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

June 22, 2006

Duke Energy Corporation
ATTN: Mr. G. R. Peterson
Vice President
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: MCGUIRE NUCLEAR STATION - NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000369/2006007 AND 05000370/2006007

Dear Mr. Peterson:

On April 21, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed the onsite portion of an inspection at your McGuire Nuclear Station, Units 1 and 2. The enclosed inspection report documents the inspection findings, which were discussed on April 20, 2006, with you and other members of your staff. Following completion of additional review in the Region II office and a meeting with your staff on May 19, 2006, a final exit was held by telephone with Mr. T. Harrall and other members of your staff on June 22, 2006, to provide an update on changes to the preliminary inspection findings.

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

The report documents four NRC-identified findings of very low safety significance (Green). These findings were determined to involve violations of NRC requirements. However, because of their very low safety significance and because they had been entered into your corrective action program, the NRC is treating these issues as non-cited violations in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny these non-cited violations you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator Region II; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the McGuire Nuclear Station.

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/

Charles R. Ogle, Chief,
Engineering Branch 1
Division of Reactor Projects

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

Enclosure: NRC Inspection Report 05000369/2006007 and 05000370/2006007
w/Attachment - Supplemental Information

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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.:	05000369/2006007, 05000370/2006007
Licensee:	Duke Energy Corporation
Facility:	McGuire Nuclear Station, Units 1 and 2
Location:	12700 Hagers Ferry Road Huntersville, NC 28078
Dates:	March 20, 2006 through May 19, 2006
Inspectors:	M. Thomas, Lead Inspector K. Harper, Reactor Inspector/NSPDP J. Leivo, Contractor J. Polickoski, Project Engineer J. Quinones, Reactor Inspector/NSPDP M. Shlyamberg, Contractor
Approved by:	Charles R. Ogle, Chief Engineering Branch 1 Division of Reactor Safety

TABLE OF CONTENT

SUMMARY OF FINDINGS iii

REPORT DETAILS 1
1. REACTOR SAFETY 1
.1 Inspection Sample Selection Process 1
.2 Results of Detailed Reviews 2
.2.1 Detailed Component and System Reviews 2
.2.1.1 Residual Heat Removal (ND) Pump/Motor/Breaker 2
.2.1.2 Component Cooling (KC) Pump/Motor/Breaker 4
.2.1.3 Refueling Water Storage Tank (FWST) Check Valve 5
.2.1.4 High Pressure Recirculation Function MOVs (Piggyback Mode) 5
.2.1.5 Charging/High Head Safety Injection (NV) Pumps/Motors 6
.2.1.6 Containment Sump Isolation Valves 8
.2.1.7 Residual Heat Removal Minimum Flow Valve 10
.2.1.8 Residual Heat Removal Hot Leg Suction MOV 11
.2.1.9 Safety Injection Valve MOV 11
.2.1.10 Safety Injection Check Valve 12
.2.1.11 Nuclear Service Water Pumps/Motors 12
.2.1.12 Nuclear Service Water Flow Control Valve 13
.2.1.13 Nuclear Service Water Supply B Isolation Valve 15
.2.1.14 Nuclear Service Water Piping Inside Containment 16
.2.1.15 Diesel Generator Room Ventilation 17
.2.1.16 FWST Level Indication and Automatic Switchover 18
.2.1.17 Diesel Generator Load Sequencer/Start Circuits 19
.3 Review of Low Margin Operator Actions 19
.4 Review of Industry Operating Experience 20
.5 Review of Permanent Plant Modifications 21
4. OTHER ACTIVITIES 22
4AO6 Meetings, Including Exit 22

SUMMARY OF FINDINGS

IR05000369/2006007, IR05000370/2006007; 03/20/2006 - 03/24/2006, 04/03/2006 - 04/07/2006, 04/17/2006 - 04/21/2006, 05/19/2006; McGuire Nuclear Station, Units 1 and 2; Component Design Bases.

This inspection was conducted by a team of four NRC inspectors from the Region II office and two NRC contract inspectors. Four Green findings, which were non-cited violations, were identified during this inspection. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609, “Significance Determination Process” (SDP). 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. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion III, Design Control. The licensee did not account for emergency diesel generator under-frequency in test acceptance criterion for ASME Section XI testing of the high head safety injection (NV) pumps 1A and 1B. The licensee entered this issue into the corrective action program and performed an operability assessment which determined that the pumps were operable.

  This finding is more than minor because it affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance because although the NV pump acceptance criteria were not conservative with respect to the safety analyses, these analyses had sufficient margin to compensate for the reduced pump performance if operated at the reduced-frequency. (Section 1R21.2.1.5)

- Green. The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion III, Design Control. The licensee did not evaluate the impact of leakage past the pressure isolation check valves during low head safety injection (ND) pump operation in minimum flow (for a pump test or during a small break loss of coolant accident (SBLOCA)), in determining the maximum differential pressure (dP) across the containment sump isolation motor operated valves (MOVs). This leakage could potentially increase pressure which may challenge the capability of these MOVs to open following a SBLOCA. The licensee entered this finding into the corrective action program with an action to implement a modification to install ND suction relief valves on both units to address long term operability.

This finding is more than minor because it affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding was determined to be of very low safety significance because the analysis of additional test data showed that the maximum dP at the containment sump isolation valves was less than the thrust capability of the valve actuators. (Section 1R21.2.1.6)

- Green. The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion III, Design Control. The licensee did not evaluate potential failure of the non-safety related valve positioner in the safety related nuclear service water valves, and the impact of the failure on the capability of the valves to perform their design function following a seismic event. The licensee entered this issue into the corrective action program with actions to pursue a long term engineering resolution.

  This finding is more than minor because it affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance (Green) because the design/qualification deficiency would not result in a loss of function. The licensee determined that adequate loads existed to prevent damage to both nuclear service water pumps if the corresponding flow control valves were to fail closed. The nuclear service water pump vendor provided documentation which indicated that the pumps could satisfactorily operate at flow rates below the minimum flow value for up to two hours without sustaining damage, which was considered adequate time to detect and respond to the problem before pump damage occurred. (Section 1R21.2.1.12)

- Green. The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion III, Design Control. The licensee did not perform an analysis or use other means to demonstrate that the non-safety related nuclear service water system piping inside containment, which was credited in emergency procedures for post-accident mitigation, was qualified for the elevated temperatures predicted for a loss of coolant accident or main steam line break inside containment. The licensee entered this issue into the corrective action program with actions to revise the affected procedures and evaluate the affected systems.

  This finding is more than minor because it affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance (Green) because the design deficiency did not result in an actual loss of function. The non-safety related portion of the nuclear service water system is designed to isolate on a loss of coolant accident signal. Post-accident realignment of the system would be required in order to create the scenario where the piping could be exposed to the potentially elevated temperatures/pressures. (Section 1R21.2.1.14)

B. Licensee-Identified Violations

None

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R21 Component Design Bases Inspection (71111.21)

.1 Inspection Sample Selection Process

The team selected risk significant components and operator actions for review using information contained in the licensee's Probabilistic Risk Assessment (PRA). In general, this included components and operator actions that had a risk achievement worth factor greater than 1.05 or a Birnbaum value greater than 1E-6. The components selected were associated with emergency core cooling system (ECCS) operation, safety-related cooling water/ventilation, and vital electrical distribution systems, as well as components required for the recirculation phase of ECCS. The operator actions were selected from the list of risk significant, time critical, operator actions. The sample selection included 17 components, five operator actions, and seven operating experience items. Additionally, the team reviewed six modifications/10 CFR 50.59 evaluations by performing activities identified in IP 71111.17, Permanent Plant Modifications, Section 02.02.a. and IP 71111.02, Evaluations of Changes, Tests, or Experiments.

The team performed a margin assessment and detailed review of the selected risk-significant components and operator actions to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design issues, margin reductions due to modification, or margin reductions identified as a result of material condition issues. In addition, the licensee's Design Margin Issues Lists were used to provide additional insights into identifying low margin equipment. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as failed performance test results, significant corrective action, repeated maintenance, Maintenance Rule (a)1 status, Generic Letter (GL) 91-18 conditions, NRC resident inspector input, system health reports, industry operating experience and licensee problem equipment lists. The margin assessment also considered the quality of operating procedures to meet the plant design bases, training to support those procedures, and the operator performance capability to complete the identified time critical actions within those procedures. Operator and/or procedural reliability issues were also considered in the selection of operator actions for detailed review. These items included operator time critical task verification tests, job performance measures, problem investigative process reports, observed and logged simulator training sessions, and system walk-downs. Consideration was also given to the uniqueness and complexity of the design, operating procedures, conditions under which the procedures would be performed, operating experience, and the available defense in depth margins.

An overall summary of the reviews performed and the specific inspection findings identified are included in the following sections of the report. A specific list of documents reviewed is included in the attachment to this report.

.2 Results of Detailed Reviews

.2.1 Detailed Component and System Reviews

.2.1.1 Residual Heat Removal (Low Head Safety Injection) Pumps/Motors/Circuit Breakers

a. Inspection Scope

This component group included the residual heat removal/low head safety injection (ND) Pump 1A, its associated pump motor, and four kilovolt (KV) circuit breaker. The team reviewed the Updated Final Safety Analysis Report (UFSAR), Technical Specifications (TS), and design basis documentation (DBD) to identify and verify implementation of design requirements related to flow, developed head, net positive suction head (NPSH), vortex formation, minimum flow, shutoff head and runout protection. Design calculations, periodic test procedures (PT), and test results were reviewed to verify that the ND pump design and licensing performance requirements were met for the various operating configurations, including the high pressure recirculation (piggyback) configuration in which the ND pumps provide flow to the suction of the charging/high head safety injection (NV) pumps. Maintenance work orders (WO), in-service testing (IST), problem investigation process (PIP) corrective actions, completed PTs, and design change history were reviewed for ND Pumps 1A and 1B to assess potential component degradation and impact on design margins or performance. The team reviewed the pump installation and periodic maintenance data, as well as pump bearing and room temperature trending information, to verify consistency with vendor recommendations.

The team reviewed the licensee’s calculations that determined the minimum voltages at ND Pump 1A motor terminals for design basis conditions. The team also reviewed the licensee’s calculations that established the device settings for protection of the motor, to verify that premature trips would be precluded under design basis conditions, without unduly compromising motor protection. This included review of available power supply under worst case conditions, brake horsepower requirements for the pump motor, and ampacity calculations for the pump motor cables. The team reviewed the installation, preventive, and corrective maintenance procedures for medium voltage circuit breakers. These procedures were compared to the vendor manual to verify consistency with vendor recommendations. The team performed a walkdown of selected four kilovolt (KV) circuit breakers to inspect the material and environmental conditions. In addition, using system health reports and data compiled by the licensee, the team reviewed the plant-wide operating history for the associated circuit breaker types to assess the failure history and operating experience over the past five years.

b. Findings

Introduction: The team identified an unresolved item (URI) for failure to follow procedures during performance of a TS required PT for ND pump 1B. Specifically, steps in completed procedure PT/1/A/4204/001B were signed by an individual that was not qualified to sign the steps, the individual signed steps as completed which were not performed, and the individual designated a non-conditional step as being not applicable (N/A). This item is unresolved pending further NRC review of the circumstances surrounding these examples of failure to follow procedures.

Description: The team reviewed completed Procedure PT/1/A/4204/001B, 1B ND Pump Performance Test, which was performed on October 2, 2005. During review of this procedure, the team noted that PT/1/A/4204/001B had been performed earlier in the outage and there had been unexpected results regarding the ND pump discharge pressure. In order to eliminate the ND pump as the source of the discrepancy, the procedure was performed again per WO 98452637, to declare the pump operable. The team reviewed this completed surveillance and questioned some of the data recorded regarding pump discharge temperatures. The questions arose because the data recorded would have been different if certain procedural steps had been performed as indicated. After further review and discussions with licensee personnel, the inspectors determined that the steps had been signed as completed when they had not actually been performed. Step 12.11 had been initialed as complete, but the task was not performed. Licensee procedure OMP 4-1, Use of Operating and Periodic Test Procedures, Revision 28, required procedure users to initial or check each step after the action was completed.

The inspectors also noted that Procedure PT/1/A/4204/001B called for the determination of ND Pump 1B discharge check valve position in Step 12.35. This step is a non-conditional task, but was signed and labeled as N/A, with no documentation of approval. Procedure OMP 4-1 stated that procedure users shall not N/A any non-conditional step, unless approved.

