



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
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ATLANTA, GEORGIA 30303-8931**

October 11, 2002

Duke Energy Corporation  
ATTN: Mr. H. B. Barron  
Vice President  
McGuire Nuclear Station  
12700 Hagers Ferry Road  
Huntersville, NC 28078-8985

**SUBJECT: MCGUIRE NUCLEAR STATION - NRC INTEGRATED INSPECTION REPORT  
50-369/02-03 AND 50-370/02-03 AND INDEPENDENT SPENT FUEL  
STORAGE INSTALLATION INSPECTION REPORT 72-38/02-03**

Dear Mr. Barron:

On September 14, 2002, the NRC completed an integrated inspection at your McGuire Nuclear Station. The enclosed report documents the inspection findings which were discussed on September 19, 2002, with Mr. D. Jamil and other members of your staff.

The inspection examined activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your licenses. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, the inspectors identified two findings of very low safety significance (Green). One of the findings was determined to involve a violation of NRC requirements. However, because of the very low safety significance and because it has been entered into your corrective action program, the NRC is treating this finding as non-cited violation, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny this non-cited violation, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the United States Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the McGuire facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system(ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Robert C. Haag, Chief,  
Reactor Projects Branch 1  
Division of Reactor Projects

Docket Nos. 50-369, 50-370, 72-38  
License Nos. NPF-9, NPF-17

Enclosure: NRC Integrated Inspection Report 50-369/02-03, 50-370/02-03, 72-38/02-03  
w/Attachment - Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-369, 50-370, 72-38

License Nos: NPF-9, NPF-17

Report Nos: 50-369/02-03, 50-370/02-03, 72-38/02-03

Licensee: Duke Energy Corporation

Facility: McGuire Nuclear Station, Units 1 and 2

Location: 12700 Hagers Ferry Road  
Huntersville, NC 28078

Dates: June 16, 2002 - September 14, 2002

Inspectors: S. Shaeffer, Senior Resident Inspector  
E. DiPaolo, Resident Inspector  
R. Aiello, Senior Operations Engineer (Section 1R11.2)  
R. Chou, Reactor Inspector (Section 4OA5)  
J. Ennis, Physical Security Inspector (Section 3PP4 - in office review)  
L. Miller, Senior Operations Engineer (Section 1R11.2)  
L. Mellen, Senior Operations Engineer (Sections 1EP2-1EP5 and 4OA1.3)  
W. Sartor, Sr. Emergency Preparedness Inspector (Sections 1EP2-1EP5 and 4OA1.3)  
J. Wallo, Physical Security Inspector (Sections 3PP1, 3PP2, 4OA1.2, and 4OA3.3)

Approved by: Robert C. Haag  
Projects Branch 1  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR05000369-02-03, IR05000370-02-03, IR 07200038-02-03, Duke Energy Corporation, 06/16/02 - 09/14/02, McGuire Nuclear Station Units 1 & 2, Operability Evaluations, Event Followup.

The inspection was conducted by two resident inspectors, a regional senior emergency preparedness inspector, a regional reactor inspector, two regional physical security inspectors, and three regional senior operations engineers. One Green non-cited violation and one Green finding were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using the Significance Determination Process (SDP) found in Inspection Manual Chapter 0609. Findings for which the SDP does not apply may be "Green" or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

### **A. Inspector Identified Findings**

#### Cornerstone: Mitigating Systems

- Green. A finding was identified for not considering the Technical Specification (TS) bases required operating time in an operability determination for equipment in a degraded condition. Following the discovery of a refrigerant leak on the A control room area chiller, the licensee concluded that the condition did not affect operability. However, in making the determination, the licensee did not consider the design bases of the control room area chilled water system to maintain the control room temperature for 30 days of continuous occupancy. Upon considering the TS bases operating time without establishing compensatory measures, the licensee declared the train inoperable.

Not considering the TS bases operating requirements in operability determinations with equipment in degraded conditions could become a more significant safety concern because it may result in TS LCOs not being met. This finding was determined to be of very low safety significance (Green) because the A train control room area chiller was not inoperable for greater than its TS allowed outage time. (Section 1R15).

- Green. A self-revealing non-cited violation of 10 CFR 50, Criterion XVI, was identified for a failure of licensee corrective actions to effectively modify the Unit 2A residual heat removal (ND) pump discharge check valve (2ND-23) to preclude it from sticking open following a similar event on the opposite Train valve in April 1999. This resulted in valve 2ND-23 sticking open during system flushing in April 2002, rendering both trains of ND inoperable.

If left uncorrected, this issue could have become a more significant safety concern, because it could have affected the functional capability of the ND system. This finding, which was evaluated using Phase II of the SDP and reviewed by a regional Senior Reactor Analyst, was determined to be of very low safety significance. This determination reflects the fact that this issue only becomes a potential problem during the injection phase of a large break loss of coolant accident when the Train of ND with

the stuck open check valve fails to start and/or run following the associated safety injection signal. (Section 4OA3.2)

**B. Licensee Identified Violations**

None

## Report Details

### Summary of Plant Status:

Unit 1 began the inspection period at approximately 100 percent power. On September 4, 2002, Unit 1 began a planned thermal average coolant temperature (Tave) reduction plan to extend the achievable power levels during coastdown for end-of-cycle (EOC 15). Following a planned power reduction, on September 13, at approximately 11:00 p.m., operators manually tripped the reactor from approximately 17 percent reactor power to initiate the EOC 15 refueling outage. This shutdown method was previously planned and performed to minimize the risk of a low power feedwater transient. The unit ended the inspection period in Mode 5 (Cold Shutdown), preparing for reactor coolant system cleanup and refueling activities.

Unit 2 began the inspection period at approximately 100 percent power. On August 22, 2002, operators manually tripped Unit 2 due to indications of lowering main generator hydrogen pressure as a result of a fire at a main turbine hydrogen dryer. Unit 2 was restarted on August 24, and continued operation at approximately 100 percent power for the remainder of the inspection period.

