

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

Report Nos.: 50-369/90-02 and 50-370/90-02

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

Docket Nos.: 50-369 and 50-370

License Nos.: NPF-9 and NPF-17

2-7-90 Date Signed

Signed

Date

Facility Name: McGuire 1 and 2

Inspection Conducted: January 29 - February 2, 1990

Inspectors: ewsome Approved by: J. J. Blake, Chief

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). The inspection included a review of the ISI program and the Unit 1 inspection 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 material certification documentation; and, a review of completed NDE examination data. Also, previously opened NRC items were addressed and the licensee's response to Temporary Instruction (TI) 2500/27 was reviewed.

Results

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

All areas inspected indicated adequate control and implementation of the inservice inspection program.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

*N. Atherton, Compliance, Production Specialist

J. Baumann, Supervisor, Eddy Current (EC) Examination

*G. Cayton, Manager, Safety Review Group

*J. Day, Compliance, Associate Engineer

*W. Goodman, Quality Assurance (QA) Technical Support Manager

M. Hatley, Supervising Engineer, Maintenance Engineering Services

L. Keith, QA, Inservice Inspection (ISI)

*R. Lopez-Ibanez, Associate Engineer, Planning and Materials

*T. Mathews, Manager, Design Engineering Site Office

*B. Travis, Plant Superintendent, Operations

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

NRC Resident Inspectors

K. Van Doorn, Senior Resident Inspector*T. Cooper, Resident Inspector

*Attended exit interview

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

2. Inservice Inspection

The inspector reviewed documents, records and examination 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 (ASNic B&PV) Code, Section XI, 1980 edition with addenda through Winter 1980. Duke Power Company (DPC) Nondestructive Examination (NDE) personnel are performing the liquid penetrant (PT) and visual (VT) examinations, while Babcock and Wilcox (B&W) personnel, assisted by DPC personnel, are conducting the ultrasonic (UT) examinations. Steam gener.tor (SG) tubing eddy current (EC) examination data collection was being accomplished by both DPC personnel and B&W personnel with B&W personnel performing the primary data analysis and DPC personnel performing a secondary data evaluation.

a. ISI Program Review, Units 1 and 2 (73051)

The inspector 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 and plans 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; audits including procedures, frequency, and qualification of personnel; general Quality Assurance requirements including examination reports, deviations from previously established program, material certifications, and identification of components to be covered; work and inspection procedures; control of processes including suitably controlled work conditions, special methods, and use of qualified personnel; corrective action; document control; control of examination equipment; quality records including documentation of indications and NDE findings, review of documentation, provisions to assure legibility and retrievability, and corrective action; scope of the inspection including description of areas to be examined, examination category, method of inspection, extent of examinations, and justification for any exception; definition of inspection interval and extent of examination; qualification of NDE personnel; and, controls of generation, approval, custody, storage and maintenance of NDE records.

 Inservice Inspection Plan McGuire Nuclear Station Unit 1, Refueling Outage #6

| • | QCL-5 (R10) | Control Of Preservice And Inservice Inspection Activities |
|---|-------------|--|
| - | QCB-1 (R28) | Control Of Measuring And Test Equipment And Calibration Standards |
| - | QA-101 (R7) | Quality Assurance Records Storage Area (General Office-Corporate Vault) |
| - | QA-513 (R7) | Control of Inservice Inspection Plans and Reports |

- b. Review of NDE Procedures, Units 1 and 2 (73052)
 - (1) The inspector 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-117 (R12) Ultrasonic Examination of Reactor Coolant Pump Motor Flywheel Forging
- NDE-35 (R12) Liquid Penetrant Examination
- QCL-14 (R9) ISI Visual Examination, VT-3 and VT-4
 - ISI-424 (R14) Multifrequency Eddy Current Examination Of .750" OD x .044" Wall RSG Tubing For ASME Exam And Tube Wear at Support Plates
 - NDE-703 (R3) Evaluation Of Eddy Current Data For Steam Generator Tubing

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

- (2) The inspector reviewed the Ultrasonic (UT) procedure to ascertain whether it 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 inspector reviewed the liquid penetrant (PT) procedure to ascertain whether it 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 6, and other licensee 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 inspector reviewed the Visual (VT) examination procedure to determine whether it contained sufficient instructions to assure that the following parameters were specified and controlled

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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.

(5) The inspector reviewed the Eddy Current (EC) 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 1 (73753)

The inspector observed in-process examination activities, conducted independent verification examinations, reviewed certification records of NDE materials, and reviewed NDE personnel qualifications for personnel that had been utilized during the required ISI examinations during this outage. The observations, independent examination verifications, and reviews conducted by the inspector are documented below.

(1) The inspector observed calibration activities and portions of the in-process UT examinations being conducted on the Loop C Main Coolant Pump Flywheel. The observation was 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. This examination appeared to be adequate.

The inspector reviewed the certification documentation for Ultrasonic couplant batch 8981.

