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

Report Nos.: 50-413/90-18 and 50-414/90-18

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

Docket Nos.: 50-413 and 50-414 License Nos.: NPF-35 and NPF-52

Facility Name: Catawba 1 and 2

Inspection Conducted: June 25-29, 1990

Inspector: Ronald W. Newsome 7-9-90
R. W. Newsome Date Signed

N. Economos 7-9-90
N. Economos Date Signed

Approved by: J. C. Blake 7/11/90
J. C. Blake, Chief Date Signed
Materials and Processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was conducted on site in the areas of Inservice Inspection (ISI) and Maintenance.

The inspection of ISI activities included a review of the Unit 2 ISI plan for this outage; reviews of nondestructive examination (NDE) procedures; observations of in-progress NDE examinations; independent examination verifications; reviews of NDE personnel qualifications; reviews of NDE equipment calibration and material certification documentation: and, a review of completed NDE examination data.

The maintenance inspection was a performance oriented inspection to observe preventative and corrective maintenance of safety related valves. Maintenance procedures and quality records were reviewed for technical adequacy and accuracy.

Results:

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

This inspection indicated that ISI nondestructive examinations were being conducted adequately.

All maintenance areas inspected indicated that the licensee's maintenance program was well organized and adequately implemented.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*J. Barbour, Quality Assurance (QA), Director Operations
*J. Cherry, QA ISI
*R. Giles, QA ISI Coordinator
R. Johnston, Foreman, Valve Maintenance
*V. King, Compliance
E. Kulesa, Nuclear Production Engineer, Maintenance
*W. McCollum, Maintenance
J. McKeown, Nuclear Production Engineer, Maintenance
*T. Owens, Catawba Station Manager
R. Pettet, NDE Supervisor
T. Walkowiak, Quality Control Inspector, Mechanical

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

NRC Resident Inspectors

*W. Orders, Senior Resident Inspector
J. Zeiler, Resident Inspector

*Attended exit interview

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

2. Inservice Inspection

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. Duke Power Company (DPC) nondestructive examination personnel are performing the liquid penetrant (PT), magnetic particle (MT), radiography (RT), ultrasonic (UT), and visual (VT) examinations. Steam generator (SG) tubing eddy current (EC) examination data collection was being accomplished by Duke Power personnel with Babcock and Wilcox (B&W) performing the primary data analysis and Duke Power personnel performing a secondary data evaluation.

a. ISI Program Review, Unit 2 (73051)

The inspectors reviewed the following documents relating to the ISI program to determine whether the plan had been approved by the licensee and to assure that procedures had been established (written, reviewed, approved and issued) to control and accomplish the following applicable activities: organizational structure including qualifications, training, responsibilities, and duties of personnel responsible for ISI; material certifications, and identification of components to be covered; work and inspection procedures; control of processes including special methods, and use of qualified personnel; scope of the inspection including description of areas to be examined, examination category, method of inspection, and extent of examinations; definition of inspection interval; and, qualification of NDE personnel.

- Inservice Inspection Plan Catawba Nuclear Station Unit 2
- NDE-B (R16) Training, Qualification And Certification Of NDE Personnel

Review of NDE Procedures, Units 1 and 2 (73052)

(1) The inspectors reviewed the procedures listed below to determine whether these procedures were consistent with regulatory requirements and licensee commitments. The procedures were also reviewed in the areas of procedure approval, requirements for qualification of NDE personnel, and compilation of required records; and, if applicable, division of responsibility between the licensee and contractor personnel if contractor personnel are involved in the ISI effort.

- ISI-119 (R12) Ultrasonic Examination of Stainless Steel and Nickel Base Alloy Weld Seams
- ISI-120 (R25) with CA-88-06, 90-01 & 90-03 Ultrasonic Examination Of Piping and Vessel Welds Joining Similar and Dissimilar Materials
- NDE-35 (R13) Liquid Penetrant Examination
- NDE-12 (R8) General Radiography Procedure For Preservice and Inservice Inspection
- QCF-9 (R4) Piping Support Installation Inspection
- QCL-13 (R6) Inservice Inspection (ISI) Visual Examination, VT-1
- QCL-14 (R10) ISI Visual Examination, VT-3 and VT-4

- ISI-424 (R14) Multi-Frequency Eddy Current Examination of .750" OD X .044" Wall RSG Tubing For ASME Exam. and Wear At Tube Support Plates

- ISI-460 (R15) Technical Procedure For The Evaluation of Eddy Current Data of Nuclear Grade Steam Generator Tubing

- Eddy Current Analysis Guidelines For Catawba Nuclear Station Unit 2„ (Rev. 2)

All procedures listed above have been reviewed during previous NRC inspections. Only current revisions were reviewed during this inspection.

