UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

October 18, 2012

Mr. Kelvin Henderson
Site Vice President
Duke Energy Corporation
Catawba Nuclear Station
4800 Concord Road
York, SC 29745-9635

SUBJECT: CATAWBA NUCLEAR STATION - NRC COMPONENT DESIGN BASES INSPECTION - INSPECTION REPORT 05000413/2012007 AND 05000414/2012007

Dear Mr. Henderson:

On, September 14, 2012, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Catawba Nuclear Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on September 14, 2012, with you and other members of your staff.

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 licenses. The team reviewed selected procedures and records, observed activities, and interviewed personnel.

Two NRC identified findings of very low safety significance (Green), which were determined to involve violations of NRC requirements, were identified during this inspection. The NRC is treating these violations as non-cited violations consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest the violations or the significance of these non-cited violations, you should provide a written response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, D.C. 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at Catawba. In addition, if you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector at Catawba.

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 Agencywide Document Access and Management System (ADAMS). ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Rebecca L. Nease, Chief
Engineering Branch 1
Division of Reactor Safety

Docket Nos.: 50-413, 50-414
License Nos.: NPF-35, NPF-52

Enclosure:
Inspection Report 05000413/2012007 and 05000414/2012007,
w/Attachment: Supplemental Information

cc: (See page 3)

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cc: (See page 3)

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DATE	10/ 5 /2012	10/ 10 /2012	10/ 5 /2012	10/ 3 /2012	10/ 4 /2012
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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.: 050000413, 05000414

License Nos.: NPF-35, NPF-52

Report Nos.: 05000413/2012007, 05000414/2012007

Licensee: Duke Energy Carolinas, LLC

Facility: Catawba Nuclear Station, Units 1 and 2

Location: York, SC 29745

Dates: August 13 – September 14, 2012

Inspectors: E. Stamm, Senior Reactor Inspector (Lead)
D. Jones, Senior Reactor Inspector
A. Alen, Reactor Inspector
J. Montgomery, Reactor Inspector
T. Su, Reactor Inspector (Trainee)
C. Baron, Accompanying Personnel
S. Kobylarz, Accompanying Personnel

Approved by: Rebecca Nease, Chief
Engineering Branch 1
Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000413/2012-007 and 05000414/2012-007; 08/13/2012 – 09/14/2012; Catawba Nuclear Station, Units 1 and 2; Component Design Bases Inspection.

This inspection was conducted by a team of five Nuclear Regulatory Commission (NRC) inspectors from Region II, and two NRC contract personnel. Two Green non-cited violations (NCVs) were identified. The significance of inspection findings are indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated June 2, 2011. Cross-cutting aspects are determined using IMC 0310, "Components Within the Cross-Cutting Areas," dated October 28, 2011. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated June 12, 2012. 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.

Cornerstone: Mitigating Systems

- Green: The team identified a non-cited violation of Catawba Nuclear Station Units 1 and 2 License Condition 2.C.5, "Fire Protection Program," for the licensee's failure to establish a leakage acceptance criteria past check valves that supported minimum, post-fire safe shutdown (SSD) design flow requirements of the standby shutdown system. The licensee entered the issue into the corrective action program as PIP C-12-7717 and conservatively limited the allowed "Total Accumulative RCS [reactor coolant system] Leakage" to gain additional standby makeup pump (SMP) flow margin.

  The licensee's use of inadequate test acceptance criteria for back-leakage through check valves was a performance deficiency. The performance deficiency was more than minor because it was associated with the Mitigating Systems cornerstone attribute in that, if back-leakage through check valves 1(2)NV-46, 1(2)NV-57, 1(2)NV-68, and 1(2)NV-79 was to degrade to the allowed limits in the test procedure, the SMP would not be capable of meeting the 26 gpm reactor coolant system makeup requirement to support the standby shutdown system post-fire SSD function. The inspectors evaluated this issue in accordance with Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," and determined the finding to be of very low safety significance (Green). The finding was assigned the category of 'post-fire SSD' and a 'low degradation' rating that reflected the severity of the identified deficiency. There was no cross-cutting aspect associated with this finding because the condition existed since initial issuance of the test procedure and was not reflective of current licensee performance. (Section 1R21.2.7)

- Green: The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to establish a procedure to ensure that the requirements in EQMM 1393.01-A01-00, "Environmental Qualification Maintenance Manual," were not exceeded to maintain the environmental qualification of motor-operated valves (MOVs). The licensee entered the issue into the corrective action program as PIP C-12-7121, declared MOVs 1KCC37A, 1WL807B, and 2KCC37A as operable but degraded/nonconforming, and instituted guidance to periodically review the cycles of all MOVs to ensure the maximum limit is not exceeded.

The licensee's failure to establish a procedure to ensure the MOV cycle requirements of EQMM 1393.01-A01-00, were not exceeded was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of procedure quality and adversely affected the cornerstone objective in that, the lack of procedural guidance to track the cycles of MOVs resulted in 1KCC37A, 1WL807B, and 2KCC37A exceeding their environmental qualification cycle limit of 2,000 cycles and decreased the reliability and capability of the MOVs. The team assessed the finding in accordance with Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and determined the finding was of very low safety significance (Green) because the performance deficiency did not result in a loss of MOV operability. The finding was associated with the cross-cutting aspect of implementation and institutionalization of operating experience in the Operating Experience component of the Problem Identification and Resolution area. [P.2(b)] (Section 1R21.2.12)

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 related operator actions for review using information contained in the licensee's probabilistic risk assessment. 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 sample included fifteen components, two of which were associated with containment large early release frequency, and six operating experience items.

The team performed a margin assessment and a detailed review of the selected risk-significant components and related operator actions to verify that the design bases had been correctly implemented and maintained. Where possible, this margin was determined by the review of the design basis and Updated Final Safety Analysis Report (UFSAR) response times associated with operator actions. This margin assessment also considered original design issues, margin reductions due to modifications, or margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for a detailed review. These reliability issues included items related to failed performance test results, significant corrective action, repeated maintenance, maintenance rule status, Regulatory Issue Summary 05-020 (formerly Generic Letter 91-18) conditions, Nuclear Regulatory Commission (NRC) resident inspector input regarding 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.

.2 Component Reviews

.2.1 Auxiliary Feedwater (CA) Check Valves (CA-8, -10, -12, -23, -28, -33)

a. Inspection Scope

The team reviewed CA system check valves located in the pump suction piping and in the pump minimum flow piping. The review included applicable portions of the plant's UFSAR and piping and instrumentation diagrams (P&IDs) to identify the design bases requirements of the CA check valves. The team examined system health reports and records of surveillance testing and maintenance activities to verify that potential degradation issues were being monitored, prevented, and/or corrected. The team performed a walkdown of the CA check valves and associated equipment to review the installed configuration of the valves, verify the material condition of the equipment, and to verify that the equipment and associated piping was not exposed to any other

hazards. Discussions with system and component engineers were conducted regarding pump and check valve design and performance requirements.

b. Findings

No findings were identified.

.2.2 Residual Heat Removal (ND) Pumps and Motors (1A and 1B)

a. Inspection Scope

The team reviewed the UFSAR, current system health report, selected drawings, operating procedures, and past Problem Investigation Program reports (PIPs) for the Unit 1 ND pumps. The team interviewed the ND system engineer to discuss the overall health and condition of the pumps and associated equipment. The team interviewed mechanical and electrical design engineers responsible for verifying the pumps' capacity to operate under both minimum and maximum flow conditions. The team reviewed calculations, test procedures, and test results addressing required ND pump performance requirements during design bases accidents, calculations addressing required pump net positive suction head, and calculations addressing pump minimum and runout flow conditions. The team reviewed the design with regard to industry issues, including potential pressurization of system piping during some accident conditions and reduced thrust bearing life under low flow conditions. The team also performed walkdowns of the pumps and associated equipment to verify the material condition of the equipment and to verify that the equipment was adequately protected.

The team verified, by review of schematic drawings, that operation of the Unit 1 ND pump motors was consistent with the design basis and operational requirements. The team verified that the brake horsepower required by the pump was the maximum horsepower that was required during a loss of coolant accident and was within the motor rating. The team reviewed the protection coordination calculation for the motor and verified that the circuit breaker ratings, protective device trip settings and alarm functions were consistent with the licensing basis and operational requirements. The team reviewed recent calibration tests of the breaker overcurrent relays to confirm that the calibration results satisfied design requirements and that corrective actions were implemented, if required. The team reviewed maintenance and corrective action histories to determine whether there had been any adverse operating trends. The team verified that the ambient conditions were consistent with vendor recommendation for the motors. In addition, the team performed a walkdown of the observable installed equipment to determine whether the installed configuration was consistent with design documents including drawings and calculations, and to assess the presence of hazards.

b. Findings

No findings were identified.

.2.3 Pressurizer Power Operated Relief Valves (PORVs) (NC-32B, -34A, -36B)

a. Inspection Scope

The team reviewed applicable portions of the design and licensing documents, including flow diagrams, applicable plant calculations, and drawings to identify the design bases and functional requirements of the pressurizer PORVs. The team also interviewed design and system engineers to evaluate the components' design requirements and obtain historical test performance results. In addition, the team reviewed the PIP database to assess identification and resolution of failures or nonconforming issues. The team reviewed the valve control diagrams to verify they conformed to the system functional description and operational requirements contained in the UFSAR and design basis documents (DBDs). The team also reviewed availability and capability of air and nitrogen supply, and electrical power sources to verify that the valves would be able to perform their intended design function when called upon under design basis requirements. The team examined system health reports, records of recent surveillance testing and maintenance activities to confirm the readiness of the components to perform their required functions during system demands. Additionally, the team reviewed station operating and off-normal procedures to verify that design basis requirements had been adequately translated into procedures and instructions. The team did not perform a walkdown and assessment of the material condition of the PORVs because they were located in an inaccessible area.

b. Findings

No findings were identified.

.2.4 Standby Shutdown Facility (SSF) Ventilation Fans (#1 and #3)

a. Inspection Scope

The team reviewed applicable portions of the plant's UFSAR, DBDs, and P&IDs to establish an overall understanding of the design bases of the SSF ventilation fans. Inspectors walked down the SSF to visually inspect the material condition of the fans. Inspectors reviewed electrical drawings and calculations to verify fans could be energized from appropriate standby power sources for accident scenarios where use of the SSF is required. Inspectors reviewed electrical and control diagrams to assess whether the fans would be able to start under accident conditions and whether they were subject to common-cause failures. Inspectors also reviewed NRC Information Notice 2012-12, "HVAC Design Control Issues Challenge Safety System Function," for applicability to this facility.

b. Findings

No findings were identified.