In addition, Steps 8.2 through 8.6 of the procedure required the initials of a licensed Reactor Operator (RO). The individual performing the PT was not a licensed RO. Hence, the individual initialed Steps 8.2 through 8.6 as being completed, but was not qualified to do so. Procedure OMP 4-1 stated that procedure users shall be qualified to perform the task.

The licensee initiated PIP M-06-1462 to address the procedural adherence issues identified by the team. The team determined that these lack of procedural adherence deficiencies did not adversely affect the test results or the acceptance criteria for PT/1/A/4204/001B.

Analysis: Failure to follow procedures PT/1/A/4204/001B and OMP 4-1 is a performance deficiency. This finding is related to the procedure quality attribute of the mitigating systems cornerstone and affects the objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The failure to follow procedures did not affect the pump performance during the periodic test and there was no actual loss of safety function.

Enforcement: 10 CFR 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, requires that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Procedure OMP 4-1, Use of Operating and Periodic Test Procedures, Revision 28 stated that procedure users shall be qualified to perform the task, initial or check each step after the action is completed, and shall not N/A any non-conditional step, unless approved.

Contrary to the above, during the performance of PT/1/A/4204/001B, 1B ND Pump Performance Test, Revision 72, on October 2, 2005, the procedure user signed certain steps without having the appropriate qualifications, initialed steps as being completed that were not performed, and marked N/A on a non-conditional step without documented approval. This condition has existed since October 2, 2005. The licensee entered this item into the corrective action program as PIP M-06-1462. This finding is identified as URI 05000369/2006007-01, Failure to Follow Procedure During ND Pump 1B Performance Test. This finding is unresolved pending further NRC review of the circumstances surrounding these examples of failure to follow procedures.

.2.1.2 Component Cooling (KC) Pump/Motor/Circuit Breaker

a. Inspection Scope

This component group included KC Pump 1A1, its associated pump motor, and four KV circuit breaker. The team reviewed the UFSAR, TS, and DBD to identify and verify implementation of design requirements related to flow, developed head, NPSH, minimum flow, shutoff head and runout protection. Design calculations, PTs, and test results were reviewed to verify that KC Pump 1A1 design and licensing performance requirements were met for the various operating configurations. Maintenance WOs, IST, PIPs, and design change history were reviewed to assess potential component degradation and impact on design margins or performance. The team reviewed KC Pump 1A1 installation and periodic maintenance procedures to verify consistency with vendor recommendations.

In addition, the team reviewed the licensee's calculations that determined the minimum voltages at KC Pump 1A1 motor terminals for design basis conditions. The team also reviewed the licensee's calculations that established the device settings for protection of the motor to confirm that premature trips would be precluded under design basis conditions, without unduly compromising motor protection. The team reviewed the installation, preventive, and corrective maintenance procedures for medium voltage circuit breakers. These procedures were compared to the vendor manual to verify consistency with vendor recommendations. The team performed a partial system walk-down of the four KV breakers to inspect the material and environmental conditions. In addition, using system health reports and data compiled by the licensee, the team reviewed the plant-wide operating history for the associated circuit breaker types to assess the failure history and operating experience over the past five years.

b. Findings

No findings of significance were identified.

.2.1.3 Refueling Water Storage Tank (FWST) Supply Check Valve to ND Pumps

a. Inspection Scope

The team reviewed the design, installed orientation, PT procedures and results, WOs, and industry operating experience for FWST check valves 1(2)FW-28 to verify the licensee's actions to detect material and performance degradation. PIP corrective actions and system health reports were reviewed to verify that degradation was being monitored. The team reviewed the check valve preventive maintenance program and the vendor recommendations to verify proper installation and testing requirements.

b. Findings

No findings of significance were identified.

.2.1.4 High Pressure Recirculation Motor Operated Valve (Piggyback mode)

a. Inspection Scope

The team reviewed the UFSAR, TS, DBD, calculations, vendor recommendations, and PTs for motor operated valve (MOV) 1ND-58A to verify that design assumptions had been appropriately translated into design calculations, installed configuration, procedures, and acceptance criteria. PTs and test results were reviewed to verify that process medium will be available and unimpeded during accident or event conditions and to verify that individual tests and analyses validate integrated system operation under accident conditions. The team reviewed design changes and system health reports to verify that the performance capability of the valve had not been degraded through system modifications. Applicable industry operating experience items were reviewed to verify that insights had been applied to the system and component.

The team reviewed the licensee's electrical calculations that determined the minimum and maximum voltage values at the terminals of MOV 1ND-58A, and reviewed the electrical interfaces with the licensee's GL 89-10 MOV sizing calculations and testing, to verify that appropriate design basis event conditions and degraded voltage conditions were used as inputs for determining the electric motor operator sizing and for establishing MOV test parameters. The team also reviewed the licensee's selection of thermal overload (TOL) heaters to determine if the alarm values were appropriate for motor protection. In addition, using system health reports and data compiled by the licensee, the team reviewed the plant-wide operating history for the associated motor control center/device types to assess the failure history and operating experience over the past five years. This included a sample of PIPs and modifications involving the motor control center (MCC) devices and circuits.

b. Findings

No findings of significance were identified.

.2.1.5 Charging/High Head Safety Injection (NV) Pumps/Motors

a. Inspection Scope

The team reviewed the DBD to identify design requirements related to flow, developed head, NPSH, vortex formation, minimum flow and runout protection and motor sizing for all NV pump operating conditions and configurations. Design calculations and IST and PT documentation and test results for NV Pump 1B were reviewed to verify that all design performance requirements were met. Maintenance, IST, PIP corrective actions, and design change history were reviewed to assess the potential for component degradation and impact on design margins or performance. The team reviewed the installed NV pump flow instrumentation design, installation configuration, and calibration documentation to verify the adequacy of flow measurement used for American Society of Mechanical Engineers (ASME) Section XI testing and design flow verification.

The team reviewed the licensee's calculations that determined the minimum voltages at the NV Pump 1B motor terminals for design basis conditions. The team also reviewed the calculations that established the device settings for protection of the motor to verify that premature trips would be precluded under design basis conditions, without unduly compromising motor protection. In addition, using system health reports and data compiled by the licensee, the team reviewed the plant-wide operating history for the associated circuit breaker types to assess the failure history and operating experience over the past five years.

b. Findings

Introduction: The team identified a Green, non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, Design Control. Specifically, the licensee did not account for emergency diesel generator under-frequency in test acceptance criterion for ASME Section XI testing of the NV pumps 1A and 1B.

Description: The team identified that acceptance criterion for the ASME Section XI testing of the NV pumps, PT/1(2)/A/4209/012 A(B), Centrifugal Charging Pump 1(2)A(B) Head Curve Performance Test, did not account for the emergency diesel generator (EDG) allowed under-frequency variation. The team evaluation identified that the test results, when corrected for the EDG allowed under-frequency variation and other non-conservative assumptions, were less than the pump acceptance criterion.

The acceptance criterion for the NV pumps was established in the licensee's calculation MCC-1552.08-0197, CNC-1552.08-00-0181, Rev. 15, Safety Injection Flows for Safety Analysis. This calculation was performed in support of the TS surveillance requirement (SR) for the TS 3.5.2. This calculation established the minimum acceptable performance for all ECCS pumps based on their required performance to mitigate the spectra of large and small break loss of coolant accidents (LOCA and SBLOCA). The acceptance criteria established by this calculation did not take into account the EDG under-frequency. The test results were also not corrected for the EDG under-frequency. The EDG under-frequency value of 58.8 hertz (i.e., a 2% reduction) used in the team's evaluation was the TS limit provided in SR 3.8.1.2, "Verify each DG starts from standby conditions and achieves steady state voltage $ 3740 V and # 4580 V, and frequency $ 58.8 hertz and # 61.2 hertz." The effect of the 2% frequency reduction would result in the decrease of the pump flows by 2% and the total developed head (TDH) by 4%. When the test results were corrected for the EDG under-frequency and instrument error, the corrected test results were below the acceptance criterion for NV Pumps 1A and 1B in the minimum flow region.

The team performed a limited extent of condition review of the effect of the EDG under-frequency on the safety injection (NI) pumps. The team reviewed the completed quarterly PT/1(2)/A/4206/001 A(B), 1(2)A(B) NI Pump Performance Test and outage PT/1(2)/A/4206/015 A(B), 1(2)A(B) Safety Injection Pump Head Curve Performance Test surveillances. The review identified that the calculation did not conservatively translate the accident performance requirements for the NI pumps. In a region from zero to about 50 gallons per minute (gpm), the acceptance criterion was not bounding for the SBLOCA required flows. Additionally, for NI Pump 2A, the corrected test results were below the accident requirements.

The licensee performed an operability assessment and initiated corrective actions to address these issues in PIP M-06-1450, Allowance for Degraded EDG Frequency for NI/NV TAC Curves and PIP M-06-1620, The Shutoff Head Portion (below ~50 gpm) of the NI TAC Curve Does Not Bound Flows Assumed in the SBLOCA Analyses. The licensee's operability assessment concluded that the accident analyses had sufficient margin to account for the effects of the EDG under-frequency and the NI pump curve error.

<u>Analysis</u>: Failure to establish adequate acceptance criteria for the ECCS pumps' surveillance is a performance deficiency. This finding is more than minor because it affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance (Green) because although the ECCS pumps' acceptance criteria were not conservative with respect to the safety analyses, these analyses had sufficient margin to compensate for the reduced pump performance due to the under-frequency.

<u>Enforcement</u>: 10 CFR 50, Appendix B, Criterion III, Design Control states, in part, that design control measures shall be applied to items such as the delineation of acceptance criteria for inspections and tests.

Contrary to the above, on April 20, 2006, the team identified that licensee calculations which established the acceptance criteria in surveillance test procedures PT/1(2)/A/4206/001A(B) and PT/1(2)/A/4206/015A(B) did not take into account operation of the NI and NV pumps at a lower allowable EDG frequency. This violation has existed for more than 10 years. Because this finding is of very low safety significance and was entered into the licensee's corrective action program as PIPs M-06-1450 and M-06-1620, it is considered an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. This finding is identified as NCV 05000369, 370/2006007-02, Effect of EDG Under-Frequency not Included in ECCS Pump Test Acceptance Criteria.

.2.1.6 Containment Sump Isolation Valves

a. Inspection Scope

The team reviewed the licensee's electrical calculations that determined the minimum and maximum voltage values at the terminals of containment sump isolation MOV 1NI-185A, and reviewed the electrical interfaces with the licensee's GL 89-10 MOV sizing calculations and testing to verify that appropriate design basis event conditions and degraded voltage conditions were used as inputs for determining the electric motor operator sizing and for establishing MOV test parameters. The team also reviewed the licensee's selection of TOL heater sizes to determine if the alarm values were appropriate for motor protection. The team reviewed elementary diagrams to confirm that the interlock circuits satisfied functional requirements with adequate redundancy, independence of redundant circuits, and that the circuits included no undetectable failure vulnerability with significant consequences. In addition, using system health reports and data compiled by the licensee, the team reviewed the plant-wide operating history for the associated MCC/device types to assess the failure history and operating experience over the past five years. This included a sample of PIPs and modifications involving the MCC devices and circuits. Test results were reviewed to verify that valve performance was being monitored to identify signs of degradation.

b. Findings

Introduction: The team identified a Green, NCV of 10 CFR 50, Appendix B, Criterion III, Design Control. Specifically, the licensee did not evaluate the impact of leakage past the pressure isolation check valves (during ND pump operation in minimum flow for a pump test or during a SBLOCA), in determining the maximum differential pressure (dP) across the ECCS containment sump isolation MOVs 1(2)NI-184B and 1(2)NI-185A. This leakage could potentially increase pressure which may challenge the capability of these MOVs to open following a small break loss of coolant accident (SBLOCA).

