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

July 27, 2009

Mr. Bruce H. Hamilton
Vice President
Duke Power Company, LLC
d/b/a Duke Energy Carolinas, LLC
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: WILLIAM B. MCGUIRE NUCLEAR STATION – NRC COMPONENT DESIGN BASES INSPECTION - INSPECTION REPORT 05000369/2009006 AND 05000370/2009006

Dear Mr. Hamilton:

On June 18, 2009, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your William B. McGuire Nuclear Station, Units 1 and 2. The enclosed inspection report documents the inspection results which were discussed on June 18, 2009, with Mr. S. Capps and other members of your staff.

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

Based on the results of this inspection, the team identified three 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 were entered into your corrective action program, the NRC is treating these findings as Non-Cited Violations (NCVs) consistent with Section VI.A.1 of the NRC's Enforcement Policy. If you contest any of these NCVs you should provide a response within 30 days of the date of this inspection report, with the bases for your denial, to the United States 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 William B. 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 responses, if any, will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the

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/

Binoy Desai, Chief
Engineering Branch 1
Division of Reactor Safety

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

Enclosure: Inspection Report 05000369/2009006 and 05000370/2009006
w/Attachment: Supplemental Information

cc w/encl: See page 3

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Letter to B. Hamilton from Binoy Desai dated July 27, 2009.

SUBJECT: WILLIAM B. MCGUIRE NUCLEAR STATION – NRC COMPONENT DESIGN BASES INSPECTION - INSPECTION REPORT 05000369/2009006 AND 05000370/2009006

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REGION II

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| Docket Nos.: | 05000369, 05000370 |
| License Nos.: | NPF-9, NPF-17 |
| Report No: | 05000369/2009006 and 05000370/2009006 |
| Licensee: | Duke Power Company, LLC |
| Facility: | McGuire Nuclear Station, Units 1 and 2 |
| Location: | 12700 Hagers Ferry Road<br>Huntersville, NC 28078 |
| Dates: | May 18, 2009 through June 18, 2009 |
| Team: | R. Moore, Senior Reactor Inspector (Lead)<br>S. Rose, Senior Reactor Inspector<br>C. Even, Reactor Inspector<br>T. Steadham, Resident Inspector, RIII<br>G. Nicely, Contract Electrical Inspector<br>C. Edwards, Contract Mechanical Inspector |
| Accompanied by: | T. Fanelli, Reactor Inspector (Training)<br>R. Patterson, Reactor Inspector (Training) |
| Approved by: | B. Desai, Branch Chief<br>Engineering Branch 1<br>Division of Reactor Safety |

Enclosure

# SUMMARY OF FINDINGS

IR 05000369/2009-006, 05000370/2009-006; 5/18/2009 – 6/18/2009; William B. McGuire Nuclear Station, Units 1 and 2; Component Design Basis Inspection.

This inspection was conducted by a team of three NRC inspectors from the Region II office, a resident inspector from RIII, and two contract inspectors. Three Green findings, which were identified as non-cited violations (NCVs), 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,” (ROP) Revision 4, dated December 2006.

Cornerstone: Mitigating Systems

Green: The team identified a finding of very low safety significance involving a non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings”, for the licensee’s failure to provide adequate procedures for flow balancing of the service water (RN) system. The RN flow balance procedure was inadequate in that it made no provision in the acceptance criteria to limit or evaluate minimum flow control valve seat/disc clearance, and subsequent potential for increased flow obstruction, resulting from system flow balancing. The licensee entered this deficiency into their corrective action program (CAP) for resolution.

The finding was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of procedure quality and affected the cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, changing position of the flow control valves without consideration of potential flow obstruction could impact the capability to adequately cool safety related equipment. The team assessed this finding for significance in accordance with the SDP for Reactor Inspection Findings for At-Power Situations, and determined that it was of very low safety significance (Green), in that no actual loss of safety system function was identified. No cross-cutting aspect was identified because the performance deficiency did not reflect current performance. (Section 1R21.2.3)

Green: The team identified a finding of very low safety significance involving a NCV of 10 CFR 50, Appendix B, Criterion III, “Design Control,” for the licensee’s failure to assure that the applicable design bases were correctly translated into the in-service test (IST) acceptance criteria for safety-related motor operated valves (MOVs). Specifically, the licensee’s testing did not account for test inaccuracies associated with limit switch actuation or minimum EDG frequency into IST stroke time testing. The licensee entered this deficiency into their CAP for resolution.

The finding was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of design control and affected the cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences. Not accounting for test inaccuracies and EDG under frequency, the IST did not ensure that MOV isolation times referenced in the Updated Final Safety Analysis Report (UFSAR) were verified by testing. The team assessed this finding for significance in accordance with the SDP for Reactor Inspection Findings for At-Power Situations, and determined that it was of very low safety significance (Green), in that no actual loss of safety system function was identified. No cross-cutting aspect was identified because the performance deficiency did not reflect current performance. (Section 1R21.2.11)

Green: The team identified a finding of very low safety significance involving a NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control", for failure to establish measures to verify the design capability of the control circuit voltage for 600 VAC safety related motors fed from motor control centers. Specifically, there was no voltage drop calculation or cable configuration specification for the control circuits that established the adequacy of the control circuit to energize the safety related motors. The licensee entered this deficiency into their CAP for resolution.

The finding was more than minor because it was associated with the design control attribute of the Mitigating Systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Due to the lack of appropriate analysis, the 600V motor control circuit design basis accident capability was not assured and further evaluation was required to demonstrate that the equipment could perform its safety function. The team assessed this finding for significance in accordance with the SDP for Reactor Inspection Findings for At-Power Situations, and determined that it was of very low safety significance (Green), because it was a design deficiency determined not to have resulted in the loss of safety function. No cross-cutting aspect was identified because the performance deficiency did not reflect current performance. (Section 1R21.2.20)

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 1.3 or Birnbaum value greater than 1 $X10^{-6}$. The components selected were located within the following systems: decay heat removal (ND), service water (RN), mid-loop level monitoring, vital instrumentation and control power, 4 kV and 600 VAC power distribution, vital bus loss/undervoltage protection scheme, vital batteries, emergency diesel generator (EDG) batteries, and the standby shutdown facility (SSF) reactor coolant makeup pump. The sample included 20 components, five operating experience items, and six operator actions.

The team performed a margin assessment and detailed review of the selected risk-significant components to verify that the design bases had 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. Equipment reliability issues were also considered in the selection of components for detailed review. These reliability issues included items related to failed performance test results, significant corrective action, repeated maintenance, maintenance rule (a)1 status, regulatory issue summary 05-020 (formerly Generic Letter 91-18) conditions, NRC resident inspector input of problem equipment, system health reports, industry operating experience and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in depth margins. An overall summary of the reviews performed and the specific inspection findings identified is included in the following sections of the report.