## **1. REACTOR SAFETY**

### **Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity**

#### 1R01 Adverse Weather

##### a. Inspection Scope

The inspectors performed reviews of design features and implementation of procedures protecting mitigating systems from adverse weather affects. Specifically, the inspectors reviewed the effects of drought and high temperature conditions on a periodic basis to ensure the adverse conditions were being monitored by the licensee and critical system parameters remained within design limits. The reviews involved the essential service water system temperature and lake level requirements, containment temperature limits, and the effects of high ambient temperatures on auxiliary and control building cooling unit capabilities. The inspectors compared actual temperature data for these systems and compared them to design basis and administrative limits, performed walkdowns of applicable plant areas, and reviewed the licensee's Problem Investigation Process system for insights to licensee identified problems in these areas.

In addition to the above, the inspectors also reviewed the licensee's current revision of RP/0/A/5700/06, Natural Disasters, to evaluate the readiness of the plant to cope with high wind conditions to ensure adequate measures were planned to maintain and protect the operability of system, structures, or components (SSCs).

##### b. Findings

No findings of significance were identified.

#### 1R04 Equipment Alignment

##### a. Inspection Scope

For the systems identified below, the inspectors reviewed plant documents to determine correct system lineup, and conducted walkdowns to verify that the systems were correctly aligned when the redundant trains were inoperable or out-of-service. For the component cooling water (KC) and the safety injection (NI) systems, the walkdowns were performed while the opposite trains were declared inoperable for maintenance and testing.

- 1A KC Train (when 1B KC Train was out-of-service on June 25, 2002)
- Unit 1 spent fuel pool cooling (prior to the beginning of EOC 15 refueling outage)
- 2A NI Train (when 2B NI Train was out-of-service on July 17, 2002)

The inspectors assessed conditions such as equipment alignment (i.e., valve positions, damper positions, and breaker alignment) and system operational readiness (i.e., control power and permissive status) that could affect operability of these systems. The inspectors also reviewed the licensee's corrective action system and component health database for previously identified conditions adverse to quality to assess the licensee's ability to identify and correct problems.

##### b. Findings

No findings of significance were identified.

#### 1R05 Fire Protection

##### a. Inspection Scope

To assess the adequacy of the fire protection program implementation, the inspectors toured the following areas to assess transient combustible material control, visible material condition, and lineup of fire detection and suppression systems, status of manual fire equipment, and condition of passive fire barriers:

- Units 1 and 2 Auxiliary Building elevation 767
- Unit 1 spent fuel pool cooling areas
- Unit 1 and 2 residual heat removal (ND) pump rooms
- Unit 2 emergency diesel generator (EDG) room
- Units 1 and 2 emergency switchgear rooms ETA and ETB
- Unit 2 turbine building (main feedwater pump area)

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

.1 Unit 1 Shutdown Training

a. Inspection Scope

On August 8, 2002, the inspectors reviewed licensed operator requalification performance and associated training documentation to verify that performance deficiencies had been addressed through the requalification training program. Specifically, the inspectors observed classroom training activities associated with Tave reduction operations in preparation for performance during coastdown on Unit 1. The inspectors focused on operator actions during abnormal operations and lessons learned from previous industry operating experiences. Additionally, the inspectors reviewed just-in-time simulator training in preparation for the Unit 1 shutdown for the EOC15 refueling outage.

b. Findings

No findings of significance were identified.

.2 Program Inspection

a. Inspection Scope

The inspectors reviewed the facility operating history since the last requalification program inspection to determine if the licensee adequately assessed operator performance. The inspectors also reviewed the biennial written examinations for several crews. This review was done to determine if the examinations given to the licensed operators were done in accordance with the criteria set forth in NUREG 1021, Operator Licensing Examination Standards for Power Reactors. The review of documentation and interviews of licensee personnel were conducted to determine if the licensee was effective in integrating industry, plant and student feedback into the requalification training program. The inspectors evaluated the method used by the licensee for examination development to determine if the licensee used the criteria contained in NUREG 1021.

The inspectors observed annual dynamic simulator examinations for two operator crews and one staff crew, and interviewed licensee personnel. During these observations, the inspectors assessed licensee evaluator effectiveness in pinpointing operator performance deficiencies which may require supplemental training. The interviews were done to determine if the licensee effectively conducted written examinations and operating tests which ensured that operators mastered the requalification training program content.

The inspectors also reviewed the licensee's remedial training program. The review was conducted to verify the adequacy and effectiveness of the remedial training conducted since the last requalification examination. In addition, the inspectors reviewed a sample of on-shift licensed operator qualification records, watchstanding records, and medical records to ensure compliance with 10CFR 55.59, Requalification, and 10CFR 55.53, Conditions of License.

b. Findings

An unresolved item (URI) was identified, when the inspectors determined that a discrepancy existed in the Updated Final Safety Analysis Report (UFSAR) between a transient analysis and the system design of the containment spray system (reactor building spray system). Emergency Operating Procedure EP/1/A/5000/ES-1.3, Transfer to Cold Leg Recirc, could be impacted if it were determined that residual heat removal (ND) auxiliary spray flow was required during single containment spray (NS) pump operation to mitigate the consequences of the peak containment pressure transient as outlined in Chapter 6 of the UFSAR.

UFSAR section 6.2.1.1.3.1, Loss of Coolant Accident, discusses the major assumptions used in the analysis of the Peak Containment Pressure Transient. Assumption 13 in the discussion stated that NS flow from the refueling water storage tank (FWST) was assumed to stop at 3000 seconds; at that time, 2350 gpm of ND auxiliary spray is initiated; and at 3180 seconds, NS is resumed, taking suction from the building sump.

UFSAR section 6.5.2 states that ND auxiliary spray operation is initiated manually by the operator only if the emergency core cooling system and containment spray system are both operating in the recirculation mode. The ND suction switchover to recirculation mode is completed manually on receipt of the FWST Level Lo-Lo Transfer to Sump alarm. The ND system will not be used for auxiliary spray if injection to Reactor Coolant System (RCS) cold legs is required. Therefore, ND auxiliary spray operation can occur when ND suction switchover is complete and ND system injection to the RCS is not required.

