



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION II
 101 MARIETTA STREET, N.W.
 ATLANTA, GEORGIA 30223

Report Nos. 50-369/90-24 and 50-370/90-24

Licensee: Duke Power Company
 P.O. Box 1007
 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: October 17, 1990 - November 19, 1990

Inspectors:	<u>W.H. Meade for</u>	11-21-90
	P. K. Van Doorn, Senior Resident Inspector	Date Signed
	<u>T. Cooper for</u>	11-21-90
	T. Cooper, Resident Inspector	Date Signed
	<u>W.H. Meade for</u>	11-21-90
	S. Vias, Resident Inspector	Date Signed
Approved by:	<u>M. B. Shymlock</u>	11-21-90
	M. B. Shymlock, Section Chief	Date Signed
	Division of Reactor Projects	

SUMMARY

Scope: This routine, resident inspection was conducted on site inspecting in the areas of plant operations safety verification, surveillance testing, maintenance activities, followup on Licensee Event Reports and followup on previous inspection findings.

Results: In the areas inspected, one non-cited violation was identified involving an inadequate operability evaluation for the Annulus Ventilation System (paragraph 5.b.)

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- G. Addis, Superintendent of Station Services
- *D. Baxter, Support Operations Manager
- J. Boyle, Superintendent of Integrated Scheduling
- D. Bumgardner, Unit 1 Operations Manager
- *G. Copp, Planning Manager
- J. Foster, Station Health Physicist
- D. Franks, QA Verification Manager
- *G. Gilbert, Superintendent of Technical Services
- *M. Hatley, Maintenance Engineer Supervisor
- *C. Hendrix, Maintenance Engineering Services Manager
- *R. Jackson, Performance Test Supervisor
- T. Mathews, Site Design Engineering Manager
- *T. McConnell, Plant Manager
- R. Michael, Station Chemist
- *D. Murdock, McGuire Design Engineering Division Manager
- *T. Pedersen, Compliance Engineer
- R. Pierce, IAE Engineer
- W. Reeside, Operations Engineer
- R. Rider, Mechanical Maintenance Engineer
- *M. Sample, Superintendent of Maintenance

- *R. Sharpe, Compliance Manager
- J. Snyder, Performance Engineer
- J. Silver, Unit 2 Operations Manager
- A. Sipe, McGuire Safety Review Group Chairman
- B. Travis, Superintendent of Operations

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

*Attended exit interview

2. Plant Operations (71707, 71710)

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 to determine whether the licensee was appropriately documenting problems and implementing corrective actions.

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 in Mode 5, following the unit being shutdown on October 16, 1990, to repair the gaskets between the inner and outer cylinders in all three low pressure turbines. On October 31, 1990, the licensee declared both trains of Control Room Ventilation (VC) inoperable due to the inability to maintain positive 0.125 inch water gauge pressure in the control room with certain alignments of Auxiliary Building Ventilation (VA). (See discussion in paragraph 3.). The licensee then entered TS 3.7.6 which prohibited them from any reactivity changes on both units.

On November 1, 1990, Unit 1 operators were informed that the Unit 1 Ice Condenser had been determined to be inoperable due to unqualified U-bolts on the Ice Condenser baskets: (See discussion in paragraph 4.c.). On November 10, 1990 the licensee declared the VC system operable after doing repairs and a performance test. On November 12, 1990 after completing repairs and testing of the U-bolts, the Ice Condenser system was declared operable. The unit began heatup on November 13, 1990 and entered Mode 1 the next day. On November 17, 1990 the unit experienced a Turbine Trip/Reactor Trip due to High Exhaust Hood Temp on the 'B' low pressure turbine. All plant systems responded normally and the unit returned on line later that evening. The root cause of the trip was a damaged temperature sensor. The unit ended the report period at 100% power.

c. Unit 2 Operations

The unit began the inspection period in Mode 6, continuing the refueling outage. The operability issues of the U-bolts in the ice condenser and the VC system for Unit 1, also pertains to Unit 2 and are being pursued. The unit entered Mode 5, mid loop operation on

November 30, 1990. The original startup date has been delayed due to problems with the turbine work. The unit is now scheduled to be on-line on December 23, 1990.

No violations or deviations were identified.

3. Surveillance Testing (61726)

a. Tests Reviewed

Selected surveillance tests were analyzed and/or witnessed by the inspector to ascertain procedural and performance adequacy and conformance with applicable Technical Specifications.

Selected tests were witnessed to ascertain that: current written 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.

