



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos. 50-369/95-17 and 50-370/95-17

Licensee: Duke Power Company
422 South Church Street

Docket Nos.: 50-369 and 50-370

License Nos.: NPF-9 and NPF-17

Facility Name: McGuire Nuclear Station 1 and 2

Inspection Conducted: July 7, 1995 - August 5, 1995

Inspectors: *George F. Maxwell, Sr.* 8/29/95
George F. Maxwell, Sr. Resident Inspector Date Signed

Garry A. Harris, Resident Inspector
Marvin D. Sykes, Resident Inspector

Approved by: *R. V. Crlenjak* 8/29/95
R. V. Crlenjak, Chief, Branch 3 Date Signed
Division of Reactor Projects

SUMMARY

Scope: This routine resident inspection was conducted in the areas of plant operations, maintenance, and engineering. Some of the inspections were conducted during backshift hours. Backshift inspections were conducted on July 7, 14, 21, 28, and August 4.

Results: In the area of operations:

The Unit 1 startup was successfully completed following a forced outage to repair the emergency diesel generator turbochargers (paragraph 3.a). Following a Unit 1 residual heat removal (NR) system flush, the licensee recognized that the Unit 1 refueling water storage tank required three makeups within a 48 hour period. Operators identified that the loss of tank inventory was attributed to two ND heat exchanger valves that were leaking by. Work orders were issued to repair the valves (paragraph 3.b). The licensee has upgraded and implemented a Block Tagout Improvement plan as a result of a self-evaluation (paragraph 3.c).

In the area of maintenance:

Maintenance and surveillance activities were conducted in accordance with procedural requirements (paragraph 4.a).

In the area of engineering:

Engineering personnel promptly identified the safety-related valves that could be potentially affected by conditions documented in a recent Part 21 notification (paragraph 5.a). Engineering conducted reviews and established actions to correct electray installations (paragraph 5.b). Engineering provided additional information to better quantify unidentified reactor coolant system leakage (paragraph 5.c). Good use of predictive maintenance on high-voltage switchyard components was observed (paragraph 5.d). A Non-Cited Violation was identified due to the inoperability of auxiliary feedwater valves (paragraph 5.e).

In the area of plant support:

A survey of specific portions of the licensee's Fire Protection Program was completed during the inspection period (paragraph 6).

REPORT DETAILS

1. PERSONS CONTACTED

Licensee Employees

- *J. Boyle, Superintendent Work Control
- *R. Cross, Compliance Specialist
- T. Curtis, System Engineering Manager
- *L. Davison, System Engineer
- *E. Geddie, Station Manager
- M. Hatley, Engineering Supervisor
- P. Herran, Engineering Manager
- *A. Hinson, System Engineer
- *D. Jamil, Manager, System Engineering
- *R. Jones, Superintendent of Operations
- A. Lindsay, Operations Training Manager
- *B. Matthews, System Engineer
- *T. McMeekin, Site Vice President
- *M. Nazar, Maintenance Superintendent
- *M. Rains, System Engineer
- J. Silver, Operations Staff Manager
- *H. Sloan, Reactor Protection Scientist
- *J. Snyder, Regulatory Compliance Manager
- J. Thrasher, Acting Manager, Mechanical Engineering
- B. Travis, Component Engineering Manager

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

NRC Resident Inspectors

- *G. Maxwell, SRI
- G. Harris, RI
- *M. Sykes, RI

*Attended exit interview

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

2. PLANT STATUS

a. Unit 1

Unit 1 returned to power operation on July 5 after a forced outage to repair both EDG turbochargers. The unit operated essentially at 100% power for the remainder of the period.

b. Unit 2

Unit 2 operated at less than 50% power while turbocharger repairs were completed. Following repair, the unit operated at essentially 100% power for the remainder of the period.

c. Inspections and Items of Interest

During this period, inspections were conducted in the areas of Chemistry and Radiation Protection. The results of these inspections will be documented in inspection reports 50-369,370/95-20 and 21. A followup inspection was conducted to evaluate the circumstances and conditions involving the failures of the 2A and 2B EDG turbochargers. The results of the inspection was documented in Inspection Report 50-369,370/95-19. During the week of July 17, the Nuclear Reactor Regulation Project Director for McGuire was on site to meet with station management.

