



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

April 26, 2007

Duke Power Company LLC
d/b/a Duke Energy Carolinas, LLC
ATTN: Mr. G. R. Peterson
Vice President
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: MCGUIRE NUCLEAR STATION - NRC INTEGRATED INSPECTION
REPORT 05000369/2007002 AND 05000370/2007002

Dear Mr. Peterson:

On March 31, 2007, the US Nuclear Regulatory Commission (NRC) completed an inspection at your McGuire Nuclear Station. The enclosed report documents the inspection results which were discussed on April 5, 2007, with you and 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. No findings of significance were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) 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/

James H. Moorman, III, Chief
Reactor Projects Branch 1
Division of Reactor Projects

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

Enclosure: NRC Integrated Inspection Report 05000369/2007002 and 05000370/2007002
w/Attachment - Supplemental Information

cc w/encls: (See page 2)

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cc w/encls:

C. J. Thomas
Regulatory Compliance Manager (MNS)
Duke Power Company LLC
d/b/a Duke Energy Carolinas, LLC
Electronic Mail Distribution

R. L. Gill, Jr., Manager
Nuclear Regulatory Issues
and Industry Affairs
Duke Power Company LLC
d/b/a Duke Energy Carolinas, LLC
526 S. Church Street
Charlotte, NC 28201-0006

Lisa F. Vaughn
Associate General Counsel
and Managing Attorney
Duke Energy Corporation
526 South Church Street-EC07H
Charlotte, NC 28202

Kathryn B. Nolan
Senior Counsel
Duke Energy Corporation
526 South Church Street-EC 07H
Charlotte, NC 28202

David A. Repka
Winston & Strawn LLP
Electronic Mail Distribution

Beverly Hall, Chief, Radiation
Protection Section
N. C. Department of Environmental
Health & Natural Resources
Electronic Mail Distribution

County Manager of Mecklenburg County
720 East Fourth Street
Charlotte, NC 28202

Distribution w/encls: (See page 3)

DPC

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Letter to G. R. Peterson from James H. Moorman, III dated April 26, 2007

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REPORT 05000369/2007002 AND 05000370/2007002

Distribution w/encl:

J. Stang, NRR

C. Evans, RII EICS

L. Slack, RII EICS

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-369, 50-370

License Nos: NPF-9, NPF-17

Report Nos: 05000369/2007002, 05000370/2007002

Licensee: Duke Power Company LLC

Facility: McGuire Nuclear Station, Units 1 and 2

Location: 12700 Hagers Ferry Road
Huntersville, NC 28078

Dates: January 1, 2007 through March 31, 2007

Inspectors: J. Brady, Senior Resident Inspector
S. Walker, Resident Inspector
R. Taylor, Reactor Inspector (Sections 1R02 and 1R17)
M. Scott, Senior Reactor Inspector (Sections 1R02 and 1R17)
A. Issa, Reactor Inspector (Sections 1R02 and 1R17)
D. Mas-Penaranda, Reactor Inspector (Sections 1R02 and 1R17)
R. Eul, Project Engineer (Section 1R20)
J. Rivera-Ortiz, Reactor Inspector (Sections 1R08 and 4OA5.2)
S. Vias, Senior Reactor Inspector (Sections 1R08 and 4OA5.2)

Approved by: James H. Moorman, III, Chief
Reactor Projects Branch 1
Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR05000369/2007002, IR05000370/2007002; 01/01/2007 - 03/31/2007; McGuire Nuclear Station, Units 1 and 2; Routine Integrated Report

The report covered a three month period of inspection by resident inspectors and announced inspections by six regional reactor inspectors and one regional project engineer. 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.

No findings of significance were identified during this inspection period.

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Report Details

Summary of Plant Status:

Unit 1 began the inspection period at approximately 100 percent rated thermal power (RTP). Unit 1 shutdown for a refueling outage on March 10 and remained shutdown for the remainder of the period.

Unit 2 began the inspection period at approximately 100 percent RTP. Unit 2 reduced power to 56 percent, on March 10, due to control problems with the 2A main feedwater pump. Power was returned to 100 percent on March 15.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection

a. Inspection Scope

When an oncoming winter storm (sleet, snow, and ice) was predicted for the site on February 1, 2007, the inspectors reviewed preparatory actions taken by the licensee in accordance with procedure PT/O/B/4700/070, On Demand Freeze Protection, to ensure that the adverse weather conditions would neither initiate a plant event nor prevent any system, structure, or component from performing its design function.

b. Findings

No findings of significance were identified.

1R02 Evaluations of Changes, Tests or Experiments

a. Inspection Scope

The inspectors reviewed selected samples of evaluations to confirm that the licensee had appropriately considered the conditions under which changes to the facility, Updated Final Safety Analysis Report (UFSAR), or procedures may be made, and tests conducted, without prior NRC approval. The inspectors reviewed evaluations for seven changes and additional information, such as calculations, supporting analyses, the UFSAR, and drawings to confirm that the licensee had appropriately concluded that the changes could be accomplished without obtaining a license amendment. The seven evaluations reviewed are listed in the Attachment to this report.

The inspectors also reviewed samples of changes for which the licensee had determined that evaluations were not required, to confirm that the licensee's conclusions to "screen out" these changes were correct and consistent with 10CFR50.59. The sixteen "screened out" changes reviewed are listed in the Attachment to this report.

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The inspectors also reviewed Problem Investigation Process reports (PIPs) to confirm that problems were identified at an appropriate threshold, were entered into the corrective action program, and appropriate corrective actions had been initiated.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

a. Inspection Scope

The inspectors performed a partial walkdown of the five systems listed below to verify the operability of redundant or diverse trains and components when safety equipment was inoperable. The inspectors attempted to identify any discrepancies that could impact the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, walked down control systems components, and verified that selected breakers, valves, and support equipment were in the correct position to support system operation. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program. Documents reviewed are listed in the Attachment to this report.

- Unit 1 train A emergency diesel generator (EDG) with train B out-of-service on January 3
- Unit 2 train A EDG with train B out of service on January 23
- Unit 2 train A motor driven auxiliary feedwater (CA) system with train B out-of-service on January 31
- Unit 1 train B EDG with train A out-of-service on February 13
- Unit 2 train B EDG with train A out-of-service on March 6

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

For the areas identified below, the inspectors reviewed the licensee's control of transient combustible material and ignition sources, fire detection and suppression capabilities, fire barriers, and any related compensatory measures, to verify that those items were consistent with UFSAR Section 9.5.1, Fire Protection System, and the fire protection program as described in the Design Basis Specification for Fire Protection, MCS-1465.00-00-0008. The inspectors walked down accessible portions of each area, as well as reviewed results from related surveillance tests, and reviewed the associated

pre-fire plan strategy, to verify that conditions in these areas were consistent with descriptions of the areas in the Design Basis Specification. Documents reviewed during this inspection are listed in the Attachment to this report.

The inspected areas included:

- Unit 1 Motor Driven CA Pump Room (Fire Area 2)
- Unit 1 Turbine Driven CA Pump Room (Fire Area 2A)
- Unit 2 Motor Driven CA Pump Room (Fire Area 3)
- Unit 2 Turbine Driven CA Pump Room (Fire Area 3A)
- Unit 1 Reactor Building Annulus
- Unit 1 Reactor Building Lower Containment

b. Findings

No findings of significance were identified.