(2) The inspector observed the in-process FT examinations of 8 Main Coolant Loop pipe welds located at the outlet and inlet nozzles of Steam Generators A and D. The observations were compared with the applicable procedure and the ASME B&PV Code in the following areas: specified method; penetrant materials identified; 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; examination technique; evaluation technique; and, reporting of examination results.

The NRC inspector independently evaluated portions of 4 of the above welds following the PT examiners evaluation of the welds but prior to the developer being removed from the weld surfaces.

The above observations and independent evaluations were conducted in order to determine if the examination technique and evaluations conducted 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 observations and evaluations conducted by the NRC inspector indicated that the proper examination technique and evaluation was made by the PT examiners and that the examination results were being reported as required.

The NRC 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 Cleaner/Remover | 78E084 87H067 | | |
| Developer | 87F047 | | |

(3) The inspector observed 10 in-process visual examinations. These examinations included pipe supports, pipe foundations, and snubber connections in several different piping systems. These observations were made to: determine whether the applicable drawing, instructions or travelers clearly specify the procedure to be used and that a copy of the procedure is available in the area where the work is being performed; identify for record review the personnel performing the examination and ascertain whether they are qualified to perform the assigned task; determine whether the required tools and examination aids (as specified in the examination procedure) are available at the work location; determine whether the specific areas, locations and extent of examination are clearly defined; determine whether the test attributes are as specified in the applicable test procedure; ascertain whether the defects are evaluated in accordance with the procedure requirements, correct acceptance

criteria is used, and the inspection results are reported in a prescribed manner.

The NRC inspector conducted independent examinations on 5 of the items previously observed being examined by DPC personnel. These examinations were conducted in order to evaluate the adequacy of the examination procedure being used by the licensee and to assess the validity of the information being reported by the examiners.

These re-examinations generally agreed with the results reported by the DPC visual examiner.

(5) Steam Generator Tubing Eddy Current Examination

The inspector observed the EC activities indicated below. The observations were compared with the applicable procedures and the Code in the following areas: method for maximum sensitive 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) In-process tube data acquisition, including calibration confirmation and tube location verifications, was observed for 21 SG tubes located in SGs A, C, and D.
- (b) In-process eddy current data evaluation, including calibration confirmation, was observed for 42 SG tubes. Primary data analysis, being conducted by B&W, was observed for 14 SG tubes. Secondary data analysis, being conducted by DPC, was observed for 22 SG tubes.
- (c) In-process eddy current data evaluation resolution of differences in analysis for reported indications noted by the primary and secondary analysts was observed for 6 steam generator D tubes.

The NRC inspector co-evaluated 14 of the SG tubes during the observations of the primary and secondary analysts evaluations, 3 in SG-A, 5 in SG-C, and 6 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 inspector agreed well with the reported results.

Certification records for EC calibration standard Z-5333 were reviewed for material type, correct fabrication, and artificial flaw location and size.

(6) The inspector reviewed personnel qualification documentation for 2 UT examiners, 3 PT examiners, 2 VT examiners, 2 B&W EC data collection personnel, 4 B&W EC data analysts, and 3 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; basis used for certification; and, annual visual acuity, color vision examination, and periodic recertification.

All personnel qualification documentation reviewed indicated that the examiners were qualified for the examinations being conducted.

- d. Data Review and Evaluation, Unit 1 (73755)
 - (1) Records of completed ISI nondestructive examinations for 2 UT, and 13 VT examinations were selected and reviewed to ascertain whether: the methods(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 inspector reviewed the eddy current data analysis results and a sample of associated completed records for 40 SG tubes, 20 tubes from SG-C and 20 tubes from SG-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 examination reports reviewed appeared to contain the required examination information including disposition of indications, if any.

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

- Licensee Action on Previously Opened Items
 - a. (Closed) Violation 50-369, 370/88-32-01, Failure To Submit PSI Relief Request

This matter revealed that the licensee had determined, during preservice inspection (PSI), that the volumetric examination of the

lower head to shell weld on the accumulator tanks was impractical to examine. The licensee had not submitted a request for relief for the required inservice inspection examinations to the Commission as required by regulatory requirements.

The licensee has reviewed PSI plans and reports for Units 1 and 2 to determine if any other similar situations existed. None were found.

The licensee has now submitted a request for relief from the ASME Code Section XI requirements pertaining to both Units 1 and 2 Safety Injection Accumulator Tanks, Relief Request No. 88-08. In the relief request, the licensee proposed to perform an additional volumetric examination of an unrequired Shell to Upper Head weld in place of the required Lower Head to Shell weld.

The NRC inspector has reviewed Relief Request 88-08. In addition, volumetric examination reports for the Upper Head to Shell welds of the Unit 2, accumulator tanks A and D and the Unit 1, accumulator tanks A and B were reviewed to confirm that the alternative testing of the accumulator tanks had been accomplished as proposed in the relief request.