.2.5 Unit 1 Emergency Diesel Generator (EDG) Starting Air System

a. Inspection Scope

The team reviewed the plant's technical specifications (TS), UFSAR, DBDs, and P&IDs to establish an overall understanding of the design bases of the EDG starting air system. Design calculations (i.e. air receiver sizing) and site procedures were reviewed to verify that the design bases and design assumptions had been appropriately translated into these documents. The team reviewed modifications over the life of the system to verify that the subject modifications did not degrade the system's performance capability and were appropriately incorporated into relevant drawings and procedures. System walkdowns were conducted to verify that the installed configurations would support its design bases functions under accident conditions and had been maintained to be consistent with design assumptions and to visually inspect the observable material condition of the system. Operating and alarm response procedures were reviewed to verify that component operation and alignments were consistent with design and licensing bases assumptions. Test procedures and recent test results were reviewed against design basis documents to verify that acceptance criteria for tested parameters were supported by calculations or other engineering documents and that individual tests and analyses served to validate component operation under accident conditions. An interview with the system engineer was conducted to discuss the history of the system operation, maintenance, and corrective actions. Vendor documentation, current system health reports, preventive and corrective maintenance history list, and relevant PIPs were reviewed in order to verify that potential degradation was monitored or prevented and that component replacement was consistent with inservice/equipment qualification life.

b. Findings

No findings were identified.

.2.6 EDG Governor and Controls

a. Inspection Scope

The team reviewed the plant's UFSAR, TS, DBDs, and relevant electrical drawings to establish an overall understanding of the design bases of the EDG governor and its control functions. The team reviewed system maintenance records of the components and relevant PIPs to verify that the maintenance activities did not degrade the component's performance and there were no adverse performance trends. Component walkdowns were conducted to verify that the installed configurations would support their design bases function under accident/event conditions and had been maintained to be consistent with design assumptions. Control panel indicators were observed and operating procedures reviewed to verify that component operation and alignments were consistent with design and licensing basis assumptions. Test procedures and results were reviewed against DBDs to verify that acceptance criteria for tested parameters were supported by calculations or other engineering documents and that individual tests and/or analyses served to validate component operation under accident/event conditions. Vendor documentation, system health reports, preventive and corrective maintenance history, and relevant PIPs were reviewed in order to verify that potential

degradation was monitored or prevented and that component replacement was consistent with inservice/equipment qualification life.

b. Findings

No findings were identified.

.2.7 Standby Makeup Pump (1NVPUSB) and Filter

a. Inspection Scope

The team reviewed the plant's TS, UFSAR, DBDs, and P&IDs to establish an overall understanding of the design bases of the standby makeup pump (SMP) and filter. Design calculations (i.e., net positive suction head, pump sizing, and alarm setpoint) and site procedures were reviewed to verify that the design bases and design assumptions had been appropriately translated into these documents. The team reviewed system modifications over the life of the component to verify that the subject modifications did not degrade the component's performance capability and were appropriately incorporated into relevant drawings and procedures. A component walkdown was conducted to verify that the installed configuration would support its design basis function under accident conditions and to visually inspect the observable material condition of the SMP. Test procedures and recent test results were reviewed against design basis documents to verify that acceptance criteria for tested parameters were supported by calculations or other engineering documents and that individual tests and analyses served to validate component operation under accident conditions. An interview with the system engineer was conducted to discuss the history of the component operation, maintenance, and corrective actions. Vendor documentation, current system health reports, preventive and corrective maintenance history, and relevant PIPs were reviewed in order to verify that potential degradation was monitored or prevented and that component replacement was consistent with inservice/equipment qualification life.

- Operator Action - The team reviewed the licensee's abnormal operating procedure to verify that adequate guidance existed to provide a back-up cooling water supply to the charging (NV) pumps during a postulated loss of component cooling water event. The team performed a walkdown of local manual actions, associated with aligning the drinking water system as a cooling water supply to the NV pumps, to verify the feasibility of the directed actions.

b. Findings

Introduction: An NRC-identified Green non-cited violation (NCV) of Catawba Nuclear Station Units 1 and 2 License Condition 2.C.5, "Fire Protection Program," was identified for the licensee's failure to establish a leakage acceptance criteria past check valves 1(2)NV-46, 1(2)NV-57, 1(2)NV-68, and 1(2)NV-79 that supported minimum, post-fire safe shutdown (SSD) design flow requirements of the standby shutdown system (SSS).

Description: The SSS is designed to mitigate the consequences of certain postulated fire, security, and station blackout events to either unit and consists of normal plant safety-related equipment and SSS-dedicated equipment. The system removes decay heat through the steam generators and provides reactor coolant system (RCS) makeup

to achieve and maintain hot standby (Mode 3) conditions. To mitigate a postulated fire in a zone that would disable the normal RCS makeup and reactor coolant pump (RCP) seal injection capability, the SSS was equipped with two SMPs, one per unit. The pumps were required to provide a minimum design flow of 26 gallons per minute (gpm), at RCS pressure. This requirement was based on the 20 gpm "Total Accumulative RCS Leakage" (RCS leakage + normal RCP seal leakage) limit specified in the Selected Licensee Commitment (SLC) 16.7-9, "Standby Shutdown System," Condition B. The SLC limit of 20 gpm provided an additional 6 gpm required to accommodate a projected 1.5 gpm RCP seal leak-off increase, per RCP, as the event progressed, thereby assuring that RCS inventory was maintained.

The team reviewed procedures PT/1(2)/A/4200/005 C, "SMP Check Valve Test," Rev. 6(5), which were used by the licensee, in part, to demonstrate the closure of the RCP normal seal supply check valves 1(2)NV-46, 1(2)NV-57, 1(2)NV-68, and 1(2)NV-79. These valves were located in the normal seal injection flow path (one for each RCP) upstream of the SMP tie-in and were required to close to prevent flow diversion from the SMP such that all flow was directed to the RCS via the normal RCP seal injection lines. The test acceptance criteria for check valve back-leakage was specified to be less than 1 gpm (per check valve) at a test pressure of 1,000 psig. Because the actual system operating pressure for the check valves was approximately 2,300 psig, the higher differential pressure (at accident conditions) could reasonably result in back-leakage of more than 1 gpm for valves with a degreated seating surface. Additionally, per calculation CNC-1223.04-00-0072, "RCP No.1 Seal Leak-off Annunciator Alarm Setpoint for Unit 1 and Unit 2," Rev. 3, the minimum design flow requirement of 26 gpm assumes each of the check valves leak a maximum of 0.2 gpm (0.8 gpm total). This assumption was not consistent with the acceptance criteria in PT/1(2)/A/4200/005 C.

Based on the above, the team concluded that the procedure for the RCP seal supply check valves was inadequate in that the acceptance criteria was non-conservative to ensure at least 26 gpm from the SMP would be available to meet the SSS flow requirements at the SLC limit of 20 gpm. The licensee entered the issue into the corrective action program as PIP C-12-7717. The licensee performed a functionality assessment and determined the SMPs would still be capable of performing their function based on the latest back-leakage test results, which indicated minimal leakage through the valves, and based on current and historical accumulative RCS leakage data. The licensee conservatively limited the SLC allowed "Total Accumulative RCS Leakage" to 15 gpm to gain additional SMP flow margin.

Analysis: The licensee's use of inadequate test acceptance criteria for back-leakage through check valves associated with the post-fire SSD flow requirements of the SMP was a performance deficiency. The performance deficiency was more than minor because it was associated with the Mitigating Systems cornerstone attribute of protection against external factors, such as fire, and adversely affected the cornerstone objective of ensuring the capability of systems to respond to events to prevent undesirable consequences. Specifically, if back-leakage through check valves 1(2)NV-46, 1(2)NV-57, 1(2)NV-68, and 1(2)NV-79 was to degrade to the allowed limits of <1 gpm in the test procedure, the SMP would not be capable of meeting the 26 gpm RCS makeup requirement to support the SSS post-fire SSD function. The team evaluated this issue in accordance with IMC 0609, Appendix F, "Fire Protection Significance Determination Process," and determined the finding to be of very low safety significance (Green). The finding was assigned the category of 'post-fire SSD' and a 'low

degradation' rating based upon the current minimal leakage past the check valves; and the current and historical accumulative RCS leakage having been sufficiently low such that margin was available for the SMP to perform its function. There was no cross-cutting aspect associated with this finding because the condition existed since initial issuance of the test procedure and was not reflective of current licensee performance.

Enforcement: Catawba Nuclear Station Operating License Condition 2.C.5 for Units 1 and 2 required that Duke Energy Carolinas, LLC implement and maintain in effect all provisions of the approved fire protection program as described in the UFSAR, as amended, for the facility and as approved in the Safety Evaluation Report (NUREG-0954), dated February 1983, and Supplement Numbers 1 through 5. Safety Evaluation Report Supplement No. 4, Section 9.5.1, "Fire Protection Program," stated, in part, that the SMP will provide at least 26 gpm of borated water to the RCS. Contrary to the above, from initial plant operation until September 14, 2012, the licensee failed to ensure that a minimum of 26 gpm from the SMP would be provided to the RCS. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy because it was of very low safety significance and was entered into the licensee's corrective action program as PIP C-12-07717, to address recurrence: NCV 05000413, 414/2012007-01, Failure to Develop Adequate Test to Ensure Minimum SMP Flow Requirements.

.2.8 Unit 1 Nuclear Service Water System Strainers

a. Inspection Scope

The team reviewed the plant's TS, UFSAR, DBDs, and P&IDs to establish an overall understanding of the design bases of the Unit 1 nuclear service water strainers. Design calculations (i.e. system thermal hydraulics) and site procedures were reviewed to verify that the design bases and design assumptions had been appropriately translated into these documents. The team reviewed modifications over the life of the component to verify that the subject modifications did not degrade the system's performance capability and were appropriately incorporated into relevant drawings and procedures. A component walkdown was conducted to verify that the installed configuration would support its design bases function under accident conditions and to visually inspect the observable material condition of the strainer and supporting equipment. Operating and alarm response procedures were reviewed to verify that strainer operation and alignment was consistent with design and licensing bases assumptions. Interviews with the component and system engineers were conducted to discuss the history of the component operation, maintenance, and corrective actions. Vendor documentation, current system health reports, preventive and corrective maintenance history list, and PIPs were reviewed in order to verify that potential degradation was monitored or prevented and that component replacement was consistent with in service/equipment qualification life.

b. Findings

No findings were identified.

