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

Report Nos.: 50-369/86-14 and 50-370/86-14

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

Facility Name: McGuire 1 and 2

Inspection Conducted: June 9-13, 1986

Inspector: N. Economos 7/16/86
N. Economos Date Signed

Approved by: J. J. Blake 7/17/86
J. J. Blake, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection was conducted on site in the areas of inservice inspection (ISI), work observation, evaluation and review of records, Eddy Current (EC) examination results of steam generators (SG) tubes; nuclear service water flow element replacement on pump 1-B; shot peening of S&G tubes; review of snubber functional test records.

Results: One violation was identified - violation 369/86-14-01, Instruments and Shot Peening Material Used to Qualify SG Tube Shot Peening Procedure and Personnel Not Identified, paragraph 5.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

G. W. Grier, Quality Assurance (QA) Manager, Corporate
*T. McConnel, Station Manager, McGuire Nuclear Staion (MNS)
*B. Hamilton, Superintendent of Technical Service - MNS
*D. J. Rains, Superintendent of Maintenance - MNS
R. P. Ruth, Senior QA Engineer - MNS
*A. F. Batts, QA Technical Support Supervisor - MNS
*N. McCraw, Compliance Engineer - MNS
*M. Carpenter, QA Vendor Inspector
D. Mayes, QA Engineer Corporate
T. Troutman, Inservice Inspector (ISI) Coordinator
G. Baker, Level II Eddy Current Examiner
W. E. Smith, Engineering Specialist, Snubbers
J. R. Pring, Test Supervisor, Technical Services Performance

Other Organization

Babcock & Wilcox, Special Products and Integrated Services (SPIF)
B. Street, Coordinator
S. Hellman, Manager, Steam Generator Services
J. Gutzwiller, Engineer
W. R. Speight, QC Level II Lead Mechanical Inspector
B. Stallings, Shift Supervisor
J. Helmey, Steam Generator Engineer
R. Patterson, ISI Coordinator

NRC Resident Inspector

W. T. Orders, Senior Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on June 13, 1986, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

(Open) Violation 369/86-14-01: Instruments and Material used for the Qualification of Special Process Shot Peening Procedure and Personnel Not Identified, paragraph 5.

(Open) Inspector Followup Item 369, 370/86-14-02: Designation of Effective Code for the Nuclear Service Water System, paragraph 6.

(Open) Inspector Followup Item 369, 370/86-14-03: Verification of Snubber Tests by Qualified Personnel, paragraph 7.

The licensee identified as proprietary some of the materials provided to and reviewed by the inspector during this inspection, however, details from this material is not included in this report.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Steam Generator Tube Shot Peening - Unit 1 (62703B)

On May 27, 1986, the licensee met with NRC staff in Bethesda, Maryland to discuss plans for shot peening the steam generator (SG) tubes of McGuire Unit 1, during the current refueling outage. The licensee stated that shot peening was a remedial preventive measure against primary water stress corrosion cracking (PWSCC) within the tubesheet region of the SGs identified at both units.

Apparently certain parameters which influence PWSCC rates include material, residual tensile stresses and aggressive environment, e.g., operating temperature. As used in this application shot peening, under controlled parameters, induces compressive stresses over a thin layer of material on the internal diameter (ID), surface of the SG tubes and thereby helps to improve the material's resistance to PWSCC in the area of interest. Through discussions with cognizant personnel the inspector ascertained that the process (shot peening) had been designated as a special process for safety-related work with commensurate administrative controls and quality assurance requirements. Within these areas the inspector reviewed for content, the process specification, the shot peening procedure, the formal process qualification records, personnel performance qualification records, equipment calibration and certification records. Also, the inspector observed the operation by video in the control center located in a trailer outside the containment building. At the time, the contractor was shot peening steam generator "C" of Unit 1.

