



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

Report Nos.: 50-369/85-16 and 50-370/85-17

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: April 21 - May 20, 1985

Inspectors: C. W. Burger, for
W. Orders, Senior Resident Inspector

7/15/85
Date Signed

C. W. Burger, for
R. Pierson, Resident Inspector

7/15/85
Date Signed

Approved by: Hugh C. Dance
Hugh C. Dance, Section Chief
Reactor Projects Branch 2
Division of Reactor Projects

7/18/85
Date Signed

SUMMARY

Scope: This routine, unannounced inspection entailed 284 inspector-hours on site in the areas of operations safety verification, surveillance testing, maintenance activities and refueling activities.

Results: Of the areas inspected, no violations or deviations were identified in the areas of surveillance testing, maintenance activities or refueling activities; two apparent violations were found in the area of operations safety verification.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *T. McConnell, Plant Manager
- G. Gage, Superintendent of Operations
- D. Rains, Superintendent of Maintenance
- *B. Hamilton, Superintendent of Technical Services
- *L. Weaver, Superintendent of Administration
- *B. Travis, Superintendent of Integrated Scheduling
- *E. McCraw, License and Compliance Engineer
- *P. Pham, Assistant Operating Engineer

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, mechanics, security force members, and office personnel.

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on May 31, 1985, with those persons indicated in paragraph 1 above. The licensee acknowledged understanding of the issues discussed and offered no substantive related discussion. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items*

Unresolved items 50-370/85-15-01 was reviewed resulting in an apparent violation 50-370/85-17-02. Details related to the apparent violation are delineated in paragraph 10.

5. Plant Operations

The inspection staff reviewed plant operations during the report period, April 21 through May 20, 1985, to verify conformance with applicable regulatory requirements. Control room logs, shift supervisors logs, shift

*An Unresolved Item is a matter about which more information is required to determine whether it is acceptable or may involve a violation or deviation.

turnover records and equipment removal and restoration records were routinely perused. Interviews were conducted with plant operations, maintenance, chemistry, health physics, and performance personnel.

Activities within the control rooms were monitored during shifts and at shift changes. Actions and/or activities observed were conducted as prescribed in applicable station administrative directives. The complement of licensed personnel on each shift met or exceeded the minimum required by technical specifications (TS).

Plant tours were taken during the reporting period on a systematic basis. The areas toured included but were not limited to the following:

- Turbine Buildings
- Auxiliary Buildings
- Unit 1 and 2, Electrical Equipment Rooms
- Units 1 and 2, Cable Spreading Rooms
- Station Yard Zone within the protected area
- Unit 2 Reactor Building

During the plant tours, ongoing activities, housekeeping, security, equipment status and radiation control practices were observed.

a. Unit 1 Operations

McGuire Unit 1 began the reporting period in Mode 4 having just cooled down in preparation for a refueling outage. The unit entered Mode 5 at 9:47 p.m. that evening and remained in Mode 5 until 11:35 p.m. on May 2, 1985, when the head was detensioned and the unit entered Mode 6. At 4:05 p.m. on May 6, 1985, unlatching control rods was commenced. Fuel unloading commenced on May 8, 1985. The last fuel assembly was removed from the core at 9:41 a.m. on Saturday, May 11, 1985. The unit remained in a defueled condition through May 19, 1985, when the unit entered Mode 6. Core load commenced at 3:12 p.m. on the 19th and the unit remained in Mode 6 throughout the reporting period.

b. Unit 2 Operations

McGuire Unit 2 began the reporting period at the end of a refueling outage in Mode 5. The unit entered Mode 4 at 6:24 a.m. on April 27, 1985. During the subsequent heatup and pressurization a water hammer occurred in the "C" main steam line following the opening of 2SM-10 ("C" main steam line isolation valve bypass valve) while main steam drains were left closed. This event is discussed in detail in paragraph 7. Following a determination of system seismic acceptability, unit start-up was continued. The unit entered Mode 3 on April 30, 1985 at 11:16 a.m., entered Mode 2 at 6:00 a.m. the following morning and went critical at 11:50 a.m. on May 7, 1985. The unit then entered Mode 1 at 6:17 a.m. on May 8th. During the process of swapping from auxiliary steam to main steam as the supply for the main feed

pump, the "A" main feed pump was lost and at 6:47 a.m. the reactor was manually tripped from 7% power.