3. OPERATIONS (NRC Inspection Procedure 71707)

Throughout the inspection period, inspectors conducted facility tours to observe operations and maintenance activities in progress. The tours included entries into the protected area and radiologically controlled areas of the plant. During these inspections, discussions were held with operators, radiation protection technicians, instrument and electrical technicians, mechanics, security personnel, engineers, supervisors, and plant management. Some operations and maintenance activity observations were conducted during backshift inspections. The inspectors attended licensee meetings to observe planning and management activities. The inspections confirmed Duke Power Company's compliance with 10 CFR, Technical Specifications (TS), License Conditions, and Administrative Procedures.

a. Unit 1 Startup From Forced Outage

On July 5, Unit 1 returned to power operation following a forced outage to repair the 1A and 1B EDG turbochargers. The EDGs were declared inoperable after a design defect was identified by the licensee. The turbochargers were replaced and startup of the unit began on July 2. Upon entry into Mode 3, unidentified leakage was calculated, using PT/1/A/4150/01B, Reactor Coolant Leakage Calculation, to be greater than the 1 gpm TS limit. The licensee conducted a reactor building walkdown to identify the source of the leak. During the walkdown, operations personnel identified a leak at the body to bonnet flanges of PORV 1NC32. The licensee also found one of four actuator hold down bolts for PORV block valve, 1NC31, broken.

The licensee conducted evaluations of the consequences of operating with external leakage from 1NC32. The licensee stated and the inspectors verified that the source of the leaking steam was located in the upper pressurizer cavity and that by distillation, the steam contained little or no boric acid which could corrode the carbon steel bonnet bolts. Engineering also evaluated the leak and determined it to have an insignificant effect on the valve stainless steel flange surfaces.

In addition, engineering evaluated the loading of block valve INC31 and confirmed that the three remaining valve actuator bolts were capable of resisting the service loads for all design accident conditions. Valve INC31 was determined to be past and present operable.

Since leakage through PORV INC32 had occurred during previous plant startups, the licensee decided to remain in mode 3 to allow for thermal expansion of the valve components. Consequently, the unit was maintained in Mode 3 for 12 hours until the leakage was reduced significantly. A successful leakage calculation was then conducted and the licensee proceeded with the plant startup.

The licensee completed an evaluation of the PORV leakage and determined that there were no safety concerns. The inspectors reviewed the actions taken by the licensee and determined that the PORV leak and the block valve broken actuator bolt had been properly assessed.

b. Degraded Residual Heat Removal System Valves

On July 17, during reviews of control room logbooks, the inspectors noted an increase in the makeup frequency to the FWST. Three makeups to the tank of approximately 10,000 gallons had occurred within a 48-hour period. The inspectors discussed the logbook entries with the control room operators and were informed that the leakage pathway had recently been identified and isolated. The loss of FWST inventory was attributed to degraded manual drain valves in the ND system.

The unit 1 ND system had recently been flushed in accordance with procedure TO/1/A/9600/076, ND System Dose Reduction Flush, to reduce background radiation levels in the auxiliary building. The flush involved operating the ND system pumps at full flow and recirculating the flow through the containment spray system back to the FWST. The FWST was then placed in cleanup mode to remove as much of the dislodged material as possible. Following this flush, the system was returned to standby alignment. However, IND46 and IND13 (ND heat exchanger drain valves) were not adequately isolated, resulting in an inventory loss from the FWST to the waste evaporator feed tank. The licensee investigated the leak by performing a lineup verification of each valve that was manipulated during the flush. Operations and engineering personnel, using an ultrasonic measuring device, identified the leakage path through valves IND46 and IND13. The valves were securely closed and the leakage was significantly reduced.