As a result of discussions, document review and observations, the inspector noted that the process specification No. 51-1159413-00, identified certain parameters and/or items as essential variables including, but not limited to shot peening material used, SG tube internal diameter, test strip material and the arc height deflection on the test strip material measured for calibration purposes. Within these areas the review disclosed that although the specification identified a specific type of shot material together with

manufacturing requirements and hardness levels, the qualification document did not identify the material, e.g. heat/lot number, therefore it could not be ascertained whether the material used in the process qualification met specification requirements and in fact was the same as, or similar to, that used in the field application. In addition, the inspector found that the qualification record did not identify the individuals who performed the qualification and certain instruments used in the qualification of the shot peening procedure. Those instruments included pressure gages, dial indicators and weight scale. The inspector, discussed this finding first with B&W's site supervision and the accountable engineer in charge of the qualification who provided copies of calibration certificates for instruments that were in use and for spares on hand. The engineer stated that although the qualification record did not identify the instruments and/or specific material used in the qualification, the instruments used had been calibrated as required by the B&W, QA program and that it was an oversight which resulted in this problem. Additional discussions were held with the licensee on this matter both prior to and after the termination of this inspection. In all instances the inspector explained to the licensee that although the instruments and material used in the qualification of the process could have been properly calibrated and/or certified there was nothing on the process qualification record to link the instruments/material used in the process qualification with the calibration records provided. The inspector stated that this failure to provide objective evidence to verify that special processes affecting the quality of nuclear safety-related structures were closely controlled was in violation of 10 CFR 50, Appendix B, Criterion IX as implemented by Duke 2-A Section 17.2.9. This violation was identified as 369/86-14-01 "Instruments-Materials Used for the Qualification of Special Process Shot Peening Procedure and Personnel Not Identified.

6. Nuclear Service Water Flow Element Installation Units 1 and 2 (62703B)

a. This work effort was a followup to that documented in Report 50-369, 370/86-13. At the time of this inspection, the licensee was installing the last of the four flow element subassemblies, two per unit. The subassembly under discussion was for train "B" and was identified as RN751. It was made out of stainless steel pipe 17.375"ID, with stainless steel flange connections welded on each end. The orifice was designed per ASME Manual on Fluid Meters, 6th Edition and calibrated to 1/2% of full scale flow of approximately 20,000 gal./min. To make room for this subassembly the licensee removed a section from the existing 18"ϕ carbon steel pipe and welded flange connections to facilitate installation of the subassembly. The inspector reviewed the field fabrication records/weld ticket at the work area and ascertained that the designated code was ANSI B31.7 (69), class 3, QA Condition 1. The flange to pipe fillet welds appeared on drawing MC-2418-14 and were identified as 1RN 751-5 and -6. At the time of this inspection, the

welds were being fabricated and the inspector checked them for compliance with code requirements. In addition, the inspector reviewed the applicable weld procedure qualification record, (PQR) L-103, performance qualification records for welders R.E.W. and R.T.M, and the quality records for the following welding consumables.

Type	Size	Heat/Lot
7018	1/8"ϕ	01-3k-803R
7018	1/8"ϕ	11684
7018	3/32"ϕ	4E418B01
7018	3/32"ϕ	422W7041

The qualification/certification records for QC welding inspector J.Y.R. were also reviewed. Within those areas, the inspector was informed that a nonconformance had been written on these welds for lack of preheat as specified on the Field Weld Data Sheet. Through discussions with cognizant site personnel and a review of the applicable documents the inspector noted an inconsistency concerning the effective code for the Nuclear Service water system. This was as follows:

- QA/QC field weld records showed the effective code as ANSI B31.7, 1969 Edition

- Pipe Specification MCS-1206.00-02-0002, Rev. 95, 3/28/86, Paragraph 4.5.5 states in part that the Nuclear Service Water System conforms to ANSI B31.7(69) Class III. Repairs, replacements and modifications performed under ASME XI, may be made in accordance with ASME III Subsection ND, 1971 Edition with W'71 Addenda.

- Design Engineering Memorandum entitled: McGuire Nuclear Station RN System - Change Effective Code, 2/16/86 states in part that Specification MCS-1206.00-02-002 will be revised to show ASME III, Subsection ND, 1971 Edition thru W'71 Addenda as the effective code for future work on the RN System.

