A HIND & WOOD	UNITED STATES NUCLEAR REGULATORY COMMISSION REGION II 101 MARIETTA STREET, N.W. ATLANTA, GEORGIA 30323	
Report Nos.:	50-413/89-14 and 50-414/89-14	
Licensee:	Duke Power Company 422 Church Street Charlotte, NC 28242	
Docket Nos.:	50-413 and 50-414	
Facility Name	e: Catawba 1 and 2	
Inspection Co Inspectors:	onducted: April 24-28, 1989 Molacon	5/25/89 Date Signed
J Approved by:	J. J. Blake, Chief Materials and Processes Section Engineering Branch Division of Reactor Safety	5-25-89 Date Signed 5/25/89 Date Signed

SUMMARY

Scope

This routine, unannounced inspection was conducted in the areas of inservice inspection and included a review of the Automated Reactor Inspection System (ARIS) data from the Unit 2 hot leg nozzle inner-radius areas in which indications were found. In addition, the inspectors followed the replacement of steam generator tube plugs identified as being susceptible to stress corrosion cracking; witnessed search for and removal of a loose part in a Unit 2 steam generator, and addressed previously opened NRC Unresolved and Inspector Followup Items. Also included in this report is a review of the Unit 1 End of Cycle 3 Inservice Inspection Report.

Results

Within the areas inspected, a major weakness in the area of protection of permanent plant equipment was identified, in that adequate procedural guidance in this area does not exist. (paragraph 3.e.) NRC inspectors witnessed personnel climbing and walking on equipment important to safety in the lower containment. In the area of inservice inspection, the licensee's program is adequate in that personnel were knowledgeable and well-q. lified to perform inspection their respective areas of certification, how er, procedure qualification documentation of examinations not fully performed to Code requirements was not available during the performance of the subject examinations, or for NRC review.

9706270488 870622 PDR ADOCK 05000413 Q PNU Within the areas inspected, a violation was identified: "Inadequate Procedural Guidance for Protection of Permanent Plant Equipment" (paragraph 3.e.).

One inspector followup item was identified involving the ARIS inspection of the reactor vessel hot leg nozzles (paragraph 2.a.(2)).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*J. Barbour, Quality Assurance Director Operations R. Giles, Site Inservice Inspection Coordinator

*R. Glover, Technical Support/Operations

R. Kaye. Maintenance Engineer Service Specialist

*V. King, Technical Support/Compliance

*P. LeRoy, Duke Power Corporation Regulatory Compliance

*T. Owens, Catawba Station Manager

*G. Robinson, Quality Assurance, Catawba

Babcock & Wilcox Employees

G. Bryant, Eddy Current Task Leader M. Hacker, Supervisor, Ultrasonic Technology R. Patterson, Task Leader, Inservice Inspection

NRC Resident Inspectors

M. Lesser, Resident Inspector *W. Orders, Senior Resident Inspector

*Attended Exit Interview

2. Inservice Inspection (ISI) Units 1 and 2

The inspectors 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, 1980 edition with addenda through Winter 1981 (80 W' 81). Commercial operation commenced June 29, 1985, for Unit 1, and August 19, 1986, for Unit 2. Unit 1 has recently completed the third outage of the first 40 month period of the first ten year interval. At the time of this inspection, Unit 2 was in the second outage of the first 40 month period of the first ten year interval.

Duke Power Company (DPC) nondestructive examination (NDE) personnel were performing the liquid penetrant (PT), magnetic particle (MT), radiography (RT), and visual examinations (VT) under the DPC Quality Assurance (QA) program. Babcock & Wilcox (B&W) and DPC personnel were conducting ultrasonic (UT) examinations, under the B&W QA program.

a. Observation of ISI Work and Work Activities, Unit 2 (73753)

The inspectors observed examination activities, and reviewed NDE personnel qualification records for personnel that performed ISI examinations this outage. The observations and reviews are listed below.

(1) Radiographic Examination (RT)

The inspectors independently verified results of the RT examinations performed in the Units 1 and 2 outages. The inspectors also reviewed documentation associated with the respective examinations listed below to assure that the examinations were consistent with Section XI. The inspectors reviewed the documentation and films to ensure that the following was evident and/or recorded: type of material; material and weld surface condition requirements; type of radiation source and its intensity; effective source-to-film distance; effective focal spot, or effective source size; film brand and type; number of films in cassette; minimum source-to-film distance; type and thickness of intensifying screens and filters; quality of radiographs; film density and contrast for single and composite viewing; use of densitometers for assuring compliance with film density requirements; system of radiograph identification; use of location markers; methods of reducing and testing for backscatter; selection of penetrameters, including penetrameter placement; number of penetrameters; shims under penetrameters; quality of film and its general condition; film storage adequate; proper evaluation of indications; proper density of film, and proper film viewing conditions.