1R08 Inservice Inspection (ISI) Activities

.1 Piping Systems and Vessels ISI

a. Inspection Scope

From March 19 - 30, 2007, the inspectors reviewed the implementation of the licensee's ISI program for monitoring degradation of the reactor coolant system (RCS) boundary and the risk-significant piping system boundaries for McGuire Unit 1. The inspectors reviewed a sample of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI-required examinations and a sample of piping examinations required by the licensee's Risk Informed ISI Program. The inspectors selected the examinations in order of risk priority as identified in Section 71111.08-03 of inspection procedure 71111.08, "Inservice Inspection Activities," based upon the ISI activities available for review during the onsite inspection period.

The inspectors conducted an on-site record review of the non-destructive examination (NDE) activities listed below to evaluate compliance with ASME Section XI and V requirements, 1998 Edition through 2000 Addenda, as modified by 10CFR 50.55a, and to verify that indications and defects (if present) were appropriately evaluated and dispositioned in accordance with the requirements of ASME Section XI IWB-3000 or IWC-3000 acceptance standards.

Ultrasonic Testing:

- 1SGA-Outlet-W6SE, Nozzle to Safe End Weld on Steam Generator Outlet (Cold Leg), ASME Class 1
- 1NV1FW182-13, Tee to Pipe Weld on Chemical and Volume Control System, ASME Class 2

Liquid Penetrant Testing:

- Weld Number 1-MCA-NV-H15, Pipe Welded Attachment on Chemical and Volume Control System, ASME Class 2

Qualification and certification records for examiners, inspection equipment, and consumables along with the applicable NDE procedures for the above ISI examination activities were reviewed and compared to requirements stated in ASME Section V and Section XI.

The inspectors reviewed the "McGuire Nuclear Station, Unit 1, Inservice Inspection Report, End of Cycle 17 Refueling Outage," dated December 12, 2005, and selected the following recordable indications to verify if the licensee's flaw evaluation was in accordance with acceptance standards contained in Article IWB-3000 of ASME Section XI.

Ultrasonic Testing:

- 1PZR-1, Pressurizer Lower Head to Shell Weld, ASME Class 1 (5 indications)

Pressure boundary welding activities associated with ASME Class 1 components were reviewed by the inspectors, to verify that the welding process and NDE examinations were performed in accordance with the ASME Code Sections III, V, IX, and XI requirements. Specifically, the inspectors observed and reviewed the licensee's weld overlay activities associated with pressurizer dissimilar metal nozzle welds. The inspectors observed portions of the in-process welding along with the review of essential variables for the welding machine set-up, and reviewed the in-process weld data sheets, the welding procedure specification, supporting welding procedure qualification records, and welder qualification records for the following welds:

- Weld Number NW2 / 1PZR-W4ASE, Weld Overlay Pressurizer Safety Nozzle 1-NC2, ASME Class 1
- Weld Number NW4 / 1PZR-W4BSE, Weld Overlay Pressurizer Power Operated Relief Valve (PORV) Nozzle, ASME Class 1
- Weld Number NW6 / 1PZR-W1SE, Weld Overlay Pressurizer Surge Nozzle, ASME Class 1

The inspectors performed a review of piping system ISI-related problems that were identified by the licensee and entered into the corrective action program. The inspectors reviewed these corrective action documents to confirm that the licensee had appropriately described the scope of the problems. In addition, the inspectors' review included confirmation that the licensee had an appropriate threshold for identifying issues and had implemented effective corrective actions. The inspectors evaluated the threshold for identifying issues through interviews with licensee staff and review of licensee actions to incorporate lessons learned from industry issues related to the ISI program. The inspectors performed these reviews to ensure compliance with 10CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. The corrective

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action documents reviewed by the inspectors are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.2 Reactor Vessel Upper Head Penetrations

The inspector completed Temporary Instruction (TI) 2515/150, "Reactor Pressure Vessel Head and Head Penetration Nozzles (NRC Order EA-03-009)," during the Unit 1 Spring 2007 outage. See Section 4OA5.2.

.3 Boric Acid Corrosion Control (BACC) Program

a. Inspection Scope

The inspectors reviewed the licensee's BACC program to ensure compliance with commitments made in response to NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary," and Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity."

The inspectors conducted an on-site record review as well as independent walk downs of the reactor building that are not normally accessible during at-power operations, and portions of the auxiliary building. The inspectors applied the results of these walk downs to evaluate the licensee's compliance with BACC program requirements and 10CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. In particular, the inspectors verified that the licensee's visual examinations focused on locations where boric acid leaks can cause degradation of safety-significant components, and that degraded or non-conforming conditions were properly identified in the licensee's corrective action system.

The inspectors reviewed a sample of engineering evaluations completed for boric acid found on reactor coolant system piping and components to verify that the minimum design code required section thickness had been maintained for the affected components. The inspectors also reviewed licensee corrective actions implemented for evidence of boric acid leakage to confirm that they were consistent with requirements of Section XI of the ASME Code and 10 CFR 50, Appendix B, Criterion XVI. The corrective action documents reviewed by the inspectors are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.4 Steam Generator (SG) Tube ISI

a. Inspection Scope

The licensee did not perform any inspections of the Unit 1 Steam Generator tubes during this outage. The inspectors did review the licensee's SG surveillance requirement stated in Technical Specifications to ensure that SG tube inspections were being appropriately scheduled.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

a. Inspection Scope

The inspectors observed licensed-operator performance during requalification simulator training for shift D, to verify that operator performance was consistent with expected operator performance, as described in Exercise Guide OP-MC-ASE-20 and OP-MC-SRT-68. This training tested the operators' ability to perform abnormal and emergency procedures dealing with load rejection, rod ejection, small break loss of coolant accident, dropped control rod, loss of ETB safety bus, and steam line break inside containment. The inspectors focused on clarity and formality of communication, use of procedures, alarm response, control board manipulations, group dynamics and supervisory oversight. The inspectors also observed the post-exercise critique, to verify that the licensee identified deficiencies and discrepancies that occurred during the simulator training.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the two samples listed below for items such as: (1) appropriate work practices; (2) identifying and addressing common cause failures; (3) scoping in accordance with 10 CFR 50.65(b) of the Maintenance Rule (MR); (4) characterizing reliability issues for performance; (5) trending key parameters for condition monitoring; (6) charging unavailability for performance; (7) classification and reclassification in accordance with 10 CFR 50.65(a)(1) or (a)(2); and (8) appropriateness of performance criteria for structures, systems, and components (SSCs)/functions classified as (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSCs/ functions classified as (a)(1). Documents reviewed are listed in the Attachment to this report. Items reviewed included the following:

- GE Bus Differential Relays (PIP M-07-1170)
- Hydrogen Skimmer (VX) damper time delay relays

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 risk assessments and the risk management actions used to manage risk for the plant configurations associated with the five activities listed below. The inspectors assessed whether the licensee performed adequate risk assessments, and implemented appropriate risk management actions when required by 10CFR50.65(a)(4). For emergent work, the inspectors also verified that any increase in risk was promptly assessed, and that appropriate risk management actions were promptly implemented. The inspectors also reviewed associated PIPs to verify that the licensee identified and implemented appropriate corrective actions.