.2 Results of Detailed Reviews

.2.1 ND Pumps 2A/2B for Reduced Inventory/Mid-loop Operations

a. Inspection Scope

The team reviewed the system design basis document (DBD), related design basis support documentation, station technical specifications (TS), pump vendor manual and related vendor correspondence, drawings, and UFSAR to identify design, maintenance, and operational requirements related to the pumps for the application of reduced inventory/mid-loop conditions. The documents were reviewed to verify that the pumps were capable of meeting their design basis requirements, with consideration of allowable pump degradation, net positive suction head (NPSH), vortex conditions, and pump minimum flow. To assess the current condition of the pumps, the team interviewed engineers, and reviewed system health reports and related problem investigation program documents (PIPs). Test procedures and acceptance values were reviewed to verify that acceptance criteria were supported by calculations or other engineering documents, and to ensure that the design and licensing bases were met and that tests and/or analyses validated component operation under accident/event conditions. The pump operating procedures were reviewed to ensure the pumps were operated in accordance with their design basis requirements. The system drawings were reviewed to verify that the installed configuration would support its design basis function under accident/event conditions and that component configurations had been maintained consistent with design assumptions.

b. Findings

No findings of significance were identified.

.2.2 ND Heat Exchangers (Hxs) 2A/2B

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the ND Hxs. The machinery history, as demonstrated by component related PIPs, corrective maintenance, and system health reports, was reviewed to verify that design bases have been maintained. The team reviewed the station testing and monitoring of Hx performance to assess the licensee's activities to maintain the performance capability of the equipment. A field walkdown of the Hxs was performed to assess observable material conditions and to verify that the installed configuration was in accordance with plant drawings.

b. Findings

No findings of significance were identified.

.2.3 ND Pump 2A/2B Motor Air Handling Units (AHUs)

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the ND AHUs. The AHUs provide cooling for the ND pump motors by rejecting heat from the motors and miscellaneous piping to the RN system via fan-forced room air driven through a ceiling mounted cooling coil. The team reviewed the cooling coil specifications, design bases information and supporting calculations to identify the heat removal requirements and capability of the AHUs. The team reviewed the procedures for and results of Hx inspections/ cleanings, flow balancing and differential pressure (dp) testing/trending to verify compliance with GL 89-13 program plan requirements and to determine remaining margin on design basis heat transfer capability. The cooling fan sizing and power availability were reviewed to verify the reliability, availability, and capability of the forced air flow required for room cooling. The team reviewed the adequacy of RN flow to the cooler as limited by the AHU flow control valve. Component related PIPs, corrective maintenance, and system health reports were reviewed to verify the licensee's capability for detection, monitoring, and correction of potential degradation. A field walkdown was performed with the system engineer to assess observable material conditions and verify that the system configuration was consistent with the design basis assumptions, system operating procedures, and plant drawings.

b. Findings

Introduction: A Green NCV of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” was identified for the licensee’s failure to provide adequate procedures for flow balancing of the RN system. The RN flow balance procedure was inadequate in that it made no provision in the acceptance criteria to limit or evaluate minimum flow control valve seat/disc clearance, and subsequent potential for increased flow obstruction, resulting from system flow balancing.

Description: Periodic Test Procedure, PT/2/A/4403/007, RN Train 2A Flow Balance, Rev. 58, provided the guidance for flow balance of the RN system. Similar procedures are used for both units. The flow balance procedures were developed in 1986. The RN system provided the heat sink for station safety related heat loads including cooling for safety related equipment. The flow to the equipment was established via manual positioning of throttle valves in the flow path from the RN pumps, via the RN strainers and system distribution piping. The flow balance procedure acceptance criteria addressed only minimum flows to the safety related equipment. The strainers had a capability to filter debris of greater than 3/16 inch (.0125 inches) from the ultimate heat sink sources of the lake and the standby nuclear service water pond. In addition to debris passing through the strainers, corrosion was generated within the system from the carbon steel system piping in contact with lake water.

The team evaluated the seat/disc geometry of the installed flow control throttle valves and identified 16 Unit 1 and 14 Unit 2 valves with valve disk-to-seat clearances less than the 3/16 inch debris size allowed by the RN system strainers. The valves were 2” and 1.5” Kerotest globe valves. The team concluded there was a potential for flow obstruction in the throttle valves due to existing in-system generated corrosion products and strainer allowed debris, with respect to the position of the throttle valves. The team noted that the RN flow balancing procedure contained no provision in the acceptance criteria to limit or evaluate minimum seat/disc clearance with respect to content of debris in the system or RN strainer gap allowance, when changing position of flow control valves. Additionally, there was no reference in the limits and precautions section of the procedure related to the increased potential for flow obstruction due to throttling the flow control valves.

Following the team’s observations, the licensee entered this issue into their corrective action program (PIP M-09-03034) and performed an immediate determination of operability (IDO). The licensee concluded that there was reasonable assurance of operability based on several factors, including the following:

- no operating history of degraded performance - monitoring of equipment temperatures and dp did not indicate a flow obstruction condition existed;
- characteristics of corrosion products found in the system were such that system differential pressure across partially clogged valves would be adequate to break the particles down in size to the point that they would pass through the restricted valve seat port area;

- a previously identified long term debris generation mechanism related to soluble iron oxides in the lake water had been resolved; and
- a previously identified debris contribution mechanism due to Alewife fish had been resolved.

Based on the available information, the team concurred with this conclusion regarding the current system configuration.

Analysis: The licensee's failure to provide adequate procedures for flow balancing of the RN system was identified as a performance deficiency. The finding was determined to be more than minor because it was associated with the mitigating systems cornerstone attribute of procedure quality and affected the cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, changing position of the flow control valves without consideration of potential flow obstruction could impact the capability to adequately cool safety related equipment. The team assessed this finding for significance in accordance with NRC Manual Chapter 0609, Appendix A, Attachment 1, Significance Determination Process (SDP) for Reactor Inspection Findings for At-Power Situations, and determined that it was of very low safety significance (Green), in that no actual loss of safety system function was identified. The team concluded that there was no cross cutting aspect to this finding because the performance deficiency did not reflect current plant performance in that it occurred in 1986 when the procedure was established.

Enforcement: 10 CFR 50, Appendix B, "Instruction, Procedures, and Drawings", requires, in part, that activities affecting quality shall be prescribed by documented procedures and that procedures shall include appropriate qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. Contrary to the above, procedures approved in 1986 which included activities affecting quality did not include appropriate qualitative acceptance criteria in that the RN system flow balance procedures did not include acceptance criteria to assure the potential for flow obstruction, due to allowed reduced valve seat clearance, was addressed. Because the finding was of very low safety significance and has been entered into the licensee's corrective action program (PIP M-09-03034), this violation is being treated as a non-cited violation (NCV), consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000369,370/2009006-01, Inadequate Procedure for RN System Flow Balancing.