Subsequently, work orders 95055686 and 95055685 were written to repair the valves during the next scheduled outage. Because the leakage pathway was identified and corrected, and the FWST minimum inventory requirements were not exceeded, the inspectors concluded that the licensee's actions were appropriate.

c. Block Tagout Improvement Program

As a result of recent station events, the licensee identified deficiencies in the BTO program that may have potentially resulted in equipment damage and personal injury. Some of the self-identified deficiencies included weak process controls and inadequate procedures. To improve the BTO process, the licensee performed a review of the current process. As a result, a site directive is being developed, new BTO implementation procedures are being written, and training guidance is being provided for the new process.

The inspectors concluded that the new process should improve the controls for the current BTO program.

4. MAINTENANCE (NRC Inspection Procedures 62703, 61726 and 92902)

The inspectors witnessed selected surveillance tests to verify that approved procedures were available and in use, test equipment in use was calibrated, test prerequisites were met, system restoration was completed, and acceptance criteria were met. In addition, resident inspectors reviewed and/or witnessed routine maintenance activities to verify, where applicable, that approved procedures were available and in use, prerequisites were met, equipment restoration was completed, and maintenance results were adequate.

The selected tests and maintenance activities below were reviewed and/or witnessed in detail:

<u>Procedure/Work Order</u>	<u>Equipment/Test</u>
WO 95051484	Investigate Low Oil Level in the Bearing for 1D Reactor Coolant Pump Motor
CP/0/B/8120/75	Anion Analysis Using Dionex 4500I
PT/1&2/A/4150/01B	Reactor Coolant Leakage Calculation
WO 93089150 & 93089055	Isolate Non-NC Leakoff Lines

The inspectors concluded that the above tests and maintenance activities were conducted in accordance with the procedures. No violations or deviations were identified.

a. (CLOSED) LER 50-370/94-01: Missed TS Surveillance Due to Inappropriate Action

The condition identified in this LER was addressed in Violation 50-369,370/93-32-07, Failure to Perform TS Verification Following

EDG Inoperability. Followup inspection was conducted and this violation was closed in Inspection Report 50-369,370/95-05. Therefore, this LER is closed.

- b. (CLOSED) LER 50-369,370/93-03: Train B of the Control Room Ventilation (VC) System Past Inoperability

On April 1, 1993, Train B of the VC system was declared past inoperable. This determination was made after mechanical maintenance personnel detected in-leakage around an angle brace used to support the Train B control room air handling unit duct work. In addition, a taped over opening was identified in the duct work. The opening was provided in the initial design to allow testing the system.

Work Order 93018873 was initiated to repair the affected duct work. The inspectors performed a walkdown of the control room air handling unit duct work and noted that the leaks had been sealed. The inspectors verified that the duct work was then smoke tested and proven to meet leakage acceptance criteria. Subsequent to this LER being written, the inspectors issued a Violation that also related to instances of inleakage into the ventilation system (Violation 50-369,370/94-12-01). Based on the issuance of this violation and followup of the repairs and corrective actions completed by the licensee to the ventilation system, this LER is closed.

- c. (CLOSED) LER 50-369/94-02: Failure to Comply with Technical Specification Action Statement for Reactor Coolant Detection System Due To The Omission Of Relevant Information

On April 8, 1994, the licensee determined that the leakage detection systems specified in TS 3.4.6.1 were past inoperable on both units because the system was not able to provide an alarm in the control room of an increase in reactor coolant system leakage to >1 gpm within 1 hour. This requirement was clearly specified in the TS Bases and Final Safety Evaluation Report. However, the specifics of the TS requirements had not been incorporated into the system design or procedures associated with TS 3.4.6.1.