(2) The inspectors reviewed the Ultrasonic procedures to ascertain whether they had been reviewed and approved in accordance with the licensee's established QA procedures. The procedures were also reviewed for technical adequacy and conformance with ASME, Section V, Article 5, and other licensee commitments/requirements in the following areas: type of apparatus used; extent of coverage of weldment; calibration requirements; search units; beam angles; DAC curves; reference level for monitoring discontinuities; method for demonstrating penetration; limits for evaluating and recording indications; recording significant indications; and, acceptance limits.

(3) The inspectors reviewed the Liquid Penetrant procedure to ascertain whether it had been reviewed and approved in accordance with the licensee's established QA procedures. The procedure was also reviewed for technical adequacy and conformance with ASME, Section V, Article 6, and other licensee commitments/requirements in the following areas: specified method; penetrant material identification; penetrant materials analyzed for sulfur; penetrant materials analyzed for total halogens; surface temperature; acceptable pre-examination surface conditioning; method used for pre-examination surface cleaning; surface drying time prior to penetrant application; method of penetrant application; penetrant dwell time; method used for excess penetrant removal; surface drying prior to developer application, if applicable; type of developer; examination technique; evaluation techniques; and, procedure requalification.

(4) The inspectors reviewed the Radiographic procedure to determine whether it contained sufficient information to assure that the following parameters were specified and controlled within the limits permitted by the applicable code, or any other specification requirement: type of material to be radiographed; material and weld surface condition requirements; type of

radiation source, effective focal spot or effective source size; film brand or 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 back-scatter; selection of penetrameters including penetrameter placement; number of penetrameters; shims under penetrameters; radiographic technique for double wall viewing; and, evaluation and disposition of radiographs.

(5) The inspectors reviewed the Visual examination procedures to determine whether they contained sufficient instructions to assure that the following parameters were specified and controlled within the limits permitted by the applicable code, standard, or any other specification requirement: method - direct visual, remote visual or translucent visual; application - hydrostatic testing, fabrication procedure, visual examination of welds, leak testing, etc.; how visual examination is to be performed; type of surface condition available; method or implement used for surface preparation, if any; whether direct or remote viewing is used; sequence of performing examination, when applicable; data to be tabulated, if any; acceptance criteria is specified and consistent with the applicable code section or controlling specification; and, report form completion.

(6) The inspectors reviewed the Eddy Current procedures for technical content relative to: multichannel examination unit, multichannel examination indication equipment is specified, examination sensitivity, method of examination, method of calibration and calibration sequence, and acceptance criteria.

All procedures reviewed appeared to contain the necessary elements for conducting the specific examination.

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

The inspectors observed in-progress work activities, conducted independent examination verifications, reviewed certification records of NDE equipment and materials, and reviewed NDE personnel qualifications for personnel that were utilized during the required ISI examinations during this outage. The observations and reviews conducted by the inspectors are documented below.

(1) The inspectors observed calibration activities and DPC examiners performing in-process ultrasonic (UT) examinations being conducted on 6 Safety Injection System circumferential pipe welds. These observations were compared with the applicable procedures and the ASME B&PV Code in the following areas:

availability of and compliance with approved NDE procedures; use of knowledgeable NDE personnel; use of NDE personnel qualified to the proper level; type of apparatus used; calibration requirements; search units; beam angles; DAC curves; reference level for monitoring discontinuities; method of demonstrating penetration; extent of weld/component examination coverage; limits of evaluating and recording indications; recording significant indications; and, acceptance limits.

The inspectors conducted an independent ultrasonic verification examination, using DPC equipment, on portions of 3 of the welds previously observed being UT examined. These examinations were conducted in order to evaluate the technical adequacy of the ultrasonic examination procedure being used by the licensee and to assess the validity of the information being reported by the ultrasonic examiners.

The verification ultrasonic examinations conducted by the inspectors indicated that the procedure being used to conduct the examinations is adequate and the verification examination results compared favorably with the information reported by the ultrasonic examiners.

The following listed ultrasonic equipment and materials certification records were reviewed:

Ultrasonic Instruments 1219 and 31501-976.