- Week of January 7, including emergent work on valve 1CA161, standby shutdown facility (SSF) nuclear service water (RN) assured suction source.
- Week of January 28, including hardware repairs to clevis on safety relief valve 2SV-1AB, rescheduling of 2B CA pump test and rod cluster control assembly (RCCA) bank movement test due to inclement weather.
- Week of February 11, including emergent work due to failure and subsequent repair of 2NS-161 (train A containment spray pump discharge check valve) following leak rate test, failure of a containment air return fan damper, and concerns over diesel loading based on operating experience, that caused significant schedule changes and resulting risk reassessments. In addition, while a repair was being made to the unit 1 turbine-driven auxiliary feedwater pump, the overall system indicator (grid status) changed to red, causing further schedule changes.
- Week of February 18, including rescheduling of maintenance on B vital battery due to emergent material issues; addition of Unit 2 turbine driven CA pump testing due to unit and grid issues from previous week; addition of inservice leak test on 2NS-163 (train B containment spray pump discharge check valve) for extent of condition review; and increased awareness for severe weather due to high wind gusts (up to 40 mph) during the week.
- Week of February 25, including planned maintenance for diving inspections in the standby nuclear service water pond and Lake Norman intake. The B train RN discharge piping inspection caused an Orange risk condition (ORAM)

condition and required a risk management plan; the A train RN discharge piping inspection, which required a complex evolution plan, but did not require a risk management plan; and the Lake Norman low level intake inspection which required a complex evolution plan, but did not require a risk management plan. Due to severe storms, the B train diving was postponed, which caused a schedule change and required a revised risk analysis.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the operability determinations the licensee had generated that warranted selection on the basis of risk insights. The selected samples are addressed in the PIPs listed below. The inspectors assessed the accuracy of the evaluations, the use and control of any necessary compensatory measures, and compliance with the Technical Specifications (TS). The inspectors verified that the operability determinations were made as specified by Nuclear System Directive (NSD) 203, Operability. The inspectors compared the arguments made in the determination to the requirements from the TS, the UFSAR, and associated design-basis documents, to verify that operability was properly justified and the subject component or system remained available, such that no unrecognized increase in risk occurred.

- M-07-0100, Non-conservative TS (3.3.1) for Reactor coolant flow-low
- M-06-5905, Non-conservative TS (SR 3.8.4) for vital battery inter-cell resistance
- M-07-206, Evaluate effect of 1CA161 being failed open on the operability evaluation for air entrainment of SSF CA water supply (M-06-2284)
- M-07-0556, Unable to load 1B EDG to overload value
- M-07-688, TS allowable values for feedwater isolation on Low Tavg and Low-Low Tavg (P-12) are non-conservative based on new methodology
- M-07-1180, Valve 1NS-25 (1A NS heat exchanger outlet to fueling water storage tank (FWST)) was discovered to have a seat leak that allowed NS system train A pressurization during performance of the 1B NS pump performance test.
- M-07-1571, Cabling for Power System Monitoring panels in the 7kV switchgear rooms need evaluation for affect of common failure to both 600V safety trains

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modificationsa. Inspection Scope

The inspectors evaluated engineering change packages for eight modifications to evaluate the modifications for adverse effects on system availability, reliability, and functional capability. The eight modifications and the associated attributes reviewed are as follows:

MG-22552/00 2KU, Operator Aid Computer (OAC) Inverter Replacement Final Scope Document (Mitigating Systems)

- Installed Configuration
- Energy Needs
- Control Signals
- Operations
- Materials/ Replacement
- Vendor Information

MD200559, Replace Transformer 2ELXD (Mitigating Systems)

- Installed Configuration
- Energy Needs
- Control Signals
- Operation
- Materials/ Replacement
- Vendor Information

MGMM-14015, Revise the EDG Droop Circuits (Mitigating Systems)

- Post Installation Testing
- Control Signals
- Energy Needs

MGMM-14019, Add a Motor Generator (MG) Set Breaker Status Signal to Annunciator 2AD2-F.09 (Mitigating Systems)

- Review Procedure
- Installed Configuration
- Vendor Information

MG-22563/00, Main Steam Isolation Valve Upgrade (Mitigating Systems)

- Seismic
- Power
- Controls
- Environmental
- Testing
- Installed Configuration

MGMM-13561, EDG 2B Jacket Water & Intercooler Pump Flanges (Mitigating Systems)

- Testing
- Inspection
- Installed Configuration

MG-201033, Slope Piping from Valves 2SA77 and 2SA78 (Barrier Integrity)

- Material
- Inspection
- Walkdown

MD200734, Alloy 600 Pressurizer Weld Overlay Unit 2 (Barrier Integrity)

- Materials/Replacement Components
- Pressure Boundary
- Post-Modification Testing
- Installation Records

As listed in the Attachment to this report, documents reviewed included procedures, engineering calculations, modification design and implementation packages, work orders, site drawings, corrective action documents, applicable sections of the living UFSAR, supporting analyses, Technical Specifications, and design basis information. The inspectors also reviewed selected PIPs and self-assessments associated with modifications to confirm that problems were identified at an appropriate threshold, were entered into the corrective action process, and appropriate corrective actions had been initiated.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testinga. Inspection Scope

The inspectors reviewed the five post-maintenance tests listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the licensee's test procedure to verify that the procedure adequately tested the safety function(s) that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with information in the applicable licensing basis and/or design basis documents, and that the procedure had been properly reviewed and approved. The inspectors also witnessed the test or reviewed the test data, to verify that test results adequately demonstrated restoration of the affected safety function(s).

- PT/0/A/4350/028 B, 125 Volt Vital Battery Quarterly Inspection - replace 6 cells in vital battery EVCC.
- PT/1/A/4450/006A, VX System Train 1A Performance Test - replace time delay relay

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- PT/1/A/4252/007, CA System Turbine Driven Train Performance Test - replace solenoid on 1SA-48 (steam supply valve from C steam generator)
- PT/2/A/4208/006, Leak Test for 2NS-161 and 2NS-163 - repair check valve 2NS-161
- PT/1/A/4208/001B, 1NS Pump Performance Test - partial drain of system for check valve leak test

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities

a. Inspection Scope

The inspectors evaluated licensee outage activities to verify that the licensee: considered risk in developing outage schedules; adhered to administrative risk reduction methodologies they developed to control plant configuration, adhered to operating license and TS requirements that maintained defense-in-depth, and developed mitigation strategies for losses of the key safety functions identified below:

- Decay Heat Removal
- Inventory Control
- Power Availability
- Reactivity Control
- Containment

Prior to the outage, the inspectors reviewed the licensee's outage risk control plan to verify that the licensee had performed adequate risk assessments and had implemented appropriate risk management strategies when required by 10CFR50.65(a)(4).

The inspectors observed portions of the cooldown process to verify that TS cooldown restrictions were followed. The inspectors observed the items or activities described below, to verify that the licensee maintained defense-in-depth commensurate with the outage risk control plan for the key safety functions identified above and applicable TS when taking equipment out of service.

- Clearance Activities
- Reactor Coolant System Instrumentation
- Electrical Power
- Decay Heat Removal
- Spent Fuel Pool Cooling
- Inventory Control
- Reactivity Control
- Containment Closure

The inspectors reviewed the licensee's responses to emergent work and unexpected conditions, to verify that resulting configuration changes were controlled in accordance with the outage risk control plan. The inspectors also observed fuel handling operations (removal) and other ongoing activities, to verify that those operations and activities were being performed in accordance with TSs and procedure PT/0/A/4150/037, Total Core Unloading. Additionally, the inspectors observed refueling activities to verify that the location of the fuel assemblies was tracked, including new fuel, from core offload through core reload.