Detailed below are selected tests which were either reviewed or witnessed:

<u>PROCEDURE</u>	<u>EQUIPMENT/TEST</u>
PT/0/A/4450/08C	Control Area Ventilation System Performance Test
PT/2/A/4404/03A	RV Train A Valve Stroke Timing Shutdown
PT/1/A/4403/07	RN Train 1A Flow Balance Test
PT/1/A/4450/06B	VX System Train 1B Performance Test
PT/2/A/4452/02B	VE Train B Valve Stroke Timing
PT/1/A/4252/01A	Motor Driven Auxiliary Feedwater Pump 1A Performance Test
PT/1/A/4200/02A	Monthly Containment Integrity Verification
OP 0/A/6100/06	Estimated Critical Rod Position
OP/1/A/6150/09	Boron Concentration Control
OP/2/A/6350/02	Diesel Generator
OP/0/A/6100/09	Reactivity Balance Calculation

PT/1/A/4600/08	Pre Criticality Surveillance Items for Unit Startup
PT/1/A/4600/01	RCCA Movement Test
PT/2/A/4200/09/A	ESF Actuation Periodic Test
PT/1/A/4204/01B	Residual Heat Removal Pump 1B Performance Test

b. Residual Heat Removal Pumps

Information Notice 90-61 was issued in September, 1990, as a result of an incident at the Sequoyah Nuclear Power Plant, when parallel operation of the Residual Heat Removal pumps caused the weaker pump to be deadheaded by the stronger pump.

The licensee determined that they had a similar configuration to the Sequoyah Residual Heat Removal system and by reviewing the data from past surveillance tests, determined that the possibility of a similar problem existed at McGuire. The utility decided to run tests on both of the units to identify whether the problem actually existed.

On November 13, 1990, the test was run on the Unit 1 Residual Heat Removal (ND) system. Pump 1B was determined to be the weaker of the two pumps, from past surveillance data. The 1B pump was started and normal surveillance data was taken. At that time, pump recirculation flow was measured at approximately 367 gpm. The 1A pump was then started and changes to the 1B pump were observed. With the 1A pump running, with approximately 620 gpm recirculation flow, the recirculation flow on the 1B pump dropped to approximately 234 gpm. This demonstrated that there was an effect on the operations of the weaker pump during parallel operation, even though the weaker pump did not actually deadhead.

Analysis performed following the issuance of Generic Letter 88-04, "Potential Safety-Related Pump Loss," concluded that if the recirculation of a single pump is between 300 and 1000 gpm, a pump is conditionally operable for 3 hours in each 24 hour period. ND pump 1A fell into the 3 hour conditional operability status during the test. During the present review, Design Engineering determined that if the recirculation flow for a single pump was between 100 and 300 gpm, the pump was conditionally operable for 30 minutes. During the parallel pump test, ND pump 1B was in this condition.

The recirculation flow for a single ND pump normally is approximately 400 gpm. This would place the pumps in a conditional operability, according to Design Engineering calculations. Appropriate steps have been placed in the Emergency Procedures to assure that operation in the conditional state is prevented for longer than the analyzed times.

The same test will be performed on Unit 2 when the unit enters Mode 4. Reviews of the normal surveillance data indicates that Unit 2 will probably have a greater interaction between the two pumps during parallel operation, with a higher probability of the weaker pump being deadheaded by the stronger. The licensee will be submitting an LER regarding this event due to past inoperability of one train of ND.

c. Engineered Safety Features Test

The inspectors witnessed the performance of surveillance procedure PT/2/A/4200/09A, Engineered Safety Features Actuation Periodic Test. This integrated test demonstrates: (1) Diesel Generator ability to restart and load in response to a manually initiated safety injection, Phase A and B Isolations, and a Blackout. (2) A paralleled Diesel Generator returns to standby status and emergency loads are sequenced onto the offsite power supply, following a safety injection. (3) Diesel Generator starting, load shedding, and emergency load sequencing in response to a blackout.

Train A testing was observed by the inspectors. The test was completed satisfactorily. All components not tested during the main test were successfully tested during the overlap test.

d. Control Room Ventilation System

The licensee has had an ongoing extensive evaluation of ventilation systems due to design weaknesses previously identified. As part of this effort the licensee tested the effect of the Auxiliary Building Ventilation System (VA) on the Control Room Ventilation System (VC). VA had recently been improved, in effect increasing its capability to draw negative pressure in the Auxiliary Building (AB). The North wall of the Control Room (CR) is a boundary with the AB that has many penetrations which were possible paths for leakage. VC is required to maintain a positive 1/8-inch water gauge pressure in the CR which is common for both Units. Therefore VA could affect VC capability to meet requirements if appreciable leakage existed. The leakage paths were under insulation, removal of which would require both Units to be in an outage since VC would be inoperable due to creation of additional leak paths by the removal process.