.2.9 Emergency Core Cooling System Supply Motor Operated Valve (MOV) (1FW-27A)

a. Inspection Scope

The team reviewed the UFSAR, selected drawings, and operating procedures for MOV 1FW-27A. Design calculations (i.e., differential pressure and required torque/thrust) and site procedures were reviewed to verify that the design bases and design assumptions had been appropriately translated into these documents. The team also performed walkdowns of the valves and associated equipment to verify the material condition of the equipment and to verify that the equipment was adequately protected. Operating procedures were reviewed to verify that component operation and alignments were consistent with design and licensing bases assumptions. Test procedures and recent test results were reviewed against design basis documents to verify that acceptance criteria for tested parameters were supported by calculations or other engineering documents and that individual tests and analyses served to validate component operation under accident conditions. Current system health reports, preventive and corrective maintenance history, and relevant PIPs were reviewed in order to verify that potential degradation was monitored or prevented.

The team reviewed schematics of record for the 1FW-27A valve motor starter. The team reviewed the valve motor vendor nameplate data and the specifications for the motor to verify conformance with the calculation for motor terminal voltage. The team reviewed the calculation for determining the minimum motor terminal voltage under design/licensing basis conditions to assess the capability of the motor to provide the required thrust to operate the valve. The team also reviewed the calculation for determining the minimum motor starter contactor terminal voltage under design/licensing basis conditions to verify adequate voltage at the contactor coil for valve motor starting and running conditions.

b. Findings

No findings were identified.

.2.10 125VDC Diesel Essential Auxiliary Power System Battery (1DGBA)

a. Inspection Scope

The team reviewed the UFSAR and DBDs to identify the loading requirements for the safety-related diesel essential auxiliary power system batteries. The team reviewed the inputs to the battery and charger sizing analysis and the battery voltage study to verify adequate sizing of the battery for both design basis accident and station blackout conditions and the sizing of the battery charger. The battery voltage study was reviewed to verify adequate voltage was available to critical components. Battery TS surveillance test and inspection results were reviewed to verify battery capacity. The team reviewed maintenance and corrective action histories to verify that identified equipment problems were corrected and to determine whether there had been any adverse operating trends. In addition, the team performed a walkdown of the battery, battery racks, battery charger and battery enclosure to determine whether the installed configuration was consistent with design documents including drawings, and calculations, and to assess the presence of hazards.

b. Findings

No findings were identified.

.2.11 EDG Supply Breaker (1ETA-18)

a. Inspection Scope

The team verified by review of schematic drawings, that operation of the breaker was consistent with the design basis and operational requirements. The team reviewed the protection coordination calculation for the EDG supply breaker and verified that the circuit breaker ratings, protective device trip settings, and alarm functions were consistent with the licensing basis and operational requirements. The team reviewed maintenance schedules and procedures, and completed work orders to determine whether the breaker was being properly maintained. The team reviewed protective relaying schemes and calculations to determine whether the breaker was adequately protected and coordinated with the switchgear. The team reviewed maintenance and corrective action histories to determine whether there had been any adverse operating trends. The team reviewed recent calibration tests of the breaker overcurrent relays to confirm that the calibration results satisfied design requirements and that corrective actions were implemented, if required. In addition, the team performed a walkdown of the observable installed equipment to determine whether the installed configuration was consistent with design documents including drawings, and calculations, and to assess the presence of hazards.

b. Findings

No findings were identified.

.2.12 Residual Heat Removal Suction MOV (1ND-36B)

a. Inspection Scope

The team reviewed the plant's TS, UFSAR, DBDs, and P&IDs to establish an overall understanding of the design bases of MOV 1ND-36B, which is the RCS 'C' hot leg supply valve (for shutdown cooling) to the 'B' ND pump. Design calculations (i.e., differential pressure and required torque/thrust) and site procedures were reviewed to verify that the design bases and design assumptions had been appropriately translated into these documents. Test procedures and recent test results were reviewed against design bases documents to verify that acceptance criteria for tested parameters were supported by calculations or other engineering documents and that individual tests and/or analyses served to validate component operation under accident conditions. Vendor documentation, current system health reports, preventive and corrective maintenance history lists, and PIPs were reviewed in order to verify that potential degradation was monitored or prevented. The team evaluated the environmental qualification requirements of the MOV including maximum allowable cycles. Selected industry operating experience was reviewed to verify that applicable insights had been applied.

The team reviewed schematics of record for the 1ND-36B valve motor starter. The team reviewed the valve motor vendor nameplate data and the specifications for the motor to verify conformance with the calculation for motor terminal voltage. The team reviewed the calculation for determining the minimum motor terminal voltage under design/licensing basis conditions to assess the capability of the motor to provide the required thrust to operate the valve. The team also reviewed the calculation for determining the minimum motor starter contactor terminal voltage under design/licensing basis conditions to verify adequate voltage at the contactor coil for valve motor starting and running conditions.

b. Findings

Introduction: An NRC-identified Green NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was identified for the licensee's failure to establish a procedure to ensure that the requirements in EQMM 1393.01-A01-00, "Environmental Qualification Maintenance Manual," were not exceeded to maintain the environmental qualification (EQ) of motor-operated valves (MOVs).

Description: The licensee's EQMM 1393.01-A01-00, "Environment Qualification Maintenance Manual," Rev. 8, section 2.1.1 established maximum limits of cycles for EQ-related MOVs. The inspection team determined that MOVs 1KCC37A (Component Cooling System Train 1A Recirculation Line Isolation Valve), 1WL807B (Reactor Coolant Drain Tank Pump Discharge Containment Isolation Valve), and 2KCC37A (Component Cooling System Train 2A Recirculation Line Isolation Valve) had exceeded their EQ cycle limit of 2,000 cycles as documented in Catawba PIP C-12-07121. Discussions with the MOV Engineer indicated that Catawba did not have written procedures for trending and monitoring the number of cycles of EQ-related MOVs.

As a result of PIP C-12-07121, an immediate determination of operability and prompt determination of operability were performed. The licensee determined the MOVs were operable but degraded/nonconforming and provided justification for continued operation for the referenced MOVs based on a Kinectrics Inc. Test Report, K-012964-RA-0001-R01, which qualified similar Rotork MOVs to 4,000 cycles, and that mechanical wear was not excessive and the cumulative wear would not prevent MOVs from performing their design basis functions.

In 2009, operating experience (OE) item OEDB-09-051790 was assigned to the Nuclear General Office to evaluate an event where EQ-related MOVs exceeded their EQ cycle limits. The OE evaluation was not effective in that it did not identify the need for written procedures at Catawba to ensure that EQ MOV cycle limits were not exceeded. In addition, the Nuclear General Office failed to involve appropriate station personnel and/or general office personnel to ensure appropriate corrective actions.

Analysis: The licensee's failure to establish a procedure to ensure that the MOV cycle requirements of EQMM 1393.01-A01-00, were not exceeded was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Mitigating Systems cornerstone attribute of procedure quality and adversely affected the cornerstone objective of ensuring availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the lack of procedural guidance to track the cycles of MOVs resulted in 1KCC37A, 1WL807B, and 2KCC37A exceeding their EQ cycle limit of 2,000

cycles and decreased the reliability and capability of the MOVs. The team assessed the finding in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and determined the finding was of very low safety significance (Green) because the performance deficiency did not result in a loss of MOV operability. The finding was associated with the cross-cutting aspect of implementation and institutionalization of OE in the OE component of the Problem Identification and Resolution area. Specifically, the 2009 OE evaluation was not effective in that it did not identify the need for written procedures to ensure that EQ MOV cycle limits were not exceeded. [P.2(b)]

Enforcement: Appendix B of 10 CFR 50, Criterion V, "Instructions, Procedures, and Drawings," required, in part, 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. Contrary to the above, from implementation of EQMM 1393.01-A01-00, Rev. 8, in 2003, until September 14, 2012, an activity affecting quality was not prescribed by documented instructions or procedures, in that the licensee failed to establish a procedure to ensure the maximum MOV cycle requirements in EQMM 1393.01-A01-00, "Environmental Qualification Maintenance Manual," were not exceeded. The licensee declared MOVs 1KCC37A, 1WL807B, and 2KCC37A as operable but degraded/nonconforming, and instituted guidance to periodically review the cycles of all MOVs to ensure the maximum limit is not exceeded. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy because it was of very low safety significance and was entered into the licensee's corrective action program as PIP C-12-07121, to address recurrence: NCV 05000413, 414/2012007-02, Inadequate Implementation of Procedure to Ensure EQ MOV Cycle Limit Is Not Exceeded.

.2.13 SSF Pressurizer Heaters Sub-bank (Group D Heaters 28, 55, 56)

a. Inspection Scope

The team reviewed applicable portions of the design and licensing documents, including plant calculations and drawings to identify the design bases and functional requirements of the pressurizer heaters that are powered and controlled from the SSF. The team reviewed plant calculations to determine that the capacity of the heaters was sufficient to support safe shutdown from the SSF. The team examined system health reports, records of recent surveillance testing and maintenance activities to confirm the readiness of the components to perform their required functions during system demands. Additionally, the team reviewed station operating and off-normal procedures to verify that design basis requirements had been adequately translated into procedures and instructions. The team also reviewed plant calculations to verify that the timeframe to energize the heaters specified in plant procedures was adequate to maintain pressure control of the RCS. The team reviewed component electrical drawings to determine that heaters would be able to be controlled from the SSF, and no interlocks would inadvertently defeat control from the SSF. The team did not perform a walkdown and assessment of the material conditions of the pressurizer heaters because they are inaccessible during plant operation.

b. Findings

No findings were identified.