The inspectors reviewed spectrum analysis data for the ultrasonic transducers listed below:

Serial No.	Size	Frequency
G15062	.25"	5.0 MHz
32357	.375"	2.25 MHz
42963	.5"	2.25 MHZ
42960	.5"	2.25 MHZ

Ultrasonic Couplant Batch Numbers 8767 and 8981

Ultrasonic Calibration Blocks 50307, 50316, and 50312

(2) The inspectors observed the in-process liquid penetrant (PT) examinations of 10 Safety Injection System circumferential pipe welds. The observations were compared with the applicable procedure and the ASME B&PV Code in the following areas: specified method, penetrant materials identified; penetrant materials analyzed for halogens and sulfur; acceptable pre-examination surface; surface temperature; surface drying time prior to penetrant application; method of penetrant application; penetrant dwell time; method used for excess

penetrant removal; surface drying prior to developing, if applicable; type of developer; examination technique; evaluation technique; and, reporting of examination results.

The NRC inspectors re-evaluated 9 of the welds noted above following the PT examiners evaluation but prior to the developer being removed from the weld surfaces. These re-evaluations were conducted in order to determine if the evaluations performed by the PT examiners were in accordance with the applicable procedure acceptance criteria and to determine if the examination results were being reported as required. The re-evaluations conducted by the NRC inspectors indicated that the proper evaluations were made by the PT examiners and that the examination results were being reported as required.

The inspector's review of the below listed liquid penetrant materials certification records indicated that the sulfur and halogen content of the material was within acceptable content limits.

Materials	Batch Number
Liquid Penetrant	78E084
Cleaner/Remover	88H038S, 88D039, 88J021, 89B01K
Developer	88G033

(3) The inspectors reviewed documentation indicating that a 10 pound lift test had been performed on magnetic particle alternating current (AC) yokes CNO-30 and CNO-16.

A review of the magnetic particle material certification record for batch number 87F008 indicated the particles met the applicable specifications requirements.

(4) Steam Generator (SG) Tubing Eddy Current Examination

The inspectors observed the EC activities indicated below. The observations were compared with the applicable procedures and the Code in the following areas: method for maximum sensitivity is applied; method of examination has been recorded; examination equipment has been calibrated in accordance with the applicable performance reference; amplitude and phase angle have been calibrated with the proper calibration reference and is recalibrated at predetermined frequency; required coverage of steam generator tubes occurs during the examination; acceptance criteria is specified or referenced and is consistent with the procedure or the ASME Code; and, results are consistent with the acceptance criteria.

(a) Steam generator tube eddy current data collection was being accomplished by DPC personnel. In-process tube data acquisition, including calibration confirmation and tube location verifications, was observed for 33 SG tubes, 17 in SG-B and 16 in SG-D.

(b) In-process eddy current data evaluation, including calibration confirmation, was observed for 70 SG tubes. Primary data analysis, being conducted by Babcock and Wilcox (B&W), was observed for 50 SG tubes, 20 tubes in SG-B and 30 in SG-D. Secondary data analysis, being conducted by DPC, was observed for 20 tubes in SG-D.

The NRC inspectors co-evaluated 31 of the SG tubes during the observations of the primary and secondary analyst's evaluations, 10 in SG-B, and 21 in SG-D. The sample of evaluations, some having reportable indications and some with no reported indications, was conducted in order to confirm the validity of the reported tubing condition. The co-evaluation analysis conducted by the inspectors agreed well with the reported results.

Certification records for EC calibration standard A-7591 were reviewed for material type, correct fabrication, and artificial flaw location and size.

(5) The inspectors reviewed personnel qualification documentation for 3 UT examiners, 5 PT examiners, 5 MT examiners, 3 VT examiners, 2 DPC EC data collection personnel, 3 B&W EC data analysts, and 2 DPC EC data analysts. These personnel qualifications were reviewed in the following areas: employer's name; person certified; activity qualified to perform; current period of certification; signature of employer's designated representative; and, annual visual acuity, color vision examination, and periodic recertification.

d. Data Review and Evaluation, Unit 2 (73755)

(1) Records of completed ISI nondestructive examinations for 12 UT, 31 PT, 10 MT, and 28 VT examinations were selected and reviewed to ascertain whether: the method(s), 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, couplants) were designated.