All systems responded normally following the reactor trip and recovery was initiated. The unit was restarted and was placed on line at 4:55 p.m. that afternoon. Following the necessary post refueling testing the unit's power was increased and the unit reached 100% power at 11:00 p.m. on May 12, 1985. The unit was maintained at this power until May 16, 1985, when the unit was manually tripped following a loss of generator hydrogen. Following a determination that the main electrical generator was not damaged, unit recovery was initiated. The unit subsequently went critical at 6:09 a.m. on May 17, 1985, but the reactor reached criticality below the insertion limits and the unit was shutdown. The unit was then restarted and reached criticality at 11:48 a.m. This incident is discussed in detail in Report Nos. 50-369/85-20 and 50-370/85-21. Following recovery, power was increased to 100% and maintained at 100% throughout the reporting period.

6. Missing Spacers on Battery EVCC

On May 1, 1985, during a routine tour of the auxiliary building, the Resident Inspector Staff determined that Vital DC Power Supply Battery EVCC was missing approximately 10 plastic cell support spacers between the individual cells.

Subsequent licensee evaluation did not determine when or for what purpose these spacers were removed. Procedure IP/O/A/3061/07, Vital Battery and Terminal Post Inspection, was last performed on battery EVCC under Work Request 040053 on February 26, 1985. During the performance of this procedure a visual inspection of the battery rack and battery cells was performed. Included on the checklist is a block for spacing. This block was checked "SAT". No discrepancies were noted during this inspection. As such one can only conclude that the spacers were for some reason removed between February 26, 1985 and May 1, 1985. As noted however, no work request could be found which authorized removal of these plastic cell spacers.

Since these spacers are required by Duke Power Design Engineering Drawing MCM 1356.01-001-001, the battery is unable to meet its structural design criteria with the spacers missing. Consequently, the battery was inoperable for the time period February 26, 1985 through May 2, 1985, the date the spacers which were missing were replaced.

TS 3.8.2.1 requires that EVCC shall be OPERABLE and energized in Modes 1, 2, 3, and 4. TS 3.8.2.1 ACTION statement b. states that:

With one 126-volt D.C. battery and/or its normal and standby chargers inoperable or not energized, either:

1. Restore the inoperable battery and/or charger to OPERABLE and energized status within two hours or be in at least Hot Standby

within the next six and in Cold Shutdown within the following 30 hours, or

2. Energize the associated bus with an Operable battery bank via Operable tie breakers within two hours; operation may then continue for up to 72 hours from time of initial loss of Operability, otherwise, be in at least Hot Standby within the next six hours and in Cold Shutdown within the following 30 hours.

During the time period between February 26, 1985 and May 2, 1985, Unit 1 was operated at power from February 26 until April 19 essentially unencumbered. Unit 2, in its first refueling outage was in Mode 5 and 6 or in a "No Mode" condition during this time. Operating Unit 1 in Modes 1 through 4 during the time that DC battery EVCC was inoperable due to missing plastic cell spacers constitutes a violation of the requirements of TS 3.8.2.1.

In as much as this event is similar in nature to events detailed in report 50-369/85-10 and 50-370/85-11 which is yet to be issued and which entails apparent enforcement issues, and in keeping with current NRC enforcement policy which allows licensees to respond to previous examples of noncompliance before issuing yet another Violation, a Notice of Violation will not be issued in this instance.

7. Water Hammer in "C" Main Steam Line

On April 20, 1985, startup was in progress on Unit 2 following a refueling outage. The main steam isolation valves were open for heatup of the secondary system. Step 3.2.25 of OP/2/A/6100/01 (Controlling Procedure for Unit Startup) which requires the opening of steam line drains 2SM-83, 2SM-89, 2SM-95 and 2SM-101 had been performed but Control Room Operators had noted that they did not receive an open indication for these valves. This discrepancy was turned over to the relieving shift.

Due to unrelated problems the unit startup was delayed and the valves were not evaluated during the day shift. When the night shift was relieved the steam drain valves were not included in the turnover. A performance technician then requested permission to perform PT/2/A/4255/03 SM (Main Steam) Valve Stroke Timing Shutdown and was granted permission. This performance test requires the cycling and timing of Main Steam Isolation Valves; 2SM1AB, 2SM3AB, 2SM5AB, 2SM7AB and main steam bypass valves; 2SM9AB, 2SM10AB, 2SM11AB and 2SM12AB. This performance test requires that the initial valve position for testing be OPEN. The main steam bypass valves were then opened. The main steam bypass valves and the main steam isolation valves were then cycled closed and remain closed for approximately two hours.

At approximately 2 o'clock in the morning on April 29, 1985, the main steam bypass valves were opened. Approximately 20 minutes later a water hammer occurred on the "C" main steam line. The main steam bypass valves were immediately shut.