.2.4 Air Operated Valve (AOV) 2RN-130A (RN to 2A ND pump motor AHU)

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the RN isolation valve to ND (decay heat removal system) pump motor AHU Hx. System health reports, selected PIPs, and work orders were reviewed to verify that potential degradation was monitored and addressed. The air operator sizing calculations were reviewed to verify inputs were consistent with the most limiting design basis operating conditions. Procurement documentation for the solenoids was reviewed to verify compliance with EQ requirements. Stroke time surveillance test procedures/ results were reviewed to verify that stroke times were consistent with design basis requirements and to identify any adverse trends. A component and system walk down was performed to assess observable material conditions and to verify that the component's installed configuration was in accordance with plant drawings.

b. Findings

No findings of significance were identified.

.2.5 Air Operated Valve (AOV) 2KC-57A (Throttle valve for 2A ND HX cooling)

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the component cooling (KC) throttle valve to the ND Hx. System health reports, selected PIPs, and work orders were reviewed to verify that potential degradation was monitored and addressed. The air operator sizing calculations were reviewed to verify inputs were consistent with most limiting design basis operating conditions. Procurement documentation for the solenoids was reviewed to verify compliance with EQ requirements. Stroke time surveillance test procedures/results were reviewed to verify that stroke times were consistent with the design basis requirements and to identify any adverse trends. A component and system walk down was performed to assess observable material conditions and to verify that the installed configuration was in accordance with the design basis and plant drawings.

b. Findings

No findings of significance were identified.

.2.6 Steam Generator (SG) Safety Relief Valve (SV-14)

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the SG safety relief valve. Maintenance history, as demonstrated by system health reports, preventive and corrective maintenance, and PIPs, was reviewed to verify that potential degradation was being monitored and addressed. Setpoint procedures were reviewed to verify that appropriate design inputs and vender tolerances were incorporated into acceptance criteria. Completed setpoint test procedures were reviewed to verify that tests were performed at required intervals and that discrepancies or trends were adequately addressed. The applicability of the station SG safety relief valves to industry operating issues related to lift set points was assessed. The team conducted a field walkdown of Unit 2 safety relief valves to verify that the installed configuration was consistent with the design basis and plant drawings and to assess observable material conditions.

b. Findings

No findings of significance were identified.

## .2.7 EDG Fuel Oil Transfer Pumps (FOTPs)

### a. Inspection Scope

The team reviewed the DBD, related design basis documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the EDG FOTPs. The team reviewed the system configuration and design calculations to verify that adequate NPSH would be available during accident conditions. Maintenance history, as demonstrated by system health reports, corrective maintenance documentation, maintenance rule (MR) monitoring, PIPs, and surveillance test results, was reviewed to verify the design bases had been maintained; potential degradation was being monitored; and that identified degradation or malfunctions had been adequately addressed. The team verified that the equipment periodic maintenance performed was consistent with vendor recommendations. Additionally, the team conducted a field walkdown of the FOTPs with the station staff to assess observable material condition and to verify that the installed configuration was consistent with the design basis and plant drawings.

### b. Findings

No findings of significance were identified.

## .2.8 SSF Reactor Coolant Makeup (RCMU) Pump

### a. Inspection Scope

The team reviewed the DBD, related design basis documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the RCMU pump. The team reviewed the system configuration to verify that an adequate supply source was available to address NPSH and vortex considerations and system requirements such that the RCMU would be available and unimpeded during station blackout conditions. Maintenance history, as demonstrated by system health reports, corrective maintenance documentation, MR monitoring, PIPs, and surveillance test results, was reviewed to verify that potential degradation was being monitored and that identified degradation or malfunctions had been adequately addressed. The team reviewed equipment and system modifications to verify the RCMU pump safety function was maintained. A field walkdown was performed to assess observable material condition, protection against internal and external hazards and to verify the configuration was consistent with plant drawing and accident assumptions.

### b. Findings

No findings of significance were identified.

## .2.9 RCMU Pump Motor Operated Valves (MOVs 2NV-842, and 2 NV-849)

### a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the RCMU pump suction and discharge valves, MOVs 2NV-842 and 2NV-849. Maintenance history, as demonstrated by system health reports, preventive and corrective maintenance, and PIPs, was reviewed to verify that potential degradation was being monitored and addressed. The MOV sizing calculations were reviewed to verify that the valves would operate during all credited design bases events and that the licensee appropriately translated the correct valve dimensions and other significant characteristics into the sizing calculations. A review was conducted of the licensee's testing procedures and results from diagnostic valve testing to verify the MOVs were tested in a manner that would detect a malfunctioning valve and verify proper operation of the valve. The team reviewed calculations pertaining to motor sizing and structural integrity in order to verify adequacy of the actuator sizing for the system application. The team reviewed vendor recommendations for preventative maintenance and operation to verify that the maintenance practices ensured that design basis requirements were met. A field walkdown was performed to assess observable material condition, protection against internal and external hazards and to verify the configuration was consistent with plant drawing and accident assumptions.

### b. Findings

No findings of significance were identified.

## .2.10 Diesel Instrument Air Compressors H,G

### a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, the UFSAR and the vendor manual to identify design, maintenance, and operational requirements for the diesel driven instrument air compressors H and G. These compressors provide a redundant, non-safety related, instrument air source which was credited in the station risk analysis. The team reviewed the MR scope established for these compressors and reviewed the compressor testing program to verify that adequate performance monitoring was accomplished. Maintenance history, as demonstrated by system health reports, preventive and corrective maintenance, and PIPs, was reviewed to verify that potential degradation was being monitored and addressed. System testing results were reviewed to verify that the system boundary check valve function the start circuit were adequately tested. A field walkdown was performed to assess observable material condition, protection against internal and external hazards and to verify the configuration was consistent with plant drawings.

### b. Findings

No findings of significance were identified.

## .2.11 Safety Injection (NI) MOVs 2NI-173A and 2NI-178B

### a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the NI discharge to the cold legs, MOVs-173A and 178B. Maintenance history, as demonstrated by system health reports, preventive and corrective maintenance, and PIPs, was reviewed to verify that potential degradation was being monitored and addressed. The MOV sizing calculations were reviewed to verify that the valves could operate during all credited design bases events and that the licensee appropriately translated the correct valve dimensions and other significant characteristics into the sizing calculations. A review was conducted of the licensee's testing procedures and results from diagnostic valve testing to verify the MOVs were tested in a manner that would detect a malfunctioning valve and verify proper operation of the valve. The team reviewed calculations pertaining to motor sizing and structural integrity in order to verify adequacy of the actuator sizing for the system application. The team reviewed vendor recommendations for preventative maintenance and operation to verify that the maintenance practices ensured that design basis requirements were met.

### b. Findings

Introduction: The team identified a Green NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to assure that the applicable design bases were correctly translated into the in-service test (IST) acceptance criteria for safety-related MOVs. Specifically, the licensee's testing did not account for test inaccuracies associated with limit switch actuation or minimum EDG frequency into IST stroke time testing.

Description: The maximum allowable isolation time for safety-related containment isolation valves was listed in UFSAR Table 6-113. Additionally, UFSAR Table 6-114, stated that the maximum allowable closure time for those valves was specified to ensure that release of radioactive material to the environment would be consistent with the loss of coolant accident analysis assumptions. These isolation times did not include any allowance for non-conservatisms such as instrument or test loop inaccuracies, delays associated with the test methodology, or minimum allowable electrical frequency.

