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

Report Nos. 50-369/95-27 and 50-370/95-27

Licensee: Duke Power Company
422 South Church Street
Charlotte, NC 28424

Docket Nos.: 50-369 and 50-370

License Nos.: NPF-9 and NPF-17

Facility Name: McGuire Nuclear Station 1 and 2

Inspection Conducted: November 11, 1995 - December 16, 1995

Inspectors: S. B. Rudisail 01/08/96
for George F. Maxwell, Sr. Resident Inspector Date Signed
per telcon 01/08/96
Garry A. Harris, Resident Inspector
Marvin D. Sykes, Resident Inspector
Steven B. Rudisail, Project Engineer

Approved by: R. V. Crlenjak 1/8/96
R. V. Crlenjak, Chief, Branch 1 Date Signed
Division of Reactor Projects

SUMMARY

Scope: This routine resident inspection was conducted in the areas of plant operations, maintenance, engineering, and plant support. Some of the inspections were conducted during backshift hours. Backshift inspections were conducted on November 20, 21, 22, and December 13, 14, 15, and 16.

Results: In the area of operations:

While unit 1 was being shutdown for refueling, the communication and coordination between the control room and other groups was good. Operator response was good during a unit 2 plant transient that involved the main turbine governor valve No. 3 (paragraph

Enclosure

3.c). A Unit 2 shutdown to Mode 5 was initiated following operator identification of increased identified reactor coolant system leakage (paragraph 3.e). A manual actuation of the auxiliary feedwater pumps was initiated due to the isolation of the auxiliary steam supply to the 2B main feedwater pump (paragraph 3.f.).

In the area of maintenance:

A potential challenge was identified in the work control process that affects post-maintenance testing activities (paragraph 4.). Maintenance activities involving repair of the Unit 2 main turbine governor valve were conducted in a professional manner (paragraph 3.e.).

In the area of engineering:

A non-cited violation was identified due to technicians disconnecting an electrical cable that supplied power to vital Channel 1 instrumentations and controls (paragraph 5.a.). Recommendations developed by an operating experience program team should improve the use of nuclear industry experience at the station (paragraph 5.b.).

In the area of plant support:

A station fire protection training exercise was challenging and the various station teams demonstrated thorough knowledge of their assigned responsibilities and duties (paragraph 6.).

REPOPT DETAILS

1. **PERSONS CONTACTED**

Licensee Employees

*S. Addison, Work Control
M. Cash, Reactor Engineering
K. Crane, Regulatory Compliance
*R. Cross, Compliance Specialist
*T. Curtis, System Engineering Manager
R. Deese, Safety Review Group
*B. Dolan, Safety Assurance Manager
*E. Geddie, Station Manager
M. Hatley, Component Engineering
*P. Herran, Engineering Manager
*M. Horne, Maintenance Manager
*D. Jamil, Electrical System Engineering Manager
R. Jones, Superintendent of Operations
*B. Matthews, Engineering Supervisor
P. McHale, I&E Training, Director
*T. McMeekin, Station Vice President
M. Nazar, Maintenance Superintendent
J. Silver, Operations Staff Manager
*J. Snyder, Regulatory Compliance Manager
K. Thomas, Work Integration Manager
J. Thrasher, Modifications Manager
*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

2. **PLANT STATUS**

a. Unit 1

Unit 1 operated at essentially 100 percent power until November 29, when the unit began a gradual power decrease prior to the scheduled 1EOC10 outage. The unit began a shutdown on December 13 and was separated from the electrical grid on December 14 at 4:01 a.m. and entered Mode 3 at 5:38 a.m.

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b. Unit 2

Unit 2 operated at essentially 100 percent power until a packing leak was identified on pressurizer spray valve 2NC-29. On December 5, power was reduced to allow the valve to be repaired. The unit was returned to 100 percent on December 7. On December 15, operators identified increased leakage to the PRT and initiated a unit shutdown. The unit entered Mode 3 at 12:38 a.m. on December 16.

c. Inspections and Items of Interest

During the week of December 4, Steve Rudisail was onsite to assist the resident inspectors during routine inspection activities.