.2.14 Steam Generator (SG) PORVs (SV-1, -7, -13, -19)

a. Inspection Scope

The team selected the SG PORVs for review due to their contribution to large early release frequency. The team reviewed the UFSAR, current system health report, selected drawings, operating procedures, and relevant PIPs for the SG PORVs. The team interviewed the air-operated valve component engineer to discuss the overall health and condition of the valves and associated equipment. The team interviewed mechanical and electrical design engineers to verify the valves' capability to perform their required functions with a loss of normal electrical power, loss of instrument air, and the most limiting single failure. The team reviewed calculations, test procedures, and test results addressing valve performance requirements during design bases accidents. The team reviewed the design with regard to the diversity of the electrical power supplies, as well as the capacity and testing of the backup nitrogen supply. The team also performed walkdowns of the valves and associated equipment to verify the material condition of the equipment and to verify that the equipment was adequately protected.

- Operator Action - The team reviewed off-normal and emergency operating procedures to verify that adequate guidance existed for operators to respond to a design basis steam generator tube rupture (SGTR) event. The team observed a simulator scenario to verify the capability of the operators to mitigate a SGTR event as described in the UFSAR. The team performed a walkdown of local manual actions associated with a SGTR event to verify the feasibility of the directed actions.

b. Findings

No findings were identified.

.2.15 SG Main Steam Isolation Valves (MSIVs) (SM-1, -3, -5, -7)

a. Inspection Scope

The team selected the SG MSIVs for review due to their contribution to large early release frequency. The team reviewed the UFSAR, current system health report, selected drawings, operating procedures, and relevant PIPs for the MSIVs. The team interviewed the air-operated valve component engineer to discuss the overall health and condition of the valves and associated equipment. The team interviewed mechanical and electrical design engineers to verify the valves' capability to perform their required functions with a loss of normal electrical power, loss of instrument air, and the most limiting single failure. The team reviewed test procedures and test results addressing valve performance requirements during design bases accidents. The team reviewed the design, including recent design changes, with regard to the diversity of the electrical power supplies. The team also performed walkdowns of the valves and associated equipment to verify the material condition of the equipment and to verify that the equipment was adequately protected.

b. Findings

No findings were identified.

.3 Operating Experience

a. Inspection Scope

The team reviewed six operating experience issues for applicability at Catawba Nuclear Station. The team performed an independent review for these issues and where applicable, assessed the licensee's evaluation and disposition of each item. The issues that received a detailed review by the team included:

- NRC Generic Letter 1989-13, "Service Water System Problems Affecting Safety-Related Equipment"
- NRC Regulatory Issue Summary 2000-05, "Resolution of Generic Safety Issue 165, Spring Actuated Safety and Relief Valve Reliability"
- NRC Information Notice 2012-06, "Ineffective Use of Vendor Technical Recommendations"
- NRC Information Notice 2006-03, "Motor Starter Failures Due To Mechanical-Interlock Binding"
- NCV 05000331/2011009-01, "Failure to Ensure Sufficient Thrust Margins for the 480 VAC Safety-Related MOVs"
- NCV 05000369, 370/2012007-02, "Inadequate Tornado Missile Protection for EDG Exhaust Ventilation System"

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA6 Meetings, Including Exit

On September 14, 2012, the team presented the inspection results to Mr. Kelvin Henderson and other members of the licensee's staff. Proprietary information that was reviewed during the inspection was returned to the licensee or destroyed in accordance with prescribed controls.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel:
S. Batson, Plant Manager
D. Belk, Component Engineer
B. Cauthen, RN System Engineer
R. Dickson, CDBI Technical Lead
A. Driver, Licensing Engineer
B. Ferguson, Systems Engineering Manager
E. Hacck, Design Engineer
T. Hamilton, Engineering Manager
R. Hart, Regulatory Compliance Manager
K. Henderson, Catawba Site Vice President
R. Herring, Standby Shutdown System Engineer
T. Jones, Field Operator
L. Keller, PCE Manager
D. Kulla, Civil Design Engineer
T. Pasour, Regulatory Compliance
D. Peal, Operations SRO
S. Putnam, Organizational Effectiveness Manager
M. Sawicki, Systems Engineer
P. Simpson, EDG System Engineer
T. Simril, Plant Manager (Acting)
W. Suslick, Design Engineering Manager

NRC personnel:
J. Bartley, Chief, Reactor Projects Branch 1, Division of Reactor Projects, RII
R. Nease, Chief, Engineering Branch Chief 1, Division of Reactor Safety, RII
A. Hutto, Senior Resident Inspector, Division of Reactor Projects, Catawba Resident Office
R. Cureton, Resident Inspector, Division of Reactor Projects, Catawba Resident Office

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

05000413, 414/2012007-01	NCV	Failure to Develop Adequate Test to Ensure Minimum SMP Flow Requirements (Section 1R21.2.7)
05000413, 414/2012007-02	NCV	Inadequate Implementation of Procedure to Ensure EQ MOV Cycle Limit Is Not Exceeded (Section 1R21.2.12)

LIST OF DOCUMENTS REVIEWED

Calculations

CNC-1139.13-01-0005, Diesel Generator Room Battery Enclosure at El. 556 – Qualification, Rev. 4
CNC-1205.19-00-0030, GL 89-10 Set-up Calculation for Valves 1(2)FW027A and FW055B, Rev. 5
CNC-1205.19-00-0039, Generic Letter 89-10 Calculations for ND System: 1(2)ND001B, 1(2)ND002A, 1(2)ND036B, 1(2)ND037A, Rev. 8
CNC-1205.19-00-0172, Operability Support of PIP C-05-2259 for 1(2)NI184B and 1(2)NI185B, Rev. 1
CNC-1206.03-00-0001, Flood Levels for Structures Outside of the Reactor Building, Rev. 20
CNC-1223.02-00-0017, Verification of Mechanical Equipment Electrical Loads, Rev. 3
CNC-1223.02-00-0017, Verification of Mechanical Equipment Electrical Loads, Rev. 4
CNC-1223.03-00-0032, Time to Energize Pressurizer Heaters from SSF, Rev. 1
CNC-1223.03-00-0033, Determination of Pressurizer Heater Capacity powered from the SSF Diesel, Rev. 1
CNC-1223.04-00-0009, Catawba Makeup Pump Sizing, Rev. 5
CNC-1223.04-00-0070, SMP NPSH and Suction Dampener Evaluation, Rev. 3
CNC-1223.04-00-0072, Reactor Coolant Pumps No. 1 Seal Leakoff Annunciator Alarm Setpoint for Unit 1 and Unit 2, Rev. 3
CNC-1223.04-00-0077, Centrifugal Charging Pump Backup Cooling Requirements, Rev. 0
CNC-1223.11.00-0007, Design Parameters For Residual Heat Removal Valves 1/2ND1 B, 2A, 36B, 37A, Rev. 7
CNC-1223.11-00-0019, Residual Heat Removal Pump Motor Stress Report and Seismic Report, Rev. 0
CNC-1223.12-00-0057, Hydraulic Model of Unit 1 Emergency Core Cooling System, Rev. 7
CNC-1223.12-00-0070, Determination of Differential Pressure for PIP C-05-2259 Reportability, Rev. 0
CNC-1223.21-00-0021, ND Suction Pressure Control Setpoint Determination for 1(2)FW96 & 1(2)FW97
CNC-1223.24-00-0027, A Flow Distribution Model for the RN System, Rev. 12
CNC-1223.42-00-0001, Confirmation of CA System RN Transfer Scheme Adequacy, Rev. 18
CNC-1223.43-01-0011, Minimum Nitrogen Pressure Requirement for Modulation of SG PORVs, Rev. 6
CNC-1318.05-00-0017, Class 1E Diesel Protective Relaying & Sequencer Undervoltage Relay Settings, Rev.15
CNC-1318.05-00-0162, Voltage Analysis of Motor Starter and Interposing Relay Coils at Catawba, Rev. 1
CNC-1318-05.00-0198, Sh. G87 and G88, U1, 6.9kV, 4.16kV, & 600V Auxiliary Power Systems Safety-Related Voltage Analysis, Rev. 7
CNC-1318-05.00-0198, U1, 6.9kV, 4.16kV, & 600V Auxiliary Power Systems Safety-Related Voltage Analysis, Rev. 12
CNC-1381.05-00-0012, 4160 Volt Essential Auxiliary Power System Switchgear Relay Settings, Rev. 15
CNC-1381.05-00-0050, U1/2 125VDC Essential Diesel Auxiliary Power System (EPQ) Battery and Charger Sizing, Rev. 10
CNC-1381.05-00-0124, ND Pump Motor Thrust Bearing Rating Life, Rev. 2
CNC-1381.05-00-0150, Essential Diesel-Generator (D/G) 125VDC Auxiliary Power System (EPQ) Station Blackout (SBO) Battery Sizing, Rev. 5

CNC-1381.05-00-0151, Voltage Analysis for 125 VDC Diesel Auxiliary Power System (EPQ), Rev. 7
CNC-1381.05-00-0194, U1/2 AC Power System ETAP Model Base File, Rev. 19
CNC-1381.05-00-0194, Sh. F62, U1/U2 AC Power System ETAP Base Model File, Rev. 19
CNC-1381.05-00-0194, Sh. 9-11, 9-12, 9-13, and 9-14, Attachment 9, MOV Input Data for ETAP Model, Rev. 7
CNC-1552.08-00-0264, FWST Level Setpoints, Rev. 11
CNC-1552.08-00-0383, Hydraulic Model Study of FWST and BWST to Evaluate the Formation of Air-Drawing Vortices, Rev. 0
CNC-1552.08-00-0411, Subcooled Margin Error Adjustment, Rev. 0
DPC-1552.08-00-0109, Safety Injection Flows for Analysis, Rev. 18
MCC-1223.03-00-0048, Determination of Pressurizer Heater Capacity powered from the SSF Diesel, Rev. 0
SAAG File No. 774, Severe Accident Analysis Report PRA-Allowable Number of Catawba MOV Contact Failures, Rev. 1