The analysis of the Peak Containment Pressure Transient assumes that ND spray flow is established prior to the shift of the operating NS suction from the FWST to the reactor building sump. However, UFSAR section 6.5.2, System Design, states that ND spray flow would only be commenced after switchover to ND recirculation mode. If FWST Lo-Lo level is reached prior to ND switchover to recirculation mode, the ND system would not be available to provide auxiliary spray flow to the containment (reactor building). Pending evaluation of the ND auxiliary spray flow requirement during NS suction switchover from the FWST to the building sump, and a clear determination of whether EP/1/A/5000/ES-1.3 provides adequate direction to ensure ND is providing the required auxiliary spray flow when shifting NS suction sources, this issue will be identified as URI 50-369/370/02-03-01: ND Auxiliary Spray Flow Requirement During Single NS Pump Operation and Suction Switchover From the FWST to Recirculation on the Reactor Building Sump.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the licensee's effectiveness in performing routine maintenance activities. This review included an assessment of the licensee's practices pertaining to the identification, scoping, and handling of degraded equipment conditions as well as common cause failure evaluations. For each selected item, the inspectors performed a detailed review of the problem history and surrounding circumstances, evaluated the extent of condition reviews as required, and reviewed the generic implications of the equipment and/or work practice problem. For those systems, structures, and components (SSCs) scoped in the maintenance rule per 10 CFR 50.65, the inspectors verified that reliability and unavailability were properly monitored and that 10 CFR 50.65 (a)(1) and (a)(2) classifications were justified in light of the reviewed degraded equipment condition. The inspectors conducted this inspection for the following two Problem Investigation Process reports (PIPs):

<u>PIP Number</u>	<u>Title/Description.</u>
M-00-1340	Repetitive maintenance preventable functional failures on Instrument loop Lambda power supplies
M-01-3758	Pressurizer spray valve 1NC 27 leakage

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation

a. Inspection Scope

The inspectors reviewed the licensee's control of plant risk and configuration, due to emergent or planned work activities, as related to SSCs listed below which were within the scope of the maintenance rule or were otherwise risk-significant. Emphasizing potential high risk configurations and high priority work items, the inspectors evaluated the following: (1) effectiveness of the work prioritization and control; (2) assessment of integrated risk of the work backlog; and (3) safety assessments and/or management activities performed when SSCs are taken out of service. The inspectors reviewed the licensee's implementation of Maintenance Rule (10 CFR 50.65) a(4), with respect to risk assessments for work activities.

The inspectors also reviewed work orders (WOs) and PIPs to verify the adequacy of planned and implemented corrective actions, including PIP M-02-3525 regarding the adequacy of risk evaluations for planned actuator replacement of the 2A motor driven auxiliary feedwater (CA) pump suction isolation valve (2CA-11A) under WO 98403017.

<u>PIP/WO Number</u>	<u>Title/Description</u>
WO 98146245	Unit 2 B nuclear service water (RN) outage resulting in Sentinel risk color Orange
M-02-3181	Unit 1 B EDG failure to meet time-to-rated voltage TS surveillance requirement (emergent)
M-02-3425	Unit 1 main turbine control swap to manual
M-02-3898	2A high head safety injection (NV) bearing problem with contact between shaft and motor housing (emergent)
M-02-3222	1B reactor coolant pump upper thrust bearing temperature trend
M-02-3704	Unit 1B NV pump slinger ring apparent failure (emergent)

b. Findings

No findings of significance were identified.

1R14 Personnel Performance During Nonroutine Plant Evolutions

a. Inspection Scope

.1 The inspectors reviewed the operating crews' performance during a non-routine evolution involving the unexpected tripping of an instrument air compressor and the entry into Abnormal Procedure (AP) 39, Loss of Instrument Air. This was specifically done to determine if the response was appropriate to the event and in accordance with procedures and training. Operator logs, plant computer data, and associated operator actions were reviewed.

.2 Review of Planned Unit 1 Reactor Trip for Refueling Shutdown

On September 13, at 11:00 p.m., the residents observed a planned McGuire Unit 1 manual reactor trip from approximately 20 percent power to initiate the EOC 15 refueling outage. This shutdown method was performed to minimize the risk of a low power feedwater transient due to known challenges to maintaining control of steam generator levels during low power operations. Operators started the motor driven (MD) auxiliary feedwater (AFW) pumps just prior to the reactor trip to provide a more stable feedwater supply to the steam generators, as well as avoid an engineered safety feature (ESF) actuation. The residents reviewed just-in-time simulator training on the evolution, as well as observed the reactor trip, recovery, and shutdown activities. The inspectors verified that the operations and engineering personnel involved in the planned reactor trip adequately conducted pre-job briefings and established plant parameters within the requirements to support the planned reactor trip and recovery. The procedure changes to allow the planned reactor trip were completed under a 50.59 review. An unplanned feedwater isolation did occur during the reactor trip. The inspectors discussed the

cause of the isolation with engineering personnel to ensure that its cause was understood and that it did not have significant impact on unit recovery. The inspectors also reviewed the post trip review report (completed shortly following the event) to ensure any indicated equipment problems or human performance issues were addressed by the licensee.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed selected operability evaluations affecting risk significant SSCs listed below to assess the technical adequacy of the evaluations. Where compensatory measures were involved, the inspectors also determined whether the compensatory measures were in place, would work as intended, and were appropriately controlled.