The inspectors reviewed the licensee's corrective action and verified that the committed actions had been completed; therefore, this item is closed.

- d. (CLOSED) LER 50-369/94-01: Technical Specification Violations Due To A Non-conservative Calculation Caused By Failure To Consider System/Component Interaction

This non-conservative leakage calculation event was also addressed in Violation 50-369,370/94-08-01. Therefore, this LER is considered closed and corrective actions will be tracked via the violation.

- e. (CLOSED) LER 50-370/94-02: Failure To Comply with Technical Specification Surveillance Requirement

On May 18, 1994, following a review of chemistry data trend graphs for the previous week, the licensee discovered that the results of the Unit 2 NC system fluoride and chloride analysis was not representative of a typical NC system sample. Therefore, an inadequate surveillance was performed.

The inspectors reviewed the licensee's corrective actions to preclude recurrence. The inspectors verified that procedure changes and controls to check the validity of generated data was in place. The inspectors concluded that the licensee's actions were adequate to prevent recurrence of this condition. Therefore, this item is closed.

5. **ENGINEERING** (NRC Inspection Procedures 37550, 37551 and 92903)

- a. Followup on Part 21 (Limitorque Valve Actuator)

Following receipt of a Part 21 notification from Limitorque, the inspectors contacted the licensee to assure proper resolution of any potential safety concerns. The 10 CFR Part 21 documented a situation where an SMB-00 actuator may not function in the automatic mode after being operated manually. Subsequent followup by the licensee showed that 12 safety-related valves at the site utilize this type actuator and may be subject to this potential concern.

The current station policy requires that safety valves be declared inoperable after manual operation. They are subsequently declared operable after the actuator is stroked electrically. Although this practice should preclude the described potential concern, the licensee is continuing to evaluate the use of this type actuator. Having evaluated the licensee's response to the notification and actions taken to resolve any related issues, the inspectors concluded that the licensee's response to the 10 CFR Part 21 notification was prompt and acceptable.

- b. Safety-Related Electray Installation

During routine walkdowns of plant systems, the inspectors and licensee personnel noted that some electray (a small electrical cable tray) installations appeared to depart from site installation practices. Some electrays were also installed near high temperature piping that may accelerate aging of the cables. Examples of the observations include:

- The valve actuator for 2NI184B, containment sump recirculation valve, was in direct contact with an electray containing cables for ORN149A, engineered safety feature Train A discharge valve to circulating water. The direct

contact between the valve actuator and the electray was evaluated for seismic concerns by the licensee and determined to be acceptable.

- Safety-related cable used to provide signals for the Train A solenoids for MSIVs 1 & 7 and the Train A solenoids for MSIV bypass valves 9 & 12 were determined to be degraded because of overheating from nearby piping. The licensee evaluated the cable failure modes (i.e., cable break and short) and determined that the degraded condition did not affect the safety function of the MSIV and MSIV bypass solenoids because of the valves' fail safe design. The licensee stated that the cables would be replaced during the next outage.
- A cable tray was found to have cables extending above its side rails. The licensee evaluated the condition and determined that no safety issue existed. The inspectors reviewed the evaluation and agreed with the licensee's conclusion.
- A cable tray was found on Unit 2 containing degraded safety-related cables routed through high temperature pipe insulation. These cables transmit turbine trip signals to the reactor protection system through the solid state protection system. The licensee conducted an evaluation and determined that, although the cables were degraded, they were operable and would remain functional as long as they remained dry. As a precaution, the licensee built a temporary water shield around the cables. The licensee has scheduled to replace and re-route these cables during the next scheduled refueling outage.