During the week of December 11, Nick Economos was onsite and assisted the resident inspectors during routine maintenance and surveillance inspection activities. The results of his inspection effort will be documented in Inspection Report 50-369,370/95-29.

3. **OPERATIONS** (NRC Inspection Procedure 71707, 40500, and 60705)

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. Preparation for Refueling Outage - Unit 1

Prior to the start of the Unit 1 shutdown on December 14, the inspectors reviewed procedures for: 1) receipt, inspection, and storage of new fuel 2) fuel assembly inspection, and 3) fuel handling, transfer, and core verification. The inspectors also reviewed licensee administrative procedures for establishing and controlling plant conditions during refueling. Guidance documents were reviewed on maintaining adequate shutdown margin, radiation monitoring, water level control, decay heat removal, and containment integrity.

The inspectors interviewed licensee personnel to determine their level of understanding of applicable administrative requirements and responsibilities including integration of contractors into the

licensee organization and using established standardized communication methods. The inspectors determined that the procedures reviewed provided adequate guidance to station personnel.

The inspectors witnessed and evaluated the new fuel receipt inspection and storage process. Also, the inspectors observed the performance of site personnel tasked with the movement and inspection of new fuel prior to its placement into the fuel pool. Plant personnel followed the instruction of the applicable procedures throughout the process. The radiation protection staff completed surveys of the shipping containers and new fuel assemblies. The inspectors concluded that the receipt, inspection and storage of the new fuel was carried out safely and in accordance with the applicable procedures.

b. Unit 1 Shutdown to 1EOC10 Refueling Outage

The inspectors witnessed the controlled shutdown of Unit 1 for the scheduled 1EOC10 refueling outage. The unit main generator was separated from the electrical grid at 4:01 a.m. and entered Mode 3 at 5:38 a.m. on December 14. During the unit shutdown the inspectors noted good communication and coordination between operations and other onsite groups. Control room access was limited to essential personnel. Operators demonstrated good command and control. The operators adhered to OP/1/A/6200/02, Controlling Procedure for the Unit Shutdown, and were aware of the status of control room annunciators, nuclear instrumentation, and other safety parameter display systems. No abnormal operating conditions were experienced during the shutdown and necessary equipment functioned as expected.

c. Repair of Main Turbine Governor Valve - Unit 2

On December 6, during the power reduction to accommodate repair of pressurizer spray valve, 2NC29, the Unit 2 main turbine governor valve No. 3 failed to the fully open position. As a result, the rod control system responded to the change in secondary side power. Operators stabilized the plant at approximately 45 percent power. Licensee personnel responded to the main turbine and discovered that the No. 3 governor valve stem had rotated and sheared off the valve limit switch arm and support arm for the linear variable differential transformer. The licensee developed plans for the valve repair. The inspectors attended the pre-job briefing and witnessed the valve repair activities. The inspector determined that the repairs were conducted in accordance with the controlling work instructions.

After completion of the repairs, while attempting to return the valve to service, the valve unexpectedly went to the full open

position. In response, control rods automatically withdrew approximately 18 steps in an attempt to correct the primary and secondary power mismatch. The power mismatch was subsequently corrected and the unit returned to 100 percent power without further incident. The inspectors determined that the performance of the operating staff was good.

d. Primary System Leakage - Unit 2

On December 5, operators noticed increased reactor coolant system leakage to the reactor coolant drain tank. The licensee conducted a reactor building inspection and determined that pressurizer spray valve, 2NC29, had developed a 2 gallon per minute packing leak. Packing leakage from this valve is directed to the reactor coolant drain tank and considered to be identified leakage. The licensee developed and implemented a repair plan that required reducing power to 10 percent and injecting a leak sealant compound into the stuffing box of the valve via the packing leak off port. The injection of leak sealing material into the stuffing box of the valve does not alter the pressure boundary of the valve.