A system walkdown was performed to evaluate potential damage. No hanger damage or mechanical damage was noted, one snubber, 2MR-SM-75, which was difficult to stroke was replaced.

An evaluation of this incident revealed the following sequence of events. On January 30, 1985 OP/O/A/6100/09 Removal and Restoration (R&R) of Station Equipment (5866) was issued to perform an inspection of the main turbine. Main steam line drain valves 2SM-89, 2SM-83, 2SM-101 and 2SM-95 were gagged closed. These valves have an internal gag mechanism which was utilized to perform this gagging operation. In addition the valves were red tagged in accordance with R&R procedures. On February 12, 1985, another R&R procedure (6005) was performed to isolate these valves. This job was to inspect and weld baffle plates on the Unit 2 hotwell. The valves were jacked closed and a mechanical gag was placed on each valve; 2SM-83, 2SM-89, 2SM-95 and 2SM-101. A work request was issued WR123182, to implement placing these collars on the valves and to subsequently remove these collars. Another red tag was hung on the valves in accordance with R&R procedures.

Upon completion of the Inspecting and Welding of Baffle Plates on the Unit 2 hotwell, R&R 6005 was closed. The technician removed one red tag from each valve but did not remove the mechanical gag because he thought it was required for the other red tag. Meanwhile work request 123182, which stipulated removal of the mechanical gag upon completion of 6005, was being held in Planning awaiting notification that the red tags needed removal and the mechanical gag removed. Later when Inspection of the Main Turbine (5866) was completed a technician removed the remaining red tag and the internal gag mechanism. He did not notice the installed collar providing a mechanical gag. As such the valves were turned back to Operations with a mechanical gag installed. As a result the valves did not open when Step 3.2.25 of OP/2/A/6100/01 was performed as discussed earlier. The resulting water hammer occurred because the drain valves were not opened as required by the startup procedure.

The above scenario suggests several potential problems. R&R procedures as implemented were inadequate to ensure removal of the mechanical collar gags. Operation personnel involved did not adequately assess their lack of an "OPEN" indication on the main steam drain valves during the startup procedure, and the shift turnover was inadequate in that the relieving night shift was not adequately informed about the status of the main steam line drain valves. Further, maintenance personnel who removed the last remaining red tag were not observant enough to notice the remaining mechanical collar gag, and as a result the valves were turned over to operations, inoperable with an outstanding work request and a mechanical gag installed.

Nonetheless, the underlying reason for the failure to remove the gags remains the inadequate implementation of Station Directive 3.1.19 covering Safety Tags, Lock-outs, and Delineation Tags. Step H. under implementation states that when a safety tag is removed, the supervisor who has operational responsibility for the equipment to be tagged shall insure that the operating device to which it is attached is returned to its normal operating

state as determined from the applicable written procedure or is placed in some other state as may be required. This was not done.

TS 6.8.1 states that written procedures shall be established, implemented, and maintained covering the activities referenced in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. This Regulatory Guide in Appendix A, Part 1, Administrative Procedures, Step C. Equipment Control (e.g., locking and tagging) implicitly states that procedures will be utilized to control removal of safety tags. Station Directive 3.1.19 which implements this requirement of Regulatory Guide 1.33 was inadequately implemented in that Safety Tags (Red Tags) were removed from main steam drain valves 2SM-83, 2SM-89, 2SM-95 and 2SM-101 contrary to Station Directive 3.1.19 without insuring that the operating device to which the tags were attached was returned to its normal operating state. This constitutes a violation of the requirements of TS 6.8.1., and collectively with the issues discussed in paragraphs 8 and 9 constitutes a Violation. (370/85-17-01).

8. UHI Vent-Sightglass Rupture

On May 2, 1985 at 2:30 p.m., a Nuclear Equipment Operator was venting the Upper Head Injection system pursuant to Enclosure 4.1 to operating procedure OP-2-A-6200/10 Upper Head Injection, when he opened valve 2NI-340, instead of valve 2NI-297. This placed reactor coolant system pressure on the vent line discharge sightglass downstream. The sightglass ruptured and the diaphragm of valve 2NC-215 which is downstream of the sightglass was ruptured as well. Valve 2NI-340 did not have a valve tag affixed. The operator noticed however that written on some duct work nearby was the number 297. He inappropriately assumed that valve 2NI-340 was 2NI-297 and opened it. Another operator assisting in the process detected that the sightglass had blown and informed his counterpart. The valve was then reclosed and the incident was terminated.

Subsequent evaluation revealed that 2NC215, had been locked open when the incident occurred as was its required position.

The above event constitutes a violation of TS 6.8.1 which requires that currently written approved procedures be followed covering the Emergency Core Cooling System as specified in Appendix A of Regulatory Guide 1.33.

