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

Report Nos.: 50-269/89-37, 50-270/89-37, and 50-287/89-37

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: November 27 - December 1, 1989

Inspector: for J. L. Coley — 1/10/90 Date Signed

Approved by: J. J. Blake, Section Chief — 1/10/90 Date Signed
Materials and Processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, unannounced inspection was in the areas of inservice inspection (ISI) and included observation of work and work activities, and review of licensee's actions regarding a Unit 3, 2nd Interval, request for relief (No. 89-08) on 3A2 and 3B1 reactor coolant pump flange stud holes.

Results:

During the inspector's observation of ultrasonic examination work, two areas of concern were identified. Violation 50-287/89-37-02, paragraph 2.a., documented that the 2nd interval inservice inspection plan has not been properly reviewed in that: calibration block number 40367 designated for Item Number B05.050.012 Weld Number 3PSP-1 did not have a surface finish that represented the pipe to be examined (surface cracks and material separations were observed in the calibration block). The calibration block also was not the same nominal diameter or the same nominal thickness as the pipe to be examined. In addition, the calibration block did not contain calibration notch reflectors as required. Each of the calibration block criteria described above are required by ASME Section XI, Appendix III, supplement 7.

Unresolved Item 50-269,270,287/89-37-01, paragraph 2.a., documents that ultrasonic examinations performed on dissimilar metal welds at Oconee are conducted using the shear wave mode of sound transmission (shear wave transducers). As a result of the intergranular stress corrosion cracking problem experienced on boiling water reactors, longitudinal wave transducers have been found necessary to properly examine dissimilar metal welds if Inconel base material is involved or if alloy 82 or 182 are used as a weld butter or filler material.

At the conclusion of the inspection, the licensee had not been able to identify the materials in the dissimilar metal welds at Oconee. The licensee also stated that, with the exception of the centrifugally cast stainless steel reactor coolant piping at McGuire and Catawba, all dissimilar welds at these sites were also examined with shear wave transducers.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*T. Coleman, Quality Assurance (QA), ISI Coordinator
*B. Foster, Maintenance Superintendent
*A. Gladney, Corporate Quality Assurance
*W. Hunt, Corporate Quality Assurance
*E. LeGette, Compliance Engineer
*E. Miller, Corporate Quality Assurance Technical Superintendent
*R. Morgan, Site Quality Assurance Manager
*R. Sweigart, Acting Station Manager
*T. Tucker, Corporate Quality Assurance

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

NRC Resident Inspector

*L. Wert, Oconee Resident Inspector

*Attended exit interview

2. Inservice Inspector (ISI) Observation of Work and Work Activities - Unit 3 (73753)

The inspector observed the ISI work and ISI-related activities, indicated below, to determine whether examination activities performed on systems and components containing reactor coolant, inside containment, were 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, 1980 edition with addenda through Winter 1980. Duke Power Company (DPC) nondestructive examination (NDE) personnel were performing the liquid penetrant (PT), magnetic particle (MT), radiography (RT), visual (VT), and the ultrasonic (UT) examinations with Babcock and Wilcox (B&W) personnel providing technical assistance to DPC personnel during the UT of components not totally familiar to the DPC personnel. Steam generator tubing eddy current (EC) examination data collection was being accomplished by DPC personnel with (B&W) and DPC personnel performing independent analysis of the data.

The inspector observed the following three methods of examination to determine if the ISI-related activities were conducted in accordance with approved procedures by qualified and certified personnel knowledgeable of the examination methods, selection, and operation of the test equipment for specific materials and components.

a. Volumetric examination of welds using the manual (A-Scan) technique

The inspector observed calibration activities and portions of the in-process ultrasonic examinations being conducted on the items indicated below.

Item and ID Number	Procedure Number	Calibration Block	Component
B05.050.012 (3PSP-1)	ISI-120	40367	Pressurizer Spray Terminal End to Safe-end
B05.050.012A (3PSP-1)	ISI-120	40406	Pressurizer Spray Terminal End to Safe-end
B09.011.081 (3PSP.3)	ISI-120	40406	Pressurizer Spray Piping
B05.050.011 (3PHB-17)	ISI-120	40414	Pressurizer Surge Nozzle to Safe-end
B05.050.009 (3PSL-10)	ISI-120	40414	B-Hotleg Surge Line Nozzle
B09.011.101 (3PSL-01)	ISI-120	40399	Pressurizer Surge Terminal End
B06.040.001 (3RPV Ligaments)	ISI-104	40390	Reactor Vessel Flange
B02.040.004 (ISI-OCN3-004)	ISI-130	40305	Steam Generator 3B Lowerhead to Tube Sheet
B03.130.004 (3SGB-WB50-1)	ISI-130	40305	3B (Y-Z Axis) Outlet Nozzle
B03.140.004 (3SGB-WB50-1)	ISI-130	40305	3B (Y-Z Axis) Nozzle Inside Radius
B03.140.003 (3SGB-WB50-2)	ISI-130	40305	3B (W-Z Axis) Nozzle Inside Radius