(2) The inspectors reviewed the eddy current data analysis results and a sample of associated completed records for over 40 SG tubes from Steam Generators B and D. The reviews were compared

with the applicable procedures and the ASME B&PV Code in the following areas: the multichannel eddy current examination equipment has been identified; material permeability has been recorded; method of examination has been recorded; and, results are consistent with acceptance criteria.

All of the reviewed examination reports appeared to contain the required examination information including disposition of indications, if any.

A random sample of current examination results were compared with historical examination results. No major discrepancies were noted during the comparisons.

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

3. Maintenance Unit 2 (62700)

a. This work effort was a performance oriented inspection conducted to observe preventive and corrective maintenance activities on selected safety related valves that was in-progress at the time of this visit. Towards this end, the inspectors concentrated on monitoring these activities with the emphasis on the licensee's technical expertise as evidenced by work preparation, evaluation of the problem, communication between craft and the various levels of supervision, engineering involvement, problem resolution, and job completion. Valves selected for this work effort were as follows:

1) Swing Check Valve 2NI-101

2) Relief Valve 2NV-14

3) Code Safety Relief Valve 2NC-01

4) Code Safety Relief Valve 2NC-02

5) Safety Relief Valve 2NI-161

Valve 2NI-101: This valve was disassembled and inspected for wear degradation under the licensee's preventive maintenance program for check valves. The valve was identified as item number 5B229 and classified as an 8 inch 150 pound Swing Check Valve, ASME Code Section III Class B. The valve was manufactured by Walworth. The valve appears on flow diagram #CN-2562-1.2, Isometric 1CN-2492-N1020 and is located in the line from the refueling water storage tank to the suction side, common to the safety injection pumps. At the time of this inspection, the valve had been disassembled and the internals had been transported to the hot machine shop for inspection. The flapper arm was disconnected from the disc, both parts were visually inspected and critical dimensions were taken and recorded. The threads on the disc stud were chased with the use of a die nut and

subsequently inspected for possible defects. Within these areas, the inspectors noted that although the procedure identifies the parts to be inspected and where and how dimensions were to be taken, it did not provide acceptance criteria for these dimensions. Instead, the as found dimensions are compared for acceptability by the engineers with those of replacement parts in storage. The inspectors found this approach to be somewhat inefficient and unusual and suggested to the engineer that a revision in the procedure to incorporate acceptance criteria should be considered. The engineer agreed with this recommendation and indicated that he would look further into this matter during the current procedure revision. Maintenance work on this valve was performed on Work Request WR #001832MES.

Valve 2NI-161: This valve was removed from service for corrective maintenance when it was found to be leaking from the vent plug hole in the bonnet. The valve was identified as item number CSR-128 and classified as an 1-1/2 inch, 900 pound safety relief, ASME Code Class B. The valve was manufactured by Dresser Industries Inc. This valve appears on Isometric CN-2492-NI038 and is located on the crossover line on the discharge side of the safety injection pump. At the time of this inspection, the valve had been removed from service and was being disassembled in the hot machine shop. Following disassembly, a visual inspection confirmed a pitting condition existed in the valve body/base on the sealing surface below the guide gasket. The licensee discussed the problem with the valve manufacturer, who authorized the removal of 1/16" material by machining. After removing 0.010" of material, there appeared a discontinuous string of porosity type indications measuring about one inch long. An additional cut of 0.045" failed to remove this defect. At the close of the inspection the licensee, in consultation with the manufacturer, was planning to try salvaging the valve by grinding out the defect, examining the area to verify material integrity followed by a weld repair. Maintenance work on this valve was performed on work request WR #3689NSM.

Valve 2NC-01: This valve was removed from service, packaged and sent to Wylie Laboratories for leak testing and cold pressure setting verification to assure compliance with Technical Specifications 4.4.2.1 and 4.4.2.2 requirements. The valve was one of the three-inch pressurizer safety reliefs and was identified as item number PRS-001 ASME Code Section III Class A. Details on the valve were covered by specification CNS-1205.09-00-001 and drawings CN-2NC-112 Revision 5 and CN-2NC-113 Revision 0. A spare valve, S/N BS02867, was used as replacement. The work was performed on Work Request WR #004499SWR and maintenance procedure MP/0/A/7650/01, Flange Gasket Removal and Replacement. A separate attachment to this procedure covered removal of the outlet and inlet flanges. The inspectors reviewed the maintenance history of this valve to ascertain whether anything other than ordinary maintenance had been performed on this valve. In that the record showed nothing unusual

it was concluded that the valve has been performing its intended task satisfactorily.