The team reviewed the results of the last performed stroke time test of valve 2NI-178B wherein the licensee utilized procedure PT/2/A/4206/003B, "NI Train B Valve Stroke Timing – Shutdown," to perform the test. The IST procedure acceptance criteria for the valve was ten seconds. The design basis maximum isolation time listed in the UFSAR Table 6-113 was also specified as ten seconds. The team noted that two non-conservatisms were not accounted for in the licensee's acceptance criteria for this valve. First, the licensee used the time between the initiation signal for the valve to close and the extinguishment of the open indication light as the valve isolation time. However, the open indication light would not extinguish when the valve was fully closed but rather when the valve was approximately 90-95 percent closed. Second, the licensee routinely tested the valve when the electrical supply to the actuator motor was 60 Hz but the minimum allowable EDG frequency was 58.8 Hz. Because the motor speed was directly proportional to frequency, the valve could operate up to 2 percent slower during certain design basis accident conditions.

Based on the most recent test performed on March 17, 2008, the time between the open light extinguishing and the actual valve closure was 0.3 seconds and the measured open-to-close stroke time was 9.7 seconds. Therefore, this valve could have taken as long as 10.2 seconds to fully close when applying the two percent slower operating time for EDG under frequency. In response, the licensee identified a previous evaluation that justified increasing the isolation time for 2NI-178B to 30 seconds. Therefore, the additional 0.2 second closure time did not impact the design basis for the two valves in the inspection sample. However, the team noted that the failure to account for the measurement inaccuracies and EDG under frequency was an IST programmatic issue and was not clearly bounded by the analysis on these two valves reviewed during this inspection. Consequently, the team was concerned that the licensee's IST procedures did not adequately demonstrate the ability of all safety-related MOVs to stroke in the isolation time stated in the UFSAR. The licensee entered the concern into their corrective action program as PIP M-09-03122. Planned corrective actions included re-evaluating IST acceptance criteria to account for non-conservatisms.

Analysis: The licensee's failure to correctly translate design basis information related to the isolation time for safety related MOVs into instructions and procedures was identified as a performance deficiency. The finding was determined to be more than minor because it was associated with the mitigating systems cornerstone attribute of design control and affected the cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee neither accounted for nor translated delays associated with either limit switch actuation or minimum EDG frequency into IST stroke time testing of safety related MOVs. The team assessed this finding for significance in accordance with NRC Manual Chapter 0609, Appendix A, Attachment 1, Significance Determination Process (SDP) for Reactor Inspection Findings for At-Power Situations, and determined that it was of very low safety significance (Green), in that no actual loss of safety system function was identified. The team concluded that this finding did not have an associated cross-cutting aspect because the relevant acceptance criteria were established in 1985 when the IST program was developed.

Enforcement: 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications and procedures. Licensee procedure PT/2/A/4206/003B was used to demonstrate that 2NI-178B, a safety-related component, would perform its intended safety function as described in the UFSAR. The UFSAR required that 2NI-178B fully close within 10 seconds. Contrary to the above, the licensee failed to assure that applicable regulatory requirements and the design bases were correctly translated into specifications and procedures. Specifically, the acceptance criteria utilized by procedure PT/2/A/4206/003B was inadequate to ensure that 2NI-178B would fully close within 10 seconds under all design basis conditions. This failure to translate UFSAR design basis information related to valve isolation times into procedures applied to other IST MOV procedures. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program as PIP M-09-03122, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000369,370/2009006-02, Failure to Correctly Translate Design Basis Information Related to the Isolation Time for Safety Related MOVS into Instructions and Procedures.

.2.12 Vital Batteries – 2EVCA, 2EVCD

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the vital batteries. The team reviewed the assumptions and design inputs to the battery sizing and voltage drop study, and the TS and maintenance allowable terminal connection resistance limits, to verify adequate sizing of the battery. The battery voltage study was reviewed to verify adequate voltage was available to critical components. The vendor manual was reviewed to verify battery installation and operating instructions were implemented. Operating and maintenance procedures were reviewed to verify that the critical battery characteristic values (electrolyte level, float voltage, connection resistance, and capacity) were correctly translated from the design basis documents. Battery TS surveillance test and inspection results were reviewed to verify degradation was identified and anomalies were addressed and corrected. The equipment history, as indicated by corrective work orders and PIPs, was reviewed to verify that identified equipment problems were corrected. A field walkdown was performed to assess observable material conditions of the batteries and chargers.

b. Findings

No findings of significance were identified.

.2.13 EDG Batteries – Unit 2

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the EDG batteries. The battery voltage calculation (assumptions, inputs, terminal connection resistances, and method of calculation) was reviewed to verify that the terminal voltage of the battery would remain at or greater than design basis minimum voltage during the worst case design basis earthquake concurrent with a station blackout or loss of offsite power. The team reviewed selected direct-current (DC) loads (largest load, and longest cable run) and associated voltage drop analysis to verify that the component had sufficient voltage to perform its safety function when the battery was at its design basis voltage. Operating and maintenance procedures were reviewed to verify that the critical battery characteristic values (electrolyte level, float voltage, connection resistance, and capacity) were correctly translated from the design basis documents. The battery vendor manual was reviewed to verify that vendor recommendations (environment, test conditions, and maintenance practices) were being followed or proper engineering evaluations were performed. Battery TS surveillance test and inspection results were reviewed to verify degradation was identified and anomalies were addressed and corrected. The equipment history, as indicated by corrective work orders and PIPs, was reviewed to verify that identified equipment problems were corrected. A field walkdown was performed to assess observable material conditions of the batteries.

b. Findings

No findings of significance were identified.

.2.14 Vital Instrumentation and Control Power (I&C)

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the 125 VDC/120 VAC Vital I&C Power System. The voltage drop calculation was reviewed to verify that adequate voltage was available to system loads for anticipated accident conditions. Vendor manuals were reviewed to verify that vendor recommendations (environment, test condition, and maintenance practices) were appropriately addressed. The equipment history, as indicated by corrective work orders and PIPs, was reviewed to verify that identified equipment problems were corrected. A field walkdown was performed to assess the observable material condition and verify that the installed configuration was consistent with the design documentation.

b. Findings

No findings of significance were identified.

.2.15 EDG Day Tank Level Instrumentation – Unit 2

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design, maintenance, and operational requirements for the EDG day tank level instrumentation. Calibration procedures and results were reviewed to verify that the level instrumentation was adequately monitored and maintained. The equipment history, as indicated by corrective work orders and PIPs, was reviewed to verify that identified equipment problems were corrected. Periodic testing was reviewed to verify that the control functions to maintain day tank level were adequately tested. The level control setpoint values were reviewed to verify that the levels assumed by the design basis for EDG continuous operation were incorporated. A field walkdown was performed to assess observable material conditions and to verify that the configuration was consistent with applicable drawings and design basis assumptions.

b. Findings

No findings of significance were identified.