The licensee stated that the above examples had existed since construction and were not the result of any recent plant modifications. The licensee also stated and the inspectors agreed that all of the cables identified in the above examples were installed with jacketed interlocked armor and therefore had adequate protection to minimize damage. The inspectors reviewed the operability evaluations in the above examples and determined them to be acceptable.

c. Unit 1 Reactor Coolant System Leakage Calculation

During review of operational data for Unit 1, the inspectors noted an increase in unidentified leakage during this inspection period. Daily calculations indicated that unidentified leakage had increased from an average of .3 gpm to .8 gpm. The licensee performed a walkdown of plant systems to identify the source of the increased leakage and began efforts to quantify non-NC system inputs into the PRT such that a more accurate value for identified and unidentified leakage could be determined. The PRT input to

the leakage calculation had been locked out of the Operator Aid Computer (OAC) calculation because of inaccuracies caused by non-NC inputs. Non-NC system leakage to the PRT results in non-conservative operator aided computer unidentified leakage values.

Procedure PT/1/A/4150/42, Quantifying non-NC Input to the PRT, was performed to determine the amount of leakage into the PRT from non-NC sources. The non-NC system leakage was determined to be .033 gpm. This value was then subtracted from a known value of PRT inleakage. The value was then reduced by 10% for conservatism. This resultant value was then programmed into the OAC calculation as a constant for PRT input to calculate an accurate value of unidentified leakage. A similar adjustment to the leakage calculation had been performed on Unit 2. Unidentified leakage is determined by subtracting identified leakage (e.g., leakage into the PRT and NCDT) from the total leakage. The McGuire TS require that the unidentified leakage remain less than one gallon per minute during Modes 1,2,3, and 4. The inspectors concluded that the licensee's method to quantify NC system unidentified leakage was acceptable.

d. Switchyard Thermography

Semi-annual thermography inspections of the 230KV and 525KV switchyards were performed during this inspection period. The inspectors verified that the test were conducted in accordance with the switchyard preventive maintenance program procedures. The inspections revealed that heating concerns, normally termed "hot spots," existed on motor operated disconnect switch bolted connections, line capacitors, current transformers, and transformer bushing bolted connections. Upon discovery, the licensee implemented prompt corrective action. Onsite and offsite groups coordinated equipment outages to investigate and repair the problems.

As a result of these preventive/predictive maintenance activities, higher than normal temperatures were identified at some critical locations. Loose bolted connections were tightened and a capacitor replaced. A followup thermography scan indicated that the component heat levels had returned to acceptable levels.

The inspectors determined that the thermography inspections provided critical information that would have otherwise been unavailable. The inspections were considered effective in minimizing the potential for forced outages due to failure of critical switchyard components. The inspectors also agreed with the licensee that this activity should result in increased availability and reliability of offsite power.

e. (CLOSED) LER 50-369/94-08 Past Inoperability of Auxiliary Feedwater Valves

On November 1, 1994, the licensee declared auxiliary feedwater to steam generator isolation valves 1CA42, 1CA46, and 1CA62 past inoperable. The valve operators had been tested during the Unit 1 End-of-Cycle 7 refueling outage using the VOTES diagnostic testing system. However, the VOTES vendor later discovered errors in the system software. Subsequent differential pressure testing of the valves by the licensee revealed that the existing setup of the valve operators would not have provided sufficient thrust to operate the valves under design basis accident conditions.

In order to return the valves to operable status, a 95% close torque switch bypass modification was added to each valve. The bypass switches were installed under modification MGMM-6409. The inspectors verified that the bypass torque switch had been installed and the valve was successfully tested. The inspectors evaluated the licensee's corrective actions concerning these valves and found them to be acceptable. Based on this evaluation, the inspectors determined that LER 369/94-08 is closed and this item will be identified as a Non-Cited Violation 50-369/95-17-01, Unit 1 Auxiliary Feedwater Isolation Valves Past Inoperable. This licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII of the NRC Enforcement Policy.