Completed Procedures

IP/0/A/4971/003, Diesel Generator 51V (COV-8) Voltage Controlled Overcurrent Relay Calibration Procedure, completed 2/23/12
KC-004, Alternate Cooling to 1A NV Pump, completed 8/7/12
PT/1/A/4200/001N, Reactor Coolant System Pressure Boundary Valve Leak Rate Test, completed 5/29/11, 12/30/10, and 2/21/10
PT/1/A/4200/005C, Standby Makeup Pump Check Valve Test, completed 5/27/11
PT/1/A/4200/007C, Standby Makeup Pump #1 Performance Test, completed 6/20/12, 3/28/12, 12/09/11, 9/22/11, 9/13/11, 6/23/11, 3/30/11, and 1/07/11
PT/1/A/4200/010A, Residual Heat Removal Pump 1A Performance Test, dated 3/9/12
PT/1/A/4200/013F, ND Valve In-service Test (CS), completed 5/8/11 and 11/29/09
PT/1/A/4200/023A, NC Valve Inservice Test (CS), completed 4/8/12, 5/23/11, and 4/23/11
PT/1/A/4200/023B, NC PORV and Air Supply Stroke Test, completed 6/1/11, 5/27/11, and 5/3/11
PT/1/A/4200/077, VG/RN Valve Inservice Test (Enclosures 13.1 and 13.2), completed 6/22/12, 3/1/12, 11/17/11, 8/24/11, and 6/22/11
PT/1/A/4200/077, VG/RN Valve Inservice Test (Enclosures 13.3 and 13.4), completed 5/16/12, 2/22/12, 12/26/11, 9/7/11, and 7/4/11
PT/1/A/4200/080, NV Pump 1A Backup Cooling Flow Verification, Rev. 5, completed 5/7/11
PT/1/A/4250/003A, Auxiliary Feedwater Motor Driven Pump 1A Performance Test, dated 12/9/11
PT/1/A/4350/016A, VG System 1A Valves Full Stroke Verification Test, completed 5/10/11 and 12/3/09
PT/1/A/4350/016B, VG System 1B Valves Full Stroke Verification Test, completed 5/22/11 and 12/3/09
PT/1/A/4400/01, ECCS Flow Balance, dated 5/26/11 and 2/23/97
PT/1/A/4600/003B, Quarterly Surveillance Items, completed 8/5/12 and 5/13/12
PT/1/A/4700/013, Auxiliary Shutdown Panel 1A (1ASPA) Functional Test, completed 6/2/11
PT/1/A/4700/015, Unit 1 Standby Shutdown System (SSS) Pressurizer Heater Functional Test, completed 2/29/12
PT/2/A/4200/005C, Standby Makeup Pump Check Valve Test, completed 3/30/12
PT/2/A/4200/007C, Standby Makeup Pump #2 Performance Test, completed 8/1/12
PT/2/A/4200/023A, NC Valve Inservice Test (CS), completed 4/1/12 and 3/10/12
PT/2/A/4600/003B, Quarterly Surveillance Items, completed 8/26/12 and 6/3/12

PT/2/A/4700/015, Unit 2 Standby Shutdown System (SSS) Pressurizer Heater Functional Test, completed 2/14/12

Completed Work Orders
WO01125458-01, Battery 1DGBA, dated 11/23/06
WO01771286-01, 1EPQ, DGBA Battery Service Test, dated 5/28/08
WO01771331-01, 1EPQ BA DGBA, Perf Res Check & Post Insp, Room, Cell & Rack General, dated 5/26/08
WO01796627-01, 1ETC BK ETA-18, dated 2/13/08
WO01822948-01, 1RN-ST-A, Clean Strainer Tubes, dated 4/27/09
WO01832989-01, 1EPC BK ETA-18, Replace Control Device Preventative, dated 9/22/09
WO01852707-01, 1ND036B, Perform Comprehensive Rotork PM, dated 11/18/09
WO01852894-01, 1EPQ BA DGBA, Perf Res Check & Post Insp, Room, Cell & Rack General, dated 11/26/09
WO01915027, 1NV, PM Standby Makeup Pump/Motor, dated 5/03/10
WO01939268-01, Inspect 1ND001B, 002A, 036B,& 037A for oil leaks, dated 3/14/12
WO01939516-01, 1ND036B, Perform Limited Rotork PM, dated 5/7/11
WO01939726-01, Battery 1DGBA, dated 4/29/11
WO01939850-01, 1EPQ BA DGBA, Perf Res Check & Post Insp, Room, Cell & Rack General, dated 6/11/11
WO01954194-01, 1EPC, Routine Test 1ETB SWGR Relays, dated 3/21/11
WO01958216-01, Disconnect Portable DC Power Supply, dated 5/3/11
WO01994154-01, 1ERN RY DGA, Perf Test of 1A D/G Relays, dated 2/27/12
WO02004399-01, 1EPC, PM Protect Relays on 1ETA, dated 5/21/12
WO02005673-01, 1EMF33, ACOT-EMF/RAD Monitor Sys, dated 6/6/12
WO02008545-01, 2EMF33, ACOT-EMF/RAD Monitor Sys, dated 6/13/12
WO02021934-01, 1RN ST A, PM Nuclear Service Water Strainer, dated 6/25/12
WO02031572-01, 2RN-42 has a 5 gpm seat leakage, dated 3/12/12
WO02032106-01, 1EPQ – Perform Quarterly Insp on 1DGBA, dated 6/13/12
WO98683092-01, Battery 1DGBA, dated 5/19/05
WO98687445, 1ND036B, Anneal SW/MECH, AOP & PFM Setup, dated 6/7/05

Design Basis Documents
Plant Design Basis Specification CNS-120.01-EQC-001, Design Basis Specification for the EQC System, Rev. 15
Plant Design Basis Specification CNS-1465.00-00-0001, Plant Systems Single Failure, Rev. 4
Plant Design Basis Specification CNS-1553.NC-00-0001, Design Basis Specification for the Reactor Coolant (NC) System, Rev. 35
Plant Design Basis Specification CNS-1592.CA-00-0001, Auxiliary Feedwater System, Rev. 40
Plant Design Basis Specification CNS-1593.SM-00-0001, Main Steam, Rev. 34

Drawings
CN-1491-NC.00-057, Reactor Building Reactor Coolant System (NC), Rev. 18
CN-1491-ND.00-001, Reactor Building Residual Heat Removal (ND), Rev. 19
CN-1499-CA.03-00, Instrument Detail Auxiliary Feedwater Pump Recirculation Flow, Rev. 6
CN-1499-NC.10-00, Instrument Detail Pressurizer Power Operated Relief Valve Control, Rev. 7
CN-1554-01.00, Flow Diagram of Chemical & Volume Control System (NV), Rev. 32
CN-1554-01.05, Flow Diagram of Chemical & Volume Control System (NV), Rev. 9
CN-1554-01.08, Flow Diagram of Chemical & Volume Control System (NV), Rev. 8
CN-1561-01.00, Flow Diagram of Residual Heat Removal System, Rev. 32
CN-1561-01-01, Flow Diagram of Residual Heat Removal System (ND), Rev. 26

CN-1562-01.01, Flow Diagram of Safety Injection System (NI), Rev. 22
CN-1570-01.00, Flow Diagram of Spent Fuel Cooling System (KF), Rev. 25
CN-1571-01.00, Flow Diagram of Refueling Water System, Rev. 33
CN-1573-02.02, Flow Diagram of Component Cooling System, Rev. 7
CN-1574-01.00, Flow Diagram of Nuclear Service Water System (RN), Rev. 53
CN-1574-01.01, Flow Diagram of Nuclear Service Water System (RN), Rev. 58
CN-1574-01.02, Flow Diagram of Nuclear Service Water System (RN), Rev. 50
CN-1574-01.05, Flow Diagram of Nuclear Service Water System (RN), Rev. 31
CN-1579-04.03, Flow Diagram of Misc. Structures Ventilation System (VK) Standby Shutdown Facility, Rev. 4
CN-1580-01.00, Flow Diagram of Steam Generator Blowdown System, Rev. 32
CN-1593-01.00, Flow Diagram of Main Steam System – Main Steam Vent to Atmos., Rev. 22
CN-1601-02.04, Flow Diagram of Drinking Water System, Rev. 9
CN-1601-02.04, Flow Diagram of Liquid Radwaste System, Rev. 29
CN-1605-01.05, Flow Diagram of Instrument Air System, Rev. 13
CN-1605-01.14, Flow Diagram of Instrument Air System (VI), Rev. 6
CN-1609-04.00, Flow Diagram of Diesel Generator Engine Starting Air System (VG), Rev. 24
CN-1609-04.01, Flow Diagram of Diesel Generator Engine Starting Air System (VG), Rev. 23
CN-1701-05.02, One Line Diagram Essential & Blackout Auxiliary Power Systems 4.16KV/600V Systems EPC, EPE, ETC, Rev. 8
CN-1702-02.01, One Line Diagram 4160 Volt Essential Auxiliary Power System (EPC) 4160V Switchgear No. 1ETA, Rev. 18
CN-1702-02.02, One Line Diagram 4160 Volt Essential Auxiliary Power System (EPC) 4160V Switchgear No. 1ETB, Rev. 18
CN-1702-05.02, One Line Diagram Essential & Blackout Auxiliary Power Systems 4.16kV/600V Systems EPC, EPE, ETC, Rev. 8
CN-1703-01.01, One Line Diagram 600V Essential Auxiliary Power System (EPE) 600V Load Centers 1EXLA, 1ELXC, Rev. 4
CN-1703-01.02, One Line Diagram 600V Essential Auxiliary Power System (EPE) 600V Load Centers 1ELXB, 1ELXD, Rev. 3
CN-1703-03.24, One Line Diagram 600V Nonessential Load Center #1SLXG Standby Shutdown Facility, Rev. 3
CN-1705-01.01, One Line Diagram 125VDC Instrumentation and Control Power System (EPL), Rev. 14
CN-1705-01.01-01, One Line Diagram 125V DC Vital Instrumentation and Control Power System (EPL), Rev. 11
CN-1705-01.01-02, One Line Diagram 125V DC Vital Instrumentation and Control Power System (EPL), Rev. 16
CN-1705-01.01-03, One Line Diagram 125V DC Vital Instrumentation and Control Power System (EPL), Rev. 14
CN-1705-04.01, One Line Diagram 125VDC Diesel Essential Auxiliary Power System (EPQ), Rev. 22
CN-2561-01.00, Flow Diagram of Residual Heat Removal System, Rev. 35
CN-2561-01.01, Flow Diagram of Residual Heat Removal System, Rev. 24
CN-2580-01.00, Flow Diagram of Steam Generator Blowdown System, Rev. 35
CN-2592-01.00, Flow Diagram of Auxiliary Feedwater System, Rev. 30
CN-2592-01.01, Flow Diagram of Auxiliary Feedwater System, Rev. 30
CN-2592-01.02, Flow Diagram of Auxiliary Feedwater System, Rev. 0
CN-2593-01.00, Flow Diagram of Main Steam System – Main Steam Vent to Atmos., Rev. 24
CN-2593-01.07, Flow Diagram of Main Steam System, Rev. 13
CN-2593-01.08, Flow Diagram of Main Steam System, Rev. 0