.2.16 4kV Vital Bus Loss of Voltage and Degraded Voltage Protection Scheme

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify the function and capability of the 4kV vital bus loss of voltage (LOV) and degraded voltage (DV) protection scheme. The team reviewed the protective relay setting calculations for the LOV and DV relays and applicable time delay settings to ensure applicable industry standards were utilized in determining the channel uncertainty for the relay monitoring circuits. To ensure that the LOV and DV relay and time delay settings were properly maintained, the team reviewed periodic TS surveillance and calibration PMs. The team reviewed plant/grid interfaces and requirements and the auxiliary power system load flow and voltage drop calculations to verify that the LOV and DV relay and time delays were adequate. The team also performed a visual inspection to assess installation, configuration, observable material condition, and potential vulnerability to hazards.

b. Findings

No findings of significance were identified.

.2.17 Vital Breakers ETA-7 and ETB-12

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, system health reports, TS, and the UFSAR to identify design, maintenance, and operational requirements for the 4kV breakers associated with 4kV Switchgear 2ETA and 2ETB. The team reviewed preventive maintenance and testing procedures to determine if the breakers were maintained in accordance with industry and vendor recommendations. The associated breaker closure and opening control logic diagrams and the 125Vdc voltage calculations were reviewed to verify that adequate voltage would be available for the breaker open/close coils and spring charging motors. The team reviewed short circuit and protection/coordination calculations to ensure that the breakers and switchgear were being applied within the vendor interrupting and close and latch ratings and that selective coordination was ensured for operability of safety-related equipment. The team also performed a visual inspection to assess installation, configuration, observable material condition, and potential vulnerability to hazards.

b. Findings

No findings of significance were identified.

.2.18 Main Steam Isolation Valve (MSIV) Auto-Close Circuit

a. Inspection Scope

The team reviewed the system DBD, related design basis support documentation, drawings, TS, and the UFSAR to identify design function for the MSIV auto-close circuit. The team reviewed the design and capability of input instrumentation for the auto-close circuit, which included main steam pressure, containment pressure, and steam rate, to verify the adequacy of actuation signals for the auto-close circuit logic. Setpoint and range calculations were reviewed to verify the adequacy of inputs for the control logic. Vendor specifications, environmental qualification, and seismic qualification documentation was reviewed to verify the adequacy of the detection and actuation instrumentation. Modifications were reviewed to verify the design function of the auto-close circuit was maintained.  Test and calibration procedures and results were reviewed to verify that the instrumentation was adequately monitored and maintained.

b. Findings

No findings of significance were identified.

.2.19 Reactor Vessel Mid-loop Level Instrumentation

The team reviewed design and licensing basis documents, including the licensee response to GL 88-17, Loss of Decay Heat Removal (non power operations), drawings, and vendor manuals to identify the design requirements and capability for the reactor vessel level indication used during reduced inventory/mid-loop operation.  The electrical drawings and component instrument loop/detail drawings were reviewed to verify the independence of level indication systems.  The team reviewed related design basis information, reactor coolant system drawings, instrument tap elevations, procedures, and calibration documentation to verify that level set points for operator actions and alarms were consistent with the ND pump operating requirements.  Additionally, the team reviewed the incorporation of mid-loop vortex and NPSH considerations for the ND pumps into setpoint values.  The team reviewed the calibration of the pressure transmitter and ultrasonic level indication instrument loops to verify that instrument accuracy was monitored and maintained.  Maintenance history, as indicated by work orders and PIPs, was reviewed to verify that the equipment maintenance was consistent with vendor recommendations and identified problems were resolved.  The team also reviewed the calibration procedures for the various sensing and signal processing components that were installed in the system to verify that instrument uncertainty had been included.

b. Findings

No findings of significance were identified.

.2.20 Motors for MOVs, Pumps, Compressors in Inspection Scope

a. Inspection Scope:

The team reviewed the power supply, motor feeder cable ampacity, and voltage drop to the motors during all modes of operation to ensure that each motor had adequate terminal voltage to start and operate under worst case design basis events.  The team reviewed the electrical control schematics associated with the motors, including a review of the control circuit voltage drop calculations, to ensure that the control circuits had adequate voltage to start or stop the motor when required.  The team reviewed the protection and coordination calculations for each of the inspection sample components to verify that the motors were adequately protected for overcurrent conditions and the protection was selected to ensure satisfactory operation during maximum brake horsepower and worst-case bus voltages.  The team reviewed feeder breaker preventive maintenance history and procedures including testing requirements to ensure compliance with vendor and industry recommendations.  For MOVs, the team additionally reviewed the electrical terminal voltages provided as design inputs to the mechanical torque and thrust calculations to verify the values were consistent with analyzed system conditions.

b. Findings

Introduction: A Green NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified for the licensee's failure to establish measures to ensure the design capability of the control circuit voltage for 600 VAC safety related motors fed from motor control centers. Specifically, there was no voltage drop calculation or cable configuration specification for the control circuits that established the adequacy of the control circuit to energize the safety related motors.

Description: The station's original cable installation was based on Duke Design Criteria DC-3.01 which stated that valve control circuits should be designed such that cabling be reduced to a minimum and big loops eliminated. In 1983, after the plant was licensed, a calculation (MCC-1381.05-00-0-147, Maximum Allowable Cable Lengths for Size 1 and 2 Starters at McGuire, dated August 1983) was developed for future design at the station which determined the maximum circuit resistance which would assure adequate control circuit actuation during degraded system voltages. This calculation used a design input for degraded bus voltage of 77.7 percent for the 600 VAC system and was based on original calculations which were superseded. The more recent calculations (MC-1381.05-00-0258 for Unit 1 and MC-1381.05-00-0263 for Unit 2, dated July 2003) determined that the worst case degraded bus voltage was 75.13 percent for Unit 1 and 76.33 percent for Unit 2. The maximum cable length calculation (MCC-1381.05-00-0-147) was not revised to reflect the more limiting degraded bus voltage value and potential impact on acceptable control circuit cable lengths. Additionally, the maximum cable length criteria established in 1983 was applied only to subsequent cable installations; the installed control circuits were not evaluated with respect to the newer criteria.

The team concluded that the licensee had not ensured the adequacy of the control circuit voltage to energize the safety related motor contactor circuit for the time interval that safety-related 600 volt motors receive an actuation signal to change state. Voltage recovery may take several seconds in which safety-related loads may not start due to inadequate control circuit voltages. The licensee had not evaluated this potential time delay and the impact on the plant safety analyses or the impact on 4kV pumps in a dead head condition for the time delay interval.

During the inspection the licensee performed a preliminary evaluation to bound the issue. The station selected two low margin 600 VAC MOVs (2NI009A and 2NI010B) to evaluate the contactors using the lower degraded bus voltage values and verified the capability of the contactors to pickup and hold while the valves stroked. Based on this evaluation, the team concluded there was no immediate operability concern; however, additional analysis was warranted to establish the bounding control circuit configurations and establish the design capability of 600 VAC motor control circuits.