Description: The licensee identified a condition in April 2005 where the dP across the containment sump isolation valves 1(2)NI-184B and 1(2)NI-185A valves was significantly greater than previously calculated and marginal with respect to the valves' capability to open. The system has a suction crosstie, thus, a pressure increase could affect the valves for both trains. These valves are required to open to establish a recirculation path for the ECCS through the ND pumps and a recirculation path for the containment spray pumps. The licensee documented this condition in PIP M-05-2204, SBLOCA dP May Be Greater than Design dP for Sump Valves 1(2)NI-184B, -185A. The licensee observed suction pressure increases during performance of ND pump quarterly IST, which are conducted in the minimum flow system alignment. The pressure increases were not attributed to thermal effects, but were attributed to addition of water to the ND system. Since the water was non-compressible, the pressure increases were indicative of gas voids in the system. The team asked if ND suction pressure could further increase due to TS allowed leakage past the PIVs (after running the ND pumps in minimum flow during a pump test or during a SBLOCA), such that the pressure could exceed the 175 psig value which the opening capability of NI-184B and NI-185A were evaluated against. The licensee indicated that the impact of leakage past the PIVs during ND pump operation in minimum flow was not considered in determining the design basis dP across 1(2)NI-184B and 1(2)NI-185A. The licensee did not have an analysis or other documentation to demonstrate that the containment sump isolation MOVs 1(2)NI-184B and 1(2)NI-185A were capable of opening against the potentially higher dPs following a SBLOCA. The licensee initiated PIP M-06-1206 to address the questions raised by the team.

The team determined that the most likely and the largest single volume of gas was the gas trapped in the ND heat exchanger u-tubes. Based on recent test data for ND Pump 2A, the team estimated this volume to be in excess of 31 standard cubic feet of gas in each ND heat exchanger. The team reviewed information provided in PIP M-02-5370, Excessive Gas Accumulation Vented at Sump Valve 1NI-185A, which indicated that there also was a non-vented gas volume of approximately seven cubic feet at each containment sump isolation valve located between each valve and the ND pumps' suction. The team determined that this volume would act as a suction accumulator. In addition to the evaluation of the maximum pressure for the SBLOCA following an ND pump test, the team's review determined that, based on current licensee programs to control minimum leakage across the PIVs, the amount of gas in the ND system u-tubes was the dominant variable controlling the suction pressure increase following an ND pump test. Although the licensee had programs to minimize the amount of gas in the ECCS, these programs did not control the gas in the u-tubes.

Subsequent to this inspection, the licensee collected additional ND pump test data for Unit 1 and Unit 2 and performed calculation MCC-1223.12-00-0026, "ND Pressurization Test for PIP M-06-1206," to evaluate the impact of successive ND pump starts on ND suction pressure. The licensee determined from evaluation of the test data that the containment sump isolation valves 1(2)NI-184B and 1(2)NI-185A were currently operable with respect to ND suction pressurization. The PIP included a corrective action to implement a modification to install ND suction relief valves on both units to address long term operability of the ECCS sump isolation valves.

<u>Analysis</u>: Failure to include the effect of RCS leakage past the PIV in determining the maximum dP across the ECCS containment sump isolation MOVs 1(2)NI-184B and 1(2)NI-185A is a performance deficiency. This finding is more than minor because it

affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance (Green) because the licensee determined from analysis of additional test data that the ECCS containment sump isolation valves 1(2)NI-184B and 1(2)NI-185A were currently operable with respect to ND suction pressurization. The test data showed that the maximum dP at 1(2)NI-184B and 1(2)NI-185A was below the thrust capability of the actuators.

Enforcement. 10 CFR 50, Appendix B, Criterion III, Design Control, requires, in part, that design control measures be established and implemented to assure that applicable regulatory requirements and the design basis for structures, systems, and components are correctly translated into specifications, drawings, procedures, and instructions.

Contrary to this requirement, on April 20, 2006, the team determined that the licensee's analyses did not include the effect of reactor coolant system (NC) leakage past the PIVs in determining the maximum dP across the ECCS containment sump isolation MOVs 1(2)NI-184B and 1(2)NI-185A. The condition has existed since before November 1993. Because this finding is of very low safety significance and was entered into the licensee's corrective action program as PIP M-06-1206, it is identified as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. This finding will be tracked as NCV 05000369, 05000370/2006007-03, Maximum Differential Pressure for Containment Sump Isolation Valves.

.2.1.7 Residual Heat Removal Minimum Flow Valve

a. Inspection Scope

The team reviewed the elementary diagrams for MOV 1ND-68A, to confirm that the minimum flow interlock circuits satisfied functional requirements with adequate redundancy and independence, and that the circuits included no undetectable failure vulnerability with significant consequences. For the flow instruments used in the loops, the team also reviewed the installation detail drawings as well as the calibration procedures and the results of the last three calibrations/tests for each of the two minimum flow loops in both units 1(2) NDPS-5040, 1(2) NDPG-5041, 1(2) NDPS-5050, and 1(2) NDPG-5051, to assess the performance history.

In addition, using system health reports and data compiled by the licensee, the team reviewed the plant-wide operating history for similar types of flow instruments, to assess the failure history and operating experience over the past five years. This included review of a sample of PIPs.

The team reviewed the licensee's electrical calculations that determined the minimum and maximum voltage values at the terminals of MOV 1ND-68A, and reviewed the electrical interfaces with the licensee's GL 89-10 sizing calculations and testing, to verify that appropriate design basis event conditions and degraded voltage conditions were used as inputs for determining the electric motor operator sizing and for establishing

MOV test parameters. The team also reviewed the licensee's selection of thermal overload heater sizes, to determine if the alarm values were appropriate for motor protection. The team reviewed system health reports and data compiled by the licensee for the associated MCC/device types to assess the failure history and operating experience over the past five years. This included a sample of PIPs and modifications involving the MCC devices and circuits.

b. Findings

No findings of significance were identified.

.2.1.8 Residual Heat Removal Hot Leg Suction MOV

a. Inspection Scope

The team reviewed the UFSAR, TS, DBD, calculations, periodic test procedures, and vendor recommendations for MOV 1ND-1B to verify that design assumptions had been appropriately translated into design calculations, installed configuration, acceptance criteria, and procedures. Completed test results were reviewed to verify that process medium would be available and unimpeded during shutdown or accident conditions, and to verify that individual tests and analyses validated integrated system operation under shutdown or accident conditions. The team reviewed design changes and system health reports to verify that the performance capability of the valve had not been degraded through system modifications. Applicable industry operating experience items were reviewed to verify that insights have been applied to the system and component.

b. Findings

No findings of significance were identified.

.2.1.9 Safety Injection Valve MOV

a. Inspection Scope

The team reviewed the MOV calculations for safety injection system (NI) valve 1NI-147A to verify that appropriate design basis event conditions and degraded voltage conditions were used as inputs into the determination of motor actuator setpoints and sizing. Test results, maintenance history, PIPs, and design changes were reviewed to verify valve performance was being monitored to identify degradation.

b. Findings

No findings of significance were identified.

.2.1.10 Safety Injection Check Valves

a. Inspection Scope

The team reviewed the design, installed orientation, and the licensee's actions to monitor potential degradation of safety injection check valves 1NI-60 and 1NI-71. This included periodic in-service flow and leakage testing to demonstrate full open and closure, and leak tightness. Maintenance history, PIP corrective actions, test results, foreign material exclusion controls, and design changes were reviewed to assess the potential for material degradation and the licensee's capability to identify degradation.

b. Findings

No findings of significance were identified.

.2.1.11 Nuclear Service Water Pumps/Motors

a. Inspection Scope

The team reviewed the design basis documentation to identify design requirements related to flow, developed head, NPSH, vortex formation, minimum flow and runout protection and motor sizing for all operating conditions and configurations for nuclear service water (RN) Pumps 1A and 1B. Design calculations and IST and PT results were reviewed to verify that all design performance requirements were met. Maintenance, IST, corrective action, and design change history were reviewed to assess the potential for component degradation and impact on design margins or performance. The team reviewed the installed RN pump flow instrumentation design, installation configuration, and calibration documentation to verify the adequacy of flow measurement used for ASME Section XI testing and design flow verification.

The team reviewed the licensee's calculations that determined the minimum voltages at the motor terminals for RN Pump Motor 1A for design basis conditions. The team also reviewed the licensee's calculations that established the device settings for protection of the motor, to confirm that premature trips would be precluded under design basis conditions, without unduly compromising motor protection.

In addition, using system health reports and data compiled by the licensee, the team reviewed the plant-wide operating history for the associated circuit breaker types to assess the failure history and operating experience over the past five years.

b. Findings

Introduction: The team identified a URI related to 10 CFR 50, Appendix B, Criterion III, Design Control. Specifically, the licensee did not perform system hydraulic analyses or use other means to demonstrate that RN Pumps 1A and 1B could perform their safety function under the most limiting design basis conditions.

Description: The team identified that the licensee did not perform system hydraulic analyses nor use other means to demonstrate that RN Pumps 1A and 1B would be able to deliver the required flows to the safety related components and heat exchangers (HX) under the limiting design basis conditions. Some of the limiting design basis conditions included: maximum allowable pump degradation; maximum number of tubes plugged in the HXs; minimum ultimate heat sink (UHS) level; and EDG under-frequency. The team also identified a lack of analysis to demonstrate that the RN pumps would be protected from cavitation under the limiting design basis conditions such as minimum allowed UHS level, EDG over-frequency, maximum RN flow, minimum HX tube plugging, etc. The team also questioned how the 60/40% mud/water assumption used to establish the heat exchanger tube plugging limits was validated. Operation of the RN pumps under the most limiting design basis conditions could have affected the system's ability to deliver the required flows to the safety related HXs, or resulted in cavitation conditions. The licensee initiated PIP M-06-1593, to address these issues.

Analysis: Failure to perform analyses to demonstrate that RN Pumps 1A and 1B could perform their safety function under the most limiting design basis conditions is a performance deficiency. This finding is more than minor because it affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

Enforcement: 10 CFR 50, Appendix B, Criterion III, Design Control states, in part, that the design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Contrary to the above, the team identified on April 20, 2006, that the licensee did not perform a system hydraulic analysis or use other means to demonstrate that RN Pumps 1A and 1B could perform their safety function under the most limiting design basis conditions. This condition has existed since original plant licensing and is applicable to RN Pumps 2A and 2B also. This finding was entered into the licensee's corrective action program as PIP M-06-1593 with actions to evaluate the RN system capability under limiting design basis conditions. This issue is identified as URI 05000369, 05000370/2006007-04, Nuclear Service Water System Flow Analysis. This item is unresolved pending NRC review of the licensee's analysis (when completed) for the RN system under limiting design basis conditions.

.2.1.12 Nuclear Service Water Flow Control Valves

a. Inspection Scope

The team reviewed the functional requirements and qualification of RN air operated valves 1RN-0089A and 1RN-190B to verify that appropriate design basis event conditions were considered. Maintenance history, PIP corrective actions, and design change history were reviewed to assess the potential for component degradation and impact on design margins or performance.

b. Findings

Introduction: The team identified a Green NCV of 10 CFR 50, Appendix B, Criterion III, Design Control. Specifically, the licensee did not evaluate the potential failure of the non-safety related valve positioners and the impact of the failure on the capability of the safety related valve to perform their design function following a seismic event. The licensee did not provide design criteria to ensure that, following a design basis seismic event, valves 1RN-0089A and 1RN-190B would not fail closed due to a spurious signal generated by the valves' non-safety related and non-seismically qualified positioner. The valves are designed to fail open to their safe flow balanced position. Closure of these valves could lead to failure of the RN pumps due to insufficient minimum flow.

Description: Nuclear service water valves 1RN-0089A and 1RN-190B are safety related air operated modulating control valves designed to fail open. The valves have two primary safety functions. The first function is to assure a RN minimum flow path (i.e., 2700 gpm) through RN Pumps 1A and 1B to prevent the pumps from reaching the shutoff head. The second function is to remain open in the throttled flow balance position (to regulate RN flow through the KC heat exchangers) following a design basis event. The team noted that the positioner which controls operation of these modulating control valves is not safety related and is not seismically qualified. The licensee had not evaluated the impact of the positioners' failure on the valves' ability to perform their design functions following a seismic event. The licensee did not provide any design measures to ensure that, following a design basis seismic event, valves 1RN-0089A and 1RN-190B would not fail closed due to a spurious signal generated by the non-safety related and non-seismically qualified positioner.

The team noted that there were no seismically qualified RN flow indications in the main control room that would aid the operators if valves 1RN-0089A or 1RN-190B failed closed. The only seismically qualified RN instrument in the control room was the pumps' amperage meter, which provided an indirect means of flow indication. The team postulated that following a seismic event, a number of non seismically qualified RN lines could be broken or cracked. This could lead to a large increase in RN flow. The operators would be responding to the event (based on the emergency procedures for a seismic event) and may not have any indication that securing broken RN branch lines could lead to the RN pumps being potentially dead headed and lost as a result of the RN flow control valves going closed. The licensee indicated that the emergency procedures did not have specific guidance on acceptable minimum amperage values relative to RN flow. The team performed a limited extent of condition review and noted that non-safety related and non-seismic qualification of the valve positioners was applicable to RN flow control valves 2RN-0089A and 2RN-190B also.