CN-2605-01.05, Flow Diagram of Instrument Air System, Rev. 13
CN-FSAR-FIG. 08-021, FSAR Appendix 8, Chapter 8 – Tables and Figures, Figure 8-21, Essential and Blackout Auxiliary Power Systems, Rev. 3
CNEE-0111-01.32-02, Elementary Diagram MCC SMXG Comp F05C Standby Shutdown Facility Pressurizer Htr Group, Rev. 9
CNEE-0115-01.09, Elementary Diagram 4160V Switchgear 1ETA Unit #9 Residual Heat Removal Pmp. Mtr. 1A (1PMTR0178), Rev. 8
CNEE-0115-01.18-01, Elementary Diagram 4160V Switchgear 1ETA Unit #18 Diesel Generator 1A (1GENR0004), Rev. 12
CNEE-0120-01.01, Diesel Generator Control Panel 1A&1B Elementary Diagram, Rev. 11
CNEE-0120-01.01-01, Diesel Generator Control Panel 1A&1B Elementary Diagram, Rev. 20
CNEE-0120-01.01-02, Diesel Generator Control Panel 1A&1B Elementary Diagram, Rev. 21
CNEE-0120-01.01-03, Diesel Generator Control Panel 1A&1B Elementary Diagram, Rev. 14A
CNEE-0120-01.01-04, Diesel Generator Control Panel 1A&1B Elementary Diagram, Rev. 9
CNEE-0120-01.01-05, Diesel Generator Control Panel 1A&1B Elementary Diagram, Rev. 11
CNEE-0120-01.01-06, Diesel Generator Control Panel 1A&1B Elementary Diagram, Rev. 6
CNEE-0120-01.01-07, Diesel Generator Control Panel 1A&1B Elementary Diagram, Rev. 5
CNEE-0120-01.01-08, Diesel Generator Control Panel 1A&1B Elementary Diagram, Rev. 7
CNEE-0120-01.01-09, Diesel Generator Control Panel 1A&1B Elementary Diagram, Rev. 7
CNEE-0120-01.01-10, Diesel Generator Control Panel Elementary Diagram, Rev. 3
CNEE-0120-01.01-11, Non-emergency Shutdown Monitor Interconnection to DECP Annunciator Elementary Diagram, Rev. 2
CNEE-0120-01.01-12, Diesel Engine 1A &1 B Vibraswitch Alarm and Reset Elementary Diagram, Rev. 1
CNEE-0120-01.01-13, Diesel Engine Shutdown Monitoring Panel 1ELMC0029 1ELMC0030 Configuration Table, Rev. 2
CNEE-0120-06.01, Elementary Diagram – Diesel Engine No. 1A – Starting Air Compressors and Dryers 1A1 and 1A2 (VG) (Part 1), Rev. 9
CNEE-0120-07.01-01, Generator Control Panel 1A&1B Elementary Diagram, Rev. 11
CNEE-0120-07.01-02, Generator Control Panel 1A&1B Elementary Diagram, Rev. 9
CNEE-0131-08.04-01, Misc. Yard Structures HVAC-VK Sys SSF SSF-SF-1, Rev. 1
CNEE-0131-08.04-02, Misc. Yard Structures HVAC-VK Sys SSF SSF-SF-2, Rev. 1
CNEE-0131-08.04-03, Misc. Yard Structures HVAC-VK Sys SSF SSF-SF-3, Rev. 1
CNEE-0138-01.10, Elementary Diagram – Nuclear Service Water System (RN) Strainer A Backflush Isolation Valve 1RN030A, Rev. 7
CNEE-0138-01.10, Elementary Diagram – Nuclear Service Water System (RN) Strainer B Backflush Isolation Valve 1RN040B, Rev. 7
CNEE-0138-01.56, Elementary Diagram – Nuclear Service Water System (RN) Automatic Strainer Backwash Drive Motor 1A, Rev. 12
CNEE-0138-01.57, Elementary Diagram – Nuclear Service Water System (RN) Automatic Strainer Backwash Drive Motor 1B, Rev. 11
CNEE-0141-01.07, Elementary Diagram Residual Heat Removal System (ND) NC Loop 3 Supply to ND Train 1B Isolation Valve 1ND036B, Rev. 16
CNEE-0150-01.15, Elementary Diagram Reactor Coolant System (NC) Solenoid Valves 1NCSV0320 and 1NCSV0360, Rev. 19
CNEE-0150-01.16, Elementary Diagram A-Train Reactor Coolant System (NC) Solenoid Valves 1NCSV0250, 1NCSV0340, 1NCSV0580, Rev. 17
CNEE-0155-02.08, Elementary Diagram Refueling Water System (FW) ND Pump 1A Suction From FWST Valve 1FW027A, Rev. 17
CNM-1203.03-0080, Pumping Unit Assembly for 5P-323 with Electric Motor, Rev. D-2
CNM-1203.03-0800, Pumping Unit Assembly for 5P-323 with Electric Motor, Rev. D-2

CNM-1205.10-0115.001, 1970 Entirely 316 Material (Flanged Connections) Consolidated Safety Relief Valve, Rev. D2
CNM-1205.10-0375.001, 19000 Consolidated Safety Relief Valve, Rev. D2
CNM-1218.01-0083.001, 2" No. 866SS 'Y' type strainer, Rev. 3
CNM-1218.02-26, Nuclear Service Water Strainer, dated 3/8/79
CNM-1225.00-0088 (Sheets 1 and 2),2.5 Gal, flow-through pulsation dampener, 2735psi, Rev. B
CNM-1301.00-0033 (Sheets 3 and 4), Panel Electric Schematic, Rev. D10
CNM-1301.00-0033 (Sheet 5), Panel Electric Schematic, Rev. D2
CNM-1301.00-0054 (Sheet 1), Diesel generator Local Panels, Rev. D12
CNM-1301.00-0054 (Sheet 2), Diesel generator Local Panels, Rev. D13
CNM-1301.00-0163 (Sheet 3), Interconnection Diagram, Rev. DP
CNTC-1554-NV.P001-01, Catawba Nuclear Station, Unit 1 NV System Test Acceptance Criteria Standby Makeup Pump, Rev. 1
CNTC-1609-VG-T001-01, Catawba Nuclear Station, Unit 1 - VG System Test Acceptance Criteria – VG Starting Air Tanks, Rev. 1

Miscellaneous Documents

1ND-36B List of completed Corrective and Preventive Maintenance work orders, 2007-2012
ASME Code for Operation and Maintenance of Nuclear Power Plants, 1998 Edition
ASME Inservice Testing Program, Rev. 27
ASME OMb Code-2000 Addenda to ASME OM Code-1998, Code for Operation and Maintenance of Nuclear Power Plants
CA-2.03, Three-Conductor Cable Impedances for Use in ETAP Analyses And Other Power System Calculations, Rev. 1
Catawba Nuclear Station, Engineering Support Document, Starters & Contactors, Rev. 5
CNDS-1223.04-00-0030, Safety Relief Valve Datasheet, dated 9/7/78
CNLT-1752-03.17, Electrical One-Line List SMXG Motor Control Center, Rev. 20
CNM-1201.01-0094.001, Unit 1 Pressurizer Instruction Manual, Rev. D10
CNM-1201.05-0318.001, RHR Pump I/M Instruction Book, Rev. 21
CNM-1203.03-0139.001, I/M for Standby Makeup Pump, Rev. D2
CNM-1203.05-0018.001, Installation, Operation, and Care of Reliance Standard Integral Horsepower Induction Motors (180-449 Frames)
CNM-1205.00-0262 (Sheets 1 and 2), Valve Ass'y. – 12-inch, 1512 Lb. Gate Pres. with Motor Operator Schedule 140, Rev. DM
CNM-1205.00-0311.001, I/B Valve 9j-201, 202, 219, 220, 9H-201 and 9H-206, Rev. D8
CNM-1205.00-2106.001, Motor Operator Sizing Information for Borg Warner Valves, Rev. D1
CNM-1205.10-0279.001, Steam Gen PORV 1&2-SV-1, 7, 13, 19 I/M
CNM-1205.12-0058-001, Main Steam Isolation Valve 1/B, Rev. D1
CNM-1218.02-0025, Nuclear Service Water I/M, Rev. D14
CNM-1301.00-0237, EDG Vendor Manual
CNM-1301.00-0237, Transamerica Delaval Inc. Instruction Manual, Vol. 1
CNM-1318.15-0003 001, Residual Heat Removal Motor Data Sheet, dated 3/7/86
CNM-1318.15-0008.001, Residual Heat Removal Pump Motors, Rev. D4
CNM-2201.01-0118.001, Unit 2 Pressurizer Instruction Manual, dated 7/16/97
CNS-1435.00-00-0002, Design Basis Specification for Post Fire Safe Shutdown, Rev. 23
CNS-1465.00-00-0006, Design Basis Specification for Plant Fire Protection, Rev. 22
CNS-1560.SS-00-0001, Design Basis Specification for the Standby Shutdown Facility (SSF), Rev. 29
CNS-1574.RN-00-0001, Design Basis Specification for the Nuclear Service Water System (RN), Rev. 58