  The inspector stated that the use of the word "may" in Revision 95 of the subject specification above, does not reflect design engineering's definitive position on the adoption of ASME Section III (71W71), as the effective code for this line. Moreover, the inspector stated that the word "may" creates ambiguity which results in confusion for everyone involved in the repair, replacement, modification and inspection of this system. The licensee agreed to review the related documents and take appropriate action to rectify the situation. This was identified as Inspector Followup Item 369, 370/86-14-02 Designation of Effective Code for the Nuclear Service Water System. In a

followup telephone conversation with cognizant site QA/QC personnel the inspector ascertained that the question, regarding the application of preheat prior to making the pipe to flange fillet weld, was being resolved by clarifying that the base metal criterion used to determine the need for preheat was the thickness of the pipe instead of the flange. In this case, the thickness of the base material (pipe) was 0.525 inches, which did not require preheat. Also, it is the inspector's understanding that action has been implemented to resolve the effective code issue.

b. Nuclear Service Water Pumps - Reference Head Curves Units 1 and 2

ASME Code Section XI, (80, W81) Subsection IWP-3100 requires that safety-related pumps first be tested to establish reference values, which are to be used for comparison during subsequent inservice testing. The tests, and the subsequent reference head curves for pumps 1-A of Unit 1 and 2A, 2B of Unit 2 were conducted and the curves drawn per procedure PT/1/A/4403/05 "RN System Baseline Performance Test." The inspector discussed the test results and reviewed the reference curves drawn for the above pumps with the accountable engineer who indicated that they (curves) were well within design requirements.

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

7. Functional Testing of Snubbers, Units 1 and 2 (73753B)

Functional testing of safety-related snubbers is conducted under McGuire Nuclear Station Technical Specification (TS) Section 3/4.7.8 which requires all snubbers listed in Tables 3.7-4a and -4b to be operable. Section 4.7.8 describes surveillance requirements including functional testing, sample plan selection, acceptance criteria and corrective actions. The following procedures, which are used to implement the above requirements, were reviewed for content:

MP/0/A/7650/54 Snubber Test Bench Calibration 4/17/86

MP/0/A/7700/01 Functional Testing of Mechanical Snubbers

MP/0/A/7650/50 Operability Testing of Hydraulic Snubbers

Work request number WR-048892 was used to perform the required checks on hydraulic and mechanical snubbers. Snubber selection is performed by computer. The snubbers picked for testing are a random sample representing all types and sizes of snubbers. Test records selected for review were from the recently completed Unit 2 outage which commenced in April of 1986. The record review and evaluation was for the following snubbers.

2MCA-CF-208A&B
2MCA-S-NI-150-09-NA&B
2MCA-CF-H204A&B
2MCA-SM-232
2MCA-S-KC-512-01-0
2MCA-RN-3022A&B

The records were reviewed to ascertain whether:

a. The test equipment and personnel were properly qualified or certified and equipment were periodically calibrated as prescribed.

b. Test acceptance criteria were established and applied.

c. Instructions and procedures were being followed.

d. Deficiencies were identified and corrective actions taken as prescribed.

e. The number of units to be tested during the performance of the test plan complies with the surveillance program.

f. Test data were recorded and results documented and reviewed as prescribed.

Within these areas, the inspector noted the following:

Section 3, Personnel Requirements, of MP/0/A/7700/01 states that testing shall be performed by qualified personnel. However, the test records reviewed had no provision for the signature of the qualified individual who performed the test and no signature of such an individual appeared on these records. Also, the inspector noted that procedure MP/0/A/7650/50 had no requirements for personnel qualifications.

In discussions with cognizant licensee personnel, the inspector acknowledged the fact that people assigned the task of supervising and/or conducting the tests appeared to be fully qualified. But stated that QA records of test results are needed to provide objective evidence that the tests complied with procedural requirements, which include but are not limited to personnel qualifications, equipment calibration, etc. The licensee agreed to review and revise the procedure/records to provide this information. This matter was identified as Inspector Followup Item 369, 370/86-14-03 Verification of Snubber Tests by Qualified Personnel.

8. Inservice Inspection (ISI) - Observation of Work and Work Activities (73753B) Unit 1

The inspector observed ISI work and work activities to determine whether the inservice inspection of pressure retaining components was performed in accordance with Technical Specifications, the applicable ASME Code requirements. The applicable code for this activity was ASME XI (80,W81).

a. The inspector reviewed the licensee's ISI plan for the current outage to determine the work scope for the present outage and to ensure that components selection, number of items to be inspected, methods of examination, and extent of examination were in accordance with the applicable edition of the Code and had been properly documented and approved.

b. Personnel qualification/certification records for four Babcock & Wilcox Level II examiners associated with the inspections of paragraph c. below were reviewed to determine whether the qualification and certification records properly reflect the following:

- Employer's name
- Person certified
- Activity qualified to perform
- Level of certification
- Effective period of certification
- Signature of individual certifying title and level
- Basis used for certification, such as the required number of training hours, etc. for the examination method specified
- Annual visual acuity, color vision examination, and periodic recertification

c. The inspector observed the ultrasonic examinations including calibration activities for the following:

Weld/Component Identification	Item Number	Component Description
1SGD-06B-07	C01.010.005	Steam Generator 1D Upper Shell to Head

The inspections were compared with applicable procedures in the following areas:

(1) Availability of and compliance with approved NDE procedure
(2) Use of knowledgeable NDE personnel
(3) Use of NDE personnel qualified to the proper level
(4) Recording of inspection results
(5) Type of apparatus used

(6) Extent of coverage of weldment
(7) Calibration requirements
(8) Search units
(9) Beam angles
(10) DAC curves
(11) Reference level for monitoring discontinuities
(12) Method of demonstrating penetration
(13) Limits of evaluating and recording indications
(14) Recording significant indications
(15) Acceptance limits

Certification records for material and equipment used in the above examinations were also reviewed by the inspector.

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

9. Inservice Inspection Data Review and Evaluation (73755B) Unit 1

The inspector reviewed nondestructive examination (NDE) records for the current inspection period to ascertain whether the extent and frequency of examinations were consistent with the Technical Specification and the NRC accepted ISI program and whether they met the minimum examination requirements specified in the applicable code.

a. NDE records for the following pressure retaining piping system welds were selected by the inspector:

Weld/Component Identification	Item Number	Results
Flywheel (inplace)	E01.001.004	No Recordable Indications (NRI)
Welded Attachments	C03.040.012	NRI
	C03.004.001	NRI
Safe End on top of Pzr. 1PZr-W4CSE	B05.020.012	NRI
1PZR-W4BSE	B05.020.010	NRI
Rubbing Pad to 42"ϕ		
Guard Pipe -1MCA-SM-148	C03.040.010	NRI
1" Lug to 42" Guard Pipe	C03.040.011	NRI
Steam Generator - 1D Upper Shell to head weld 1SGD-06B-07	C01.010.005	Three recordable indications, ER-400,-401, -402 documented and evaluated as required by Level III

The records for the above welds were reviewed to determine whether they contained or provided reference to the following documents:

- Examination results and data sheets
- Examination equipment data
- Calibration data sheets
- Examination evaluation data
- Records on extent of examination
- Records of deviation from program and procedures including justification of deviation, if applicable
- Records on disposition of findings
- Re-examination data after repair work, if applicable
- Identification of NDE material such as penetrant, penetrant cleaner, couplant, films, tapes, etc. as applicable,

and to ascertain whether the following requirements were met as applicable,

- The method, extent, and technique of examination complied with the licensee's ISI program and applicable NDE procedure.

- The examination data within the acceptance criteria as outlined in the applicable NDE procedure and applicable Code requirements.

- The recording, evaluating, and dispositioning of findings were in compliance with the applicable NDE procedure and Code requirements.

- Inservice NDE results were compared with the recorded results of prior Section XI examinations.

- The method used for NDE was sufficient to determine the full extent of indication or acceptance.

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

b. Eddy Current (EC) Examination of Steam Generator (SG) Tubes, Unit 1

ISI activities during this refueling outage included the eddy current (EC) examination of tubes in the four SGs A-D. Data acquisition and analysis was being performed by B&W. The approved B&W procedure ISI-423 Rev. 8 and related references such as, Regulatory Guide 1.83, July 1975 and Code Case N-401 were the governing documents.

The examination was conducted with a multi-frequency technique, utilizing the computerized MIZ-18 EC Examination System to analyze tube integrity. Discussions with the licensee disclosed the following:

Steam Generator	Tube Sample Inspected	Inspection Results
A	6% sample - 3% random and 3% special interest and preheater area	clear
B	6% sample - 3% random and 3% special interest and preheater area	clear
C	Same as A&B above with an additional 6% because of three (3) pluggers	Three (3) tubes plugged
D	6% sample, identified four (4) plugable tubes which resulted in inspection of 100% of SG tubes	135 tubes plugged

Discussions with licensee personnel disclosed that the tube defects showed no bias towards any specific location and the degree of degradation varied in magnitude between 40% and 100% of tube wall thickness. In SG "D" the defects were located in the tube sheet region. It is the inspector's understanding that the licensee met with NRR to discuss the EC results in SG"D".

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