<u>PIP Number</u>	<u>Title/Description</u>
M-02-2427	Design Basis Classification of Safety-Related Service Water Strainers
M-02-2780	Discrepancy for Turbine-Driven AFW Total Dynamic Head Calculation
M-02-2925	Part 21 Notification Regarding Potential Manufacturing Problem with Rotork Add-on-pak Assemblies
M-02-2901	1 NC-27, Pressurizer Spray Valve Leak Affecting Pressurizer Heater Capacity
M-02-3567	A Control Room Area Chiller Refrigerant Leak

b. Findings

(1) Introduction

A Green finding was identified for not considering the TS bases required operating time in an operability determination for equipment in a degraded condition. Following the discovery of a refrigerant leak on the A control room area chiller, the licensee concluded that the condition did not affect operability. However, in making that determination, the licensee did not consider the design basis of the control room area chilled water system to maintain the control room temperature for 30 days of continuous occupancy. Upon considering the TS bases operating time without establishing compensatory measures, the licensee declared the affected train inoperable.

(2) Description

On July 22, 2002, the licensee discovered a low refrigerant level on the A train chilled water (YC). PIP M-02-3567 was initiated to document and trend the occurrence. The train was determined to be operable because the chiller was satisfactorily performing its function. Therefore, no corrective actions were generated by the PIP, and corrective actions to repair the leak were addressed in a work request. The licensee planned to complete repairs within 30 days, as required by environmental protection requirements. Additionally, the PIP stated that the performance of the chiller had degraded over the previous 4 days of operation, indicating the recent development of the leak.

The inspectors reviewed the TS Bases for the control room area chilled water system. TS Bases 3.7.10, Control Room Area Chilled Water System, indicates that the design bases of the system is to maintain the control room temperature for 30 days of continuous occupancy. Given the initial indications of a notable refrigerant leak (i.e., 90 lbs. of refrigerant were added on July 22, 2002), the inspectors questioned whether the chiller could satisfy the 30-day operating function without any compensatory measures. The licensee stated that the 30-day operating design basis requirement was not considered when determining present operability in PIP M-02-3567.

On July 25, 2002, the licensee recharged an additional 117 lbs. of refrigerant to the A train YC chiller. Engineering evaluation concluded that the size of the leak would require the chiller to be recharged approximately every 3-4 days to remain functional. Based on the leak size and the 30-day operating requirement, the licensee declared the chiller inoperable. Later that day, the licensee established satisfactory compensatory measures to maintain the Train in an operable, but degraded status. Subsequently, on July 28, 2002, the licensee completed repairs and declared the chiller operable.

(3) Analysis

This issue affects the Mitigating Systems Cornerstone. If left uncorrected, not considering the TS bases operating requirements in operability determinations with equipment in degraded conditions could become a more significant safety concern because it may result in TS LCOs not being met. This finding was determined to be of very low safety significance (Green) because the A train YC chiller was not inoperable for greater than its TS allowed outage time.

(4) Enforcement

No violation of regulatory requirements occurred.

1R16 Operator Workaroundsa. Inspection Scope

The inspectors evaluated the operator workaround described in PIP M-02-0795 for the 2B feedwater pump not operating properly in "roll back hold" (i.e., runback to minimum speed following reactor trip). The workaround was reviewed to determine: (1) if the functional capability of the system or human reliability in responding to an initiating event

was affected; (2) the affect on the operators' ability to implement abnormal or emergency procedures; and (3) if operator workaround problems were appropriately captured in the licensee's corrective action program. The inspectors reviewed the potential abnormal plant configurations and conditions to assess if the conditions could increase the likelihood of an initiating event or affect multiple mitigating systems. Licensee actions were also reviewed to determine if they were appropriate to address the issue.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

a. Inspection Scope

The inspectors reviewed the licensee's planned modification (i.e., adjustment of T reference in reactor protection logic cabinets) to implement a Tave reduction coastdown method prior to the EOC 15 refueling outage for Unit 1. The inspectors discussed the proposed modification with reactor engineering prior to implementation and periodically reviewed plant parameters to ensure they were within the established limit for the reduced Tave conditions. During the Unit 1 refueling outage shutdown, the inspectors reviewed the affect of the modification on the operator's ability to conduct the shutdown (manual trip) in a controlled manner.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (PMT)

a. Inspection Scope

The inspectors reviewed PMT instructions and/or observed testing activities for the equipment below to ensure the equipment was returned to service satisfactorily. The inspectors evaluated the PMT to ensure it properly addressed the work performed and that equipment functional capabilities were adequately verified. The inspectors also reviewed PIPs to verify the adequacy of planned and implemented corrective actions, including PIP M-02-4449, regarding a variety of PMT problems encountered during replacement of the 1A EDG Woodward governor.

Procedure

PIP/WO Number

Title/Description

WO 98512753

1B EDG fuel rack interference repair

WO 98386501

2B AFW motor bearing oil change and repair oiler

PT/1/A/4403/008

1B RN flow balance

M-02-3898 2A NV pump performance testing following motor bearing temperature increase

M-02-3987 Testing for 1B EDG failure to achieve overload conditions

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

.1 Routine Surveillance Testing

a. Inspection Scope

The inspectors witnessed surveillance tests and/or reviewed test data of selected risk-significant SSCs listed below, to assess, as appropriate, whether the SSCs met TS requirements, UFSAR, and licensee procedure requirements. The inspectors also determined if the testing effectively demonstrated that the SSCs were operationally ready and capable of performing their intended safety functions. Compensatory measures, where applicable, were also verified.

<u>Procedure</u>	<u>Title/Description</u>
PT/1/A/4150/001B	Reactor coolant leakage calculation
PT/2/A/4350/002B	2B EDG operability test
PT/2/A/4208/001A	2A NS pump test
PT/2/A/4252/001	2A TDCA pump test
PT/1/A/4350/002B	1A EDG operability test

The inspectors also reviewed PIPs to verify the adequacy of planned and implemented corrective actions including, PIP M-02-3667, which concerned high differential pressure conditions identified during testing of containment spray system check valve 1NS-163.

b. Findings

No findings of significance were identified.