Analysis: The licensee's failure to evaluate the control circuits, for the time interval that safety-related 600 volt motors receive an actuation signal to change state, was identified as a performance deficiency. The finding was more than minor because it was associated with the design control attribute of the Mitigating System Cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Due to the lack of appropriate analysis, the 600V motor control circuit design basis accident capability was not assured and further evaluation was required to demonstrate that the equipment could perform its safety function. The team assessed this finding for significance in accordance with NRC Manual Chapter 0609, Appendix A, Attachment 1, Significance Determination Process (SDP) for Reactor Inspection Findings for At-Power Situations, and determined that it was of very low safety significance (Green), since it was a design deficiency determined not to have resulted in the loss of safety function. The team concluded that there was no cross cutting aspect to this finding because the design deficiency resulted from nonspecific original station design criteria and the subsequent opportunity to identify the issue occurred in 1983 when the station cable length criteria was established.

Enforcement: 10 CFR 50 Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall be provided for verifying or checking the adequacy of design via simplified calculation methods, or by the performance of a suitable testing program. Contrary to the above, in 1983, design control measures were not provided to verify the adequacy of the control circuit voltage for 600 VAC safety related motors in that there was no voltage drop calculation, cable configuration specification, or testing for the control circuit that established the adequacy of the control circuit to energize the safety related motors. Because the finding was of very low safety significance and has been entered into the licensee's corrective action program (PIP M-09-02846), this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000369,370/2009006-03, Inadequate Verification of the Design Adequacy of the Control Circuit Voltage for 600 VAC Safety Related Motors.

.3 Review of Low Margin Operator Actions

a. Inspection Scope

The team performed a margin assessment and detailed review of six risk significant and time critical operator actions. Where possible, margins were determined by the review of the assumed design basis and UFSAR response times. For the selected operator actions, the team performed a walkthrough of associated Emergency Procedures (EPs) Abnormal Procedures (APs), Normal Operating Procedures (OPs), and other operations procedures with appropriate plant operators and 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 operations and training department leadership, and through observation and utilization of a simulator training period to further understand and assess the procedural rationale and approach to meeting the design basis and UFSAR response and performance requirements. Operator actions were observed on the plant simulator and during plant walk downs.

Operator actions associated with the following events/evolutions were reviewed:

- Initiation of SSF Make-Flow to the Reactor Coolant Pumps
- Aligning the SSF Diesel Generator to the CXA Battery Charger
- Loss of Instrument Air – Restoration of VI or Alignment of B/U Nitrogen to PORV

- Loss of ND Pumps during Mid-loop/Reduced Inventory Operations
- Shutdown LOCA
- Establish RCS  Feed and Bleed

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 the McGuire Nuclear Station. The team performed an independent applicability review for issues that were identified as applicable to the McGuire Nuclear Station and were selected for a detailed review. The issues that received a detailed review by the team included:

- GL 88-17 Loss of Decay Heat Removal (non-power operations)
- IN 06-31, Inadvertent Fault Interruption Rating of Breakers
- IN 07-09, Equipment Operability Under Degraded Voltage Conditions
- IN 06-24, Recent Operating Experience Associated with Pressurizer and Main Steam Safety/relief Valve Lift Set Points
- NRC IN 2006-05, Possible Defect in Bussmann KWN-R and KTN-R Fuses

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Meetings, Including Exit

On June 18, 2009, the team presented the inspection results to Mr. S. Capps and other members of the licensee staff. Although proprietary information was reviewed as part of this inspection, all proprietary information was returned and no proprietary information is documented in the report.

ATTACHMENT: SUPPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

Licensee personnel:

K. Ashe, Regulatory Compliance Manager
J. Bryant, Regulatory Compliance
S. Capps, Engineering Manager
G. Carpenter, Primary Systems Engineer
B. Marrow, Operations Supervisor
B. Meyer, Primary Systems Engineer
J. Nolin, Engineering Manager
S. Snyder, Engineering Manager
M. Weiner, Operations Supervisor

NRC personnel:

B. Desai, Engineering Branch 1, Chief

### LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

**Opened and Closed**

| | | |
|---|---|---|
| 05000369,370/2009006-01 | NCV | Inadequate Procedure for RN System Flow Balancing (Section 1R21.2.3) |
| 05000369,370/2009006-02 | NCV | Failure to Correctly Translate Design Basis Information Related to the Isolation Time for Safety Related MOVs into Instructions and Procedures (Section 1R21.2.11) |
| 05000369,370/2009006-03 | NCV | Inadequate Verification of the Design Adequacy of the Control Circuit Voltage for 600 VAC Safety Related Motors (Section 1R21.20) |

# LIST OF DOCUMENTS REVIEWED

Licensing Documents

TS, Current
UFSAR, Current
SER and Supplements

Drawings

MCFD-2574-01.01, Flow Diagram of Nuclear Service Water System (RN), Rev. 15
MCFD-2574-02.00, Flow Diagram of Nuclear Service Water System (RN), Rev. 22
MCFD-2574-02.01, Flow Diagram of Nuclear Service Water System (RN), Rev. 8
MCFD-2574-03.00, Flow Diagram of Nuclear Service Water System (RN), Rev. 14
MCFD-2574-04.00, Flow Diagram of Nuclear Service Water System (RN), Rev. 22
MCFD-2561-01.00, Flow Diagram of Residual Heat Removal System (ND), Rev. 14
MCFD-2573-01.01, Flow Diagram of Component Cooling System (KC), Rev. 5
MCM 1211.00-912, Nuclear Containment Cooling Coil, Assembly Dwg, Rev. A
MCM 1211.00-0666.001, 40 PCD, Assembly Dwg, Rev. A
MCM 1205.01-0472.001, 2” 600# SS Packed Y-Globe Throttle Vlv, Assembly Dwg, Rev. D
MC-1331-06.00, External Screens on the Low Level Intake, Detail Dwg, Rev. 0
MCM 2201.05-7, Certified RHR Pump Curve N-455, 6/21/72
MCSF -1577.VA-02, Summary Flow Diagram, Aux Bldg Ventilation System, Rev. 1
J-2046-2A/B, Joseph Oates, RHR Hx Data sheet, Rev. 2
MCSF-1593.SM-01 SummFlow Diagrams Main Steam/Vent to Atmosphere, Rev.4 dtd.10/06/03
MCFD-2593-01.01 Flow Diagrams Main Steam/Vent to Atmosphere, Rev.15 dtd. 3/11/08
MCFD-2593-01.00 Flow Diagrams Main Steam/Vent to Atmosphere, Rev.15 dtd. 9/25/03
MCFD-2593-01.03 Flow Diagrams Main Steam/Vent to Atmosphere, Rev.15 dtd. 9/25/03
MCFD-2609-03.01 Flow Diagram of DG Fuel Oil System 2B, Rev. 9, dtd. 02/06/09
MCFD-2609-03.00 Flow Diagram of DG Fuel Oil System 2A, Rev.14, dtd. 01/27/09
1082H65, Containment Pressure, Sheet 19, Rev. DK
108D440, Solid State Protection System, Sheet 20, Rev. D11
MCEE-214-00.03, Diesel Generator 2A Load Sequencer, Rev. 3
1082H65, SSPS Safety Injection, Sheet 20, Rev. D1
1082H65, Pressurizer Preesure, Sheet 17, Rev. G
MCEE-214-00.04, Diesel Generator 2A Load Sequencer, Rev. 8
MCEE-214-00.03, Diesel Generator 2A Load Sequencer, Rev. 3
MCEE-214-00.05, Diesel Generator 2A Load Sequencer, Rev. 7
MCEE-214-00.00-01, Diesel Generator 2A Load Sequencer, Rev. 5
MCEE-214-00.00-02, Diesel Generator 2A Load Sequencer, Rev. 3
MCEE-214-00.00-03, Diesel Generator 2A Load Sequencer, Rev. 7
MCEE-214-00.00-04, Diesel Generator 2A Load Sequencer, Rev. 5
MCEE-214-00.00-05, Diesel Generator 2A Load Sequencer, Rev. 4
MCEE-214-00.00-12, Diesel Generator 2A Load Sequencer, Rev. 0
MCEE-214-00.02, Diesel Generator 2A Load Sequencer, Rev. 5
MCEE-215-00.07, 4160V Switchgear #2ETA Unit #8, Rev. 6