6. **PLANT SUPPORT** (NRC Inspection Procedures 71750 and 64704)

The inspectors conducted a survey of certain portions of the station Fire Protection Program. The inspectors determined that the fire brigade normally consisted of an Incident Commander (Senior Reactor Operator), a Safety Officer (Non-licensed Operator), another NLO, and two Single Point Of Contact team members. These positions are assigned during normal and backshift hours. The fire brigade conducts periodic drills during normal and backshift hours. Upon activation of the fire brigade, the assigned individuals are expected to carry out their designated fire brigade duties. However, there may be instances when certain plant conditions could exist that may take priority over a fire.

There are audible as well as visible fire alarm annunciators in the control room to notify the operators of a fire within the plant. The Incident Commander and the Operations Shift Manager decide whether offsite assistance is needed. The decisions are based on the size and location of the fire and available firefighting resources. Water is the primary source used to extinguish fires at the station. However, water is not normally used on electrical circuits unless the circuit has been verified de-energized.

The fire conditions that would cause the declaration of an Emergency Action Level were as follows:

- a. NOUE
 - Fire within the plant lasting longer than 10 minutes.
- b. ALERT
 - Fire potentially affecting safety systems.
 - Fire resulting in potential deterioration of any ESF component or component subsystem required by TS for the current operating mode.
- c. SITE AREA EMERGENCY
 - Fire compromising the function of a safety system.
 - Fire resulting in redundant trains of ESF components or component subsystems required by TS for the current operating mode becoming incapable of performing their design function.
 - Fire requiring control room evacuation and control of shutdown systems has been established or is in the process of being established from the standby shutdown facility.
- d. GENERAL AREA EMERGENCY
 - Any major fire which could cause massive common damage to plant systems.
 - Fire requiring control room evacuation and control of shutdown systems cannot be established from any plant location and NC subcooling based on core exit thermocouple cannot be maintained greater than 0 degrees F.

7. EXIT INTERVIEW

The inspection scope and findings identified below were summarized on August 9, 1995, with those persons listed in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection findings in the Summary and listed below. The licensee did not identify as proprietary any of the material provided to or reviewed

by the inspectors during this inspection. The following items were discussed in detail:

<u>Item Number</u>	<u>Status</u>	<u>Description and Reference</u>
NCV 50-369/95-17-01	CLOSED	Unit 1 auxiliary feedwater isolation valves past inoperable (paragraph 5.e.)
LER 50-370/94-01	CLOSED	Missed T.S. surveillance due to inappropriate action (paragraph 4.a.)
LER 50-369,370/93-03	CLOSED	Train B of the control room ventilation system past inoperability (paragraph 4.b.)
LER 50-369/94-02	CLOSED	Failure to comply with T.S. action statement for reactor coolant detection system due to the omission of relevant information (paragraph 4.c.)
LER 50-369/94-01	CLOSED	T.S. violations due to a non-conservative calculation caused by failure to consider system/component interaction (paragraph 4.d.)
LER 50-370/94-02	CLOSED	Failure to comply with TS surveillance requirement (paragraph 4.e)
LER 50-369/94-08	CLOSED	Past inoperability of auxiliary feedwater valves (paragraph 5.e.)

8. ACRONYMS AND ABBREVIATIONS

BTO	-	Block Tagout
CP	-	Chemistry Procedure
EDG	-	Emergency Diesel Generator
ESF	-	Engineered Safety Feature
FWST	-	Refueling Water Storage Tank
gpm	-	gallons per minute
LER	-	Licensee Event Report
MSIV	-	Main Steam Isolation Valve
NC	-	Reactor Coolant
NCOT	-	Reactor Coolant Drain Tank
NCV	-	Non-Cited Violation
ND	-	Residual Heat Removal

NI	-	Safety Injection
NLO	-	Non-Licensed Operator
NOUE	-	Notification of Unusual Event
OAC	-	Operator Aid Computer
PORV	-	Power Operated Relief Valve
PRT	-	Pressurizer Relief Tank
PT	-	Performance Test
RN	-	Nuclear Service Water
TS	-	Technical Specification
VC	-	Control Room Ventilation
WO	-	Work Order