The inspectors attended a Plant Operations Review Committee meeting to review the repair plan and supporting activities and concluded that the plan was sound and adequate. Contingency plans were developed. The repair activity was conducted using procedure MP/0/A/7650/077, On-Line Leak Sealing Initial Injection. The licensee has stated that the valve will be repaired or replaced during the next Unit 2 scheduled outage. The inspectors evaluated the licensees' repair activities and determined they were conducted in accordance with established procedures.

e. Unit 2 Forced Outage

On December 15, Unit 2 reactor operators began a unit shutdown from 100 percent power in accordance with AP/2/A/5500/04, Rapid Downpower, due to a sudden increase in identified leakage of approximately 8 gpm. The source of the leakage was determined to be the reactor head vents. The licensee decided to bring the unit to cold shutdown to replace the head vent valves. The unit entered Mode 3 at 12:38 a.m. on December 16. All plant equipment functioned as expected during the shutdown.

The head vent system contains two parallel 1" flow paths with two redundant failed closed Target Rock solenoid valves in each flow path. During normal operations, these valves are de-energized closed. The valves were originally scheduled for replacement in the upcoming 2EOC10 outage. The head vent valve replacement activities will be covered in detail in Inspection Report 50-369, 370/95-30. The resident inspectors responded to the unit shutdown.

f. Manual ESF Actuation - Unit 2

On December 16, with Unit 2 in Mode 3 following a rapid shutdown, control room operators manually actuated the auxiliary feedwater system in response to the loss of the 2B main feedwater pump. Unit 1 was in mode 5 and had been shutdown for the 1EOC10 outage. The "B" auxiliary boiler was supplying steam to loads on both units including the 2B main feedwater pump. A leak had developed earlier on the "A" auxiliary boiler. To accommodate the lack of auxiliary steam boiler capacity, operators shed steam loads that required breaking condenser vacuum. OP/1/A/6100/SD-18, Controlling Procedure for Unit Shutdown-Break Vacuum, instructed the unit 1 control room operators to close, 1AS-74, Unit 1 and Unit 2 Auxiliary Steam Header Isolation. The closure of the valve caused the 2B main feedwater pump to slow down due to the resulting decrease in auxiliary steam header pressure causing a decrease in SG levels on all four steam generators. Control room operators on unit 2 responded promptly by starting the 2A and 2B auxiliary feedwater pumps and the 2B service water pump to assist in maintaining steam generator water levels. The auxiliary steam isolation valve was re-opened and steam was restored to the main feedwater pump. The manual actuation of the auxiliary feedwater system was determined by the licensee to be reportable per 10CFR50.72. The licensee is conducting an investigation to determine the root cause.

4. MAINTENANCE (NRC Inspection Procedures 62703 and 61726)

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:

Procedure/Work Order	Equipment/Test
PT/1/A/4350/02B	1B Emergency Diesel Generator Run - Slave Start
PT/1/A/4150/01B	Reactor Coolant Leakage Calculation

PT/2/A/4600/01	RCCA Movement Test
PT/1/A/4600/03A	Semi-Daily Surveillance Items

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

a. Post-Maintenance Testing

The inspectors evaluated two recent plant issues involving post-maintenance/modification testing of safety related equipment. In the first example, maintenance instructions did not include a post maintenance test for the A-train control room essential chiller heat exchanger. This test was required prior to declaring the chiller operable. The licensee declared the chiller operable but later realized the test had not been performed. The chiller was again required to be declared inoperable until the testing could be completed. The testing was completed and the chiller verified to be operable.

The second example involved the post-modification testing of the emergency diesel generator starting air system. During the performance of this test the 2A emergency diesel generator was unexpectedly rendered inoperable. Specifically, sufficient guidance was not provided to ensure starting air system pressure was maintained greater than the minimum allowed system pressure (220 psi).

The inspectors discussed the issues with the licensee and were informed that an evaluation is being conducted on the current work control process, as it relates to post-maintenance/modification testing. The evaluation is expected to identify and resolve challenges that may exist.

