



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

Report Nos. 50-369/92-28 and 50-370/92-28

Licensee: Duke Power Company  
 422 South Church Street  
 Charlotte, NC 28201-1007

Facility Name: McGuire Nuclear Station 1 and 2

Docket Nos. 50-369 and 50-370 License Nos. NPF-9 and NPF-17

Inspection Conducted: November 15, 1992 - December 19, 1992

Inspector:	<u><i>W. H. Miller</i></u>	<u>1/12/93</u>
	<i>For</i> P. K. Vanhoorn, Senior Resident Inspector	Date Signed
Inspector:	<u><i>W. H. Miller</i></u>	<u>1/12/93</u>
	T. A. Cooper, Resident Inspector	Date Signed
Approved by:	<u><i>G. A. Benise</i></u>	<u>1/12/93</u>
	G. A. Benise, Section Chief Division of Reactor Projects	Date Signed

SUMMARY

Scope: This routine, resident inspection was conducted in the areas of plant operations, surveillance testing, maintenance observations, Licensee Event Report followup, followup on previous inspection findings, preparation for cold weather, commercial grade material dedication, and evaluation of licensee self-assessment capability.

Results: In the areas inspected, one cited violation and one non-cited violation were identified. The cited violation involved the failure to adequately perform a root cause analysis and develop necessary corrective actions for a Problem Investigation Report as required by a station directive (paragraph 7.b). The non-cited violation involved failure to consider instrument error in the design of the auxiliary feedwater suction supply valve pressure switches (paragraph 6).

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

D. Baxter	Support Operations Manager
A. Beaver	Operations Manager
J. Boyle	Work Control Superintendent
R. Branch	Maintenance General Supervisor
D. Bumgardner	Unit 1 Operations Manager
*B. Caldwell	Training Manager
T. Curtis	System Engineering Manager
J. Foster	Station Health Physicist
F. Fowler	Human Resources Manager
*G. Gilbert	Safety Assurance Manager
P. Guill	Compliance Engineer
B. Hamilton	Superintendent of Operations
B. Hasty	Emergency Planner
M. Hatley	Component Engineering Supervisor
*P. Herran	Engineering Manager
L. Kunka	Compliance Engineer
E. Geddie	Station Manager
T. McMeekin	Site Vice President
R. Michael	Station Chemist
*T. Pederson	Safety Review Supervisor
N. Pope	Instrument & Electrical Superintendent
*R. Sharpe	Regulatory Compliance Manager
B. Travis	Component Engineering Manager
*R. White	Mechanical Maintenance Superintendent

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

#### NRC Resident Inspectors

\*P. VanDoorn, SRI  
\*T. Cooper, RI

\*Attended exit interview

### 2. Plant Operations (71707)

#### a. Observations

The inspection staff reviewed plant operations during the report period to verify conformance with applicable regulatory requirements. Control room logs, shift supervisors' logs, shift turnover records and equipment removal and restoration records

were routinely reviewed. Interviews were conducted with plant operations, maintenance, chemistry, health physics, and performance personnel.

Activities within the control room 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). The inspectors also reviewed Problem Investigation Reports (PIRs) to determine whether the licensee was appropriately documenting problems and implementing corrective actions. The inspectors identified a problem in the PIR area. This is discussed in paragraph 7.b.

Plant tours taken during the reporting period included, but were not limited to, the turbine buildings, the auxiliary building, electrical equipment rooms, cable spreading rooms, and the station yard zone inside the protected area.

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

b. Unit 1 Operations

The unit began the inspection period at 100 percent power and continued to operate at that level except for brief times at reduced power to perform routine testing. At the end of the inspection period, the unit had been on line for 144 days, a unit record.

c. Unit 2 Operations

The unit began the inspection period at 100 percent power and continued to operate at that level throughout the inspection period.

No violations or deviations were identified.

3. Surveillance Testing (61726)

Selected surveillance tests were analyzed and/or witnessed by the resident inspection staff to ascertain procedural and performance adequacy and conformance with the applicable TS.

Selected tests were witnessed to ascertain that approved procedures were available and in use, that test equipment in use was calibrated, that test prerequisites were met, that system restoration was completed and acceptance criteria were met.