Unit 1 Radiographs

Identification	Diameter x Wall Thk.	System
1SM 29-3	34" × 1.451"	Main Steam
1SM 29-7	32" × 1.459"	Main Steam
1SM 1B-1	32" × 1.375"	Main Steam

Unit 2 Radiographs

Weld Identification	Diameter x Wall Thk.	System
2SM 11-2	34" x 1.375"	Main Steam
2SM 1A-I	34" x 1.375"	Main Steam
2SM 11-3	34" x 1.375"	Main Steam

Within the areas inspected, violations or deviations were not identified.

(2) Evaluation of ARIS Data, Reactor Vessel Hot Leg Nozzle Inside Radius

During the week of April 17-21, 1989, Region II was notified that indications had been detected during the ultrasonic examinations of the inside radius of reactor vessel hot leg nozzles A, C, and D on Unit 2. On April 24, 1989, the inspectors arrived at the Catawba facility to review B&W's evaluation of the reported evaluation of the reported indications. Discussions with the Level III examiner revealed that B&W's preliminary evaluation of the indications indicated that the ultrasonic reflectors appeared to be located totally in the stainless steel clad. The Accusonex (B&W's Automated Ultrasonic/Computer System) data further revealed that the indications were laying in a circumferential direction around the nozzles, in the same plane as the clad deposition, and spaced between each pass of the weld metal. The indications had initially been detected with a 70 degree refracted longitudinal (RL) wave transducer which examines the clad and base material for 1/2 inch below the clad. This transducer is excellent for near-surface detection, however, the long beam angle required for near-surface detection tends to over size indications considerably. To prevent distortion in indication size, B&W examined the indications with focused 5 Megahertz (mHz) straight-beam transducer, and 40 and 60 degree angle beam RL transducers. The result of this ultrasonic enhancement revealed that the indications were not planar oriented like a crack, but had volume like an inclusion, and contained within the clad weld material. The focused 5mHz readily displayed the indications revealing width and no depth. The 40 degree and 60 degree RL transducers did not detect crack tips or facets to the indications. A test block with apparent inclusions and electro-discharge machined (EDM) notches in the clad and examination area also revealed similar type ultrasonic reflectors for visual/ultrasonic comparison. At the conclusion of the inspection, B&W had not completed their evaluation, since they intended to further enhance the focused 5 mHz data to further pin-point the exact location in the clad of the indications. However, the inspectors were confident that the preliminary evaluations were sound, based on the data reviewed, and the DPC corporate QA supervisor agreed to pursue the following three concerns raised by the inspectors as a result of their examination of the evaluation activities:

Clad welding fixture/process data should be determined by contacting the fabricator prior to classification of the indications as a particular type of welding abnormality.

- The test block used for comparison should be polished, etched, and examined with magnification on a side edge to determine the type of inclusion in the test block and whether the inclusions have any cracks running from them into the base material.
- Demonstrate the sizing capabilities of the ARIS system (Accusonex) on real underclad cracks, using the same type of angle beam transducers used to evaluate the Unit ? nozzle inner radius indications. B&W intends to perform this demonstration for the B&W owners group and Duke in several months at the Electric Power Research Institute in Charlotte, NC. The inspectors requested that the licensee notify Region II, Materials and Processes Section, when this demonstration is performed so that Region II can observe the capabilities of this system.

The first two concerns will be addressed by the licensee prior restart. The third concern addresses system capabilities and limitations resulting from the inspectors' review of the system's display of the trailing tip on the EDM notches, and concerns that cracks would be even harder to detect. This item was reported to the licensee as Inspector Followup Item (IFI) 50-414/89-14-01, "Evaluation of ARIS Data."

Within the areas examined, no violations or deviations were identified.