.2 Inservice Surveillance Testing

a. Inspection Scope

The inspectors observed the performance of PT/1/A/4252/001A, 1A Auxiliary Feedwater Pump Performance Test. The inspectors evaluated the effectiveness of the licensee's American Society of Mechanical Engineers (ASME) Section XI testing program to

determine equipment availability and reliability. The inspectors evaluated selected portions of the following areas: (1) testing procedures; (2) acceptance criteria; (3) testing methods; (4) compliance with the licensee's in-service testing program, TS, Selected Licensee Commitments, and code requirements; (5) range and accuracy of test instruments; and (6) required corrective actions. The inspectors also assessed whether corrective actions were taken as applicable.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed temporary modification MGTM-0232, Unit 1 auxiliary building filtered exhaust fan modification, involving addition of weights to reduce identified vibrations, to determine whether system operability and availability were affected, that configuration control was maintained, and that post-installation testing was performed.

b. Findings

No findings of significance were identified.

**Cornerstone: Emergency Preparedness**

1EP2 Alert Notification System Testing

a. Inspection Scope

The inspectors reviewed the testing program for the alert and notification system (ANS), which comprised of 64 pole mounted sirens within the ten-mile emergency planning zone. The testing program involved weekly lo-growl and silent tests, and a quarterly full volume test. The inspector also reviewed maintenance records to ascertain the effectiveness and timeliness of repairs when siren problems were identified.

b. Findings

No findings of significance were identified.

1EP3 Emergency Response Organization Augmentation Testing

a. Inspection Scope

The inspector reviewed the documentation supporting the maintenance and testing of the licensee's emergency response organization augmentation system.

c. Findings

No findings of significance were identified.

1EP4 Emergency Action Levels (EALs) and Emergency Plan Changes

a. Inspection Scope

The inspectors reviewed changes to the Emergency Plan and the EALs to determine whether any of the changes decreased the effectiveness of the Emergency Plan. The current McGuire Nuclear Site Emergency Plan was Revision 02-1, dated March 18, 2002. The review was performed against the requirements specified in 10 CFR 50.54q.

b. Findings

No findings of significance were identified.

1EP5 Correction of Emergency Preparedness Weaknesses and Deficiencies

a. Inspection Scope

The inspectors evaluated the efficacy of licensee programs that addressed weaknesses and deficiencies in emergency preparedness. Items reviewed included exercise and drill critique reports and the licensee's Problem Investigation Process. The inspectors reviewed the documentation of the Emergency Plan activation on January 15, 2002, at the Notification of Unusual Event (NOUE) level.

b. Findings

No findings of significance were identified.

### **3. SAFEGUARDS**

#### **Cornerstone: Physical Protection**

3PP1 Access Authorization (Behavior Observation Program)

a. Inspection Scope

During the period of June 17 - 21, 2002, the inspectors evaluated the licensee's behavioral observation program to evaluate the effectiveness and proper implementation of the behavioral observation portion of the personnel screening and fitness for duty (FFD) programs. Three representatives of licensee management and three representatives assigned escort duties were interviewed to determine their knowledge of their specific responsibilities for the behavior observation program. The inspectors evaluated the effectiveness of each individual's training, including their ability to recognize aberrant behavioral traits, indications of narcotic and alcohol use, and knowledge of work call-out reporting procedures.

The inspector reviewed the licensee's Semi-Annual FFD report dated December 31, 2001, a sample of the licensee's PIPs, and Security Event Logs for the period July 2001 through May 2002 to determine if issues were being appropriately reported to the NRC and to identify any adverse trends in the access authorization and behavioral observation programs.

The licensee's activities were evaluated against requirements in the McGuire Nuclear Plant Physical Security Plan, associated plant procedures, and 10 CFR Part 26, Fitness For Duty Program. Specific licensee documents evaluated are described in the Attachment to this report.

b. Findings

No findings of significance were identified.

3PP2 Access Control

a. Inspection Scope

During the period of June 17 - 21, 2002, the effectiveness of the licensee's access control procedures and associated equipment designed to detect and prevent the introduction of contraband into the protected area were evaluated. On June 19, 2002, the inspector evaluated, via direct observation, the adequacy of the licensee's equipment testing procedures performed on in-use access control equipment and on in-service standby equipment at the site's Personnel Access Portal (PAP). The inspector evaluated the equipment testing procedure to determine if testing was performance based and challenged the presently installed and configured site equipment. Through observation of licensee performance testing, the inspectors assessed the adequacy of the PAP card readers and biometric hand readers to prevent unauthorized entry into the protected area and to preclude multiple entries without logging out of the protected area. On June 18, 2002, the inspector also observed and assessed searches of personnel and packages at the PAP and vehicle searches conducted at the protected area vehicle access portal.

The licensee's Key and Lock Program and associated procedures for controlling vital area keys were examined, including daily and annual key inventories for calendar year 2001. The inspector further evaluated key and lock accountability through independent verification of cores removed from two vital area doors. The inspector discussed with members of the plant access and site security staffs, the safeguards and procedures in place to protect against unauthorized access to the site security computers from outside the protected area.

The inspector evaluated the licensee's procedures and process for granting unescorted access to vital area equipment to determine if access was granted to only those personnel identified as having a need for such access. Specifically, the frequency of vital area access for a sample of employees was examined. The inspector evaluated the licensee's actions associated with observations in the annual Nuclear Assessment Program to determine if security related observations were being appropriately dispositioned.

The inspector also evaluated physical security requirements for the Independent Spent Fuel Storage Installation (ISFSI). The inspector evaluated the protected area barrier, perimeter lighting, and evaluated compensatory measures in place due to construction of additional cask pads.

The licensee's activity was evaluated against requirements contained in the McGuire Nuclear Plant Physical Security Plan, associated procedures, 10 CFR 73.55, Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors Against Radiological Sabotage, and 10 CFR 73.56, Personnel Access Authorization Requirements for Nuclear Power Plants. Specific licensee documents evaluated are described in the attachment.

b. Findings

No findings of significance were identified.