The licensee initiated PIP M-06-1256, Potential Nonconformance with GDC-2 with Respect to Seismic Qualification of RN to KC HX Outlet Flow Control Valves 1(2)RN-0089A and 1(2)RN-190B, to address this issue. The licensee determined that adequate Train A loads existed to prevent RN Pump 1A damage if valve 1RN-0089A were to fail closed. RN Pump 1B would have loads below the pump minimum flow requirements if valve 1RN-190B were to fail closed. The RN pump vendor provided documentation to the licensee which indicated that the RN pumps could satisfactorily operate at flow rates below the minimum flow value of 2700 gpm for up to two hours without sustaining damage, which was considered adequate time to detect and respond to the problem before RN pump damage would occur. The PIP included actions to pursue a long term engineering resolution which would alleviate the need to rely on the operator actions in place of the qualified components to address the design basis events.

Analysis: Failure to provide adequate design measures to ensure that the modulating nuclear service water control valves 1RN-0089A and 1RN-190B will not fail closed during a seismic event is a performance deficiency. This finding is more than minor because it affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance (Green) because the design/qualification deficiency did not result in a loss of function per GL 91-18. The licensee determined that adequate loads existed to prevent damage to both RN pumps if the corresponding flow control valves were to fail closed. In addition, the RN pump vendor provided documentation to the licensee which indicated that the RN pumps could satisfactorily operate at flow rates below the minimum flow value of 2700 gpm for up to two hours without sustaining damage, which was considered adequate time to detect and respond to the problem before RN pump damage occurred.

Enforcement: 10 CFR 50, Appendix B, Criterion III, Design Control, states, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. UFSAR Sections 3.2 and 9.2.2 state that RN system valves designated as safety related are designed to withstand the effects of the design basis earthquake.

Contrary to the above, on April 20, 2006, the team identified that the licensee did not provide adequate design measures to ensure that the modulating service water control valves 1RN-0089A and 1RN-190B will not fail closed during a seismic event. Specifically, the positioners for valves 1RN-0089A and 1RN-190B are not safety related nor seismically qualified. There is no assurance that these valves will remain open following a seismic event. This condition has existed since original plant licensing and is applicable to valves 2RN-0089A and 2RN-190B also. Because this finding is of very low safety significance and was entered into the licensee’s corrective action program as PIP M-06-1256, it is identified as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. This item will be tracked as NCV 05000369, 370/2006007-05, Valve Positioners not Analyzed for Seismic Requirements.

.2.1.13 Nuclear Service Water Supply B Isolation Valve

a. Inspection Scope

The team reviewed the MOV calculations for RN supply B isolation valve 0RN-9B to verify that appropriate design basis event conditions and degraded voltage conditions were used as inputs into the determination of motor actuator setpoints and sizing. Test results, maintenance history, PIPs, and design changes were reviewed to verify valve performance was being monitored to identify degradation. The team reviewed the licensee's electrical calculations that determined the minimum and maximum voltage values at the terminals of valve 0RN-9B, and reviewed the electrical interfaces with the licensee's GL 89-10 sizing calculations and testing, to verify that appropriate design basis event conditions and degraded voltage conditions were used as inputs for determining the electric motor operator sizing and for establishing MOV test parameters. The team also reviewed the licensee's selection of thermal overload heater sizes, to determine if the alarm values were appropriate for motor protection. Using system health reports and data compiled by the licensee, the team reviewed the plant-wide operating history for the associated MCC center/device types to assess the failure history and operating experience over the past five years. This included a sample of PIPs and modifications involving the MCC devices and circuits.

b. Findings

No findings of significance were identified.

.2.1.14 Nuclear Service Water Piping Inside Containment

a. Inspection Scope

The team reviewed design drawings and operating procedures to verify that functional requirements and qualification of RN system piping inside containment were considered for design basis event conditions.

b. Findings

Introduction: The team identified a Green NCV of 10 CFR 50, Appendix B, Criterion III, Design Control. The licensee did not perform an analysis or use other means to demonstrate that the non-safety related piping of the RN system inside containment, which was credited in emergency operating procedures (EP) for post-accident mitigation, was qualified for the elevated temperatures/pressures predicted for these events.

Description: The team noted that portions of the RN system inside containment, which were shown on the flow diagrams, were non-safety related. The team questioned if this piping was qualified for the elevated temperatures/pressures that could result from a LOCA or main steam line break (MSLB) event inside containment. The team also questioned if this had been evaluated as part of the licensee's response to GL 96-06, Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions. The team was concerned that RN system pressure boundary integrity may not be assured if the RN piping and components inside containment were to reach temperatures/pressures beyond the analyzed/design levels. Thus, re-establishment of RN flows in accordance with accident recovery procedures may result in undesirable consequences such as potential releases which bypass the credited filtration systems and/or containment flooding. The team noted that the licensee did not perform an analysis or use other means to demonstrate that the non-safety related portions of the RN system inside containment, which were credited in plant EPs for event mitigation, were qualified for the elevated temperatures predicted for these events. The licensee did not appear to have evaluated this issue in response to GL 96-06.

The licensee initiated PIP M-06-1381, Plant Response During a Postulated Small Break LOCA During which the Reactor Coolant Pumps May Be Used to Assist in Plant Cooldown. The licensee's evaluation determined that there was no specific analysis for the piping at question at the elevated temperatures/pressures and that the EOP procedures called for use of the RN and closed KC systems for certain post-accident actions. The licensee performed an extent of condition evaluation, revised the affected procedures, and initiated corrective actions to perform analysis of the affected systems.

Analysis: Crediting the RN system for pressure integrity in EPs for post-accident recovery, after the RN system has been potentially being exposed to conditions in excess of design limits, is a performance deficiency.

This finding is more than minor because it affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance (Green) because the design deficiency did not result in an actual loss of function per GL 91-18. The non-safety related portion of the RN system is designed to isolate on a LOCA signal. Post-accident realignment of the RN system would be required in order to create the scenario where the RN piping could be exposed to the potentially elevated temperatures and pressures.

Enforcement: 10 CFR 50, Appendix B, Criterion III, Design Control states, in part, that the design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, on April 20, 2006, the team identified that the licensee credited the use of RN piping in the accident recovery procedures which was not analyzed for the elevated temperatures. This condition has existed since plant licensing. Because this finding is of very low safety significance and was entered into the licensee's corrective action program as PIP M-06-1381, it is identified as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy. This finding will be tracked as NCV 05000369, 370/2006007-06, Effect of Post-Accident Elevated Temperatures not Analyzed for Nuclear Service Water Piping Inside Containment.

.2.1.15 Diesel Generator Room Ventilation

a. Inspection Scope

The team reviewed applicable portions of UFSAR Sections 3.1 and 3.3, NRC Regulatory Guides 1.76 and 1.117, and NRC Safety Evaluation Reports (SER) for the McGuire

Nuclear Station, to verify that the functional requirements and qualification of the Emergency Diesel Generator (EDG) area ventilation system were consistent with the licensing and design basis. The team walked down the EDG room, inspected the ventilation dampers, reviewed the ventilation system layout and drawings, and inspected electrical cabinets housing the EDG control circuits to assess the potential for component degradation and impact on design margins or performance during design basis events.

b. Findings

No findings of significance were identified.

.2.1.16 FWST Level Indication and Automatic Switchover

a. Inspection Scope

The team reviewed the design of the FWST level instrumentation and the logic circuits for automatic switch-over from the injection to the recirculation flow path for the safety injection system, initiated by low-low FWST level. The team also reviewed the basis and determination of the low alarm setpoints. This included review of the loop diagrams, elementary diagrams, schematic diagrams, and logic test procedures to confirm the independence and testability of the redundant logic circuits, and to confirm that test procedures would preclude undetectable failures of significance. This included review to confirm that the valve interlock circuits satisfied functional requirements with adequate redundancy and independence of redundant circuits, subject to single failure criteria. The team also reviewed tank and installation drawings, instrument scaling and uncertainty calculations, and interfaces with mechanical calculations, to determine the associated margins in the existing setpoints, including allowance for vortexing or other process effects. The team reviewed calibration procedures for the instrument loops to confirm that the range, scaling, accuracy and setpoints were consistent with the design and licensing bases, including consistency with the assumptions in the uncertainty calculations. The team reviewed the past three calibration and logic test results for both units to confirm an adequate performance history, and to confirm that instrument performance degradation would be identified. The team visually inspected the Unit 2 switchover logic cabinets as well as the level transmitter configurations and outdoor enclosures for both units, to assess observable material condition, vulnerability to hazards, separation of redundant channels, and the potential for environmental effects on instrument reliability and performance. The team also reviewed the configuration and performance history for the instrumentation cables routed in underground trenches from the level transmitters to the auxiliary building, with respect to the potential for long-term flooding of the cables, and the potential for circuit degradation. The team also observed the performance and use of the FWST level instrumentation and alarms during a small break LOCA scenario performed by the licensee on the plant simulator.

b. Findings

No findings of significance were identified.

.2.1.17 Diesel Generator Load Sequence/Start Circuits

a. Inspection Scope

The team selectively reviewed the design of the EDG load sequence and starting circuits. Because of their comparative risk significance, the review was primarily focused on the performance of auto reset relay ED (TRB3), defeat test relay FB (DTSB), and relay FC (TRA1).

This included review of the elementary diagrams and test procedures to confirm the independence and testability of the redundant logic circuits, and to confirm that test procedures would preclude undetectable failures of significance. The team reviewed the last three test results involving these relays, for both units. In addition, the team reviewed the EDG system health reports for the last three trimesters that were associated with these relays, and discussed with the system engineer the plant-wide failure history for these relay types, based on data that the system engineer had compiled and evaluated. The team also visually inspected an EDG room to assess potential vulnerabilities of the EDG electrical auxiliaries, electrical devices, and electrical enclosures to the effects of a transient low ambient pressure condition resulting from a design basis tornado.

b. Findings

No findings of significance were identified.

.3 Review of Low Margin Operator Actions

a. Inspection Scope

The team performed a margin assessment and detailed review of a sample of risk significant, time critical operator actions. Where possible, margins were determined by the review of the assumed design basis and UFSAR response times and performance times documented by job performance measures (JPM) results within operator time critical task verification tests. For the selected operator actions, the team performed a walk through of associated EPs, Abnormal Procedures (APs), Annunciator Response Procedures (ARPs), and other operations procedures with an appropriate plant operator and operations engineers to assess operator knowledge level, adequacy of procedures, availability of special equipment when required, and the conditions under which the procedures would be performed. Detailed reviews were also conducted with risk assessment engineers, engineering safety analysts, training department leadership, and through observation and utilization of two simulator training periods to further understand and assess the procedural rationale and approach to meeting the design basis and UFSAR response and performance times. The following operator actions were reviewed:

- Operator actions in response to a failure to establish high pressure recirculation

- Operator actions in response to a failure to aggressively depressurize using steam generator power operated relief valves during small/medium break LOCAs

- Operator actions in response to a failure to initiate safe shutdown system operation in time following a loss of power and a loss of RN

- Operator actions in response to a failure to swap to the containment sump during all size LOCAs given a failure of autoswap from the FWST

- Operator actions in response to a failure to cross-tie to Unit 2 RN

b. Findings

No findings of significance were identified.

.4 Review of Industry Operating Experience

a. Inspection Scope

The team reviewed selected operating experience issues that had occurred at domestic and foreign nuclear facilities for applicability at McGuire. The team performed an independent applicability review, and issues that appeared to be applicable to McGuire were selected for a detailed review. The issues reviewed by the team included:

- Review of Water-Hammer Events, NRC IN 91-50 dated August 20, 1991

- Breaker Failed to Close on Demand due to Loose Fuse Holder Clips, 12/06/2004

- 4160V Magne-Blast Air Operated Circuit Breaker Failed to Close, 04/13/2005

- TB-04-7, Westinghouse Type DS Breaker Failure to Close on Demand, 04/14/2004

- Breaker Failed to Close for a Low Head Safety Injection Pump, 05/09/2005

- Potential for Gas Binding for High Head Safety Injection Pumps (Diablo Canyon ECCS Cross Over Pipe Voiding When Swapping Charging Pumps), 10/22/2004

- Credit for Operator Actions in Place of Automatic Operator Actions, NRC Information Notice 97-78

b. Findings

No findings of significance were identified.