The licensee developed the most conservative VA test configuration which included all four VA filtered exhaust fans on, all VA outside air supply fans and unfiltered exhaust fans off, and isolation dampers for the idle VC filter train failed open. Both VC trains were tested in this configuration and failed. The licensee began an extensive evaluation relative to possible modifications and/or compensatory actions to reestablish operability. Since both Units were in an outage a concurrent extensive search and seal effort was conducted at the North wall of the CR. The licensee found

significant leakage areas which were sealed. VC was retested and passed without the need for modifications or compensatory actions. The weakest train developed .225 - inch water gauge positive pressure. The licensee will submit an LER concerning this situation. Further review of this issue will be accomplished through review of the LER.

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 applicable Technical Specifications.

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.

<u>Activity</u>	<u>Work Request/Procedure</u>
Adjust Turbine Driven Auxiliary Feedwater Governor Valve	08377B PM
Perform Unit 2 10 Year ISI Hydro, NI Hydro #1	503450 MNT
Smoke Test on B Train Control Room Air Handling Unit 2	504089 MNT
Perform Vibration Measurement on 2B ND Pump	05069B PM
Perform PM/PT on NIS Flux Deviation, Time Scaler, Comparator and Rate Drawers	04357B PT
Clean/Repair Packing Leak on 2RNCV0022A	137061 OPS
Perform PM on 2EVIA Inverter Board Relays	05126B PM
Perform PM/PT on NI35 Analog Channel Operational Test	03994C PT

Inspect All Cables in Unit 2 600480 IAE
7300 Cabinets

Replace White Melamine 69317 IAE
Torque Switch and Movats
Actuator to Valve-in Mov
List

Ice Condenser U Bolt Torque 504191
to Preload Comparison Test
Procedure (MP/O/A/7150/09)

Fire Barrier Penetration 504216 MNT

b. Containment Purge Fan

Problem Investigation Report (PIR) 2-M89-0193, was written on August 9, 1989 on a failure to perform a functional test and retest on the Containment Purge fan, 2B, following maintenance, prior to the system being required operable for Core Alterations. The system was considered operable, however, since the routine surveillance had been performed prior to Core Alterations, it appeared to be merely an administrative problem in the completion of Work Request (WR) 56105 MNT.

PIR 2-M90-0275, was written on October 16, 1990, for the same issue, on the same WR. In the 14 months since the earlier PIR, the retest on WR 56105 MNT had not been signed off, even though the routine surveillance had been completed twice. Either of these surveillances could have been used to complete the retest requirements of the WR.

This is considered an administrative issue in the completion of this WR. Work planning acknowledges that a programmatic problem exists in identifying equipment which is required in a shutdown mode, when in operation, which may require maintenance or testing. Resolution will be tracked under the recent PIR.

c. Ice Condenser U-Bolts

On November 1, 1990, the licensee reported finding some missing and broken U-bolts in the Unit 2 Ice Condenser while conducting routine maintenance during Cycle 7 Refueling Outage. On November 2-3, 1990, the licensee conducted a 100 percent visual inspection of the Unit 1 and Unit 2 Ice Condenser basket U-bolts, to more accurately assess the extent of this condition. The results of the inspection revealed: 4 broken bolts, 2 missing bolts, and 13 missing nuts on Unit 1; 5 broken bolts, 8 missing bolts, and 11 missing nuts on Unit 2. Additionally, during proof testing the Unit 1 U-bolts, several more bolts were broken and it was discovered that a significant number of split ring lockwashers used with the U-bolts were cracked or broken.

In efforts to determine the significance of the broken bolts, Duke requested Westinghouse to conduct an evaluation of this condition. There are two U-bolt assemblies, located at the bottom of each ice basket column, which affix the basket, by means of a clevis, to its lower support structure. These assemblies serve to provide assurance that the ice basket does not lift-off under the loading condition represented by a design basis accident in combination with a safe shutdown earthquake. The U-bolts are Cadmium plated, 3/8" diameter, SAE J 429 GR 8 material. There are 1,944 baskets in each unit. The licensee developed a test method and procedure to assure that the U-bolts would be able to withstand the design bases load. The licensee also developed a surveillance procedure to proof torque test all accessible bolts in the field. In total, the bolts for 1415 baskets were tested on Unit 1 and bolts for 672 baskets were tested on Unit 2.

The licensee reports that initial indications suggest that the initiating mechanism may be inner granular cracking further propagated by ductile type transgranular cracking under tensile stress - possibly the result of loads applied to each of the assemblies during the periodic weighing per TS surveillance requirements. Duke metallurgists also revealed that there are also indications of quench cracking, and evidence, in some cases of the cadmium plating on the inside of the fissures in the U-bolt material that had cracked.