This example of failure to follow procedure in conjunction with the examples detailed in Paragraphs 7 and 9 constitutes a violation (370/85-17-01).

9. Containment Cleanliness

On April 24, 1985, during a routine inspection of Unit 2 containment loose debris, trash, clothing and plastic was observed which during accident conditions could be transported to the containment sump causing a restriction.

Procedure number OP/2/A/6100/01, the Controlling Procedure for Unit Startup, was subsequently reviewed to determine if the requirements set forth therein

concerning containment cleanliness had been completed. Step 39 of OP/2/A/6100/01 requires that Enclosure 13.1 of PT/2/A/4600/08 (Precriticality Surveillance Requirements for Unit Startup) be completed if unit startup is from Mode 5 or 6. PT/2/A/4600/08 Part A item 1 specifically requires that containment cleanliness be verified by visual inspection: that no loose debris is present in the containment.

The inspectors brought this situation to the attention of plant management on April 26, 1985. A subsequent inspection of Unit 2 containment was then conducted by Operations and a list of remaining items to be performed/removed prior to Unit 2 startup was prepared.

In as much as the procedure step had been signed off on April 20, 1985, but the requirement of that step, to remove all loose debris, trash, clothing and plastic from the containment which during accident conditions could be transported to the containment sump causing a restriction had not been performed, the above event constitutes a failure to follow procedure.

The above event constitutes a violation of T.S. 6.8.1 which requires that current written approved procedures be employed covering the startup of a facility as specified in Appendix A of Regulatory Guide 1.33. This in conjunction with the examples detailed in Paragraphs 7 and 8 constitutes a Violation. (370/85-17-01)

10. Thermal Overload Protection Design

In Report 50-369/85-14 it was identified that on April 3, 1985, at 3:05 p.m. while performing Performance Test PT/2/4200/09A ESF Train A, the licensee found that shorting bars which were to have been installed on the breaker of the operator of valve 2NI-9A had not been installed. The shorting bars were to bypass the thermal overload protection of the breaker to assure valve operation during an accident situation. At that time the issue was under review and maintained as an Unresolved Item pending completion of that analysis. (370/85-15-01)

Further analysis by the resident inspection staff and the licensee revealed that a number of valves on both units had not been installed per design specification;

Those valves are:

<u>Valve Number</u>	<u>Function</u>
1NV-94	Reactor Coolant Seal Return Containment Isolation
1NV-842	Standby Makeup Pump Inlet Isolation
1NV-849	Standby Makeup Pump Outlet Containment Isolation
1YC-40	Control Room Area Chilled Water Flow Control

1YC-99	Control Room Area Chilled Water Flow
0 RN-10	Nuclear Service Water Supply B Shutoff
0 RN-12	Nuclear Service Water Supply A Shutoff
0 RN-4	Circ Water Supply B Shutoff
0 RN-147	Circ Water Discharge A Isolation
0 RN-283	Circ Water Discharge B Isolation
0 RN-301	Containment Ventilation System Isolation
2 NI-9	Safety Injection Discharge Isolation
2 NI-288	Reciprocating Charging Pump Recirc Isolation
2 NI-358	Safety Injection Pump 2A to Upper Head Injection
2 NI-430	Accumulator 2A Vent to NC 34
2 NI-88	Accumulator 2D Discharge Isolation
2 NC-33	Pressurizer PORV Isolation
2 NC-31	Pressurizer PORV Isolation
2 NC-35	Pressurizer PORV Isolation
2 RN-174	Diesel Generator 2B Heat Exchange Flow Control Valve

Subsequent to determining that the above listed valves were technically inoperable due to their having not been tested and/or evaluated in their "degraded" state, the licensee performed the necessary modifications to bring the components into compliance with the applicable design specification (MCS 1390.01-00-0077) which not only required that the shorting bars be installed but that the control contact actuated by the overload heaters be jumpered.

Regulatory Guide 1.106, November 1975, Thermal Overload Protection For Electric Motors On Motor-Operated Valves, as revised in Revision 1, March 1977 offered acceptable methods for complying with the german criterion in Appendices A and B of 10 CFR 50 with regard to the application of thermal overload protection devices for electric motors on motor-operated valves to ensure that thermal overload protection devices will not prevent the valve/motor from performing its intended safety-related function.

The design specification under which Unit 1 safety related valves/motors were installed (MCS 1390.01-00-0077) specified that shorting bars which explore the overload heaters be installed and the corresponding control contact be jumpered with the appropriate modifications installed "...safety related motor operated valve start as are equipped with thermal overload devices which are connected to alarm only." (FSAR, Section 8.3.1.1.6)

During McGuire Unit 2 construction the specification was modified to allow the re-installation of the protection circuitry during construction; however, the protection circuitry was to have been removed prior to Unit 2 fuel load.