.5 Review of Permanent Plant Modifications

a. Inspection Scope

The team reviewed six modifications related to the selected risk significant components and operator actions to verify that the design bases, licensing bases, and performance capability of the components and operator actions have not been degraded through these modifications. The adequacy of design and post-modification testing for these modifications was reviewed by performing activities identified in NRC Inspection Procedures (IP) 71111.17, Permanent Plant Modifications, Section 02.02.a. Additionally, the team reviewed the modifications, procedure changes, and UFSAR changes in accordance with IP 71111.02, Evaluations of Changes, Tests, or Experiments, to verify the licensee had appropriately evaluated the modifications and procedure changes for 10 CFR 50.59 applicability. The following modifications, procedure changes, and UFSAR changes were reviewed:

- MGMM-5261, Replace Westinghouse H Series Overload Heaters with FH Series Overload Heaters
- MGMM-14119, Replace existing motor control center auxiliary contacts and wire electrical interlock circuits in parallel for valve 1ND-0058A
- MGMM-14126, Replace existing motor control center auxiliary contacts and wire electrical interlock circuits in parallel for selected important valve circuits
- MEVN-1819, Change overload size from H43 to H45 for valves 1NI184 & 1NI185
- UFSAR change 06-003, Revise UFSAR Section 6.3.2.6 (Coolant Quantity, amended 04/14/05) to incorporate certain small break LOCA events and their mitigation in support of resolution of the operable but degraded/nonconforming (OBDN) condition described in PIP M-04-5115
- 10 CFR 50.59 MNS-2006-1: EP/1&2/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization) Rev. 11, Unit 1, Rev. 10, Unit 2; EP/1&2/A/5000/ES-1.3 (Transfer to Cold Leg Recirc) Rev. 20; EP/1&2/A/5000/E-1 (Loss of Reactor or Secondary Coolant) Rev. 11, Unit 1, Rev. 9, Unit 2

b. Findings

No findings of significance were identified.

While no findings of significance were identified, extensive research, numerous personnel interviews, and detailed review were required to fully understand and analyze the identified, credible NC system break scenarios that could cause a diversion of ECCS inventory to the Incore Instrument Room during a spectrum of small break LOCA's.

This extensive evaluation involved on-site, regional, and headquarters involvement and review which included a public meeting requested by the licensee to discuss the 10 CFR 50.59 evaluations related to changes to the emergency operating procedures and UFSAR that were reviewed during the McGuire component design basis inspection. A summary of the public meeting is discussed in Section 4OA6.2 of this IR. The meeting slides are available in ADAMS (Accession No. ML061740010).

4. OTHER ACTIVITIES

4OA6 Meetings, Including Exit

.1 Exit Meeting Summary

On April 20, 2006, the team lead presented the inspection results to Mr. G. Peterson, Site Vice President, and other members of the licensee's staff. Proprietary information is not included in this inspection report. Following completion of additional review in the Region II office and a meeting with the licensee's staff on May 19, 2006, a final exit was held by telephone with Mr. T. Harrall and other members of the licensee's staff on June 22, 2006, to provide an update on changes to the preliminary inspection findings. The licensee acknowledged the findings.

.2 Public Meeting Summary

On May 19, 2006, a Category 1 technical information public meeting was conducted at the licensee's request at the Region II Office, Sam Nunn Atlanta Federal Center, 61 Forsyth Street SW, Atlanta, Georgia, 30303-8931 in Suite 24T20. The purpose of the meeting was to discuss the 10 CFR 50.59 evaluations related to changes to the emergency operating procedures and Updated Final Safety Analysis Report that were reviewed during the McGuire component design basis inspection.

During the presentation, Mr. J. Kammer, Safety Assurance Manager, delivered the opening remarks and summarized the information provided. Mr. J. Thomas, Regulatory Compliance Manager, provided some issue background and position rationale. Mr. E. Henshaw, Safety Analysis Senior Engineer, and Mr. M. Weiner, Operations Senior Engineer, provided a detailed technical discussion with analyses and conclusions.

A copy of the meeting presentation slides are available in ADAMS (ML ____________).

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee
S. Bradshaw, Superintendent, Plant Operations
S. Brown, Manager, Engineering
K. Crane, Regulatory Compliance
T. Harrall, Station Manager, McGuire Nuclear Station
E. Henshaw, Senior Engineer, Safety Analysis
J. Kammer, Manager, Safety Assurance
R. Kirk, System Engineer, Mechanical and Civil Equipment Engineering (MCE)
P. Kowalewski, Maintenance Rule Coordinator, MCE
J. Nolin, Manager, MCE
G. Peterson, Site Vice President, McGuire Nuclear Station
S. Snider, Manager, Reactor and Electrical Systems Engineering (RES)
J. Thomas, Manager, Regulatory Compliance
M. Weiner, Senior Engineer, Operations

NRC personnel
J. Brady, Senior Resident Inspector
H. Chernoff, Project Manager, NRR
H. Christensen, Deputy Director, Division of Reactor Safety, Region II
C. Ogle, Chief, Engineering Branch 1, Division of Reactor Safety, Region II
J. Stang, Project Manager, NRR
S. Walker, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000369/2006007-01	URI	Failure to Follow Procedure During ND Pump 1B Performance Test (Section 1R21.2.1.1)
05000369,370/2006007-04	URI	Nuclear Service Water System Flow Analysis (Section 1R21.2.1.11)

Opened and Closed

05000369,370/2006007-02	NCV	Effect of EDG Under-Frequency not Included in ECCS Pump Test Acceptance Criteria (Section 1R21.2.1.5)
05000369,370/2006007-03	NCV	Maximum Differential Pressure for Containment Sump Isolation Valves (Section 1R21.2.1.6)
05000369,370/2006007-05	NCV	Valve Positioner not Analyzed for Seismic Requirements (Section 1R21.2.1.12)

05000369,370/2006007-06 NCV Effect of Post-Accident Elevated Temperatures not Analyzed for Nuclear Service Water Piping Inside Containment (Section 1R21.2.1.14)

Discussed

None

LIST OF DOCUMENTS REVIEWED

Procedures

AP/1&2/A/5500/020, Loss of RN, Rev. 18
EP/1&2/A/5000/E-0, Reactor Trip or Safety Injection, Rev. 19
EP/1&2/A/5000/E-1, Loss of Reactor or Secondary Coolant, Rev. 11
EP/1&2/A/5000/ES-1.2, Post LOCA Cooldown and Depressurization, Rev. 11
EP/1&2/A/5000/ES-1.3, Transfer to Cold Leg Recirculation, Rev. 22
EP/1&2/A/5000/ECA-0.0, Loss of All AC Power, Rev. 19
EP/1&2/A/5000/ECA-1.1, Loss of Emergency Coolant Recirculation, Rev. 9
EP/1&2/A/5000/F-0, Critical Safety Function Status Trees, Rev. 3
EP/1&2/A/5000/FR-C.1, Response to Inadequate Core Cooling, Rev. 5
EP/1&2/A/5000/FR-C.2, Response to Degraded Core Cooling, Rev. 4
EP/1&2/A/5000/FR-P.1, Response to Imminent Pressurized Thermal Shock Condition, Rev. 9
EP/1&2/A/5000/FR-Z.1, Response to High Containment Pressure, Rev. 14
IP/0/A/2001/004A, 5HK Air Circuit Breaker Inspection and Maintenance, Rev. 4
IP/0/A/2001/0004H, Removal and Installation of Station Circuit Breakers
IP/0/A/2001/004C, Refurbish ABB/ITE 5 HK Air Circuit Breakers, Rev. 10
IP/0/A/2001/004I, Refurbishment, Replacement, and Alignment of Auxiliary Switches in Medium Voltage Switchgear Compartments, Rev. 2
IP/0/A/3066/002H, Testing Motor Operated Gate Valves Using VOTES, Rev. 19 and Rev. 21
IP/0/A/3066/002M, Testing Kerotest Valves Using VOTES, Rev. 4
IP/0/A/3066/012, Using MPM to Obtain Data for Trending Valve Performance, Rev. 1
IP/0/A/3066/013B, Testing Kerotest Valves Using VIPER, Rev. 8
IP/0/A/3066/013E, Testing Motor Operated Gate Valves Using VIPER, Rev. 0, Rev. 4, Rev. 5
IP/0/A/3004/009A, RHR Pump A Flow Loop NDPS5040 and NDPG5041 Calibration, Rev. 5
IP/0/A/3204/001, Barton Model 288 and 289 Series D/P Switch Calibration, Rev. 14
IP/1/A/305/013D, RWST Class 1E Level Transmitter Loop Cal 1FWLP5000 Channel IV, Rev. 2
IP/1/A/3250/012B, Diesel Load Sequencer 1A Timer Calibration, Rev. 4
MP/0/A/7150/133, RHR Pump Motor Upper Brg Removal, Inspection and Replacement, Rev. 5
OMP 4-1, Use of Operating and Periodic Test Procedures, Rev. 28
OMP 8-2, Component Verification Techniques, Rev. 17
PT/1/A/4201/001, RWST Level Auto Switchover Actuation Logic Test, Rev. 22
PT/1/A/4204/001A, 1A ND Pump Performance Test, Rev. 76
PT/1/A/4204/001B, 1B ND Pump Performance Test, Rev. 73
PT/1/A/4204/001B, 1B ND Pump Performance Test, Rev. 72
PT/1/A/4204/001B, 1B ND Pump Performance Test, Rev. 71

PT/2/A/4204/001A, 2A ND Pump Performance Test, Rev. 53
PT/2/A/4204/001B, 2B ND Pump Performance Test, Rev. 43
PT/1/A/4200/008B, NC Pressure Isolation Valve Leak Test, Rev. 50
PT/1/A/4401/001A, KC Train 1A Performance Test, Rev. 63
PT/1/A/4401/001A, KC Train 1A Performance Test, Rev. 62
PT/1/A/4401/001A, KC Train 1A Performance Test, Rev. 61
PT/1/A/4401/006A, KC Train 1A Head Curve Verification, Rev. 6
PT/2/A/4600/003A, Semi-Daily Surveillance Items, Rev. 88
PT/1/A/4600/003A, Semi-Daily Surveillance Items, Rev. 114

Completed Procedures

IP/0/A/3190/005, Inspection and Testing of Motors, performed 9/14/00, 3/22/01, 9/05/02, 9/28/02, 9/15/04, and 8/2/05
MP/0/A/7300/025, Residual Heat Removal Pump Motor Oil Sampling and Oil Replacement, performed 2/9/05, 5/4/05, 7/27/05, 10/18/05, and 1/11/06
PT/0/A/4600/113, Operator Time Critical Task Verification, performed 11/25/02 and 10/06/04
PT/1/A/4600/030, Rev. 7, Cycling Time Critical Manually Operated Valves, performed 09/18/05
PT/2/A/4600/030, Rev. 9, Cycling Time Critical Manually Operated Valves, performed 04/04/05
MCTC-1562-NI.V025-01, Isolation Valves 1/2NI-173A, -178B, Rev. 9
MCTC-1562-NI.V028-01, Isolation Valves 1/2NI-184B, -185A, Rev. 2
PT/1/A/4206/001 A, 1A NI Pump Performance Test, Rev. 47, WO# 98757677, dated 1/9/06
PT/1/A/4206/001 A, 1A NI Pump Performance Test, Rev. 47, WO# 98757677, dated 10/22/05
PT/1/A/4206/001 A, 1A NI Pump Performance Test, Rev. 47, WO# 98691874, dated 8/1/05
PT/1/A/4206/001 A, 1A NI Pump Performance Test, Rev. 47, WO# 98726765, dated 7/25/05
PT/1/A/4206/001 A, 1A NI Pump Performance Test, Rev. 47, WO# 98714875, dated 5/2/05
PT/1/A/4206/001 B, 1B NI Pump Performance Test, Rev. 46, WO# 98747381, dated 11/29/05
PT/1/A/4206/001 B, 1B NI Pump Performance Test, Rev. 46, WO# 98733628-01, dated 9/6/05
PT/1/A/4206/001 B, 1B NI Pump Performance Test, Rev. 46, WO# 98747381, dated 11/29/05
PT/1/A/4206/001 B, 1B NI Pump Performance Test, Rev. 46, WO# 98721297, dated 6/13/05
PT/2/A/4206/001 A, 2A NI Pump Performance Test, Rev. 41, WO# 98761813, dated 7/12/06
PT/2/A/4206/001 A, 2A NI Pump Performance Test, Rev. 41, WO# 98746548, dated 11/21/05
PT/2/A/4206/001 A, 2A NI Pump Performance Test, Rev. 41, WO# 98732370, dated 8/29/05
PT/2/A/4206/001 A, 2A NI Pump Performance Test, Rev. 40, WO# 987233922, dated 6/7/05
PT/2/A/4206/001 B, 2B NI Pump Performance Test, Rev. 41, WO# 98762809-01, dated ½/06
PT/2/A/4206/001 B, 2B NI Pump Performance Test, Rev. 41, WO# 98745488, dated 10/12/05
PT/2/A/4206/001 B, 2B NI Pump Performance Test, Rev. 41, WO# 98725680-01, dated 7/18/06
PT/2/A/4206/001 B, 2B NI Pump Performance Test, Rev. 41, WO# 98717120, dated 4/25/05
PT/2/A/4206/001 B, 2B NI Pump Performance Test, Rev. 41, WO# 98701488-01, dated 2/25/05
PT/2/A/4206/001 B, 2B NI Pump Performance Test, Rev. 41, WO# 98687127-01, dated 11/9/04
PT/1/A/4206/015 A, 1A Safety Injection Pump Head Curve Performance Test, Rev. 018, WO# 98682610-01, 02, 03, dated 10/3/05
PT/1/A/4206/015 B, 1B Safety Injection Pump Head Curve Performance Test, Rev. 021, WO# 98581738-01, dated 3/10/04
PT/1/A/4206/015 B, 1B Safety Injection Pump Head Curve Performance Test, Rev. 022, WO# 98653327, -01, 02, 03, dated 10/03/05