Prior to mode changes and on a sampling basis, the inspectors reviewed system lineups and/or control board indications to verify that TSs, license conditions, and other requirements, commitments, and administrative procedure prerequisites for mode changes were met prior to changing modes or plant configurations.

Periodically, the inspectors reviewed the items that had been entered into the licensee's corrective action program, to verify that the licensee had identified problems related to outage activities at an appropriate threshold and had entered them into the corrective action program. Documents reviewed are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

For the surveillance tests identified below, the inspectors witnessed testing and/or reviewed the test data, to verify that the systems, structures, and components involved in these tests satisfied the requirements described in the Technical Specifications, the Final Safety Analysis Report (FSAR), and applicable licensee procedures, and that the tests demonstrated that the SSCs were capable of performing their intended safety functions.

- *PT/1/A/4209/001C, Standby Makeup Pump Flow Periodic Test, Rev. 34
- *PT/1/A/4255/004B, Main Steam Power Operated Relief Train B Valve Stroke Timing Quarterly
- PT/1/A/4200/028B, Train B Slave Relay Test
- PT/1/A/4350/036B, D/G 1B 24 Hour Run
- PT/1/A/4350/002A, D/G 1A 24 Hour Run
- *PT/2/A/4208/001A, 2A NS Pump Performance Test
- PT/0/A/4200/032, Periodic Inspection of Ice Condenser Lower Inlet Doors

*This procedure included inservice testing requirements.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluationa. Inspection Scope

Resident inspectors evaluated the conduct of a routine licensee emergency drill on February 7, 2007, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities in accordance with 10CFR50, Appendix E. The inspectors observed emergency response operations in the simulated control room to verify that event classification and notifications were done in accordance with RP/0/A/5700/000, Classification of Emergency. The inspectors also attended the licensee critique of the drill to compare any inspector-observed weaknesses with those identified by the licensee in order to verify whether the licensee was properly identifying failures.

b. Findings

No findings of significance were identified.

2. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems.1 Daily Screening of Corrective Action Items

As required by Inspection Procedure 71152, "Identification and Resolution of Problems", and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's corrective action program. This review was accomplished by reviewing hard copies of condition reports, attending daily screening meetings, and accessing the licensee's computerized database.

.2 Annual Sample Reviewa. Inspection Scope

The inspectors selected PIP M-06-4255 for detailed review. This PIP concerned an adverse trend associated with increased fouling of plant raw service water systems. The inspectors reviewed this report to verify that the licensee identified the full extent of the issue, performed an appropriate evaluation, and specified and prioritized appropriate corrective actions. The inspectors evaluated the report against the requirements of the

licensee's corrective action program as delineated in corporate procedure NSD 208, Problem Identification Process, and 10 CFR 50, Appendix B .

b. Observations and Findings

From the review of PIP M-06-4255, no findings of significance were identified. The inspectors observed that the root cause analysis was very thorough. The inspectors attributed the thoroughness to a broad multi-disciplined team that involved plant personnel, as well as industry experts and personnel from other plants. Corrective actions identified were comprehensive, but were not yet completed.

4OA3 Event Follow-up

.1 Unit 1 Shutdown for Refueling Outage

a. Inspection Scope

The inspectors reviewed the licensee's actions associated with the Unit 1 reactor shutdown, including the planned manual reactor trip from 17 percent power that occurred on March 10. The inspectors observed plant parameters for mitigating systems and fission product barriers, and evaluated performance of systems and operators.

b. Findings

No findings of significance were identified.

.2 Unit 2 Manual Turbine Runback

a. Inspection Scope

The inspectors observed the licensee's actions associated with a Unit 2A main feedwater pump control problem that required a rapid manual turbine load reduction on March 10. The inspectors observed plant parameters, evaluated performance of systems, and observed operator response to determine whether abnormal procedures were followed.

b. Findings

No findings of significance were identified.

.3 (Closed) Licensee Event Report (LER) 05000369/2006001-00, Ice Condenser and Floor Cooling System Containment Isolation Valve Inoperable longer than allowed by TS 3.6.3. On June 16, 2006, licensee engineers identified a historical condition that could have caused the ice condenser floor cooling outside isolation valve (air operated) to reopen after its closure on a containment isolation signal. The hypothesized scenario considered the potential heat-up and expansion of the glycol after containment isolation.

Once the containment isolation signal is reset there was the possibility that the hotter glycol could expand and lift the outside containment isolation valve off of its seat. Because the inside containment isolation valve was not affected by this condition, the containment penetration (M-372) would have remained isolated. The licensee implemented a modification to correct this problem by installing a safety grade relief valve to limit the pressure increase. This finding constitutes a violation of minor significance that is not subject to enforcement action in accordance with section IV of the NRC's Enforcement Manual. The licensee documented the problem in PIP M-06-2378. This LER is closed.

b. Findings

No findings of significance were identified.

4OA5 Other Activities

.1 (Open) Unresolved Item (URI) 05000370/2006005-02, Duct Tape in Unit 2 Emergency Core Cooling System (ECCS) Sump. Documented in PIP M-06-4364, this issue was unresolved pending NRC review and evaluation of various licensee documents, associated analyses, and other NRC information, to determine what extent the Unit 2 ECCS performance (high head, intermediate head, low head safety injection, and piggy back high pressure recirculation) would have been affected by the duct tape found in the ECCS sump. The inspectors reviewed the following documentation for this issue:

- Significant Event Investigation Team (SEIT) report, which was documented in PIP M-06-4364
- Westinghouse report dated December 20, 2006, titled "McGuire Operability Determination for Duct Tape in Containment Sump"
- Duke Materials Engineering and Lab Services Report dated October 18, 2006, titled "Characterization of Degraded Duct Tape from MNS ECCS System"
- Duke Materials Engineering and Lab Services Report dated February 15, 2007, titled "Evaluation of New Duct Tape"
- NRC Information Notice (IN) 96-27, Potential Clogging of High Pressure Safety Injection Throttle Valves During Recirculation
- PIP M-96-00530, issued to document the licensee's review and evaluation of IN 96-27
- Licensee document dated February 21, 2007, titled "McGuire ECCS Throttle Valve Duct-tape Flow Testing"

The inspectors and other NRC personnel discussed these documents with the licensee on several occasions during this inspection period to obtain additional details concerning the reviews and tests the licensee is conducting. This issue remains unresolved pending review and evaluation of additional testing the licensee plans to conduct that is intended to reduce the uncertainties associated with the tape's interaction with both the residual heat removal (ND) heat exchanger and the ECCS throttle valves during high pressure recirculation, and how that interaction affects the ECCS system performance.

.2 (Closed) NRC TI 2515/150-2, Reactor Pressure Vessel Head and Head Penetration Nozzles (NRC Order EA-03-009) (Unit 1)

a. Inspection Scope

From March 19-30, 2007, the inspectors reviewed the licensee's activities relative to the NDE of the reactor pressure vessel head (RPVH) nozzles, the bare metal visual (BMV) examination of the RPVH nozzles and head surface area, and the visual examination to identify potential boric acid leaks from pressure-retaining components above the RPVH. These activities were reviewed during the Unit 1-Spring 2007 refueling outage, in order to verify licensee compliance with the regulatory requirements of NRC Order EA-03-009 Modifying Licenses (hereinafter NRC Order), dated February 20, 2004, and gather information to help the NRC staff identify possible further regulatory positions and generic communications.