3PP3 Response to Contingency Events

The Office of Homeland Security (OHS) developed a Homeland Security Advisory System (HSAS) to disseminate information regarding the risk of terrorist attacks. The HSAS implements five color-coded threat conditions with a description of corresponding actions at each level. NRC Regulatory Information Summary (RIS) 2002-12a, dated August 19, 2002, "NRC Threat Advisory and Protective Measures System," discusses the HSAS and provides additional information on protective measures to licensees.

a. Inspection Scope

On September 10, 2002, the NRC issued a Safeguards Advisory to reactor licensees to implement the protective measures described in RIS 2002-12a in response to the Federal government declaration of threat level "orange." Subsequently, on September 24, 2002, the OHS downgraded the national security threat condition to "yellow" and a corresponding reduction in the risk of a terrorist threat.

The inspectors interviewed licensee personnel and security staff, observed the conduct of security operations, and assessed licensee implementation of the threat level "orange" protective measures. Inspection results were communicated to the region and headquarters security staff for further evaluation.

b. Findings

No findings of significance were identified.

3PP4 Security Plan Changes

a. Inspection Scope

The inspectors evaluated five revisions (numbers 9, 10, 11, 12, and 13) to the Duke Power Company Nuclear Security and Contingency Plan as they related to the McGuire Nuclear Station. The revisions were submitted under the provisions of 10 CFR 50.54(p)

and were evaluated for decreases in effectiveness against the previously-approved physical security plan.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator (PI) Verification

.1 Reactor Safety PI Verification

a. Inspection Scope

The inspectors reviewed data for the following three Reactor Safety PIs for the period of March 31, 2001, through June 30, 2002, to verify the accuracy of the PIs reported during that period. PI definitions and guidance contained in NEI 99-02, Regulatory Assessment Indicator Guideline, Rev. 2, were used while assessing the accuracy in reported data.

<b><u>Cornerstone</u></b>	<b><u>PI</u></b>
Mitigating Systems	Safety System Unavailability, High Pressure Safety Injection System
Mitigating Systems	Safety System Unavailability, Residual Heat Removal System
Barrier Integrity	Reactor Coolant System Specific Activity

To verify the PI data, the inspectors reviewed control room and chemistry logs, TS Action Item Log entries, system availability information, and maintenance rule data for the aforementioned time frame. In addition, the inspectors reviewed the licensee's procedural process for monitoring and trending reactor coolant system radiological parameters in preparation for the Unit 1 refueling outage.

b. Findings

No findings of significance were identified.

.2 Physical Protection PI Verification

a. Inspection Scope

Utilizing the guidance of NEI 99-02, Revision 2, the inspectors evaluated the licensee's PI data associated with the Intrusion Detection System (IDS) and Closed Circuit Television (CCTV) to determine if the licensee provided accurate reporting for compensatory time relative to equipment degradation for the protected area intrusion

detection equipment PI. The evaluation included a sample review of tracking and trending reports, equipment maintenance logs, and security event reports for 2001 and the first quarter of 2002. The inspector also reviewed a sample list of licensee's event reports, and security logs for the same period to determine the accuracy of PI data associated with the FFD/Personnel Reliability and Personnel Screening Program.

b. Findings

No findings of significance were identified.

.3 Emergency Preparedness PI Verification

a. Inspection Scope

On June 25-27, 2002, licensee records were reviewed to determine whether the submitted PI values (through the first quarter of 2002) were calculated in accordance with the guidance contained in Section 2.4 (Emergency Preparedness Cornerstone) of NEI 99-02. The inspectors assessed the accuracy of the PI for Emergency Response Organization (ERO) Drill and Exercise Performance (DEP) through review of a sample of drill records. (The latest reported DEP PI value, an aggregate of data from the past eight quarters, was 92.4 percent.) The accuracy of the PI for ERO Drill Participation was also assessed through review of the training records for the 172 individuals assigned to key positions in the ERO as of the end of the first quarter of 2002. (The latest reported ERO drill participation PI value was 99.4 percent.) The inspectors assessed the accuracy of the PI for the Alert and Notification System (ANS) Reliability through review of a sample of siren test records conducted from July 1, 2001, to March 31, 2002. (The latest reported ANS reliability PI value was 99.3 percent.)

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

a. Inspection Scope

The inspectors performed an in-depth review of two issues entered into the licensee's corrective action program. The samples selected were within the cornerstone of mitigating systems and involved risk significant systems. The following issues and corrective actions were reviewed:

- The licensee's actions concerning the 10 CFR 21 Notification filed by Rotork Controls Inc. as documented in PIP M-02-2925. The 10 CFR 21 Notification involved a potential concern with the materials used in the Add-On-Pak switch assemblies manufactured between 1978 and October 2001.
- PIP M-02-1877, which documented the licensee's corrective actions concerning Unit 2 entering TS LCO 3.0.3 on April 5, 2002, when the discharge check valve for the 2A ND pump became stuck open. The issue resulted in licensee event

report (LER) 50-370/02-01, Residual Heat Removal System Inoperable due to Stuck Open Check Valve, dated May 31, 2002. Additionally, the issue was a non-cited violation of 10CFR 50, Appendix B, Criterion XVI, "Corrective Action" (See 4OA3.2) because the licensee failed to properly redesign the valve to preclude the valve from sticking open following an event in April 1999.

The inspectors reviewed the actions taken to determine if the licensee had adequately addressed the following attributes:

- Complete, accurate, and timely identification of the problem
- Evaluation and disposition of operability and reportability issues
- Consideration of previous failures, extent of condition, generic or common cause implications
- Prioritization and resolution of the issue commensurate with the safety significance
- Identification of the root cause and contributing causes of the problem
- Identification and implementation of corrective actions commensurate with the safety significance of the issue

b. Findings

No findings of significance were identified.