The selected tests listed below were reviewed or witnessed in detail:

<u>PROCEDURE</u>	<u>EQUIPMENT/TEST</u>
PT/0/A/4601/08A	Solid State Protection System Train A Periodic Test (Unit 1)
PT/0/A/4457/01A	Chilled Water Pump 1A Performance Test
PT/1/A/4355/01B	Diesel Generator 1B Sump Pump Performance Test
PT/2/A/4204/01A	Residual Heat Removal Pump 2A Performance Test
PT/1/A/4252/02B	Auxiliary Feedwater Valve Stroke Timing - Quarterly 1B Motor Driven Pump Flow Path
PT/2/A/4403/02A	Nuclear Service Water Train A Valve Stroke Timing - Quarterly Unit 2
PT/0/A/4400/15	Fire Protection Annunciator Functional Test
PT/1/A/4250/04A	Turbine Valve Movement Test
PT/1/A/4600/01	RCCA Movement Test

The inspector noted that the Diesel Generator sump pump failed on high flow but upon subsequent re-test, without any other actions, the pump passed. The inspector questioned why this occurred. The licensee indicated that performance may vary slightly due to back-pressure conditions. The test is a simple flow verification. The licensee indicated that they would consider procedurally requiring throttling the discharge valves to regain flow margin.

No violations or deviations were identified.

#### 4. Maintenance Observations (62703)

##### a. Observation

Routine maintenance activities were reviewed and/or witnessed by the resident inspection staff to ascertain procedural and performance adequacy and conformance with the applicable TS.

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

The selected maintenance activities listed below were reviewed or witnessed in detail:

<u>WORK REQUEST/WORK ORDER</u>	<u>ACTIVITY</u>
92088082	Performance Test on Steam Generator "D" Steam Line Pressure Transmitter 2MSMLP5180
92089508	Perform Performance Test Functional Test on Intermediate Range Neutron Monitor N36
92095464	Take As-Found Data and Calibrate Auxiliary Feedwater Suction Pressure Switch 1MCAPS5381
92095463	Take As-Found Data and Calibrate Auxiliary Feedwater Suction Pressure Switch 2MCAIP5380

No violations or deviations were identified.

b Use of Commercial Grade Materials in Safety Related Applications

The inspector continued the review of the commercial grade dedication program. Five commercial grade evaluations were reviewed to assure that they met the requirements of licensee's procedures CGP 1.1, Design Engineering Commercial Grade Technical Evaluation Procedure, and NPP-220, Commercial Grade Items. The evaluations included three lubricating oils or greases, one on several mechanical components, and one on an electrical power supply.

All of the evaluations included the determination that the component was used in a safety related application and could not be procured other than commercial grade. With this determination, was the development of the critical characteristics of each component and the required acceptance criteria for dedication.

The inspector verified, for the lubricating oils and greases, that the acceptance tests were being performed prior to the materials being released for use in the plant. Oil samples were taken from each container of oil received and the oil was segregated until the test results were completed. For the oils, the identified critical characteristics were appearance, kinematic viscosity, flashpoint, and additives (per ASTM D974 or ASTM D664). These characteristics are in line with the licensee's program and the standard developed by EPRI, NP-5652, Guideline for the Utilization of Commercial Grade Items in Nuclear Safety related Applications.

No violations or deviations were identified.

5. Licensee Event Report (LER) Followup (90712, 92700)

The LER listed below was reviewed to determine if the information provided met NRC requirements. The determination included: adequacy of description, verification of compliance with Technical Specifications and regulatory requirements, corrective action taken, existence of potential generic problems, if reporting requirements were satisfied, and the relative safety significance of each event.

(Closed) LER 369/92-10: Unit 1 Containment Integrity Technical Specification Violated

No violations or deviations were identified

6. Followup on Previous Inspection Findings (92701, 92702)

The following previously identified item was reviewed to ascertain that the licensee's responses, where applicable, and licensee actions were in compliance with regulatory requirements and corrective actions have been implemented. Selective verification included record review, observations, and discussions with licensee personnel.

(Closed) Unresolved Item 369,370/92-26-01: Review of Auxiliary Feedwater System Design. The Auxiliary Feedwater System (CA) is provided with three pumps, two motor driven and one turbine driven. Three preferred non-safety related suction sources are provided from the Condensate Storage Tank, the Upper Surge Tank and the Hotwell. A common pipe from these three sources is connected to the CA suction header for all three pumps. A portion of this pipe is located in the Service Building and was not designed for seismic loads. In addition, a seismic suction source is provided by the Nuclear Service Water System (RN). Suction valves to the RN system are actuated by CA pressure switches when low pressure is sensed in the suction header. The actuation is delayed by three seconds.