MCEE-215-00.07-01, 4160V Switchgear #2ETA Unit #8, Rev. 2
MCEE-215-00.39, 4kV Switchgear, Rev. 0
MCEE-215-00.07-02, 4160V Switchgear #2ETA Unit #8, Rev. 1
V70900-0045-0, Valve – Solenoid, 6/85
MCCD-1702-02.00, 4160V Essential Auxiliary Power System, Rev. 2A
MC-1705-01.00, 125VDC/120VAC I And C Power System On-Line Diagram, Rev. 94
MCEE-0220-13.01, Fuel Oil Transfer Pump Diesel Generator 2B, Rev. 1
MCEE-0220-13.01-01, Diesel Generator 2B Fuel Oil Day Tank Level, Rev. 4
MCEE-0220-05.01-01, Diesel Generator 2A Fuel Oil Day Tank Level, Rev. 1
MCEE-0220-05.01, Fuel Oil Transfer Pump Diesel Generator 2A, Rev. 1
MCID-1499-FD.04, D/G Fuel Oil Day Tank Level, Rev. 1
MCM-1301.00-0035 001, 275 Gallon Day Tank, Rev. D2
MCCD-1702-02.00, One Line – 4160V Essential Auxiliary Power System, Rev. 7
MCCD-1702-02.20, One Line Diagram – 4kV Essential Power System, Rev. 7
MCEE-257-00.50, Elementary Diagram – MOV 2NV842A,C, Rev. 8
MCEE-257-00.51, Elementary Diagram – MOV 2NV849A,C, Rev. 7
MMCD-2700-00.00, U2 Configuration – One Line Diagram, Rev. 5
MCCD-2703-06.08, One Line Diagram – 600V MCC 2EMXA4, Rev. 7
MCCD-2703-07.05, One Line Diagram – 600V MCC 2EMXF, Rev. 6
MCCD-2703-06.01, One Line Diagram – 600V MCC 2EMXA, Rev. 16
MCCD-2703-07.01, One Line Diagram – 600V MCC 2EMXB, Rev. 12
MCCD-2703-07.03, One Line Diagram – 600V MCC 2EMXB1, Rev. 7
MCCD-1703-10.10, One Line Diagram – 600V MCC SMXG, Rev. 10
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MCEE-0220-13.01, Elementary Diagram – Fuel Oil Transfer Pump, Rev. 1
MCEE-0220-11.01, Elementary Diagram – EDG Air Compressor, Rev. 1
MCEE-0251-00.60, Elementary Diagram – MOV 2NI173A, Rev. 6
MCEE-266-00.09, Elementary Diagram – AB ES AHU, Rev. 6
MCEE-0251-00.62, Elementary Diagram – MOV 2NI178B, Rev. 6
MCEE-257-00.55, Elementary Diagram – Standby Makeup Pump, Rev. 1
MCEE-214-00.08.05, Elementary Diagram – 4kV SWGR 2ETA Degraded Voltage Relaying, Rev. 1
MCID-1499-NC.07, Wide range, Narrow range and Sight Glass instrument detail (Reactor coolant System Level).
MC-1499-NC.22, Narrow range level for mid loop operations instrument detail (Ultrasonic level sensor and instrument).
MC-1789-01.03, Transducer terminal cabinet 1TDC1-Front connection diagrams. (Wide and narrow range level instruments power supplies)
MC-1789-01.04, Transducer terminal cabinet 1TDC1-Rear (Power connections for wide range level instrument)
MC-1789-01.05, Transducer terminal cabinet 1TDC1-Left Side-Rear Right Side (Power connection for wide and narrow range level instruments)
MC-1789-01.06, Computer transducers trans room & remote MTD (Power connections for narrow range level instrument)
MCEE-0141-00.17, Elementary diagram for ultrasonic loop power (Hot leg A)
MCEE-0141-00.18, Elementary diagram for ultrasonic loop power (Hot leg C)
MCID-1499-SM.03, Instrument detail SG steam line pressure

MCEE-270-00.01-00, Elementary diagram main steam system main steam isolation valve controls Rev. 7
MCEE-270-00.01-01 Elementary diagram main steam system main steam isolation valve controls Unit 2, Rev. 11

Problem Investigation Program Reports (PIPs)