PT/2/A/4206/015 A, 2A Safety Injection Pump Head Curve Performance Test, Rev. 014, WO# 98653327, 98665862, dated 3/26/05
PT/2/A/4206/015 A, 2A Safety Injection Pump Head Curve Performance Test, Rev. 013, WO# 98532094, dated 9/11/03
PT/2/A/4206/015 B, 2B Safety Injection Pump Head Curve Performance Test, Rev. 014, WO# 98653328, 98665862, dated 03/26/05
PT/2/A/4206/015 B, 2B Safety Injection Pump Head Curve Performance Test, Rev. 013, WO# 98532095, dated 9/11/03
PT/1/A/4206/015 A, 1A Safety Injection Pump Head Curve Performance Test, Rev. 017, WO# 98581737-01, dated 3/11/04
PT/1/A/4209/001 A, 1A NV Pump Performance Test, WO# 98754209, dated 12/26/2005
PT/1/A/4209/001 A, 1A NV Pump Performance Test, WO# 98739584, dated 10/7/2005
PT/1/A/4209/001 A, 1A NV Pump Performance Test, WO# 98724738, dated 7/11/2005
PT/1/A/4209/001 B, 1B NV Pump Performance Test, WO# 98760967, dated 2/6/2006
PT/1/A/4209/001 B, 1B NV Pump Performance Test, WO# 98745481, dated 11/14/2005
PT/1/A/4209/001 B, 1B NV Pump Performance Test, WO# 98731314, dated 8/22/2005
PT/1/A/4209/001 B, 1B NV Pump Performance Test, WO# 98718323, dated 5/30/2005
PT/2/A/4209/001 A, 2A NV Pump Performance Test, WO# 98759825, dated 11/7/2005
PT/2/A/4209/001 A, 2A NV Pump Performance Test, WO# 98745492, dated 1/31/2006
PT/2/A/4209/001 B, 2B NV Pump Performance Test, WO# 98765439, dated 12/19/2005
PT/2/A/4209/001 B, 2B NV Pump Performance Test, WO# 98741576, dated 9/26/2005
PT/2/A/4209/001 B, 2B NV Pump Performance Test, WO# 98723924, dated 7/25/2005
PT/1/A/4209/012 A, Centrifugal Charging Pump 1A Head Curve Performance Test, Rev. 020, WO# 98682616, dated 10/7/05
PT/1/A/4209/012 A, Centrifugal Charging Pump 1A Head Curve Performance Test, Rev. 019, WO# 98581740, dated 3/21/04
PT/1/A/4209/012 B, Centrifugal Charging Pump 1B Head Curve Performance Test, Rev. 026, WO# 98581741, dated 3/21/04
PT/1/A/4209/012 B, Centrifugal Charging Pump 1B Head Curve Performance Test, Rev. 025, WO# 98682615, dated 10/7/05
PT/2/A/4209/012 A, Centrifugal Charging Pump 2A Head Curve Performance Test, Rev. 011, WO# 98653330, dated 3/26/05
PT/2/A/4209/012 A, Centrifugal Charging Pump 2A Head Curve Performance Test, Rev. 010, WO# 98532098, dated 9/9/03
PT/2/A/4209/012 B, Centrifugal Charging Pump 2B Head Curve Performance Test, Rev. 010, WO# 98532097, dated 9/3/03
PT/2/A/4209/012 B, Centrifugal Charging Pump 2B Head Curve Performance Test, Rev. 010, WO# 98653331, dated 3/26/05
PT/1/A/4403/001 A, 1A RN Pump Performance Test, Rev. 55, WO# 98760974, dated 12/4/05
PT/1/A/4403/001 A, 1A RN Pump Performance Test, Rev. 55, WO# 98745486, dated 11/05/05
PT/1/A/4403/001 A, 1A RN Pump Performance Test, Rev. 55, WO# 98739589, dated 8/23/05
PT/1/A/4403/001 A, 1A RN Pump Performance Test, Rev. 54, WO# 98723912, dated 7/8/05
PT/1/A/4403/001 B, 1B RN Pump Performance Test, Rev. 53, WO# 98758765, dated 12/28/05
PT/1/A/4403/001 B, 1B RN Pump Performance Test, Rev. 52, WO# 98749603, dated 11/2/05
PT/1/A/4403/001 B, 1B RN Pump Performance Test, Rev. 52, WO# 98739590, dated 9/8/05
PT/1/A/4403/001 B, 1B RN Pump Performance Test, Rev. 52, WO# 98724745, dated 7/12/05
PT/2/A/4403/001 A, 2A RN Pump Performance Test, Rev. 40, WO# 98758772, dated 1/19/06

PT/2/A/4403/001 A, 2A RN Pump Performance Test, Rev. 40, WO# 98743596, dated 10/31/05
PT/2/A/4403/001 B, 2B RN Pump Performance Test, Rev. 41, WO# 9875077601, dated 12/8/05
PT/2/A/4403/001 B, 2B RN Pump Performance Test, Rev. 41, WO# 9873745101, dated 9/15/05
PT/1/A/4403/007 A, RN Train 1A Flow Balance, Rev. 47, WO# 98729121-01, dated 12/12/05
PT/1/A/4403/007 A, RN Train 1A Flow Balance, Rev. 47, WO# 98729121-01, dated 12/12/05

Design Changes/Modifications

UFSAR change 06-003, Revise UFSAR Section 6.3.2.6 (Coolant Quantity, amended 04/14/05) to incorporate certain small break LOCA events and their mitigation in support of resolution of the operable but degraded/nonconforming (OBDN) condition described in PIP M-04-05115
10 CFR 50.59 evaluation MNS-2006-1: EP/1&2/A/5000/ES-1.2 (Post LOCA Cooldown and Depressurization) Rev. 11, Unit 1, Rev. 10, Unit 2; EP/1&2/A/5000/ES-1.3 (Transfer to Cold Leg Recirc) Rev. 20; EP-1&2/A/5000/E-1 (Loss of Reactor or Secondary Coolant) Rev. 11, Unit, rev 9, unit 2
MGMM-5261, Replace Westinghouse H Series Overload Htrs with FH Series Overload Htrs
MGMM-14119, Replace existing MCC aux contacts and wire electrical interlock circuits in parallel for 1ND0058A, 2/17/05
MGMM-14126, Replace existing MCC aux contacts and wire electrical interlock circuits in parallel for selected important valve circuits, 12/13/03
MEVN-1819, Change overload size from H43 to H45 for 1NI184 & 1NI185
MGMM-14954, Sight gauge replacement will affect KC, KF, ND, NS, RN pump motors, 9/14/04
MGMM-15053, Motor internal space Htr no longer available for ND, CA, KC, NI motors, 11/9/05
MGMM- 14300, Relay settings changed for various 4kV motors should based on latest revision of Calculation MCC-1381.05-00-0094, 01/21/04
MGMM-14966, ND pump motors thrust bearing OAC alarm response needs refinement for Setpoint Responses, 10/14/04

Calculations

MCC-1381.05-00-0094, Protective Relay Setting Calculation for Essential Switchgear, Rev. 0
MCC-1381.05-00-0260, McGuire ETAP DG Dynamic Analysis, Rev. 21
MCC-1552.08-00-0118, FWST Level Setpoints (PIP M-97-0045), Rev. 6
MCC-1552.08-00-0208, Emergency Procedure Setpoints, Rev. 19
MCC-1223.12-00-0005, Verification of Refueling Water Storage Tank Design and Emergency Core Cooling System Pump Switchover Scheme, Rev. 0
MCC-1223.21-00-0003, Refueling Water Storage Tank Capacity, Rev. 0
MCC-1552.08-00-0197, Safety Injection Flows for Safety Analysis, Rev. 15
MCM-1205.00-0021 001, Swing Check Valve Assembly, 3/17/89
MCC-1223.12-00-0010, Verification of Minimum Available NPSH for ECCS Pumps, Rev. 4
MCC-1205.19-00-0003, Electric Motor Operator Sizing Guidelines per GL 89-10 for Gate Valves, [review of electrical interfaces], Rev. 28
MCC-1205.19-00-0007, Electric Motor Operator Sizing Guidelines per GL 89-10 for Globe Valves, [review of electrical interfaces], Rev. 17
MCC-1205.19-00-0012, GL 89-10 Butterfly Valve Electric Motor Operator Sizing Calculations,

[review of electrical interfaces], Rev. 13
MCC-1210.04-00-0068, Instrument Loop Uncertainty for FWST Level (Loops FW500, 501, 502) per NSM MG-12496 & MG-22496, Rev. 1
MCC-1223.21-00-0016, Refueling Water Storage Tank (FWST) Level Setpoints and Volumes per NSM MG-12496 & MG-22496, Rev. 2
MCC-1381.05-00-0094, Protective Relay Setting Calculation for Essential Switchgear, Rev. 21
MCC-1381.05-00-258, McGuire Unit 1 Aux System Voltage and Transformer Tap Study, Rev. 1
MCC-1381.05-00-263, McGuire Unit 2 Aux System Voltage and Transformer Tap Study, Rev. 2
MCC-1552.08-00-0118, FWST Level Setpoints (PIP M-97-0045), Rev. 5
ME-143, NPSH-Available for RHR Pumps when the NC System is Partially Filled, Rev. 0
DCP-1552.08-00-00-0109, MCC-1552.08-0197, CNC-1552.08-00-0181, Safety Injection, Flows for Safety Analysis, Rev. 15
MCC-1223.12-00-0017, Maximum Expected Delta P's of NI EMO Valves, Rev. 9
MCC-1223.24-00-0001, RN Parameters, Dated 12/4/73
MCC-1223.24-00-0004, RN System Design Parameter Verification, Rev. 1
MCC-1223.24-00-0050, Design Parameters of RN Valves for Generic Letter 89-10, Rev. 8
MCC-1223.24-00-0075, RN/KC Heat Exchanger Tube Plugging Analysis, Rev. 3
MCC-1223.24-00-0078, RN/KC Heat Exchanger Operability Evaluation, Rev. 0