Item and ID Number (cont'd)	Procedure Number	Calibration Block	Component
B03.130.003 (3SGB-WG50-2)	ISI-130	40305	3B (W-Z Axis) Outlet Nozzle
B05.050.011A (3PHP-17)	ISI-120	40399	Surge Nozzle Safe-end

During the inspector's observation of calibration activities, two areas of concern were identified. The first concern dealt with one of the calibration blocks (Cal. Blk No. 40367) that was to be utilized for the examination of dissimilar metal weld 3PSP-1, Item No. B05.050.012. The inspector noted that calibration block number 40367 had apparent surface cracks and material separations on its outside diameter surface. In addition, the block was not the same nominal diameter or the same nominal thickness as the calibration block that was going to be used on the opposite side of weld (3PSP-1) Item No. B05.050.012A or the piping to be examined. These concerns were discussed with the B&W examiner who was acting as a technical adviser to Duke and who subsequently noted that the block also did not have notches that were required by ASME Section XI, Appendix III, Supplement 7, and the examination procedure.

The inspector reviewed the Oconee Unit 3, 2nd Interval, Inservice Inspection Plan and discovered that the calibration block had been improperly designated as the calibration block to use for the examination of Item No. B05.050.012. Duke Power Company, Quality Assurance Program, Procedure QA-513, Rev. 6, states, in part, that the Quality Assurance Engineer shall prepare each Inservice Inspection Plan and that each plan shall include a detailed listing of welds or components to be examined including their classification, category and item number, required examination procedure, and calibration standards to be used. In addition, paragraph 5.6 of the Quality Assurance Program Procedure requires that the Quality Assurance Engineer or his designee, in writing, shall review each Inservice Inspection Plan or Summary Report for conformance to the ASME Section XI, Final Safety Analysis Report, Technical Specification, and other licensing commitments. The finding described above was reported to Oconee's management as Violation 50-287/89-37-02, "Inadequate Technical Review of Oconee's 2nd Interval Inservice Inspection Plan."

The second area of concern observed, during the calibration of dissimilar metal welds listed above, was that DPC and B&W ultrasonic examiners were using the shear wave mode of sound transmission (shear wave transducers) to examine dissimilar metal welds at Oconee Nuclear Station. As a result of the intergranular stress corrosion cracking

problems experienced on Boiling Water Reactors in the early to mid-1980's, angle beam transducers which produce refracted longitudinal wave mode of sound transmission have been found to be necessary to properly examine dissimilar metal welds in some 600 series base materials or when alloy 82 or 182 are used as a weld butter,and/or filler material.

Upon finding that Duke Power was using shear wave transducers to examine all dissimilar metal welds at Oconee, McGuire and Catawba Nuclear Stations, with the exception of the centrifugally cast stainless steel reactor coolant piping to component nozzles at their McGuire and Catawba Nuclear Stations, the inspector requested that the licensee identify what materials were involved in Oconee's dissimilar metal welds. At the conclusion of the inspection, the licensee had not been able to provide the inspector with this information. This item was reported to Oconee's management as Unresolved Item 50-269,270,287/89-37-01, "Ultrasonic Examination of Dissimilar Metal Welds Using Shear Wave Mode Transducers."

b. Radiographic Review of ISI Class 2 Piping Welds

Radiographs of the ISI welds listed below were reviewed by the inspector. These radiographs were compared to the requirements of the licensee's approved radiographic procedure, NDE-12, Rev. 7

Item No.	Weld No.	Size
C05.021.309	3-03-3FWD-74-A	24" dia. x 1.218" thk.
C05.021.360	3-01A-23-04	26" dia. x .875" thk.
C05.021.372	3-01A-24-02	26" dia. x .875" thk.
C05.021.378	3-01A-24-03	26" dia. x .875" thk.
C05.022.013	3-01A-24-02L	26" dia. x .875" thk.
C05.022.009	3-01A-23-04L	26" dia. x .875" thk.
C05.022.015	3-01A-24-03L	26" dia. x .875" thk.

c. Eddy Current Examination

The inspector observed B&W performing the 360° rotating coil examinations listed below. With the exception of these enhanced examinations, all steam generator (SG) tubes designated for examination with the bobbin coil (9210 in SG-A and 9226 in SG-B) had been completed and all eddy current data evaluated by B&W and Duke Power.