The inspectors' review of the NDE of RPVH nozzles included: a) review of NDE procedures; b) assessment of NDE personnel training and qualification; c) review of NDE equipment certification and performance demonstration; d) observation and assessment of ultrasonic (UT) examinations, and e) review of surface liquid penetrant test (LPT) examinations. The inspectors also held discussions with contractor representatives (Areva) and licensee personnel involved in the RPVH examination. Specifically, the inspectors reviewed a sample of NDEs as follows:

- Observed portion of in-process UT scanning for four RPVH nozzles
- Reviewed the UT data sheets and electronic data for RPVH Nozzle Nos. 6, 17, 37, 49, 62, 68, 75, and 76
- Reviewed the UT and LPT data sheets for the RPVH vent line penetration
- Reviewed the results of the UT examination performed to assess for leakage into the annulus between the RPVH penetration nozzle and the RPVH low-alloy steel (interference fit zone) for Penetration Nos. 6, 17, 37, 49, 62, 68, 75, and 76
- Reviewed training and qualification records, including qualification and certification procedures, for NDE personnel who performed the above volumetric and surface examinations
- Reviewed certification, performance demonstration, and calibration records for the NDE equipment used to perform the above volumetric examinations
- Reviewed Areva's examination procedures used to perform the above volumetric and surface examinations.

The inspectors' review of the BMV examination of the RPVH nozzles and head surface area included: a) review of procedures used to perform the examination; b) assessment of personnel training and qualification; and c) review of video and examination final results.

The inspectors' review of the visual examination to identify potential boric acid leaks from pressure-retaining components above the RPVH consisted of the review of licensee procedures used to meet this requirement and the results from the visual examinations performed in the Unit 1 Spring 2007 refueling outage.

Enclosure

The inspectors also reviewed the licensee's effective degradation years calculation, which was performed to determine the RPVH's susceptibility category and its examination requirements.

b. Observations and Findings

- 1) Verification that the examinations were performed by qualified and knowledgeable personnel.

The inspectors reviewed personnel training and qualifications to verify that volumetric and surface NDEs were performed by trained and qualified personnel. All examiners were qualified in accordance with the ASME Code and had additional training on RPVH examination, as required in Areva's "Written Practice for the Qualification and Certification of NDE Personnel" document.

- 2) Verification that the examinations were performed in accordance with approved and demonstrated procedures.

McGuire's RPVH (Unit 1) has 78 control rod drive mechanism (CRDM) penetrations and 1 vent line penetration. Fifty seven (57) of the 78 penetrations contain thermal sleeves and the remaining 21 penetrations have open bores. All penetration nozzles, including the vent line nozzle, were examined by remote automated UT from the inside diameter (ID) surface in accordance with Areva approved procedures 54-ISI-604-002 for open bore penetrations, 54-ISI-603-003 for sleeved penetrations, and 54-ISI-605-03 for small bore penetrations.

In addition to the CRDM and vent line penetrations, McGuire's RPVH has four auxiliary head adapter penetrations. These penetrations consist of an Alloy 600 nozzle welded to the top of the RPVH with a dissimilar metal full penetration weld. These welds were not examined as part of the NDEs required to meet the NRC Order. However, these welds were included within the scope of the Inservice Inspection Program as required by Section XI of the ASME Code.

RPVH penetrations with thermal sleeves and some open bore penetrations were examined with the Time of Flight Diffraction (TOFD) technique using a blade probe containing one set of 55 degree/5 MHz/L-Wave transducers circumferentially oriented for axial flaws (COAF). The transducer set was contained in a single inspection housing. Assessment of leakage into the interference fit zone was employed by analyzing the pattern and amplitude of the backwall reflection from the TOFD transducers set up.

RPVH thermocouple penetrations (open bore) were examined with a 0 degree/5 MHz/L-Wave transducer, one TOFD set of 30 degree/5 MHz/L-Wave transducers axially oriented for circumferential flaws (AOCF), one set of 60 degree/2.25 MHz/S-Wave transducers AOCF down-beam direction, and one TOFD set of 45 degree/5 MHz/L-Wave transducers COAF. All transducer sets were contained in a single inspection housing. Assessment of leakage into the interference fit zone was employed

by analyzing the pattern and amplitude of the backwall reflection from the TOFD and 0 degree transducers set up.

The vent line penetration nozzle was examined with a set of 0 degree/5 MHz/L-Wave transducers, one set of 45 degree/5 MHz/S-Wave transducers (CW and CCW beam direction), and one set of 70 degree/5 MHz/S-Wave transducers (up and down beam direction). All transducer sets were contained in a single inspection housing. Assessment of leakage through the J-groove weld was employed by performing a LPT examination on the surface of the J-groove weld in accordance with Areva procedure 54-PT-200-07.

The inspectors found that Areva examination procedures for CRDM nozzles were demonstrated to be able to detect and size flaws in the RPVH nozzles in accordance with Electric Power Research Institute (EPRI) NDE Center's protocol contained in "Materials Reliability Program: Demonstration of Vendor Procedures for the Inspection of Control Drive Mechanism Head Penetrations (MRP-89)." Areva's equipment demonstration took place from August 14 to August 24, 2006. Areva had performed a similar demonstration in 2002, as documented in MRP-89. However, because Areva modified its equipment including changing the essential variables of the demonstration in 2002, the demonstration was repeated. The 2006 demonstration was performed with three RPVH nozzle mockups with multiple tube flaws representing the expected field degradations. These mockups were different from the ones used during the demonstration performed in 2002 (i.e., demonstration documented in MRP-89).

The demonstration adopted security portions from the EPRI Performance Demonstration Initiative protocol by restricting the access to the mockups and making them available to Areva only when the EPRI NDE personnel were present. EPRI letter to Duke Energy Corporation, dated March 29, 2007, documents the comparison of the recent Areva's equipment demonstration with the previous demonstration performed in 2002. The letter states that the scatter observed is within the variability of the examination and the reliability of the examinations conducted with the new instrumentation will be comparable to the previous demonstration.

The procedure used for the RPVH vent line was not demonstrated under a specific program such as the EPRI MRP. This procedure was developed with NDE techniques similar to the CRDM procedures with regard to basic fundamental ultrasonic requirements. The procedure used for the LPT examination of the vent line weld surface was developed in accordance with the ASME Code.

- 3) Verification that the licensee was able to identify, disposition, and resolve deficiencies.

All indications of cracks or interference fit zone leakage were required to be reported for further examination and disposition as specified in Areva's NDE procedures. Based on observation of the examination process and discussions with vendor's personnel, the inspectors considered that deficiencies would be appropriately identified, dispositioned, and resolved. UT indications associated with the fabrication of the J-groove weld and

nozzle tube material were identified at several RPVH penetrations. These indications did not exhibit service related crack characteristics and were documented for future reference.

- 4) Verification that the licensee was capable of identifying the primary water stress corrosion cracking (PWSCC) and/or RPVH corrosion phenomenon described in the NRC Order.

The NDE techniques employed for the examination of RPVH CRDM nozzles had been previously demonstrated under EPRI MRP/Inspection Demonstration Program protocols as capable of detecting PWSCC type manufactured cracks. Based on the review of performance demonstration documents, observation of in-process examinations, and review of NDE data, the inspectors considered that the licensee was capable of identifying PWSCC and/or corrosion as required by the NRC Order.

- 5) Evaluation of the RPVH condition (e.g., debris, insulation, dirt, boron from other sources, physical layout, viewing obstructions).

