MT records for the previous Unit 3 outage (Dtd 8/92). This was done because the MT records for the current outage have not been finalized. During the inspector's review no incomplete records were identified and this item is considered closed.

(Closed) Violation No. 50-269,270,287/93-15-01, "Interpretation of Radiographs and Documentation of Finding"

The inspector verified by review of RT film and associated records that the corrective actions stated in the licensee's letter of response dated July 7,1993 had been fully implemented. This item is considered closed.

Within the areas examined, no violation or deviation was identified

5. Exit Interview

The Inspection scope and results were summarized on January 27, 1994. with those persons indicated in paragraph 1. The inspector described the area inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

6. Acronyms and Initialisms

ASME	-	American Society of Mechanical Engineers
ARIS	-	Automated Reactor Inspection System
B&PV	-	Boiler and Pressure Vessel
B&W	-	Babcock and Wilcox
Dia.	-	Diameter
DPC	-	Duke Power Company
ID	-	Identification
ISI	-	Inservice Inspection
MHz	-	Megahertz (units of sound frequency)

MT	-	Magnetic Particles
NDE	-	Nondestructive Examination
No.	-	Number
Nos.	-	Numbers
NRC	-	Nuclear Regulatory Commission
Rev.	-	Revision
RL	-	Refracted Longitudinal Wave Transducer
RPV	-	Reactor Pressure Vessel
RT	-	Radiographic Test
S	-	Shear Wave Transducer
SNT	-	Society of Nondestructive Testing
THK.	-	Thickness
°	-	Degree
"	-	Inch