CNS-1609.VG-04-0001, Design Basis Specification for the Diesel Engine Starting Air System (VG), Rev. 14
CNS ASME In-Service Testing Program, Rev. 27
CNSD-0149-01, Unit 1 Electrical System Description Pressurizer Heaters System, (ILE), Rev. 4
CNSD-0249-01, Unit 2 Electrical System Description Pressurizer Heaters System, (ILE), Rev. 0
Commitment Change No. 2002-C-005, The intake and pit inspections will be performed on a three-year frequency, dated 12/9/02
Commitment Change No. 2008-C-001, Defer the inspection of RN Pit B from 2EOC15 to 2EOC16, dated 5/7/08
Commitment Change No. 2008-C-003, Continue to perform the quarterly flush of the RN to CA piping and perform the RN to CA flow measurement test every 18 months, dated 11/3/08
Component Health Report – Air Operated Valves (2nd Qtr. of 2012)
Component Health Report – Check Valves (2nd Qtr. of 2012)
Component Health Report – Motor Operated Valves (2nd Qtr. of 2012)
Component Health Report – Residual Heat Removal System (2nd Qtr. of 2012)
Condition Monitoring Report 2CA 0008, CAPT #2 Suction Check
Condition Monitoring Report 2CA 0010, 2B Pump Suction Check
Condition Monitoring Report 2CA 0012, 2A Pump Suction Check
Condition Monitoring Report 2CA 0023, CAPT #2 Pump Miniflow
Condition Monitoring Report 2CA 0028, 2A CA Pump Miniflow
Condition Monitoring Report 2CA 0033, 2B CA Pump Miniflow
Condition Monitoring Report 1FW 0096, ND Pump Suction Pressure Control Check Valve
CNOV26, Simulator Exercise Guide – Steam Generator Tube Rupture, Rev. 26
Data Sheet 2, Case 2 SGTR SG Overfill Scenario, dated 1/6/10
DC-3.12, Cable Ampacity Design Criteria, Rev. 2
EDG Unit 1, System Health Report (2nd Qtr. of 2012)
EDG System Health Report (1st/2nd Qtrs. of 2012)
EDG System Health Report Update, dated 9/6/2012
Engineering Change CD100697, Install a 3/4" Pressure Relieving Bypass Line, dated 7/30/07
Engineering Completion Notice CN-11441/00, MSIV Upgrades, Rev. dated 8/8/06
Engineering Support Document, Starters and Contactors, Rev. 5
Exempt Change Variation Notice CE-1955, Check Valve 1CA 129 is not Required, dated 3/17/89
Generic Letter 89-13, Service Water Problems Affecting Safety-related Equipment, dated 7/18/89
GL 89-10, Safety Related Motor Operated Valve Testing and Surveillance, dated 6/28/89
GL 96-06, Assurance of Equipment Operability and Containment Integrity during Design-Bases Accident Conditions, dated 9/30/96
Hal B. Tucker, Catawba Nuclear Station Units 1 and 2, "10CFR50.63, Requirements for Station Blackout," letter to USNRC, dated 4/17/89
Hal B. Tucker, Catawba Nuclear Station Units 1 and 2, "10CFR50.63, Requirements for Station Blackout," letter to USNRC, dated 4/4/90
IN 92-60, Valve Stem Failure Caused by Embrittlement, dated 8/20/92
Issuance of Amendments Re: Steam Generator Tube Rupture, dated 9/24/04
Maintenance Rule: SSC Summary Sheets for the VG System, dated 8/14/12
OEDB-09-051790, MOV Actuator Cycles in Excess of Their 2,000 Cycle Limit (Clinton NGS)
OP-CN-CP-AD, Standby Shutdown Facility (AD) Lesson Plan, dated 8/17/05
RE-3.02, Relaying - 600 and 480 VAC Auxiliary Systems - Equipment Protection Settings, Rev. 5

Reactor Coolant System Health Report, (2nd Qtr. of 2012)
RIS 2000-05 Evaluation, dated 9/11/91
RN System Health Report (1st/2nd Qtrs. of 2012)
Robert E. Martin, Office of Nuclear Reactor Regulation, "Station Blackout Analysis for Catawba Site", letter to Catawba Nuclear Station, dated 1/10/92
Service Water System Program Manual, Rev. 9
Simulator Exercise Guide – Steam Generator Tube Rupture CNS UFSAR Study, Rev. 26
TT/1/A/9100/029, D/G Start Capability Test with one Tank, dated 3/3/90
Unit 1 EDG-VG list of Corrective and Preventive Maintenance, 2009-2012
Unit 1 ND System Health Report (1st/2nd Qtrs. 2012 and 4th Qtr. 2011)
Unit 1 RN System Health Report (1st/2nd Qtrs. of 2012)
Unit 1 SMP list of Corrective and Preventive Maintenance, 2009-2012
Unit 1 SSF System Health Report (1st/2nd Qtrs. 2012)
Valve Design Parameters CNDS-1571-FW.0002-01, dated 4/9/07
WO0112370201, 1EQC GV A, Remote Relay Contact
WO0175432001, 1EQC GV A, Replace Digital Reference Unit
WO0197131401, 1EQC DE B, R/R Governor Mechanical Actuator
WO0203101801, 2EQC CA DGCPA, Replace EG-A Control Unit
WO0203101804, 2EQC CA DGCPA, Replace EG-A Control Unit
WO0203101807, 2EQC CA DGCPA, Replace EG-A Control Unit
WO0203101808, 2EQC CA DGCPA, Replace EG-A Control Unit
WO02047418, 1BB-65, 1D SG BB Flow Control Valve Leaking By
WO9857918701, 1EQC DE A, R/R Governor Mechanical Actuator
WO9857918705, 1EQC DE A, R/R Governor Mechanical Actuator
WO9857918706, 1EQC DE A, R/R Governor Mechanical Actuator

Modifications

A/R 00399156, 50.59 Screen for EC 106261 – Configuration Management Associated with 2B RN Strainer, Rev. 3
CN-11232, Modify Piping and Instrumentation to Supply Both VG Tanks with a Single Compressor on D/G 1B, dated 12/15/93
CN-11447, Replace Unit 1 Essential Diesel Aux Power System Batteries, dated 3/31/05
CN-50443, Replace RN strainer 1A, 2A, 1B and 2B backwash discharge piping with stainless steel and install flow elements to measure discharge, dated 10/5/94
CNC-1223.59-04-0006, VG Capability, Rev. 5
EC102856, Replace Unit 2 Standby Makeup Pump Discharge Dampener, dated 6/6/12
EC104810, Allow Relocation of Terminal Block in Pressurizer Heater Panel

Problem Investigation Program reports (PIPs)

C-91-00232, PZR failed to depressurize when PZR PORV (2NC-34A) opened with NCS at 100 psig
C-97-03331, Problem Related To The Pressurizer Heaters Was Noted During The SSF DBD Project
C-97-03621, Scenario Exists Where Flow From The CA TDP to two S/Gs Cannot be Stopped
C-98-00188, Time Critical Operator Actions – SGTR
C-99-01452, Time Critical Operating Actions – Establish NV Backup Cooling
C-01-02802, Several MOV Exceeded Their Operating Cycle Limit
C-02-01772, Starters are Maintenance Rule A1 Based on Adverse Trend of the Auxiliary Contacts Failing
C-02-03326, Rotork Controls Inc. Part 21 Notification to Duke Power that identifies a problem with Add-on-Paks

C-04-02668, Rotork Controls Inc. Part 21 Notification to Duke Power that identifies a deficiency with primary switch mechanism
C-05-02259, ND Pressure Trapped in the ND Pump Suction Following Pump Operation
C-05-03368, Dose Analysis may not Account for Effluent Pathways
C-06-00773, NRC Information Notice 2006-03: Motor Starter Failures Due to Mechanical-Interlock Binding
C-06-05810, VA condensing unit fan motor failures
C-07-01343, Problems with Unit 1 and 2 VA condensing unit PM models
C-07-01648, Enhance the Reactor Trip Breaker Procedure to Clearly Depict Vendor Recommendation
C-07-01649, Enhance the Reactor Trip Breaker Procedure to Clearly Track Vendor Manual Recommendation
C-08-05724, Mechanical Equipment Electrical Loads Were Not Included in Diesel Loading Calculation
C-09-03028, Damage to CA Recirculation Piping Could Compromise Minimum Flow
C-09-04390, Check Valves are not Identified as Being within the Scope of Inservice Testing
C-09-04685, Flow diagrams CN 1561-1.0 and CN 2561-1.0 list the wrong stroke time for valves 1ND28A and 2ND28A
C-09-05007, Review of EQCM Reveals that 4160V Switchgear is Located in an EQ Mild Environment
C-09-05020, 1WL848 Failed to Close per PT/1/A/4700/020
C-09-05073, SSF D/G Testing Issue (Load Bank Testing and Power Factor Value)
C-09-06261, On 10/26/09 an air leak was discovered on the copper instrument tubing upstream of 2VGPS5270
C-09-07880, 1B DG Run for Extra Hour While Attempting to Contact Crew
C-10-04173, Unexpected TSAIL entry due to apparent seal failure on 1A RN pump strainer
C-10-04182, Water intrusion in 1A RN strainer gearbox
C-10-04956, CNS needs to evaluate whether cross connecting VG Starting Air Receiver Tanks for maintenance is outside of licensing basis due to single failure criteria
C-10-05452, While Running 1B D/G Governor Oil Dropped Below Black Line on Sight Glass
C-10-05683, Evaluate Need to Declare EMF-33 Non-Functional
C-10-06565, This PIP is being written to evaluate the applicability of McGuire PIP M-10-05299 to Catawba
C-10-07403, While Running 1B D/G Governor Oil Was Observed Below Minimum Level Line
C-11-00050, Wiring Conduit to 1VG71 Discovered Disconnected From Coupling
C-11-00225, Higher than expected amount of gas found in Unit 2 Standby Makeup Pump Suction piping
C-11-00419, YC Chiller A condenser fouling factor coming into Hi-Hi Alarm
C-11-00614, Received OAC “YC Chiller B Condenser Fouling Factor HIHI” Alarm
C-11-01407, 1B D/G exhibited erratic control at full load during 24-hour run
C-11-01496, Woodward Governor Part # 9903-013 is obsolete
C-11-01857, 1A1 VG compressor had abnormal noise while running
C-11-02877, The speed check was recorded to be 458.25 RPM which is below the desired range of 460 to 465 RPM
C-11-04232, Drawing error on CNEE-0251-01.10
C-11-04389, During testing per PT/1/A/4200/005C, valve 1NV-79 did not meet the acceptance criteria
C-11-04773, During Unit 1 Aux Building Rounds, 1B D/G receiver tank 1B1 was discovered to be at 220 psig
C-11-05182, D/G 1B starting air (VG) pressure low
C-11-06970, Water leak from Unit 2 Standby Makeup Pump