(3) Visual Examination and Retrieval of Foreign Material in Steam Generator A, Unit 2

The inspectors observed B&W efforts to examine Steam Generator A Unit 2 (S/G 2A) for apparent loose material which had damaged three Alloy 600 tubes. This retrieval required the Licensee to bore an additional hole in S/G 2A near the level of the third support plate in order to expedite this retrieval effort. Several days of visual examination were required, and various fixtures for the remote video probe were tried before B&W located and retrieved the loose part. The inspectors observed B&W's visual examination to determine the condition of the Alloy 600 tubes in contact with the loose part. In addition, the inspectors observed the examinations to determine if applicable drawings of the steam generator's internal structure and tube alignments were available; whether required tools and examination aids were available; if specific areas, locations, and extent of examinations were clearly defined, and if inspection results were recorded and reported in a prescribed manner. The loose part was retrieved on April 25, 1989, and consisted of a 3" x 5/8" x 1/4" tube wedge that had apparently been left in the steam generator since fabrication.

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

(4) Observation of Steam Generator A Unit 2 Tube Plug Replacement and Plug Repair

In a B&W letter, from James H. Taylor of B&W Licensing Services to Dr. Thomas E. Murley, Director, NRR, dated September 6, 1988, B&W indicated that certain steam generator (S/G) tube plugs fabricated from Inocnel 600, heat W-592-1, possessed a microstructure that may be susceptible to stress corrosion cracking (SCC). This letter identified the plants which had plugs installed that were manufactured from this heat of material. Catawba Unit 2 was identified as having six non-conforming plugs installed that were fabricated from Heat W592-1. The inspectors observed B&W replace these six plugs in S/G 2A with conforming material. In addition, three plugs were installed because of tube degradation caused by loose parts in S/G 2A as described above in paragraph 2.a.(3). The inspectors observed the plugging of the following tubes:

Steam Generator A, Unit 2

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Tube Number	Location	Replacement/Repair
49-54 49-39 24-67 24-68 24-69 15-77	Cold Leg Cold Leg Cold Leg Cold Leg Cold Leg Cold Leg Cold Leg	W592-1 Replacement W592-1 Replacement * W592-1 Replacement/Repair Repair W592-1 Replacement

* Denotes tube with non-conforming plug installed, and degradation caused by foreign object on steam generator.

The non-conforming W592-1 S/G tube plugs were only in S/G 2A, and have been in service since February 23, 1988, or the duration of one fuel cycle. The locations the non-conforming plugs occupied are shown in the table below:

Steam Generator 2A

Tube Number	Location
15-77	Hot Leg
15-77	Cold Leg
24-67	Hot Leg
24-67	Cold Leg
49-39	Cold Leg
49-54	Cold Leg

At the time of the inspection, the licensee and B&W did not have any definite plans for laboratory evaluation or NDE to determine if the W592-1 plugs which were removed suffered service induced degradation.

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

- b. Inservice Inspection Data Review and Evaluation, Unit 2 (73755)
 - (1) Records of completed nondestructive examinations were selected and reviewed to ascertain whether: the methods, technique, and extent of the examination complied with the ISI plan, and applicable NDE procedures; findings were properly recorded and evaluated by qualified personnel; programmatic deviations were recorded as required; personnel, instruments, calibration blocks, and NDE materials (penetrants, materials) were designated. The records selected for this review are listed below:

Item Number	Weld/Component	Method
B02.011.002	2PZR-W8E Pressurizer	UT
B02.012.002	2PZR-W9D Pressurizer	UT
B09.011.044	2NC25-05 Reactor Coolant	UT
B09.011.312	2N161-05 Safety Injection	UT
B09.011.021	2NC13-W2 Reactor Coolant	UT
B05.010.005B	2RPV202-121ASE Reactor Vessel Hot Leg Safe End	PT
B05.040.002A	2PZR~W2SE Pressurizer Safe End	PT
C05.011.181	2ND13-7 Decay Heat Removal	РТ
C05.011.300	2NI18-01 Safety Injection	PT

















B09.021.011	2NC44-23 Reactor Coolant	PT
C05.011.322	2NI60-06 Safity Injection	PT
C05.011.400	2SM25-01 Main Steam	MT
C05.012.300	2SV-02L Main Steam	MT
C05.021.054A	2CF-27-C Feedwater	MT
B07.070.049	2NI-175 Safety Injection	VT-1
B07.070.023	2ND-36B Decay Heat Pemoval	VT-1
F1.03.959	2-R-TE-0021 Feedwater Turbine	VT-3
2-R-KC-0414	F1.03.269 Component Cooling Water	VT-3

(2) Review of Catawba Unit 1 Cycle 3 Inservice Report

The Inspectors reviewed the DPC Inservice Summary Report for Catawba Unit 1, cycle 3 refueling outage. This outage was completed February 6, 1989. The report was reviewed to determine whether the inspections performed were consistent with the requirements of Section XI of the ASME B&PV Code, applicable addenda, and licensee commitments. Specific areas examined for compliance were: minimum examinations completed; limitations recorded; examination methods recorded, and indications were recorded, evaluated, and reported as required.