Based on the NRC inspectors review of the above documentation and the licensee's completion of the alternative examinations, this item is considered closed.

b. (Closed) Inspector Followup Item (IFI) 50-369, 370/88-32-03, Section XI Suitability Evaluation

This item identified a deficiency in the licensee's formal document program for the evaluation of the suitability of replacement parts as required by ASME B&PV Code Section XI paragraph IWA-7220 for "Replacement-In-Kind" items viewed by maintenance to be "nonrepetitive" "normal wear and tear." In addition, there was no documented guidance for the determination of "nonrepetitive" or "normal wear and tear" on component parts.

The licensee has issued procedure MP/0/A/7700/45, "Controlling Procedure For System Leakage Testing Of ASME Mechanical Connections And/Or ASME Section XI Suitability Evaluation." In addition, repair and replacement are defined in Section E of the Duke Power Company ASME Section XI Manual. These documents formalize the document program for evaluation of the suitability of replacement parts and establishes guidance for the determination of "nonrepetitive" or "normal wear and tear" on component parts.

Based on the NRC inspectors review of procedure MP/O/A/7700/45 and Section E Rev. 0 of the Duke Power Company ASME Section XI Manual, this matter is considered closed.

c. (Closed) IFI 50-369, 370/89-15-04, Dwg Errors

This item identified several minor drawing errors which appear to have stemmed from errors made at the time of plant construction.

The NRC inspector has reviewed all drawings previously identified in order to verify that these errors were corrected. Based on these reviews, this item is considered closed.

 d. (Closed) IFI 50-370/89-22-01, Pipe Support Discrepancies Found During ISI Inspection

This item identified minor pipe support discrepancies which the licensee committed to repair. The licensee initiated several work requests and Problem Investigation Reports (PIR) in order to accomplish the repair of these supports. In addition, the licensee has issued revision No. 3 to procedure MP/0/A/7650/62 to clarify inspection criteria and indicated that a change to upper tier specifications is being accomplished which will more clearly indicate the type of hanger required at specific locations.

The NRC inspector reviewed 5 work requests and 1 PIR relative to the repair of these supports. Also, revision 3 to procedure MP/0/A/7650/62 was reviewed by the inspector.

Based on the reviews of the above documents and discussions with licensee personnel, this item is considered closed.

e. (Closed) TI 2500/27, Inspection Requirements For NRC Compliance Bulletin 87-02, "Fastener Testing To Determine Conformance With Applicable Material Specifications"

The objective of this TI was to verify that licensees ensure that fasteners used in licensed nuclear plants meet the requisite specifications and that operability of safety-related components is not affected.

The licensee has completed all testing of fasteners as stipulated in Bulletin 87-02. As a result of these tests several Non-QA, non-safety related fasteners were identified as being deficient. This TI specifically identifies 5 samples, screws MNS19/20/21 and nuts MNS32/33 as warranting follow-up action.

The licensee has determined that improperly stored fasteners (located in wrong storage bins designated for grade or type) and inadequate purchase order descriptions of specific types of fasteners as being the root causes of the majority of the discrepancies identified as a result of fastener testing. In addition, there was no formal receipt inspection program for non-safety related fasteners and traceability of non-safety related fasteners was not required. During the process of determining the cause of the deficient fasteners, the licensee determined that an acute intermixing of non-safety related fasteners in various storage bins had taken place over a period of several years and decided to delete all non-safety related fasteners from inventory and purchase replacement fasteners. In addition, the licensee instituted a receipt inspection program for non-safety related fasteners and has established increased control of fastener storage.

The licensee has now revised their fastener purchase descriptions to reflect correct material specification and grade. All non-safety related fasteners were deleted from inventory, at considerable expense, and all replacement fasteners are subject to the current receipt inspection program for non-safety related fasteners.

Based on the licensee's corrective actions to date and their on-going receipt inspection program for both safety related and non-safety related fasteners, this TI is considered closed.

4. Exit Interview

The inspection scope and results were summarized on February 2, 1990, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. Dissenting comments were not received from the licensee.

5. Acronyms and Initialisms

| ASME | | American Society of Mechanical | Engineers |
|------|---|--------------------------------|-----------|
| B&PV | | Boiler and Pressure Vessel | |
| B&W | | Babcock and Wilcox | |
| DAC | | Distance Amplitude Curve | |
| DPC | | Duke Power Company | |
| EC | | Eddy Current | |
| ISI | | Inservice Inspection | |
| NDE | | Nondestructive Examination | |
| NRC | | Nuclear Regulatory Commission | |
| PIR | | Problem Investigation Report | |
| PSI | | Preservice Inspection | |
| PT | | Liquid penetrant | |
| QA | | Quality Assurance | |
| R | - | Revision | |
| RSG | - | Recirculating Steam Generator | |
| SG | | Steam Generator | |
| TI | | Temporary Instruction | |
| UT | | Ultrasonic | |
| VT | | Visual | |