C-11-07334, Standby Makeup Pump #1 did not meet the Acceptance Criteria of the Performance Test per PT/1/A/4200/007 C
C-11-07426, Observed packing leakage on Unit 1 standby makeup pump following IWP with the pump suction valve in normal closed alignment
C-11-09319, Water intrusion in SSF battery room
C-12-00319, SNSW Pond and NSW Lake intake inspections performed by divers
C-12-00586, The motor drain plug is missing on the bottom end bracket of all four RN strainer backwash drive motors
C-12-00781, IN12-06 Ineffective Use of Vendor Technical Recommendations
C-12-01741, Engineering to evaluate skipping fludh of RN to YCA TRN WO 02011212
C-12-01789, 2RN-42 (2B RN Strainer Drain) has approximately 5 gpm seat leakage
C-12-02449, RN Pit closeout inspection results
C-12-03462, Suspect leakage past 1ND-36BC-12-04110, Non-QA shear keys installed on 1A, 1B, 2A, and 2B RN strainer backwash drives
C-12-03766, 1B D/G governor failed to control speed/frequency during test
C-12-04173, Scheduled work not performed due to current system alignment
C-12-04350, Water was observed to be leaking from 2A RN pump strainer
C-12-04483, Engineering evaluation of OE35876 – Update to OE35240 EDG Mechanical governor speed setting drift low
C-12-05100, 1EMF-33, Flow Control Valve For The 1D S/G Did Not Appear To Go Fully Closed
C-12-05553, PT/1/A/4200/077 for check valve testing on the 1A2 VG compressor cannot be performed at this time due to both VG tanks being x-tied
C-12-05954, The test frequency change for the EDG Starting Air Tank (VG) Inlet Check Valves
C-12-06111, Engineering evaluation of OE36026
C-12-06618, NRC Bulletin, Design Vulnerability in Electric Power System

Procedures
AP/0/A/5500/045, Plant Fire, Rev. 7
AP/1/A/5500/017, Loss of Control Room, Rev. 55
AP/1/A/5500/021, Loss of Component Cooling, Rev. 42
AP/2/A/5500/017, Loss of Control Room, Rev. 50
EBG/1/5000/E-3, Steam Generator Tube Rupture, Rev. 22
EDM 501, Engineering Change Program for Nuclear Fuel, Rev. 7
EM/1/A/5200/003, Troubleshooting Cause for a Diesel Generator Failing to Start, Rev. 5
EP/1/A/5000/E-3, Steam Generator Tube Rupture, Rev. 41
EP/1/A/5000/ECA-0.0, Loss of All AC Power, Rev. 45
EP/1/A/5000/G-1, Unit 1 Generic Control Room Enclosures – Enclosure 19, Rev. 4
EQMM-1393.01-A01-00, Environmental Qualification Maintenance Manual, Electric Motor Actuator, Rotork, NA1, Rev. 0
EQMM-1393.01-A01-00, Environmental Qualification Maintenance Manual, Electric Motor Actuator, Rotork, NA1, Rev. 8
EQMM-1393.01-A01-02, Environmental Qualification Maintenance Manual, Electric Motor Actuator, Rotork, NA1E, Rev. 5
EQMM-1393.01-A02-00, Environmental Qualification Maintenance Manual, Electric Motor Actuator, Limitorque, SMB/SBD/SB Inside & Outside Containment, Rev. 8
IP/0/A/3112/002, Calibration Procedure for RN System Time Delay Relays and Strainer Pressure Switches, Rev. 34
IP/0/A/4974/0003, Inspection and Maintenance of 5HK Air Circuit Breakers, Rev. 43
IP/1/A/3631/001A, Diesel Generator – 1A Engine Starting Air System (VG), Rev. 6
MP/0/A/7150/032, Nuclear Service Water Strainer Corrective Maintenance, Rev. 19

MP/0/A/7600/149, Anchor Darling/Flowserve Model 1878 Piston Check Valve Corrective Maintenance, Adjustment, and Bench Test, Rev. 9
MP/0/A/7650/002, Lubrication of Station Equipment, Rev. 29
NSD 203, Operability/Functionality, Rev. 24
NSD 204, Operating Experience Program (OEP) Description, Rev. 14
NSD 208, Problem Investigation Program (PIP), Rev. 35
NSD 220, USFAR Revision Process, Rev. 13
NSD 301, Engineering Change Program, Rev. 40
NSD 319, Vendor Technical Information Program, Rev. 3
NSD 408, Testing, Rev. 15
OE 4.2, Performance Improvement Team Work Place Guide lines, Rev. 7
OP/0/A/6400/006C, Nuclear Service Water System, Rev. 272
OP/0/B/6100/013, Standby Shutdown Facility Operation, Rev. 51
OP/0/B/6350/011, Standby Shutdown Facility Operations, Rev. 42
OP/1/A/6100/002, Controlling Procedure For Unit Shutdown, Rev. 175
OP/1/A/6100/004, Shutdown Outside the Control Room from Hot Standby to Cold Shutdown, Rev. 53
OP/1/A/6100/009A, Annunciator Response for 1A D/G Panel, Rev. 27
OP/1/A/6100/010M, Annunciator Response for Panel 1AD-12, Rev. 40
OP/1/A/6100/010J, Annunciator Response For Panel 1AD-9, Rev. 68
OP/1/A/6200/004, Residual Heat Removal System, Rev. 133
OP/1/A/6200/006, Safety Injection System, Rev. 61
OP/1/A/6250/002, Auxiliary Feedwater System, Rev. 145
OP/1/A/6250/006, Main Steam
OP/1/A/6350/002, Diesel Generator Operation, Rev. 153
OP/1/B/6100/010H, Annunciator Response for Panel 1AD-7, Rev. 76
OP/1/B/6100/010X, Annunciator Response for Radiation Monitoring Panel 1RAD-1, Rev. 63
PT/0/A/4450/015, Air Moisture Periodic Test for VG System, Rev. 18
PT/0/A/4450/015C, Air Quality Periodic Test for VG System, Rev. 4
PT/1/A/4200/001N, Reactor Coolant System Pressure Boundary Valve Leak Rate Test, Rev. 55
PT/1/A/4200/002K, Refueling Water Check Valve Backflow/Forward Flow Test, Rev. 3
PT/1/A/4200/005C, Standby Makeup Pump Check Valve Test, Rev. 6
PT/1/A/4200/007C, Standby Makeup Pump #1 Performance Test, Rev. 39
PT/1/A/4200/010A, Residual Heat Removal Pump 1A Performance Test, Rev. 75
PT/1/A/4200/013F, ND Valve In-service Test (CS), Rev. 32
PT/1/A/4200/020, FW Valve Inservice Test (QU), Rev. 36
PT/1/A/4200/023A, NC Valve Inservice Test (CS), Rev. 32
PT/1/A/4200/023B, NC PORV and Air Supply Stroke Test, Rev. 17
PT/1/A/4200/030A, SM Valve Inservice Test (UNK), Rev. 38
PT/1/A/4200/030B, SM Valve Inservice Test (QU), Rev. 36
PT/1/A/4200/031, SV Valve Inservice Test (QU), Rev. 55
PT/1/A/4200/031A, S/G PORV Hot Stroke Test, Rev. 13
PT/1/A/4250/001C, S/G PORV Stroke Test, Rev. 10
PT/1/A/4250/003A, Auxiliary Feedwater Motor Driven Pump 1A Performance Test, Rev. 63
PT/1/A/4350/002 A, CNS Diesel Generator 1A Operability Test, Rev. 124
PT/1/A/4350/015A, CNS Diesel Generator 1A Periodic Test, Rev. 041
PT/1/A/4400/01, ECCS Flow Balance, Rev. 42
PT/2/A/4200/005C, Standby Makeup Pump Check Valve Test, Rev. 5
PT/2/A/4200/007C, Standby Makeup Pump #2 Performance Test, Rev. 22
SM/0/A/8030/001, Relief Valve Set Pressure Testing and Adjustment, Rev. 20

UFSAR
UFSAR Section 5.4.10, Pressurizer
UFSAR Section 5.4.12, Safety and Relief Valves
UFSAR Section 8.3.1, AC Power Systems
UFSAR Section 8.3.1.4.1, Diesel Generators
UFSAR Section 8.3.2.1.2.2, 125VDC Diesel Essential Auxiliary Power System
UFSAR Section 8.4, Station Blackout
UFSAR Section 15.6.3, Steam Generator Tube Failure

PIPs Initiated Due to CDBI Activity
C-12-07025, Source of flow vs. DP for RN strainers not properly referenced in CNC-1223.24-00-0027
C-12-07029, Calculation Referenced in 4.8.12 CNC-1381.06-00-0052 has been superceded by CNC-1381.06-00-0060
C-12-07059, 5HK Breaker Maintenance Procedure Allows Use of Silicon Oil to Lubricate Kirk-Key Interlock Found Not In Accordance With Vendor Requirement
C-12-07074, Hoists Not Properly Stored
C-12-07109, Incorrect ND Pump Motor Horsepower Evaluated in Safety-Related Voltage Analysis
C-12-07112, ND Pump Motor Power Factor and Efficiency Not Consistent with Motor Vendor Data
C-12-07116, Possible leak noticed by NRC inspector while on walkdown for SMP during CDBI inspection
C-12-07121, EQ MOVs Exceeding Operating Limit
C-12-07276, Standby makeup pump error analysis and acceptance criteria
C-12-07392, NRC inspectors noticed water intrusion into the SSF battery room
C-12-07417, RN strainer motor lubrication discrepancies
C-12-07444, Over-frequency effect on ND pump horsepower
C-12-07454, NRC CDBI team is questioning CNS Practice of Crediting Pressurizer PORV strokes
C-12-07466, Allowance for variations in SSF D/G frequency in the SMP test acceptance criteria
C-12-07717, Question from NRC related to testing of the standby makeup pump check valves
C-12-07754, Calc is Using an Incorrect PM Frequency for ND Pump Motor Bearings
C-12-07757, Calculation CNC-1223.03-00-0032 Has Erroneous Statement
C-12-07792, Wrong Revision for ESP Document Was Used for Monitoring and Trending Motor Starter Contacts
C-12-07804, Maintenance Rule Run-to-Failure Evaluation for Starter Contacts for MOVs on PIP C-02-01172 Did Not Include Three Components from SAGG Calculation File No. 744, Revision 1