A BMV examination was performed per licensee's procedure MP/0/A/7150/153 by a reactor vessel component engineer and a VT-2 qualified inspector. All RPVH penetrations were inspected either by direct visual examination or visual examination using a mirror on a pole and flashlights. The licensee was able to have access to essentially 100% of the required examination surface. No evidence of significant corrosion or leakage from the annular gaps around the penetrations was observed.

The inspectors reviewed a video of the BMV examination and found no indications of leakage from the RPVH nozzles or significant corrosion of the RPVH top surface area around the penetration nozzles.

- 6) Evaluation of the licensee's ability to identify and characterize small boron deposits, as described in NRC Bulletin 2001-01.

As noted above, the licensee was able to have access to essentially 100% of the required examination surface. The examination procedure established requirements for the illumination and resolution of the examination equipment. Per procedure, the light intensity must allow the examiner to see a 1/32" wide black line on a 18% neutral gray card. In addition, the procedure recommends that the examiner should be capable of resolving a 0.158 inch characters height at a 6 ft distance and 0.044 inch characters height at a 1 ft distance. Based on the inspector's assessment of the BMV examination implementation, the review of personnel qualifications, the review of the BMV examination procedure, and the review of the licensee's observations captured in the examination results, the inspectors determined that the licensee had the ability to identify and characterize small boron deposits in the examination area.

- 7) Evaluation of the extent of material deficiencies (i.e., cracks, corrosion, etc.) that required repair.

No examples of RPVH leakage, significant material deficiencies, or flaws requiring repair were identified during the NDEs and the BMV examination. As indicated above, UT indications were identified at several RPVH penetrations and they were dispositioned as fabrication indications (not service related).

The licensee did identify a material deficiency that required repair in one of the RPVH penetrations, but it was not pressure boundary related. During the volumetric examination of the RPVH, the licensee identified that there was no funnel on the thermal sleeve at one of the RPVH penetrations. The funnel was found resting on top of the RPV upper internals. The licensee performed visual inspections of the other RPVH penetrations with thermal sleeves and found no additional material deficiencies. At the time of the NRC inspection, the licensee was in the process of selecting a repair process to reinstall the thermal sleeve/funnel assembly.

- 8) Evaluation of any significant impediments to effectively perform each examination method (e.g., centering rings, insulation, thermal sleeves, nozzle distortion, etc.)

The volumetric examination coverage extended from a minimum of two inches above the highest point of the J-groove weld to the maximum coverage possible below the lowest point of the J-groove weld, which resulted to be more than one inch for all nozzles. The inspectors reviewed Engineering Calculation C-3023-00-01, which contains the axial and hoop stress analysis for McGuire's RPVH nozzles. The analysis determined the distance below the J-groove weld where the stresses reach 20 kips per square inch (ksi) tension in penetrations with a set up angle of 0, 16.2, 26.2, 36.3, and 48.7 degrees.

The inspectors reviewed the coverage obtained for a sample of RPVH penetrations at different set up angles to verify that the distance below the lowest point of J-groove weld to reach 20 ksi was bounded by the examination coverage. No issues concerning the UT coverage below the J-groove weld were found during the NRC inspection.

The BMV examination required the removal of the CRDM shroud and the RPVH mirror insulation. Some pieces of insulation could not be removed, but they were lifted as necessary to perform the examination.

The inspectors considered that the examination coverage requirement of the NRC Order was met for the NDE activities reviewed during the NRC inspection. The licensee did not experience any significant impediment that would preclude the effective performance of the volumetric and BMV examinations.

- 9) Evaluation of the basis for the temperatures used in the susceptibility ranking calculation.

The inspectors reviewed the susceptibility ranking calculation and the basis for the RPVH temperatures used in the calculation. The calculation determined the RPVH Effective Degradation Years (EDY) and susceptibility ranking since the first operating

cycle until the end of the operating license using estimated values of effective full power days (EFPD) for future cycles. The calculation is updated every refueling outage in accordance with procedure PT/0/A/4150/038 and the result is recorded in procedure OP/1/A/6100/022. The temperature used for the calculation was the reactor coolant system cold leg temperature. The use of this temperature was based on the RPV upper internals temperature documented on WCAP-15440, "Best Estimate Analysis of the Large Break Loss of Coolant Accident for the McGuire and Catawba Nuclear Stations," and WCAP-9404, "Study of Reactor Vessel Upper Head Region Fluid Temperature."

- 10) Verification that the methods used for disposition of NDE identified flaws were consistent with NRC flaw evaluation guidance.

No indications considered to be flaws were found during the RPVH examinations. As indicated above, UT indications were identified at several RPVH penetrations and they were dispositioned as fabrication indications (not service related).

- 11) Evaluation of the existing procedures to identify potential boric acid leaks from pressure-retaining components above the RPVH and the licensee's followup actions for indications of boric acid leaks.

The inspectors reviewed Procedure MP/1/A/7150/042 A, which was implemented to conduct inspection activities required by the NRC Order to identify potential boric acid leaks from pressure retaining components above the RPVH. This procedure has steps to inspect the following components for leakage before disassembly of the RPVH every refueling outage: CRDM vent valves, mirror insulation at RPVH flange, Conoseal flanges and thermocouple fittings, RPVH vent line flanges, Reactor Vessel Level Instrumentation System (RVLIS) instrument tubing and isolation valve, CRDM canopy seal welds, and CRDM housings. The inspectors reviewed the visual examination results for the Unit 1, Spring 2007 outage and held discussions with licensee personnel to confirm followup actions taken for any evidence of boric acid leaks above the RPVH. The inspectors considered that the implementation of the procedure mentioned above met the requirements of the NRC Order.

4OA6 Meetings, Including Exit

On April 5, 2007, the resident inspectors presented the inspection results to Mr. G. Peterson and other members of his staff. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

K. Ashe, Manager, Regulatory Compliance
D. Black, Security Manager
J. Boyle, MNS Mod Manager
S. Bradshaw, Superintendent, Plant Operations
R. Branch, ISI Group
S. Brown, Manager, Engineering
K. Crane, Regulatory Compliance
G. Cutri, Boric Acid Program Manager
K. Evans, Superintendent, Maintenance
M. Hatley, Weld Overlay Manager
P. Hull, Chemistry Manager
J. Kammer, Manager, Safety Assurance
S. Mooneyhan, Radiation Protection Manager
T. Moore, Reactor Vessel Manager
J. Nolin, Manager, Mechanical and Civil Engineering (MCE)
R. Parker, Superintendent, Work Control
G. Peterson, Site Vice President, McGuire Nuclear Station
R. Repko, Station Manager, McGuire Nuclear Station
S. Snider, Manager, RES Engineering
J. Thomas, Manager, Regulatory Compliance

NRC personnel

J. Moorman, III, Chief, Reactor Projects Branch 1
J. Stang, Project Manager, NRR

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

05000369/2006001-00	LER	Ice Condenser and Floor Cooling System Containment Isolation Valve Inoperable Longer Than Allowed by TS 3.6.3. (Section 4OA3.3)
2515/150-2	TI	Reactor Pressure Vessel Head and Head Penetration Nozzles (NRC Order EA-03-009) - Unit 1 only (Section 4OA5.2)

Discussed

05000370/2006005-02	URI	Duct tape in Unit 2 ECCS Sump (Section 4OA5.1)
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Attachment

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

For cold weather (actual):