According to the licensee the Unit 1 valves and the shared valves (the ones with an "O" prefix) detailed in the table above were installed or modified subsequent to the specification being revised and were not properly modified.

Succinctly stated, the measures established and/or complemented at McGuire to ensure that the applicable regulatory requirements and design basis, as defined in 10 CFR 50.2, and as specified in the license as they pertain to the design control of structures, systems and components were inadequate.

More specifically; 10 CFR 50, Appendix B, Criterion III, Design Control Criterion V, Instructions, Procedures, and Drawings and Criterion X, Inspection, require that:

- a. Measures be established to assure that applicable regulatory requirements and the design basis for safety-related structures, systems, and components are correctly translated into specifications, drawings, procedures, and instructions. These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled.
- b. Those specifications, drawings procedures and instructions be of a type appropriate to the circumstances and that the associated activities be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.
- c. A program for inspection of these activities be established and executed to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity to assure conformance.

Contrary to those requirements:

- (1) There were no specific procedures, or instructions generated to assure that all requirements of design specification MCS 1390.01-00-0077 were implemented.
- (2) The inspection program to verify conformance with regulatory requirements was inadequate, in that it did not detect that there were no procedures for the activity in question, nor did the program detect the inadequate installations.
- (3) The measures established to control components which do not conform to requirements to prevent their use was inadequate, resulting in the delineated components' employment.

The above constitutes a Violation (369/85-16-01, 370/85-17-02).

11. Surveillance Testing

The surveillance tests categorized below were analyzed and/or witnessed by the inspector to ascertain procedural and performance adequacy.

The completed test procedures examined were analyzed for embodiment of the necessary test prerequisites, preparations, instructions, acceptance criteria, and sufficiency of technical content.

The selected tests witnessed were examined to ascertain that current written approved procedures were available and in use, that test equipment in use was calibrated, that test prerequisites were met, system restoration completed and test results were adequate.

The selected procedures perused attested conformance with applicable TS and procedural requirements, they appeared to have received the required administrative review and they apparently were performed within the surveillance frequency specified.

<u>Procedure Number</u>	<u>Procedure Title</u>
PT/2/A/4206/02	NI Valve Stroke Timing Quarterly
PT/2/A/4208/01A	Containment Spray Pump 2A Performance Test
PT/2/A/4208/01B	Containment Spray Pump 2B Performance Test
PT/2/A/4252/01A	Motor Driven Auxiliary Feedwater Pump 2A Performance Test

PT/2/A/4252/01B	Motor Driven Auxiliary Feedwater Pump 2B Performance Test
PT/2/A/4200/28	Slave Relay Test
PT/2/A/4601/04	Protection System Channel 4 Functional Test
PT/2/A/4200/09A	ESF Actuation Test
PT/2/A/4601/02	Protection System Channel 2 Functional Test
PT/1/A/4350/17B	D/G 1B Fuel Oil Transfer Pump Performance Test
PT/1/A/4208/02	Containment Spray Valve Stroke Timing Test

12. Maintenance Observations

The maintenance activities categorized below were analyzed and/or witnessed by the resident inspection staff to ascertain procedural and performance adequacy.

The completed procedures examined were analyzed for embodiment of the necessary prerequisites, preparation, instruction, acceptance criteria and sufficiency of technical detail.

The selected activities witnessed were examined to ascertain that where applicable, current written approved procedures were available and in use, that prerequisites were met, equipment restoration completed and maintenance results were adequate.

The selected work requests/maintenance packages perused attested conformance with applicable TS and procedural requirements and appeared to have received the required administrative review.

<u>Work Request</u>	<u>Equipment</u>
123674	1A D/G Inspect Fuel Injectors
86058	Interim Calibration of Excores
93484	Rebuild CF Pump Pedestals
65481	Replace Styrofoam Spacers on Battery EVCC
123182	Place Collars on Main Steam Drain Valves
040053	Perform IP/0/A/3061/07 on Battery EVCC

13. Open Items Review

The following items, entailing in part licensee event reports, violations, inspector followup items and unresolved items were reviewed in order to determine the adequacy of corrective actions, the implications as they pertain to safety of operations, the applicable reporting requirements, and licensee review of the event.

Based upon the results of this review, the items are herewith closed.

Unit 1, Docket 50-369, LER 85-03
LER 85-04

Unit 2, Docket 50-370, LER 85-07