S G	Row No.	Column No.	Position
B-Hotleg	120	105	8th support plate
B-Hotleg	122	103	8th support plate
B-Hotleg	123	103	14th to 15th support plate
B-Hotleg	82	124	14th support plate

The inspector reviewed qualification documentation for a select sample of examiners audited during the examinations previously observed. The qualification and certification records for the following personnel were reviewed:

Company	Examiner	Method-Level
DPC	H.A.D.	RT/Level II
DPC	G.E.H.	UT/Level II
B&W	J.S.S.	EC/Level IIA
DPC	J.L.R.	PT/Level II

Within the areas examined, violations or deviations were not identified except as noted in paragraph 2.a. above.

3. Review of Oconee Unit 3 Request for Relief No. 89-08

Duke Power Request for Relief No. 89-08, dated October 13, 1989, was reviewed by the inspector. This untimely relief request addressed reportable indications found in reactor coolant pumps 3A2 and 3B1 main flange stud hole threads. The damage to the stud hole threads was not due to cracks in the base metal or pitting caused by boric acid corrosion but instead was more characteristics of damage done during the process of removing the studs. The damage to the five threads on reactor coolant pump casing 3A2 was typical of damage seen after removing a stuck stud. The damage to the three threads on reactor coolant pump casing 3B1 was typical of damage due to stud handling during removal and installation. The discrepant conditions were found during the 9th outage for Unit 3 in the Spring of 1987. Oconee Unit 3 is presently in the 11th outage. At the time of discovery, engineering justifications were written and the condition on both main flanges accepted based on the fact that a main flange stud would be installed in each of the two holes in question and tensioned normally. Although credit would not be taken for these studs for operability purposes, the licensee felt that their actions were conservative based on a letter from B&W (Serial No. SGBM-85-507, dated July 9, 1985), stating that damaged threads in one stud hole would not affect the safety or operability of a reactor coolant pump since each pump has been evaluated for 19 of 20 studs in-place. However, the inspector was concerned over this relief request for the following reasons:

a. Why was the condition not reported by a relief request in 1987 when it was found?

b. Why did drawings accompanying the Relief Request have handwritten notes on them indicating that Fermanite may be used to seal the flange?

The inspector held discussions with the Supervisor of Maintenance Engineering, the Maintenance Engineer for the reactor coolant system, and the ISI

Coordinator (QA Engineer) and reviewed documents provided by these individuals. The licensee's responses to the above inspector's questions are as follows:

a. The licensee did not report the discrepant conditions in 1987 because maintenance engineering and the ISI QA Engineer at the time concluded that, since the discrepancies were not service-induced but mechanically induced, they were not reportable to ASME Section XI.

b. Discussions with the Supervisor of Maintenance Engineering revealed that the handwritten notes on the licensee's drawings concerning fermanite were no longer applicable. During the 1982 to 1985 time period, all Bingham reactor coolant pumps at Oconee had the pump casing seat re-machined and a new stainless steel/graphite type gasket was installed in lieu of the old stainless steel/asbestos type gasket previously used. Fermanite injection ports were also removed during the above pump casing refurbishing efforts and set screws were installed in their place. In the time period since this work was performed, no leaks have been observed in the pump casing sealing surface.

The NRC Office of Nuclear Reactor Regulations (NRR) will evaluate the licensee's request for relief from the ASME Code requirements. However a complete copy of the B&W evaluation analysis (Document No. 31-1153263-00) should be forwarded to NRR for their review as required by ASME Section XI Paragraph I WB-3125.

Within the areas examined, violations and deviations were not identified.

4. Exit Interview

The inspection scope and results were summarized on December 1, 1989, 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.

During discussion of the violation listed below, the Corporate Quality Assurance Technical Superintendent requested that the Inspection Report reflect that a Babcock and Wilcox examiner discovered concurrently with the inspector the fact that the calibration block did not have calibration notch reflectors.

(Open) Violation 50-287/89-37-02, Inadequate Review of Unit 2, 2nd Period, 2nd Interval, Inservice Inspection Plan, paragraph 2.a.

(Open) Unresolved Item 50-269,270,287/89-37-01, Ultrasonic Examination of Dissimilar Metal Welds Using Shear Wave Mode Transducers, paragraph 2.a.