Valve 2NC-02: This valve is a pressurizer code safety in loop #2 and was removed to establish a vent path for drain and fill of the primary system during this outage. The work was performed on Work Request #004472SWR and maintenance procedure MP/0/A/7650/01. The inspectors reviewed the maintenance history of this valve and ascertained that nothing other than ordinary maintenance had been performed. Therefore, it was concluded that the valve has been performing it's intended task satisfactorily.

Valve 2NV-14: This valve was removed from service for corrective maintenance to investigate the reason for leaking-by to the pressurizer relief tank. The valve was identified as item CSR-31 and classified as a three (3) inch flanged, 300 pound, ASME Code Class B. The valve was manufactured by Dresser Industries Inc., and had been installed in the letdown relief line of Unit 2, as shown in drawing number CN-2491-NV056 Revision 14. At the time of this inspection, the repair work had been completed and the valve had been set on the bench to check the 618 pounds lift pressure set point. The inspectors witnessed the test and verified that the valve lifted at the above set point within the allowed $\pm$ 3% margin. The test was repeated successfully three times as required by procedure. This activity was performed under Work Request #0453320PS. Following completion of these tests, the subject valve was installed on the seal table of Unit 2.

Following is a list of maintenance procedures, common to the activities described above, which were reviewed for technical content.

MP/0/A/7600/12	Walworth and Aloyco Bolted Cover Swing Check Valves Corrective Maintenance
MP/0/A/7650/37	Relief Valve Pressure Testing and Adjustment
MP/0/A/7600/33	Wolworth and Aloyco Bolted Cover Swing Check Valves Corrective Maintenance. Enclosure 13.1, Dresser Relief Valve Flange T[illegible]e Corrective Maintenance
MP/0/A/7650/88	System Pressure Testing of ASME and ANSI Piping Systems and ASME Section XI Suitability Evaluation
MP/0/A/7650/01	Flange Gasket Removal and Replacement

The following instruments were used for measuring purposes on the subject valves.

Serial Number	Type
18361	Depth Micrometer
18420	Inside Micrometer
18686	Dial Indicator

Calibration stickers showed the instruments were controlled and within the period of calibration.

b. Welding Unit 2 (55050)

Discussions with cognizant licensee personnel disclosed that a portion of carbon steel pipe connecting the Heater Bleed System to the Turbine Crossover System was being removed because of erosion corrosion problems and was being replaced with piping made of stainless steel material. This activity was controlled under work request 13137NSM and maintenance procedure MP/0/A/7650/94, Controlling Procedure for Mechanical Piping Nuclear Station Modification. Applicable Drawings included CN-2490-HC003 Revision 7 and CN-2594-2.0 Revision 6. The replacement material was 18 inch diameter stainless steel A312 type TP304 electric fusion welded pipe and elbows of standard wall schedule thickness 0.375 inches. The material was procured under Catawba's specification CNS-1206.00-02-1002 Appendix 23 dated 5/28/82.

Applicable field weld data sheets L-232 Revision 11 and L-231 Revision 18 were reviewed for technical content and accuracy. This system was classified as Duke, Class G which indicates that it is not safety related. No welding was in progress at the time of this inspection although the old pipe had been removed and the replacement spools were temporarily stored in the work area. Following weld completion the subject system including the new welds will be leak tested to verify integrity.

Other documents reviewed included Station Problem Report CNPR-04579 and Exempt Change CE-2772 dated 4/18/90. The latter document provided an evaluation to show that a 10CFR 50.59 evaluation was not required for the subject modification.

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

4. Exit Interview

The inspection scope and results were summarized on June 29, 1990, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

5. Acronyms and Initialisms

AC - Alternating Current
ASME - American Society of Mechanical Engineers
B&PV - Boiler and Pressure Vessel
B&W - Babcock and Wilcox
CA - Change Authorization
DAC - Distance Amplitude Curve
DPC - Duke Power Company
EC - Eddy Current
ISI - Inservice Inspection
MT - Magnetic Particle
MHz - Megahertz
NDE - Nondestructive Examination
No. - Number
NRC - Nuclear Regulatory Commission
OD - Outside Diameter
PT - Liquid Penetrant
QA - Quality Assurance
R - Revision
RT - Radiographic Test
SG - Steam Generator
S/N - Serial Number
UT - Ultrasonic
VT - Visual