Drawings

MCCD-1701-02.00, One Line Diagram 4kV Essential Auxiliary Power System, Rev. 2
MCEE-115-00.08, Elem. Diagram 4kV SWGR for RHR Pump Motor Bkr 1ETA-7, Rev. 10
MCEE-115-00.24, Elem. Diagram 4kV SWGR for KC Pump Motor Bkr 1ETB-4, Rev. 7
MCFD-1561-01.00, Flow Diagram of Residual Heat Removal System (ND), Rev. 11
MCFD-1571-01.00, Flow Diagram of Refueling Water System (FW), Rev. 18
MCFD-2573-01.00, Flow Diagram of Component Cooling System (KC), Rev. 5
MCFD-2573-01.01, Flow Diagram of Component Cooling System (KC), Rev. 5
MCFD-2573-02.00, Flow Diagram of Component Cooling System (KC), Rev. 2
MCFD-2573-02.01, Flow Diagram of Component Cooling System (KC), Rev. 0
MCFD-2573-03.00, Flow Diagram of Component Cooling System (KC), Rev. 4
MCFD-2573-03.01, Flow Diagram of Component Cooling System (KC), Rev. 2
MCFD-2573-04.00, Flow Diagram of Component Cooling System (KC), Rev. 5
MCFD-1550-01.00, Symbols for Flow Diagrams, Unit 1 & 2, Rev. 2
MCFD-1550-01.01, HVAC Symbols for Flow Diagrams, Unit 1 & 2, Rev. 1
MCFD-1550-02.00, Symbols for Flow Diagrams, Unit 1 & 2, Rev. 0
MCFD-1550-03.00, Symbols for Flow Diagrams, Unit 1 & 2, Rev. 2
MCFD-1550-01.00, Index of McGuire Flow Diagrams, Unit 1 & 2, Rev. 7
MCFD-1554-03.01, Flow Diagram Chemical and Volume Control System (NV), Unit 1, Rev. 15
MCFD-1574-01.00, Flow Diagram of Nuclear Service Water System (RN), Unit 1 & 2, Rev. 7
MCFD-1574-01.00, Flow Diagram of Nuclear Service Water System (RN), Unit 1 & 2, Rev. 7
MCFD-2562-01.00, Flow Diagram of Safety Injection System (NI), Unit 2, Rev. 2
MCFD-2562-02.00, Flow Diagram of Safety Injection System (NI), Unit 2, Rev. 4
MCFD-2562-02.01, Flow Diagram of Safety Injection System (NI), Unit 2, Rev. 2
MCFD-2562-03.00, Flow Diagram of Safety Injection System (Upper Head) (NI), Unit 2, Rev. 11
MCFD-2562-03.01, Flow Diagram of Safety Injection System (NI), Unit 2, Rev. 5

MCFD-2562-04.00, Flow Diagram of Safety Injection System (NI), Unit 2, Rev. 2
MCFD-2574-01.00, Flow Diagram of Nuclear Service Water System (RN), Unit 2, Rev. 9
MCFD-2574-02.00, Flow Diagram of Nuclear Service Water System (RN), Unit 2, Rev. 14
MCFD-2574-02.01, Flow Diagram of Nuclear Service Water System (RN), Unit 2, Rev. 4
MCFD-2574-03.00, Flow Diagram of Nuclear Service Water System (RN), Unit 2, Rev. 12
MCFD-2574-03.01, Flow Diagram of Nuclear Service Water System (RN), Unit 2, Rev. 5
MCFD-2574-04.00, Flow Diagram of Nuclear Service Water System (RN), Unit 2, Rev. 19
MC-1730-02.05, Outline Diagram, Refueling Water System RWST Level Controls and Instrumentation Panel, Rev. 15
MC-2730-02.05, Outline Diagram, Refueling Water System RWST Level Controls and Instrumentation Panel, Rev. 11
MCCD-1700-00.00, Unit 1 Configuration One Line Diagram, Unit Essential Power Sys, Rev. 4
MCCD-1702-02.00, Unit 1 & 2 One Line Diagram, 4160 Vac Essential Aux Power Sys, Rev. 2
MCCD-1703-06.01, Unit 1 One Line Diagram, 600 Vac Essential MCC 1EXMA, Rev. 17
MCCD-1705-01.00, Units 1 & 2 One Line Diagram, 125 Vdc/120 Vac Vital Instrument & Control Power System, Rev. 88
MCCD-1705-01.01, Units 1 & 2 One Line Diagram, 125 Vdc/120 Vac Vital Instrument & Control Power System, Rev. 29
MCCD-2700-00.00, Unit 2 Configuration One Line Diagram, Unit Essential Power Sys, Rev. 5
MCEE-0114-00.02, Elementary Diagram, Diesel Generator 1A Load Sequencer, Part 2, Rev. 6
MCEE-0114-00.02-01, Elementary Diagram, Diesel Generator 1A Load Sequencer, Relay Developments, Rev. 6
MCEE-0114-00.03, Elementary Diagram, Diesel Generator 1A Load Sequencer, Part 3, Rev. 4
MCEE-0114-00.03-01, Elementary Diagram, Diesel Generator 1A Load Sequencer, Relay Developments, Rev. 19
MCEE-0114-00.08, Elementary Diagram, Diesel Generator 1A Load Sequencer, Part 8, Rev. 9
MCEE-0114-00.08-01, Elem Diagram, DG 1A Load Sequencer, Relay Developments, Rev. 3
MCEE-0138-00.79, Elementary Diagram, Train B Engineered Safeguards Modulating Control Valves, Rev. 7
MCEE-0141-00.07, Elementary Diagram, ND HX 1A Outlet to Centrifugal Charging Pump 1A and 1B Block Valve 1ND0058A, Rev. 2
MCEE-0141-00.09, Elementary Diagram, ND Pump 1A and HX 1A Miniflow Stop Valve 1ND0068A, Rev. 0
MCEE-0151-00.65, Elementary Diagram, Containment Sump Line 1B Isol 1NI184B, Rev. 13
MCEE-0151-00.65-01, Elementary Diagram, Containment Sump Line 1B Isol 1NI184B, Rev. 7
MCEE-0151-00.66, Elementary Diagram, Containment Sump Line 1A Isol 1NI185A, Rev. 13
MCEE-0151-00.66-01, Elementary Diagram, Containment Sump Line 1A Isol 1NI185A, Rev. 7
MCEE-0155-01.17, Elementary Diagram, Refueling Water System, RWST Level Controls and Instrumentation, Rev. 4
MCEE-0155-01.18, Elementary Diagram, Refueling Water System, RWST Level Controls and Instrumentation, Rev. 3
MCEE-0155-01.19, Elementary Diagram, Refueling Water System, RWST Level Controls and Instrumentation, Rev. 4
MCID-1499-ND-01, Instrument Detail, RHR Pump Minimum Flow Control, Rev. 2
MCID-1499-RN.34, Instrument Detail, ND Pump AHU, Rev. 1
MCID-1499-RN.03, Instrument Detail, Control for KC HX RN Discharge Throttle Valve 1RN89A and 1RN190B, Rev. 0

MCM 2201.04-022-001, Tank C, Unit 2, General Plan for Refueling Water Tank for Duke Power Co. McGuire #2 Nuclear Station, Rev. A
Chicago Bridge & Iron Co. Tank 'C', Unit 2, 24" [RWST] Outlet Nozzle, Customer MKA, Drawing 8, Rev. 2

Design Basis Documents

MCS-144.01-EQD-0001, Safe Shutdown Facility Diesel Generator, Rev. 4
MCS-1571.FW-00-0001, Design Basis Specification for the FW System, Rev. 16
MCS-1574.RN-00-0001, Design Basis Specification for the RN System, Rev. 21
MCTC-1561-ND.S001-01, ND Flow Balance Test Acceptance Criteria, Rev. 2
MCTC-1561-ND.P001-01, ND Pumps ½ A and B Test Acceptance Criteria, Rev. 2
MCTC-1561-ND.P002-01, ND (Residual Heat Removal) Pump Safety Analysis Performance Test Acceptance Criteria, Rev. 4
MCTC-1561-ND.P004-01, ND Pumps 1A and 1B Miniflow TAC, Rev. 2
MCTC-2561-ND.P001-01, ND Pumps 2A and 2B Miniflow TAC, Rev. 2
MCTC-1561-ND.V001-01, Isolation Valves 1/2ND-1B and 1/2ND-2AC TAC, Rev. 5
MCTC-1561-ND.V001-02, Isolation Valves 1/2ND-1B and 1/2ND-2AC TAC, Rev. 5
MCTC-1561-ND.V008-01, Isolation Valves 1/2ND-58A TAC, Rev. 4
MCTC-1571-FW.V006-01, Design Criteria, Operability Requirements and Compensatory Measures, Testing and Acceptance Criteria, Check Valves 1/2FW28, Rev. 1
CA-2.03, Three-conductor Cable Impedances for Use in ETAP™ Analyses and Other Power System Calculations, Rev. 1
CO-4.01 Motor Operated Valve (MOV) Motor Overload Protection, Revision 3
DC-1.01, Separation - McGuire, Rev. 22

Work Orders

WO 98055196-05, 1EPCBK1ETA7 PM Replace/Refurbish Breaker, 12/31/03
WO 98172653-04, PM 1ETB4 Replace with Refurbished Breaker, 7/31/03
WO 98676500-01, 1EPCBK1ETA14: Inspect Breaker Part 21 Concern
WO 98288135-05, 1ND0058 VOTES Analysis Inputs, 4/5/01
WO 98527848-07, 2ND-58A Replace Actuator, 9/14/03
WO 98393678-02, PT 2ND-1B / GT VLV / Verify Closing Force, 3/24/05
WO 98697878-08, 1ND-1B GT VLV / Verify Closing Force, 9/30/05
WO 98705209-01, PT 1FWLP5000, Refueling Water Storage Tank Level Loop Cal, 6/9/05
WO 98596978-01, PT 1FWLP5000, Refueling Water Storage Tank Level Loop Cal, 12/10/03
WO 98454652-01, PT 1FWLP5000, Refueling Water Storage Tank Level Loop Cal, 2002
WO 98711062-01, PT 1FWLP5010, Refueling Water Storage Tank Level Loop Cal, 7/14/05
WO 98595796-01, PT 1FWLP5010, Refueling Water Storage Tank Level Loop Cal, 1/15/04
WO 98454651-01, PT 1FWLP5010, Refueling Water Storage Tank Level Loop Cal, 2002
WO 98711061-01, PT 1FWLP5020, Refueling Water Storage Tank Level Loop Cal, 7/19/05
WO 98595795-01, PT 1FWLP5020, Refueling Water Storage Tank Level Loop Cal, ½0/04
WO 98454650-01, PT 1FWLP5020, Refueling Water Storage Tank Level Loop Cal, 4/22/02
WO 98648112-01, PT 2FWLP5000, Refueling Water Storage Tank Level Loop Cal, 7/27/04
WO 98530413-01, PT 2FWLP5000, Refueling Water Storage Tank Level Loop Cal, 1/30/03
WO 98370716-01, PT 2FWLP5000, Refueling Water Storage Tank Level Loop Cal, 8/15/01

WO 98737410-01, PT 2FWLP5010, Refueling Water Storage Tank Level Loop Cal, 12/12/05
WO 98632707-01, PT 2FWLP5010, Refueling Water Storage Tank Level Loop Cal, 6/28/04
WO 98646891-01, PT 2FWLP5020, Refueling Water Storage Tank Level Loop Cal, 7/14/04
WO 98739539-01, PT 2FWLP5020, Refueling Water Storage Tank Level Loop Cal, 1/9/06
WO 98530412-01, PT 2FWLP5020, Refueling Water Storage Tank Level Loop Cal, ½8/03
WO 98705208-01, RHR Pump A Flow Loop 1NDPS5040 and 1NDPG5041 Calibration, 5/11/05
WO 98626827-01, RHR Pump A Flow Loop 1NDPS5040 and 1NDPG5041 Calibration, 6/11/04
WO 98558430-01, RHR Pump A Flow Loop 1NDPS5040 and 1NDPG5041 Calibration, 4/16/03
WO 98723829-01, RHR Pump B Flow Loop 1NDPS5050 and 1NDPG5051 Calibration, 9/14/05
WO 98650562-01, RHR Pump B Flow Loop 1NDPS5050 and 1NDPG5051 Cal, 10/12/04
WO 98567506-01, RHR Pump B Flow Loop 2NDPS5050 and 2NDPG5051 Calibration, 8/21/03
WO 98707776-01, RHR Pump A Flow Loop 2NDPS5040 and 2NDPG5041 Calibration, 8/22/05
WO 98626828-01, RHR Pump A Flow Loop 2NDPS5040 and 2NDPG5041 Calibration, 6/29/04
WO 98562899-01, RHR Pump A Flow Loop 2NDPS5040 and 2NDPG5041 Calibration, 5/13/03
WO 98727825-01, RHR Pump B Flow Loop 2NDPS5050 and 2NDPG5051 Calibration, 7/13/05
WO 98671558-01, RHR Pump B Flow Loop 2NDPS5050 and 2NDPG5051 Calibration, 11/9/04
WO 98607943-01, RHR Pump B Flow Loop 2NDPS5050 and 2NDPG5051 Cal, 12/03/03
WO 98682021-01, IP/1/A/3250/012A, Diesel Load Sequencer 1A Timer Calibration, 9/30/05
WO 98581173-01, IP/1/A/3250/012A, Diesel Load Sequencer 1A Timer Calibration, 3/11/04
WO 98441482-01, IP/1/A/3250/012A, Diesel Load Sequencer 1A Timer Calibration, 9/27/02
WO 98682022-01, IP/1/A/3250/012B, Diesel Load Sequencer 1B Timer Calibration, 9/23/05
WO 98581174-01, IP/1/A/3250/012B, Diesel Load Sequencer 1B Timer Calibration, 3/20/04
WO 98441483-01, IP/1/A/3250/012B, Diesel Load Sequencer 1B Timer Calibration, 9/22/02
WO 98652791-01, IP/2/A/3250/012A, Diesel Load Sequencer 2A Timer Calibration, 3/12/05
WO 98531533-01, IP/2/A/3250/012A, Diesel Load Sequencer 2ATimer Calibration, 9/22/03
WO 98410335-01, IP/2/A/3250/012A, Diesel Load Sequencer 2A Timer Calibration, 3/1/02
WO 98652792-01, IP/2/A/3250/012B, Diesel Load Sequencer 2BTimer Calibration, 3/22/05
WO 98531534-01, IP/2/A/3250/012B, Diesel Load Sequencer 2BTimer Calibration, 9/10/03
WO 98410336-01, IP/2/A/3250/012B, Diesel Load Sequencer 2BTimer Calibration, 3/7/02
WO 98681982-01, PT/1/A/4201/001, RWST Lvl Auto Switchover Actuation Logic Test, 10/1/05
WO 98581135-01, PT/1/A/4201/001, RWST Lvl Auto Switchover Actuation Logic Test, 3/19/04
WO 98441449-01, PT/1/A/4201/001, RWST Lvl Auto Switchover Actuation Logic Test, 10/3/02
WO 98652747-01, PT/2/A/4201/001, RWST Lvl Auto Switchover Actuation Logic Test, 3/23/05
WO 98531503-01, PT/2A/4201/001, RWST Lvl Auto Switchover Actuation Logic Test, 9/20/03
WO 98410293-01, PT/2/A/4201/001, RWST Lvl Auto Switchover Actuation Logic Test, 3/12/02
WO 98441060-01, Breaker testing/inspection for EPE-MX-EMXA, 9/24/02
WO 98481041-01, Measure current imbalance for EPE-BK-EMXAF12A, 3/12/02
WO 98720869, Replacement of auxiliary contacts for EPE-BK-EMXD8D, 3/24/05