Within the areas inspected, violations or deviations were not identified.

- 3. Action on Previous Inspection Findings (92701)
 - a. (Open) URI 50-413,414/89-08-01, "MT Demonstration"

In the performance of the MT examinations on reactor vessel studs and nuts, the licensee used less amperage than Section XI requires. The Code, however, allows this if it can be shown to the

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satisfaction of the Authorized Inservice Nuclear Inspector (ANII) that the alternate method(s) are equivalent or superior to the Code-specified method. The inspectors found that a procedure qualification document approved by the ANII was on file for the alternative MT exam for the nuts, however, the procedure qualification documentation for the studs ras not prepared at the time of the inspection. The inspectors found, however, that the ANII did, in fact, witness, and approve the alternate MT examination for the studs. Pending NRC review of the DPC procedure qualification documentation, this item will remain open.

b. (Open) IFI 50-413,414/89-08-02, "ISI Baseline Inspection Method"

The Code requires that repair work be inspected using the same method that was used to detect the defect prior to performance of the required repair work. Two DPC NDE procedures (NDE 25, Revision 12, and NDE 35, Revision 10) did not incorporate this requirement, and at the time of the inspection, were being revised. Pending NRC review of the revised NDE procedures, this item will remain open.

c. (Close) IFI 50-413,414/89-08-03, "Unavailable ISI Records"

Spectrum analysis data for transducer numbers M18416, M18423, and data indicating hot leg wide range temperature instrument A0668 was in calibration were shown to the inspectors. This item is closed.

d. (Open) IFI 50-413,414/89-08-04, "Valve Identification"

A Valve tagged "27SV27A" was incorrectly identified as "2SV027" on a DPC drawing used by inspectors as reference in performing ISI. The subject valve is a S/G power operated relief block valve; the "A" indicating either A or B train power for the valve. Further review by the licensee indicated that additional drawings which included this valve required correction, however, the inspector found that the valve was correctly identified on the Unit 2 main control board. The inspectors also checked nine other A and B train valves for consistency between drawings (Flow Isometrics and Design Isometrics) and tagging on the main control board and found no additional inconsistencies. Pending NRC review of the revised DPC drawings, this item will remain open.

e. (Close) URI 50-413,414/89-08-05, "Protection of Installed Plant Equipment"

During a tour of the Unit 2 Containment lower level, the inspectors confirmed that personnel were climbing and walking on safety-related equipment, including cable trays, small-bore piping, and pipe supports. At one point, the inspectors observed a number of personnel climbing down a long, vertically-run cable tray, scaling its rungs as if it were a ladder. The inspectors also found an example of a damaged line (WL400-12) during this tour at the 558' 270 degree location in the pipechase. The line, part of the liquid waste system, carries radwaste and was obviously struck with a heavy object, and badly dented at the point of impact. At the time of the inspection, the inspectors found that the licensee's procedure, CNS Station Directive 3.11.1, page 4, states, in part, that "Adequate working space shall be provided where possible utilizing proper work stages and platforms having accessibility by stairs or ladders." Discussions with the licensee indicated, however, that this Station Directive was not intended to provide guidance to personnel regarding protection of installed plant equipment during regular movement through the containment. Based on these observations, this unresolved item will be closed, and elevated to a violation for tack of procedural coverage for protection of permanent plant equipment. This matter will be identified as Violation 50-413,414/89-14-02, "Inadequate Procedural Coverage for Protection of Permanent, Plant Equipment."

4. Exit Interview

The inspection scope and results were summarized on April 28, 1989, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results listed below. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

Item Number	Description and Reference
50-414/89-14-01	IFI, "Evaluation of ARIS Data", Paragraph 2.a.(2)
50-413, 414/89-14-02	Violation, "Inadequate Procedural Coverage for Protection of Permanent Plant Equipment," Paragraph 3

Licensee management was informed that one IFI and one URI discussed in paragraph 3 were closed.