Listed in IP/0/B/3250/095

Section 1R02: Evaluation of Changes, Tests, or Experiments

Full Evaluations

MNS-2005-001, MG 12563/00 Main Steam Isolation Valve Control Upgrade, 9/13/05
 MNS-2006-003, Change In Spray Initiation Time UFSAR Table 15-33
 MNS-2006-004, Procedure Change TT/2/B/9100/60,1 Rev.001
 MNS-2006-009, NSM MG-12563/00 and MG-22563/00 Main Steam Isolation Valve Upgrade, 9/19/06
 MNS-2006-012, Replace 2EMXD Breakers with HFD type mod, 9/29/06
 MNS-2006-013, Double Isolation To The U2 Containment Sump Suction
 MNS-2006-015, LBLOCA Environmental Consequences UFSAR

Screened Out Items

MGMM13560, EDG 1B Jacket Water & Intercooler Pump Flanges
 MGMM13561, EDG 2B Jacket Water & Intercooler Pump Flanges
 MGMM-13563, EDG 2B 2KD-29 Pump Flanges
 MGTM-0318, Replace SSF EDG Governor Actuator [temporary modification]
 MGMM-1380, Electrical Connections for Pressurizer Valves
 ME-201033, Slope Piping from Valves 2SA77 and 2SA78
 MD200169, ND Valve Replacement
 ME100679, Allow Use 1000 Volts Capacitors Pressurizer Heater Circuit
 ME 5000792, Replace 7300 power supplies
 NSM MG-22552/00, 2KU OAC Inverter Replacement Final Scope Document
 MD200559, Replace Transformer 2ELXD
 MGMM-14015, Revise the EDG Droop Circuits
 MGMM-14019, Add a MG Set Breaker Status Signal to Annunciator 2AD2-F.09
 MD200996, Replace 2EMXD Breakers with HFD type mod, 9/29/06
 MD200347, Unit 2 NS Pump Full Flow Test Loop
 MD200734, Alloy 600 Pressurizer Weld Overlay Unit 2

Condition Reports

PIP 04-03488, SSF Acuator Problem
 PIP 01-00804, LD, KD, FD, EDG Flanges

Procedures

MP/0/A/7650/076, KD System Operation, Rev. 10

Work Orders

WO 00561531, SF D/G Overspeed Trip

WO 00550289, 1KDPU00101, Remove and Replace Flange

Drawings

MC1411.04.42-00 and 022, MCF1-KD2

MC-2419-13.20-00, Pipe Support, Mark No. 2MCA-SA-5195, Rev. 3 [ME 201033]

2-MCA-SA-5200, Hanger Rev. 3 [ME 201033]

Other Documents

MCS-1205.06-00-0012, Pipe Specification, ND Heat Exchanger Outlet and Bypass Butterfly Control Valves for the Residual Heat Removal (ND) system

MCC01205.06-00-0040, Valve Setup Calculation 2ND-0014, Rev. 3

Valve Replacement form for MD 200169, ND Heat exchangers 2A and 2B flow Control Valves, 5/23/06

MCM-1205.06-0514.001, Fisher Weak Link and Seismic Report for Valve Item #09G-250, 9/14/05

Section 1R04: Equipment AlignmentPartial System Walkdown

[Emergency Diesel Generator 1A]

Drawing MCFD-1609-04.00, Flow Diagram of the Diesel Generator Starting Air System

Drawing MCFD-1609-03.00, Flow Diagram of the Diesel Generator Engine 1A Fuel Oil System

Drawing MCFD-1609-02.00, Flow Diagram of the Diesel Generator Engine Lube Oil System

Drawing MCFD-1609-01.00, Flow Diagram of the Diesel Generator Engine Cooling Water System

[Emergency Diesel Generator 2A]

Drawing MCFD-2609-04.00, Flow Diagram of the Diesel Generator Starting Air System

Drawing MCFD-2609-03.00, Flow Diagram of the Diesel Generator Engine 2A Fuel Oil System

Drawing MCFD-2609-02.00, Flow Diagram of the Diesel Generator Engine Lube Oil System

Drawing MCFD-2609-01.00, Flow Diagram of the Diesel Generator Engine Cooling Water System

[2A Auxiliary Feedwater System]

Drawing MCFD-2592-01.01, Flow Diagram of Auxiliary Feedwater System

Drawing MCFD-2592-02.00, Flow Diagram of Auxiliary Feedwater System

OP/2/A/6250/002, Auxiliary Feedwater System, Rev. 72, Enclosure 4.8, Valve and Power Checklist

[Emergency Diesel Generator 1B]

Drawing MCFD-1609-04.00, Flow Diagram of the Diesel Generator Starting Air System

Drawing MCFD-1609-03.01, Flow Diagram of the Diesel Generator Engine 1B Fuel Oil System

Drawing MCFD-1609-02.00, Flow Diagram of the Diesel Generator Engine Lube Oil System

Drawing MCFD-1609-01.00, Flow Diagram of the Diesel Generator Engine Cooling Water System

[Emergency Diesel Generator 2B]

Drawing MCFD-2609-04.00, Flow Diagram of the Diesel Generator Starting Air System

Drawing MCFD-2609-03.01, Flow Diagram of the Diesel Generator Engine 2B Fuel Oil System

Drawing MCFD-2609-02.00, Flow Diagram of the Diesel Generator Engine Lube Oil System

Drawing MCFD-2609-01.00, Flow Diagram of the Diesel Generator Engine Cooling Water System

Section 1R05: Fire Protection

Procedures

McGuire Nuclear Station IPEEE Submittal Report dated June 1, 1994

McGuire Nuclear Station Supplemental IPEEE Fire Analysis Report dated August 1, 1996

MCS-1465.00-00-0008, R4, Design Basis Specification for Fire Protection

Sections 1R08 and 4OA5.2: ISI and TI 2515/150

Procedures

MP/0/A/7150/153, Reactor Vessel Head Bare Metal Inspection, Revision 5

54-ISI-30-05, "Written Practice for the Qualification and Certification of NDE Personnel," Revision 2/26/07

54-PT-200-07, "Color Contrast Solvent Removable Liquid Penetrant Examination of Components," Revision 01/08/07

54-ISI-604-002, "Automated Ultrasonic Examination of Open Tube RPV Closure Head Penetrations," Revision 01/30/2007

54-ISI-603-003, "Automated Ultrasonic Examination of RPV Closure Head Penetrations Containing Thermal Sleeves," Revision 1/30/2007

54-ISI-605-003, "Automated Ultrasonic Examination of RPV Closure Head Small Bore Penetrations," Revision 1/29/2007

MP/1/A/7150/042 A, "Reactor Vessel Head Removal," Revision 13

MP/0/A/7150/153, "Reactor Vessel Head Bare Metal Inspection," Revision 5

MP/0/A/7700/080, "Inspection, Evaluation and Cleanup of Boric Acid on Plant Materials." Revision 010

PT/0/A/4150/038, "Controlling Procedure For Transition To Next Fuel Cycle," Revision 28

PT/0/A/4150/046, "Containment Walkdown," Revision 003

OP/1/A/6100/022, "Unit 1 Data Book," Revision 478

Boric Acid Corrosion Program, Revision 3

Boric Acid Corrosion Program, McGuire Specific Appendix 8.6, 3/29/06

Other Documents

DPC-1201.01-00-0007, "EDY Calculation for Reactor Pressure Vessel Head Penetrations," Revision 10/11/06