5. **ENGINEERING** (NRC Inspection Procedure 37551)

a. Temporary Loss Of Vital AC Power

The inspectors evaluated modification NSM MG-52428. The modification affected certain 125 VDC vital instrumentation control circuit breakers and was previously documented in Inspection Report 50-369,370/95-13. The modification was implemented in response to NRC concerns regarding the McGuire Nuclear Station power system overcurrent coordination. The modification was designed to improve coordination and minimize the probability that the incoming breaker would trip because of a fault, and thereby reduce the vulnerability to a dual unit trip.

On November 28, with Unit 1 at 100 percent power, maintenance personnel were performing the last phase of modification NSM MG-52428. Technicians were implementing modification procedure TN/O/A/2428/P1/AE1, that required the installation of a temporary cable at inverter 1EVIA. The procedure required that the inverter DC input cable, 1EPG 501, be marked and disconnected. However, the technicians erroneously disconnected the AC output cable, 1EPG 510 instead. Disconnecting cable 1EPG 510 caused a loss of the unit Channel I instrumentation and control power.

The inspectors evaluated the effects caused by the loss of AC power to Channel I and noted that first stage impulse pressure instrumentation failed low resulting in a control rod insertion. The control room operators promptly responded and stabilized the plant. Plant challenges were minimized because control room operators had switched controlling channels in preparation for the modification and entered the appropriate abnormal operating procedures. After an evaluation of the occurrence, work continued and the modification was completed without further incident.

The licensee conducted a root cause evaluation and determined that the major contributors to this event was poor communication and co-dependency. The licensee has implemented additional training in qualification, validation, and verification (QV&V) for maintenance and engineering personnel. Also, the licensee expects to develop a training aid for all stations to emphasize the importance of self-checking.

Based on the inspectors evaluation, this item will be identified as a Non-Cited Violation 50-369,370/95-27-01: Failure to follow procedure. This licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII of the NRC Enforcement Policy.

b. Operating Experience Program (OEP) Improvement

The licensee formed an OEP improvement team to resolve previously identified self-assessment and inspection related issues. These issues included the practice of not routinely using OE for the resolution of station problems, ineffective application of operating experience contributing to station events, limited use of OE data, incomplete understanding of the OEP process and inadequate implementation of corrective actions to resolve problems with the OEP process.

The team conducted extensive interviews with station personnel and identified several additional OEP process problems. The licensee also conducted benchmarking meetings with several other utilities.

The OEP improvement team proposed several recommendations. Some of these included the following:

Creation of an OE computerized database

Identification and use of good practices from other utilities

Revising the OEP screening process to identify items of significant interest to the station or industry

Frequent contact with other utilities to identify steps taken in response to OE events

Consolidation of OE information

Development of a communications matrix to facilitate dissemination of OE information

The inspectors evaluated the OEP recommendations and concluded that implementation of these recommendations should improve the use of operating experience data at the station.

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

Fire Protection Training

On November 29, a fire protection training exercise was conducted. The training scenario began with a simulated fire located in a building behind the auxiliary electrical boiler room. The fire involved a transformer that supplied power to a lighting panel. The fire was complicated by the presence of a large quantity of sulfuric acid in the vicinity of the fire.

The inspectors observed that the fire brigade promptly responded to the fire and demonstrated good fire fighting practices. These practices included proper clothing, fire fighting equipment, and SCBA equipment. The site security team arrived promptly at the location of the fire and provided support for the fire brigade. The inspectors observed that the brigade was cautious concerning the use of the fire extinguishing techniques for fighting a fire that was located close to chemicals.

The inspectors determined that the exercise was challenging and that each of the various station teams demonstrated thorough knowledge of their responsibilities and duties. The inspectors observed that the licensee conducted a self-assessment of personnel performance during the exercise. The inspectors determined that the self-assessment was accurate and provided useful recommendations for future exercises.

7. EXIT INTERVIEW

The inspection scope and findings identified below were summarized on December 14, 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:

Item Number	Status	Description and Reference
NCV 50-369,370/95-27-01	CLOSED	Failure to follow procedure (paragraph 5.a.)