On October 27, 1992, during an instrument setpoint verification associated with the Design Basis Documentation (DBD) program, the licensee questioned whether failure of this non-seismic portion of piping was a problem. The licensee postulated a failure of the non-seismic pipe that results in a loss of the normal CA suction sources and a partial draindown of the CA suction header. The licensee questioned whether the setpoints of the pressure switches would allow the RN suction source to be available in sufficient time to prevent air binding of the pumps. A PIR (O-M92-0406) was written, calculations were started, a modification to raise the setpoints was started and the licensee began to evaluate the non-seismic pipe against Seismic Qualification Utility Group (SQUG) seismic guidance.

On October 29, the licensee completed modifications to raise the switch setpoints by one psi. The licensee also determined that portions of the piping met the SQUG criteria and further determined that the new setpoints along with the portion of pipe which met the SQUG criteria

assured CA operability.

On November 24, 1992, the licensee declared that the CA System had been inoperable for the following specific scenario:

- Safe Shutdown Earthquake
- Loss of normal feedwater
- Loss of normal CA suction source, e.g., loss of the non-seismic portion of suction piping
- No loss of offsite power (turbine driven pump does not auto start)
- A motor driven CA pump fails
- Pressure switches were in error below 2 PSIG

In this event RN swapover would not occur in time per the calculations to prevent air entering the suction header and possibly resulting in damage to the CA pumps.

The inspector reviewed the licensee's probabilistic analysis of this event. It appears that the probability of this event causing loss of CA has a frequency of  $4E-7$ /year. This coupled with a failure of operators to properly perform feed and bleed cooling leads to a core damage frequency of  $4E-9$ /year. It is also noted that the switchyard insulators have a lower seismic capability than the normal CA suction piping (mean value of 0.2g versus 0.4g). Because of this lower seismic capability, a switchyard failure is more probable than a CA suction piping failure.

The licensee determined that the original design failed to consider the maximum possible error (1.7 PSIG) of the pressure switches. The licensee has completed approximately 30 system setpoint verifications without finding a similar problem and intends to continue the verification process with each DBD system. The licensee was unable to identify exactly why the original design did not fully consider the instrument error. At the end of the inspection period, the licensee was still evaluating the best way to upgrade the suction piping.

10 CFR 50, Appendix B, Criterion III and the licensee's accepted Quality Assurance Program (Duke Topical Report, Duke 1-A) require that measures be established to assure that applicable regulatory requirements and the design basis for structures, systems, and components are correctly translated into specifications, drawings, procedures, and instructions.

Contrary to the above, measures were not adequate to assure that applicable regulatory requirements and the design bases for structures, systems, and components were correctly translated into specifications, drawings, procedures, and instructions, in that the licensee failed to consider instrument error in designing suction pressure switch settings for the CA system. This resulted in the possibility of air entrainment

into CA pumps prior to swap over to the assured suction source if the normal non-seismic/non-safety related suction piping should fail. This is a licensee identified issue and the licensee appears to be taking appropriate corrective action. Therefore, this violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII.B. of the Enforcement Policy. This is Non-Cited Violation 369,370/92-28-01: Failure to Adequately Consider Instrument Error in Design of the Auxiliary Feedwater System.

Following the increase of the setpoint on the pressure switches, at the end of October, the licensee resumed the normal preventive maintenance schedule for the switches. On December 10, 1992, some of the switches came due for normal preventive maintenance. While calibrating four of the switches, it was noted that some of the switches had drifted outside of the operational tolerances. All of the switches were recalibrated as a result. Eight of the switches had drifted outside of the calibration tolerances and four of these had drifted outside of the operational tolerances. The original thought was that the calibration methodology and switch design had lead to the problem. The calibration methods were revised and all of the switches recalibrated.

On December 17, 1992, four of the switches were checked to verify setpoints. Two of these switches were ones that had been found inoperable during the previous calibration. At this time, three of the four switches had drifted out of the calibration tolerances; one had drifted out of the operational tolerances and one had drifted a significant amount in the conservative direction. Conclusions were drawn that the switches had a tendency to drift, but it could not be predicted if the drift would be in the conservative or non-conservative direction. On December 18 and 19, 1992, the four worst drifting switches were replaced, all other switches were calibrated, and all switch setpoints were raised 2 psig. In all, prior to the higher setpoints, 11 switches had drifted out of the calibration tolerances and 2 switches had drifted out of the operational tolerances. The higher setpoint would allow for a larger drift prior to the switch being inoperable, allowing enough time to evaluate long term corrective actions for the drifting switch problem. Plans being evaluated include the replacement of the switches with a different type of switch. The residents will follow the resolution of this issue during future inspections.

One non-cited violation was identified as described above.