Areva Document 51-9045055-001, "RPV Head Penetration Inspection Plan and Coverage Assessment for Catawba Unit 2 and McGuire Unit 1," Revision 3/5/07

Engineering Calculation C-3023-00-01, "McGuire Unit 1 Upper Head CRDM Nozzle Welding Residual Stress Analysis," Revision 0

EPRI Letter from Mr. Jack Spanner (Program Mng.) to Mr. Tom Alley (Duke Power Corp., Technical System Mng. II) dated March 29, 2007

Personnel Certification Records for all Areva NDE examiners
M-07-02094, Results of 1EOC18 Reactor Vessel Head Bare Metal Visual Inspection, dated 3/31/07

Areva UT Transducer Reports and/or Acceptance Test Report for the following UT Examinations Probes: Gimbaled Inspection Head (rotating probe for open bore penetrations, transducer models 2978 & 2929), Inspection Heads S1022NL & S1013NL (blade probes), and Inspection Head 36335 (open bore, vent line)
Boric Acid Corrosion Program Health Report - Period: 2006T3

Corrective Action Documents (PIPs)

M-05-04894	M-07-00016	M-07-01607
M-06-00799	M-07-00323	M-07-01403
M-06-02995	M-07-00610	M-07-01441
M-06-03221	M-07-00732	M-07-01709
M-06-04513	M-07-01277	M-07-01727
M-06-04706	M-07-01351	M-07-01736
M-06-05096	M-07-01530	M-07-01856
G-06-00256	M-07-01586	M-07-02157

Section1R12: Maintenance Effectiveness

PIP M-07-912, 1RAF-D-2 failed test
PIP M-07-710, 2A VX performance test results were marginal

Section1R15: Operability Evaluations

MCEE-212-00.15-01, Elementary diagram 600V essential load center 2ELXB

Section1R17: Permanent Plant Modifications

2SM-1AB, 2SM-2ABC, 2SM-5AB, and 2SM-7AB Control Upgrade, completed 10-11 to 16-06
MCM 1205.12-0027-001, [Calculation], Weir 3002-90803, Main Steam Isolation Valve Weak Link and Seismic Calculation, Rev. 2
IP/0/A/2003/041, Double Testing, Rev. 007
IP/0/A/3190/030, Molded Case Circuit Breaker Inspection and Functional Test, Rev. 028
OP/0/A/6350/001B, 125VDC - 240/120 VAC Auxiliary Control Power System, Rev. 051
IP/0/B/3061/006H, Auxiliary Control and OAC Inverter maintenance, Aligment and Troubleshooting, Rev. 10
IP/0/A/3200/036, Process 7300 Series Cabinet DC Power Supply Replacement, Rev. 04

Calculations

MCM-1205.12-0025.001, [Calculation] MSIV Environmental and Seismic Qualiffication Evaluation, Rev. 5
MCC-1205.06-00-0024, [Calculation] AOV Capability Evaluation for 1&2 SM0001, 0003, 0005, and 0007, Rev. 4
MCC-1227.00-00-0048, Dose Consequence Impact of Mark-BW Fule Reload for Accidents Analyzed in Chapter 15 of the McGuire FSAR, Rev. 9

MCC-1211.00-17-0023, Control room and Control Room Areas Heat Load Calculation, Rev. 2
 MCC-1381.05-00-0274, Three-phase short-Circuit for 2ELXD to Support Transformer 2ELXD
 replacement, 08/24/06

Condition Reports

PIP 06-01444, ECCS Offsite Dose Calculation

Work Orders

WO 00568247, MSIV Stroke testing and Adjustments (Unit 2 ,TYPICAL)
 WO 00563878, MGMM13810 - Add Pressurizer Valve Controls

Drawings

MCCD-2703-07.04, One Line Diagram 600 VAC Essential Motor Control Center 2EMXD,Unit 2,
 03/16/95
 413762,SCR Power Controller 600V 3phase 550A, 07/24/06
 7389D01, Schematic Diagram Unit 1, 09/12/06

Other Documents

MCM 1358.01-0044.001, 1KU & 2KU Inverter Instruction manual, Rev. 0
 MCM 1358.01-0045.001, 1KU & 2KU Inverter Instruction manual, Rev. 0
 MCM 2312.03-0085.001, 4160/600 V, 1500 KVA Class 1E Dry Ventilated transformer
 Installation/Maintenance manual, Rev. 0
 MCM 2312.03-0088.001, 4160/600 V, 1500 KVA Class 1E Dry Ventilated transformer Final Test
 Report, Rev. 0

Section 1R20: Refueling and Outage Activities

OP/1/A/6100/SD-1, Prepare for Cooldown
 OP/1/A/6100/SD-2, Cooldown to 400 Degrees
 OP/1/A/6100/SD-4, Cooldown to 240 Degrees
 OP/1/A/6100/SD-7, Cooldown to 200 Degrees
 PIP generated from this inspection: M-07-1758, STA/DID coordinator and CRSRO did not
 understand clearly what the additional Boron injection flowpath was.

Section 4OA3: Event Follow-up

AP/2/A/5500/006, S/G Feedwater Malfunction
 AP/2/A/5500/03, Load Rejection
 PIPs M-07-1376 and M-07-1379
 Operator statements and time line for 2A main feedpump controls malfunction
 OP/1/A/6100/003, Controlling Procedure for Unit Operation, section 4.10, Shutdown via Reactor
 Trip
 EP/1/A/5500/E-0, Reactor Trip or Safety Injection
 EP/1/A/5500/ES-0.1, Reactor Trip Response

LIST OF ACRONYMS

AOCF	-	Axially Oriented for Circumferential Flaws
ASME	-	American Society of Mechanical Engineers
BACC	-	Boric Acid Corrosion Control
BMV	-	Bare Metal Visual
CA	-	Auxiliary Feedwater
COAF	-	Circumferentially Oriented for Axial Flaws
CRDM	-	Control Rod Drive Mechanism
ECCS	-	Emergency Core Cooling System
EDG	-	Emergency Diesel Generator
EFPD	-	Effective Full Power Day
EPRI	-	Electric Power Research Institute
FWST	-	Fueling Water Storage Tank
ID	-	Inner Diameter
IN	-	Information Notice
ISI	-	Inservice Inspection
LER	-	Licensee Event Report
LPT	-	Liquid Penetrant Test
MG	-	Motor Generator
MR	-	Maintenance Rule
ND	-	Residual Heat Removal
NDE	-	Non-Destructive Examination
NS	-	Containment Spray
NSD	-	Nuclear System Directive
OAC	-	Operator Aid Computer
ORAM	-	Outage Risk Assessment Management
PAR	-	Protective Action Recommendation
PIP	-	Problem Investigation Process report
PWSCC	-	Primary Water Stress Corrosion Cracking
RCCA	-	Rod Cluster Control Assembly
RCS	-	Reactor Coolant System
RN	-	Nuclear Service Water
RPVH	-	Reactor Pressure Vessel Head
RTP	-	Rated Thermal Power
RVLIS	-	Reactor Vessel Level Instrumentation System
SEIT	-	Significant Event Investigation Team
SG	-	Steam Generator
SSC	-	Structures, Systems, and Components
SSF	-	Standby Shutdown Facility
TI	-	Technical Instruction
TOFD	-	Time of Flight Diffraction
TS	-	Technical Specifications
USFAR	-	Updated Final Safety Analysis Report
UT	-	Ultrasonic
VX	-	Hydrogen Skimmer