M-09-02216, 2A Strainer fouled (high dP alarm) during high RN flow testing.
M-05-00911, 2B ND pump declared inoperable due to failure of EX AHU RN dP test
M-06-04255, Adverse trend associated with increased fouling of plant raw water systems
M-07-00034, Main Steam Safety valves may not meet required test schedule
M-09-02339, Some portions of NSR piping in doghouses may not be protected from tornado missiles
M-08-02567, Main Steam Safety Valves(2SV-2,4) appear to be leaking
M-08-04098, DG Fuel Oil System piping on pad not protect from missiles
M-07-00823, Spill of D/G fuel oil while transferring from 1B to 1A Storage tank
M-09-00898, Modification MD50192 to remove flow elements
M-09-00088, 1B FD Particulate Contamination indicating above TS limit
M-08-07134, 125 VDC Voltage Drop Calculation has some inconsistencies
M-07-00393, Battery intercell resistance outside of Tech Spec limits
M-06-02845, EVCB test system failed
M-06-05610, Inverter sync light would not light when toggle switch placed to sync
M-07-04315, Spare 125VDC battery cell #4 below acceptance criteria
M-070-4093, Spare 125VDC battery cell was below acceptance criteria
M-07-04872, EVCD battery charger on float with equalize light lit
M-08-00290, Spare vital battery bus voltage below battery acceptance criteria
M-09-01516, 2A D/G fuel oil storage tank level failed
M-08-07204, Level indication for 2B D/G erratic
M-08-04781, 2A D/G fuel oil transfer pump did not auto stop
M-08-01302, Revision needed to calculation to include volumetric FD day tank level
M-07-06378, 2B D/G fuel oil level transmitter is erratic
M-07-00432, Review of NRC IN 2006-31
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M-06-00509, MNS evaluation and corrective actions associated with NRC GL 2006-02
M-06-05824, RAI to GL 2006-02 evaluation and corrective actions
M-07-06078, Evaluation of NRC IN-2007-36, EDG Voltage Regulator Problems
M-03-03113, Evaluation by valve engineering of results from U2 voltage calculation
M-03-01055, Motor calculation methodology change
M-06-03604, GE HFB MCC breakers exceed interrupting ratings
M-06-03770, PSA evaluation of over-dutied 480V MCC breakers
M-07-06338, MV SWGR and Bus PM Practices
M-08-07285, Degraded voltage relay actuation on 1ETB Bus
M-05-5503, Grid voltage during one busline operation
M-00-00338, SOER 99-1 Loss of Grid
M-08-00301, Reactor coolant system pressure transmitters.
M-08-01286, Drain down instrument problems.
M-06-02145, Breaker alignment from SSF to CXA (loop mitigation to Auxiliary power system)

Calculations

MCC-1223.43-00-0003 Main Steam Safety Valves Set-point Calculation, Rev. 6, dtd. 08/27/03
MCC-1223.59-03-0002 DG Fuel Oil Transfer Pump Suction Piping Losses, dtd. 01/14/77
MCC-1381.05-00-0200, 125 VDC Vital Instrumentation and Control Power System Battery and Battery Charger Sizing Calculation, Rev. 7
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MCC-1552.08-00-0357, Narrow range containment pressure instrument loop uncertainty
MCC-1399.03-00-0001, Main steam line EIA system scaling
MCC-1205.06-00-0043, AOV Capability Evaluation for 1/2KC0057,0082, Rev. 1
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MCC-1381.05-00-0263, U2 6.9KV & 600V Auxiliary Power Systems Safety-Related Voltage Analysis, Rev. 6
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MCC-1381.05-00-0266, U2 Diesel Generator Dynamic Loading Analysis, Rev. 3

PIPs written due to CDBI

| | |
|---|---|
| M-09-02607 | Documentation deficiency in ND and KC DBDs – TS references |
| M-09-02630 | Determination of station commitment and compliance with RG 1.106, Thermal Overload Protection for MOVs |
| M-09-02634 | Documentation deficiency in PT/2/A/4350/017A references |
| M-09-02654 | Example identified in which station unsupported cable length criteria not met |
| M-09-02664 | FOTP hold down bolts not shown on drawing |
| M-09-02716 | Documentation deficiency in Protective Relay setting calculation for Essential Swgr |
| M-09-02720 | Documentation deficiency in Protective Relay setting calculation for Essential Swgr – recommendation to increase timer setting not implemented |
| M-09-02790 | MR category B VI valves with no periodic maintenance |
| M-09-02838 | Documentation deficiency in SMUP operability step |
| M-09-02844 | Charging spring motors for 4 kV and 600 VAC breakers – voltage drop calc. indicates available less than vendor recommended operating voltage |
| M-09-02846 | Inadequate documentation of voltage control circuit lengths |
| M-09-02904 | Documentation error in UFSAR Table 3-42 |
| M-09-02914 | Documentation duty cycle of 125VDC auxiliary control power |
| M-09-02929 | Enhancement to test procedure for ND pump motor AHU RN dP |
| M-09-03018 | Documentation enhancement of MR Procedure |
| M-09-03034 | NRC CDBI question arose regarding RN strainer perforation design basis |
| M-09-03113, | Molded-case circuit breaker testing program, 06/16/2009 |
| M-09-03114, | Cable impedances used in ETAP analyses |
| M-09-03115 | Station interpretation of “independence” as applied to mid-loop level instrumentation |
| M-09-03117 | Update of vendor information in MOV EQ test reports |
| M-09-03122 | IST stroke time acceptance criteria does not incorporate margin for test inaccuracy |
| M-09-03134 | Documentation deficiency of 10 CFR 50.59 screening for procedure change to PT/2/A/4204/011 |
| M-09-03163 | Sizing of Y-phase OL heaters methodology |
| M-09-03189 | Discrepancy between drawing and installed configuration on containment pressure transmitter vent line |

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PT/1/A/4403/002A, RN Train A Valve Stroke Timing – Quarterly, 1/09/2009
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PT/2/A/4401/014A, Train A KC/ND HX Valve Stroke Timing – Quarterly, 2/12/2009
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MP/0/A/7650/002, Vertical U-tube Heat Exchanger Corrective Maintenance, Rev. 5
IO/0/A/3219/008, Corrective Maintenance and Setup of Fisher Type 650 and 656 Actuators, Rev. 9
MP/0/A/7600/043, Fisher Butterfly Control Valve (Type 7600 Series, 9500 Series, 7800 Series) Corrective Maintenance, Rev. 10
MP/0/A/7600/016, ¾ Inch, 1.5 Inch and 2 Inch Grinnell Diaphragm Valves with 3125 Air Motor Corrective Maintenance, Rev. 12
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EQMM-1393.01-N03-01, NAMCO Limit Switch EQ Maintenance Instructions, Rev. 7
EQMM-1393.01-Q03-01, Valcor Solenoid Valve EQ Maintenance Instructions, Rev. 6
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PT/2/A/4403/007, RN Train 2A Flow Balance, Rev. 58
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PT/0/A4250/001, MSSV Setpoint Test, Rev. 020
OP/2/A/6350/002, Diesel Generator, Rev. 092
PT/2/A/4350/004 A, 2A D/G Periodic and Load Sequencer Test, Rev. 021
PT/2/A/4350/004 B, 2B D/G Periodic and Load Sequencer Test, Rev. 019
PT/2/A/4350/017B, 2B D/G Fuel Oil Transfer Pump Performance Test, Rev. 039
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PT/0/A/4350/038 A, 125 VDC GNB Vital I And C Battery Service Test Using BCT-2000, Rev. 11
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IP/0/A/4971/007, ITE 27N & Time Delay Relay Calibration, Rev. 20
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AP/1/A/5500/12, Loss of Letdown, Charging or Seal Injection, Rev. 21
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AP/1/A/5500/34, Shutdown LOCA, Rev. 14
AP/1/A/5500/35, ECCS Actuation During Plant Shutdown, Rev. 16
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572594-01, Chemically clean 2B ND AHU, 3/24/2005
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1784223 08 Wide and narrow range reduced inventory level calibration.
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01747301 03 Containment pressure Channel 4 loop calibration unit 2,
01739383 01 Containment pressure Channel 3 loop calibration unit 2,
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