4OA3 Event Followup

.1 McGuire Unit 2 NOUE for Fire in the Turbine Building

On August 22, 2002, at 4:33 p.m., a loud noise and report of a fire was identified in the Unit 2 turbine building one level below the turbine. Control room operators responded to the fire alarm and fire system automatic actuation indications and noted a decreasing Unit 2 main generator hydrogen pressure. Operators initially attempted a rapid downpower of the unit in anticipation of the loss of main generator hydrogen. However, a manual reactor trip was initiated at 4:36 p.m. to prevent damage to the turbine generator. The licensee declared a NOUE at 4:50 p.m., due to the fire lasting greater than 15 minutes. The resident inspectors responded to the event and evaluated the unit shutdown, status of the area impacted by the fire, and fire brigade response.

The plant fire brigade responded to the fire at a hydrogen dryer tower unit and provided cover suppression to allow isolation of local hydrogen supply valves. The fire was considered extinguished at 4:55 p.m. The NOUE was terminated at 6:30 p.m. Damage was localized to the dryer tower unit and minor fire suppression water intrusion into electrical cabinets containing feedwater control circuitry. The licensee also conducted evaluations of adjacent condensate system piping for heat damage and the affects of the fire suppression on equipment adjacent to and below the fire location. No major equipment concerns were identified. The inspectors concluded that the manual reactor trip and shutdown occurred without significant safety concerns to warrant additional NRC response. The unit was stabilized in Mode 3 (Hot Standby). Prior to the event, licensee personnel had been performing maintenance activities on the hydrogen tower dryer unit. At the initiation of the fire, one individual, after tightening a drain plug on the

dryer, suffered minor burns to an extremity. The licensee plans to submit an LER on the event. The inspectors will review the root cause of the event during closeout of the LER.

.2 (Closed) LER 50-370/02-01-00: ND System Inoperable due to Stuck Open Check Valve

During ND system flushing activities the 2A ND pump discharge check valve (2ND-23) became stuck open. There were no immediate indications to plant operators that 2ND-23 was stuck open. Later, during the flushing activities, the 2A ND pump was rendered inoperable as part of the planned procedural sequence. During this time period, the stuck open check valve could have diverted sufficient 2B ND pump safety injection flow from going to the reactor core and prevented the 2B ND train from performing its safety function. The combination of these conditions resulted in both trains of the Unit 2 ND system being inoperable. The cause of 2ND-23 sticking open was determined to be due to valve disc-to-valve body contact. The contact developed a lip on the valve body, which provided a point where the disc became stuck in the open position.

The licensee previously identified the potential for 2ND-23 to stick open during the evaluation of a similar event on the opposite Train valve in April 1999. As corrective actions for that event, the internal backstop for 2ND-23 was extended to prevent the valve disc from striking the valve body. However, for vertical applications similar to 2ND-23, the length of the backstop extension was insufficient to accomplish this goal. The previous corrective actions were inadequate to prevent recurrence. 10CFR50, Appendix B, Criterion XVI, requires that measures shall be established to assure conditions adverse to quality are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to Criterion XVI, the licensee failed to effectively modify valve 2ND-23 to preclude it from sticking open. The functional capability of the ND system was affected by this issue. This finding, which was evaluated using Phase II of the Significance Determination Process and reviewed by a regional Senior Reactor Analyst, was determined to be of very low safety significance (Green). This determination reflects the fact that this issue only becomes a potential problem during the injection phase of a large break loss of coolant accident when the Train of ND with the stuck open check valve fails to start and/or run following the associated safety injection signal. Accordingly, because the finding has also been captured in the licensee's corrective action program as PIP M-02-1877, it is being treated as a non-cited violation (NCV), consistent with Section VI.A.1 of the NRC Enforcement Policy. It will be identified as NCV 50-370/02-03-02: Inadequate Corrective Actions to Prevent Recurrence of ND Pump Discharge Check Valve Sticking Open. This LER is closed.

.3 (Closed) LER 50-369/99-02-(S)-00: Employee's Submittal of False Information Resulting in Unescorted Access

This LER addresses the licensee's granting of unescorted access to protected and vital areas to an individual during the period October 11 through November 1, 1999, based on incomplete information submitted by the individual on his Background Investigation Questionnaire (BIQ). The incomplete information involved the individual failing to report a positive drug and alcohol test in June 1999 at a non-nuclear facility, which was

revealed during the licensee's full background investigation. Based on a review of the individual's access authorization file and Nuclear System Directive (NSD) -218, Access Authorization, Revision 7, the inspector concluded the licensee followed their access authorization process. Corrective actions associated with the event were also evaluated to determine their effectiveness, including immediate actions to terminate the access of the employee, current procedural understanding by access authorization personnel, and the adequacy of the BIQ for eliciting complete information from perspective employees. Based on information available, no findings of significance or violations of regulatory requirements were identified.

#### 4OA5 Other

##### Review of ISFSI Cask Storage Pad Number 3 Construction

###### a. Inspection Scope

The inspectors reviewed construction activities associated with the ISFSI Cask Storage Pad Number 3. The inspectors measured the rebar size, spacing, splice length, coated supporting chair, and the concrete coverage protection on the top, side, and bottom. The inspectors evaluated concrete form installation, including depth, straightness, chamber, and horizontal bracing. The inspectors also measured the size of the pad and verified the form elevation installation for the pad surface slope for drainage purposes as required by the drawings. The inspectors observed the concrete pour, mixed flow vibration, slump test, air contained test, temperature measurement, cylinder samples taken for compression tests, leveling, surface finishing, and curing compound application. The inspectors also reviewed the licensee Quality Control (QC) inspectors' reports for pre-pour inspection and concrete pour record. The inspectors reviewed the Site Work Specification for ISFSI Phase II, as well as the QC inspectors' qualification and certification. The inspectors compared the observation results to the project construction specification; the design drawings; and standards, codes, and criteria of the American Concrete Institute and the American Society for Testing Materials. Documents reviewed during this inspection are listed in the Attachment of this report.

###### b. Findings

No findings of significance were identified.