## 7. Evaluation of Licensee Self-Assessment Capability (40500)

### a. Joint Utility Management Audit (JUMA)

The inspector reviewed a report to the licensee regarding the results of a JUMA review of the quality assurance program. The audit team consisted of three individuals from three other utilities, two audit supervisors and a quality verification



general manager. The licensee requested this audit to provide additional assurance that the quality assurance (QA) program had been effectively implemented under the new organization which had been in place for approximately one year. The audit was conducted on October 19-23, 1992.

The audit covered the areas of supplier activities, internal audits, Nuclear Safety Review Board (NSRB) activities, Safety Assurance activities, engineering and maintenance. The audit team made the following conclusion:

"Based on reviews and interviews conducted, it appears the reorganization and the resulting Topical Report revision have not adversely effected day to day work activities. However, procedural changes to reflect the organizational structure and associated responsibilities are still in progress. Even though the development schedule is apparent, it does not appear it will have an adverse effect."

The team noted 15 observations/recommendations. The most significant included:

- A misinterpretation of requirements may exist regarding the level of review by the NSRB for unreviewed safety questions.
- The site Safety Review Group (SRG) has not fully defined its role in self-assessment.
- The SRG inplant reviews and surveillances have decreased in 1992.
- SRG has not reviewed modification activities or instrumentation inspection activities.
- A number of procedures are yet to be revised and the schedule appears to be slipping. Most are scheduled for completion by January, 1993.
- Additional training should be conducted such as Q Philosophy/Awareness and Q Procedure Skill Training. For example, several SRG personnel were not aware of their "stop work authority". Also the philosophy behind incorporating inspectors into the maintenance group was not well understood in some cases.

The audit appeared to cover the key areas of the Q program and appropriately identified areas for improvement. The licensee informed the inspector that appropriate corrective actions would be developed and that the inspector would be informed of these actions.

b. Review of Problem Investigation Reports

The inspector reviewed selected Problem Investigation Reports (PIRs) to determine if the licensee was thoroughly evaluating problems and developing appropriate corrective actions. PIR No. 0-M92-0140 documented a problem with effluent monitor (EMF) 53 which functions to shutdown the exhaust fan for the waste storage building ventilation system upon reaching the setpoint. On September 17, 1992, the EMF did not shutdown the exhaust fan during a test. The licensee discovered two loose wires and a jumper in the electrical termination cabinet for the EMF. The root cause documented on the PIR was simply a restatement of the problem and consequently no preventive corrective actions were developed relative to the root cause of the problem. The inspector questioned the licensee as to the adequacy of the evaluation and corrective actions and the licensee immediately reopened the PIR for further review.

Licensee Station Directive 2.8.1, Problem Investigation Process, paragraph 5.2.5.2.2 requires that the PIR resolution be sufficiently detailed to clearly identify the root cause, when possible, and identify actions necessary to prevent recurrence. This failure to adhere to procedural requirements is a violation of 10 CFR 50, Appendix B, Criterion V, which requires activities affecting quality to be accomplished in accordance with established procedures. This is Violation 369,370/92-28-02: Failure to Follow Procedure for the Problem Investigation Process.

One violation was identified as described above.

8. Cold Weather Preparations (71714)

The inspector performed an inspection of the licensee preparation to protect safety related systems against cold weather. The inspector reviewed licensee procedure, PT/O/B/4700/38, Verification of Freeze Protection Equipment and Systems, which was being implemented during the inspection. All required steps of the procedure had been completed, with the exception of the evaluation of the functional test on the hot water system (YH).

The inspector verified that the YH system was in operation, the evaluation was continuing as the licensee procedure was being performed.

The inspector verified that preventive maintenance was completed on the heat tracing in the plant, prior to the completion of the check-list. The doghouse lower steam vent louvers have been closed and top steam vent curtains have been installed. The doghouse heaters are energized and functioning when the temperature is below 35 degrees F.

The licensee operations staff have successfully verified that the operator aid computer points that monitor doghouse temperatures are in service and functioning.

The Auxiliary Building ventilation system preparation for cold weather has been completed, cooling water has been isolated and all moisture has been drained from the system.

No violations or deviations were identified.

9. Exit Interview (30703)

The inspection scope and findings identified below were summarized on December 21, 1992, with those persons indicated in paragraph 1 above. The following items were discussed in detail:

Non-Cited Violation 369,370/92-28-01: Failure to Adequately Consider Instrument Error in Design of the Auxiliary Feedwater System (paragraph 6).

Violation 369, 370/92-28-02: Failure to Follow Procedure for the Problem Investigation Process (paragraph 7.b.).

The licensee representatives present offered no dissenting comments, nor did they identify as proprietary any of the information reviewed by the inspectors during the course of their inspection.