After all testing and repairs were performed on Unit 1, the Ice Condenser was declared conditionally operable with restrictions. The ice basket weighing and replenishment are not to be performed in the future without prior approval of Design Engineering. Work was complete on the Unit 2 assemblies and final documentation was in progress at the end of the inspection period.

No violations or deviations were identified.

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

The below listed Licensee Event Reports (LER) were 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; reporting requirements satisfied; and, the relative safety significance of each event. Additional inplant reviews and discussion with plant personnel, as appropriate, were conducted for those reports indicated by an (*). The following LERs are closed:

369/90-25, Rev. 1

Unit 1 Shutdown Because of Unidentified
Reactor Coolant System Leak

- *369/90-26 Removal of the Emergency Air Penetration Access Plate Rendered the Annulus Ventilation System Inoperable Because of a Design Deficiency
- *369/90-12 Loose Material Located in Upper Containment During Unit Operation
- 370/90-03 Diesel Generator Surveillance Missed Because of Management Deficiency

In August, 1989 the licensee identified that removal of the Emergency Air Penetration Access Plate which was required to be accomplished during testing could render the Annulus Ventilation System (VE) inoperable. This plate was required to be removed in order to test the Lower Personnel Air Lock (LPAL). A licensee analysis indicated that if appropriate precautions were implemented to reinstall the plate if VE was needed that testing could proceed. The licensee implemented the precautions in the procedure (Pf/1 and 2/A/4200/01F) and conducted testing.

A licensee Quality Assurance audit in September 1990 questioned the viability of the previous evaluation. During the reevaluation it was recognized that the Annulus Bypass Leakage Enclosure Access Door was also required to be open during the testing. This had not been previously identified to Design Engineering (DE) and therefore had not been considered in the first evaluation. The reevaluation showed that under the required design accident assumptions, offsite dose would have slightly exceeded design basis guidelines. This issue was reported by LER 369/90-26.

A previous violation was issued (NRC Inspection Report 369,370/89-24 dated October 6, 1989) for inadequate design control of VE in that the original design had the test tap located nonconservatively. This issue is similar in that the LPAL and Annulus were not adequately designed for testing without rendering VE inoperable. However, the licensee had originally identified this issue just prior to the time frame of the previous violation. The licensee did fail to properly communicate facts to DE leading to an incomplete evaluation and therefore violated T.S. 3.6.1.8 which requires both trains of VE to be operable. The licensee has completed a modification to provide for adequate testing.

This licensee identified violation is not being cited because criteria specified in Section V.G.1 of the NRC Enforcement Policy were satisfied. This is Non-Cited Violation 369,370/90-24-01: Failure to Meet T.S. for Annulus Ventilation Due to Inadequate Evaluation of Design Problem.

One non-cited violation was identified.

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

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

(Closed) Violation 370/89-31-01: Inadequate Procedure Leading to Containment Spray Overpressurization. The licensee responded to this violation in a letter dated December 22, 1989. The inspector reviewed the procedure and programmatic revisions made to assure that an adequate review of operating status exists prior to releasing components for testing. Personnel have been trained and have demonstrated a familiarity with the requirements.

(Closed) Inspector Followup Item 369,370/90-09-03: Lack of Centralized Control of Fire Protection Program. The licensee has assigned a System Expert (SE) for fire protection. The duties of the assignee appear to be excessive and may not allow adequate proactive SE effort. However, the licensee is presently evaluating the entire SE program including work distribution and intends to make appropriate changes. Further review will be conducted of the overall SE program changes.

(Closed) Unresolved Item 369,370/90-11-07: Evaluation of QA Consumable Materials Ordering Practices. The Quality Standards Manual for McGuire listed Diesel Generator (DG) fuel as QA 1 material but had been ordered as commercial grade. In the case of DG fuel, complete licensee testing had been accomplished which is required by the Technical Specification. The licensee had only failed to fill out the commercial grade evaluation for the commercial grade evaluation for the DG fuel. This appears to be an isolated paperwork problem. Therefore, this item is closed.

(Closed) Violation 369/90-13-03: Failure to Follow Containment Cleanliness Technical Specification. The licensee responded to this violation in a letter dated September 10, 1990. Procedure revisions have been issued, and the appropriate personnel trained on these procedures, to control containment cleanliness.

7. Exit Interview (30703)

The inspection scope and findings identified below were summarized on November 19, 1990 those persons indicated in paragraph 1 above. The following item was discussed in detail:

Non-Cited Violation 369,370/90-24-01: Failure to Meet TS for Annulus Ventilation Due to Inadequate Evaluation of Design Problem (paragraph 5).

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.