#### 4OA6 Meetings

##### Exit Meeting

The inspectors presented the inspection results to Mr. D. Jamil, Plant Manager, McGuire Nuclear Station, at the conclusion of the inspection on September 19, 2002. The licensee acknowledged the findings presented. A subsequent conversation was held on October 9, 2002, with Mr. B. Dolan, Safety Assurance Manager, to discuss the final inspection results. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

## SUPPLEMENTAL INFORMATION

### **PARTIAL LIST OF PERSONS CONTACTED**

#### Licensee

Barron, B., Vice President, McGuire Nuclear Station  
Beaver, A., Emergency Planning Specialist  
Bradshaw, S., Superintendent, Plant Operations  
Bramblett J., Chemistry Manager  
Brenton D., Shift Operations Manager  
Bryant, J., Licensing Engineer  
Dolan, B., Manager, Safety Assurance  
Evans W., Security Manager  
Geer, T., Manager, Reactor Electrical Systems Engineering  
Jamil, D., Station Manager, McGuire Nuclear Station  
Loucks L. , Radiation Protection Manager  
Patrick, M., Superintendent, Maintenance  
Peele, J., Manager, Engineering  
Sellers, T., Security Support Supervisor  
Sloan H. , RP Shift/Effluent Controls Supervisor  
Thomas, J., Manager, Regulatory Compliance  
Thomas, K., Superintendent, Work Control  
Travis, B., Manager, Mechanical Civil Engineering

### **ITEMS OPENED, CLOSED, AND DISCUSSED**

#### Opened

50-369/370/02-03-01	URI	ND Auxiliary Spray Flow Requirement During Single NS Pump Operation and Suction Switchover From the FWST to Recirculation on the Reactor Building Sump (Section 1R11.2)
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#### Opened and Closed

50-370/02-03-02	NCV	Inadequate Corrective Actions to Prevent Recurrence of ND Pump Discharge Check Valve Sticking Open (Section 4OA3.2)
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#### Closed

50-370/02-01-00	LER	ND System Inoperable due to Stuck Open Check Valve (Section 4OA3.2)
50-369/99-02-(S)-00	LER	Employee's Submittal of False Information Resulting in Unescorted Access (Section 4OA3.3)

**LIST OF ACRONYMS**

AP	-	Abnormal Procedure
ASME	-	American Society of Mechanical Engineers
AFW	-	Auxiliary Feedwater
BIQ	-	Background Investigation Questionnaire
CCTV	-	Closed Circuit Television
DEP	-	Drill and Exercise Performance
EAL	-	Emergency Action Level
EDG	-	Emergency Diesel Generator
ERO	-	Emergency Response Organization
EOC	-	End Of Cycle
ESF	-	Engineered Safeguards Feature
FFD	-	Fitness for Duty
FWST	-	Refueling Water Storage Tank
HSAS	-	Homeland Security Advisory System
IDS	-	Intrusion Detection System
IR	-	Inspection Report
ISFSI	-	Independent Spent Fuel Storage Installation
KC	-	Component Cooling Water
KV	-	Kilo Volt
LCO	-	Limiting Condition for Operation
LER	-	Licensee Event Report
MD	-	Motor Driven
MGTM	-	Temporary Modification
MSIV	-	Main Steam Line Isolation Valves
NC	-	Reactor Coolant
NCV	-	Non-Cited Violation
ND	-	Residual Heat Removal
NI	-	Safety Injection
NOUE	-	Notification of Unusual Event
NSD	-	Nuclear System Directive
OHS	-	Office of Homeland Security
PAP	-	Personnel Access Portal
PI	-	Performance Indicator
PIP	-	Problem Investigation Process Report
PMT	-	Post-Maintenance Testing
PORC	-	Plant Operations Review Committee
QC	-	Quality Control
RCS	-	Reactor Coolant System
RN	-	Nuclear Service Water
SSC	-	Structures, Systems, Components
Tave	-	Thermal Average Coolant Temperature
TS	-	Technical Specifications
UFSAR	-	Updated Final Safety Analysis Report
URI	-	Unresolved Item
WO	-	Work Order
YC	-	Chilled Water

## DOCUMENTS REVIEWED

### (Sections 3PP1 and 3PP2)

McGuire Physical Security Plan, Revisions 9, 10, and 11

McGuire Plant Access Training, Revision 7, January 2002

Duke Power Company General Employees Training, Revision 7

Duke Power Nuclear Security Manual Directive 8.0, Protected Area Security/Ingress Process, Revision 8

Duke Power Nuclear Security Directive 217, Nuclear Security Program, Revision 10

Duke Power Nuclear Security Directive 218, Duke Power Company Nuclear Access Authorization Program, Revision 7

Duke Power Security Procedures:

EXAT - 14, Hand Geometry Testing, Revision 2

EXAT - 03 , Security Search Equipment Testing, Revision 5

EXAO - 01, Personnel Access, Revision 57

EXOA-05, Vehicle Access, Revision 47

Semi-Annual Fitness for Duty Report, July - December, 2001

### (Section 4OA5)

Specification No. MCS-1140.00-00-0011, Specification for the McGuire Nuclear Station Independent Spent Fuel Storage Installation Site Work PHASE II

Drawing No. MC-1030-10.04-20, Rev. B, Dry Cask Storage Project Phase II Cask Pads and Manholes Concrete and Reinforcing, Sheet 1 of 3

Drawing No. MC-1030-10.04-21, Rev. B, Dry Cask Storage Project Phase II Cask Pads and Manholes Concrete and Reinforcing, Sheet 2 of 3

Drawing No. MC-1030-10.04-22, Rev. B, Dry Cask Storage Project Phase II Cask Pads and Manholes Concrete and Reinforcing, Sheet 3 of 3

Problem Investigation Process reports M-02-03230, M-02-03250, M-02-03296, and M-02-03298

Pre-pour Site Inspection for Pad Pour No. 3, dated June 25, 2002

Record of Concrete Placed for Pad Pour No. 3, Dated June 27, 2002

Qualification and Certification Records for QC inspectors