<u>System Health Reports</u>

FW-Refueling Water Health Report, 2005T1, 2005T2, 2005T3
KC-Component Cooling Health Report, 2005T1, 2005T2, 2005T3
ND-Residual Heat Removal/LHSI Health Report, 2005T1, 2005T2, 2005T3
Motors Health Report for 2005T1, 2005T2, 2005T3
Residual Heat Removal And Low Head Safety Injection Health Report for 2005T3
EPC-4.16 kV Essential Auxiliary Power Health Report, 2005T1, 2005T2, 2005T3

Circuit Breakers, Molded Case Health Report for 2005T3
120 Vac Systems Health Report, 2005T1, 2005T2, 2005T3
600 Vac Health Report, 2005T1, 2005T2, 2005T3
DC Power Systems Health Report, 2005T1, 2005T2, 2005T3
Process Switches Health Report, 2003T3, 2004T2, 2004T3, 2005T3
Starters/Contactors Health Report, 2003T1, 2003T2, 2003T3, 2004T1, 2004T2, 2004T3, 2005T1, 2005T2, 2005T3
Transmitters, Electronic and Pneumatic, Health Report, 2003T3, 2004T3

Miscellaneous Documents

UFSAR Chapters 3, 6, 7, 8, and 15
MCEI-0400-151, NS operation following SBLOCA with Inadequate Indicated Sump Lvl, 8/26/05
Report on M-04-5049, Operability Evaluation Issues, SRG Manager Assessment
NEI 96-07, Guidelines for 10 CFR 50.59 Implementation, Rev. 1
License Amendment Request (LAR) for McGuire and Catawba Technical Specification 3.4.15, RCS Leakage Detection Instrumentation, and Associated Bases, and Applicable Sections of the Updated Final Safety Analysis Reports, 7/27/05
Time Critical Operator Action Study, 11/9/05
Job Performance Measures index, 3/06/06
Background document for AP/1&2/A/5500/020 (Loss of RN), 10/24/05
NSD-514, Rev. 1, Control of Time Critical Tasks, 12/15/05
ERG-04-008, DW-03-020, WOG Procedure Working Group response to securing spray during small RCS breaks
Simulator task list and schedule, 4/06/06
Six year LOR training matrix and topic assignment, 4/06/06
MRB-070, McGuire Margin Board: Upper Thrust Bearing Temperature on ND Pump Motor
MCM-1201.05-0025-002, RHR Pump Motor Curves and Data Sheets
MCM-1201.05-0048-001, RHR Pump & Motor Vendor Manual
MCM-1312.02-0028-001, Maintenance and Surveillance of Medium Voltage Switchgear Equipment Vendor Manual
In-Service Testing Program for ND-Residual Heat Removal System Valves, Rev. 27
Check Valves, A Reliability and Cost Management Program, Rev. 3
MCLL-1703-04.01, McGuire Nuclear Station Electrical Load List, Rev. 38
Specification No. DPS 1205.19-00-0004, Rotork Motor Operators and Spare Parts, 11/2/92
EQMM-1393.01-N01-02, Environmental Qualification Maintenance Manual, Differential Pressure Switch, ITT-Barton, Model 289-A, Rev. 2
Generic Letter 96-06, Assurance of Equipment Operability and Containment Integrity During Design Basis Accident Conditions

Problem Investigative Process Reports (PIPs)

M-00-5052, RHR Pump room temperature monitors are in the hallway
M-01-2715, Found high and low switches for 1KCPG5530 out of tolerance per procedure
M-02-00247, 89-10 Setup of MOVs NI-173A and 173B may be such that these valves would not close during a LOCA outside containment
M-02-01528, Auxiliary contact failures in motor control centers

M-02-3387, Review of OE-13991 Information
M-02-3834, 1NDPS5040 switch two times out of tolerance
M-02-4942, Elevated 1A ND Motor Upper Bearing Temp Noted After Motor Replacement
M-02-05370, Excessive gas accumulation vented at sump valve 1NI-185A
M-03-0008, 2NDPS5050 high setpoint two times out of tolerance
M-03-1436, 10 CFR Part 21- Westinghouse NSAL-03-2, “ABB 4kV Bkr Fail to Close and Latch”
M-03-1489, Pipe/conduit trench from Unit 2 FWST to auxiliary building was found full of water
M-03-1992, Resolution of risk significant time critical action review
M-03-3196, Asea Brown Boveri (ABB) HK Control Device Failure Leading to CNS LER
M-03-3543, Conduits containing RWST level transmitter signal cable were found corroded and some supports were broken
M-03-3994, 2A ND Motor Upper Bearing Temp Increased to 203 degrees
M-03-5465, 2A ND Motor Upper Bearing Temp Stabilized at 194 degrees
M-04-0147, ND Motor at Repair Shop Found to have Bend in Shaft
M-04-0593, Discussion with ITT Grinnell regarding actuator materials
M-04-0907, Evaluate NS setpoints for NRC Bulletin 2003-01 and GSI-191
M-04-3069, Part 21 - Failure of Spring Charging Function in an ABB Model HK Circuit Breaker
M-04-3418, Include control room pressurization action in operations procedures for responding to fuel handling accident and dry storage cask drop accident
M-04-3810, Evaluate modifications and procedure and training enhancements to gain margin in time to initiate NC pump seal injection from SSF
M-04-4877, The purpose of this PIP is document results of PT/0/A/4600/113 (Operator time critical task verification)
M-04-5115, Potentially credible NC System break locations have been identified that may cause a diversion of inventory to the Incore Instrument Room
M-04-5272, 2KCPG5540 low switch out of calibration two times
M-05-0043, Switch 2 on 1KCPG5540 was greater than two times out of tolerance
M-05-0888, OAC Hi Temp Alarm Received
M-05-01883, Setpoint needed for maximum ND system pressure that sump valves NI-184&185 can open against
M-05-02204, SBLOCA dP may be > than design dP for sump valves 1(2)NI-184B, 185A
M-05-4872, ND Pump 1A appears to have experienced a step-change in discharge pressure
M-05-5195, Lower Oil Leak Past Newly Refurbished Motor Lower Bearing
M-06-0615, Potential Part 21 Concern for Breaker in 1ETA14 Identified on 6/9/04, and has not been Inspected to Determine if it is or is not affected
M-06-0652, Enhancements/corrections needed to PRA list of significant time critical actions
M-06-0675, 10 new time critical actions identified by PRA group need to be added to the time critical action program in accordance with NSD-514
M-06-1089, Calculation for FWST vortexing allowances may be non-conservative
M-90-0096, Sizes for existing Westinghouse FH series overload heaters were determined from H series heater sizing data, and as a result, overload heaters may be oversized
C-06-3007, There is a ~3 inch diameter hole in the containment floor @ 552' elevation, 17' radius, 75 degrees going into the incore sump room

PIPs Written Due to CDBI

M-06-1206, Assuming leakage by PIV could challenge capability of NI-184B, 185A to open
M-06-1256, Potential non-conformance with GDC-2 with respect to seismic qualification of RN to KC HX outlet flow control valves 1/2RN89A and 1/2RN190B
M-06-1360, Impact of de-pressurization of the EDG room ventilation system due to a tornado
M-06-1381, Plant response during a postulated SBLOCA during which the RCPs may be used to assist in plant cooldown
M-06-1423, 1RN863 and 1RN477 shown in the wrong position on MCFD1574-01.00
M-06-1425, Evaluate compliance with ASME Section VIII with respect to overpressure protection on RN system heat exchangers
M-06-1444, Possible ECCS back leakage to the FWST is not explicitly documented in a license basis offsite dose calculation
M-06-01450, Allowance for degraded EDG frequency for NI/NV TAC curves
M-06-01462, Procedural adherence issue with respect to performance of PT/1/A/4204/001
M-06-1567, Discrepancy between voltage study calculation and electrical load list regarding thermal overload heater size for MOV 1ND058A
M-06-1570, Time critical valve operation may be delayed while operators get ladders, fall protection, or transition around obstacles
M-06-01588, Power cable conditions to valves 1ND-67B and 1ND-68A
M-06-01593, The analytical basis for the IST RN Pump acceptance criteria to assure delivery of required safety related flows
M-06-01597, NI flow diagram shows suction pressure tap on wrong size line
M-06-1617, Incorrect horsepower rating for 1NI185A was identified on electrical load list
M-06-01620, The shutoff head portion (below ~50 gpm) of the NI TAC curve does not bound flows assumed in the SBLOCA analyses
M-06-1623, Changes authorized under 10CFR50.59 may have required NRC approval
M-06-1625, Internal wiring separation problem in 2FWPNRWLP
M-06-01632, NI-147A discussion in dP calc does not completely describe pressure sources and uses incorrect terms
M-06-01634, KC valves locked open but not indicated as requiring locks on flow diagram
M-06-01938, 10 CFR 50.59 screen performed 2/28/06 may unintentionally lead one to believe that changes made to UFSAR Section 6.3.2.6, Coolant Quantity, involve a new accident

LIST OF ACRONYMS

AP	Abnormal Procedure
ARP	Annunciator Response Procedure
ASME	American Society of Mechanical Engineers
DBD	Design Basis Document
dP	Differential Pressure
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EOP	Emergency Operating Procedure
FWST	Refueling Water Storage Tank
GL	Generic Letter

gpm	Gallons Per Minute
HX	Heat Exchanger
IST	In-Service Testing
JPM	Job Performance Measure
KC	Component Cooling Water System
KV	Kilovolt
LOCA	Loss of Coolant Accident
MCC	Motor Control Center
MOV	Motor Operated Valve
MSLB	Main Steam Line Break
NC	Reactor Coolant System
NCV	Non-Cited Violation
ND	Residual Heat Removal/Low Head Safety Injection System
NI	Safety Injection System
NPSH	Net Positive Suction Head
NV	Centrifugal Charging/High Head Safety Injection System
PIP	Problem Investigation Process
PIV	Pressure Isolation Check Valve
PRA	Probabilistic Risk Assessment
psig	Pounds per Square Inch Gauge
PT	Periodic Test Procedure
RN	Nuclear Service Water System
RO	Reactor Operator
SBLOCA	Small Break Loss of Coolant Accident
SER	Safety Evaluation Report
TAC	Test Acceptance Criteria
TDH	Total Developed Head
TOL	Thermal Overload
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink
URI	Unresolved Item
WO	Work Order