UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

July 19, 2007

Southern Nuclear Operating Company, Inc.
ATTN: Mr. T. E. Tynan
Vice President - Vogtle
Vogtle Electric Generating Plant
7821 River Road
Waynesboro, GA 30830

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT- NRC COMPONENT DESIGN BASIS INSPECTION REPORT 05000424/2007006, 05000425/2007006

Dear Mr. Tynan:

On May 25, 2007, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Vogtle Electric Generating Plant Units 1 and 2. The enclosed inspection report documents the inspection findings which were discussed with you on May 25, 2007, and on June 4, 2007, with Mr. J. Williams 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 license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, the inspectors identified two findings of very low safety significance (Green). These two findings were determined to involve violations of NRC requirements. However, because of their very low safety significance and because they are entered into your corrective action program, the NRC is treating these violations as non-cited violations consistent with Section VI.A.1 of the NRC's Enforcement Policy. If you contest any of these non-cited violations you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the 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 Vogtle.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Loyd M. Cain, Acting Chief
Engineering Branch 1
Division of Reactor Safety

Docket Nos.: 50-424, 40-425
License Nos.: NPF-68, NPF-81

Enclosure: NRC Inspection Report 05000424/2007006, 05000425/2007006
w/Attachment: Supplemental Information

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Sincerely,

/RA/

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Docket Nos.: 50-424, 40-425
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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-424, 50-425
License Nos.:	NPF-68, NPF-81
Report Nos.:	05000424/2007006, 05000425/2007006
Licensee:	Southern Nuclear Operating Company
Facility:	Vogtle Electric Generating Plant, Units 1 and 2
Location:	Waynesboro, GA 30830
Dates:	April 23 - May 25, 2007
Inspectors:	R. Berryman, P.E., Senior Reactor Inspector (Lead) S. Rose, Senior Reactor Inspector D. Mas-Penaranda, Reactor Inspector M. Shlyamberg, Contractor J. Chiloyan, Contractor
Accompanying personnel:	A. Issa, P.E., Reactor Inspector (trainee)
Approved by:	Loyd M. Cain, Acting Chief Engineering Branch 1 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000424/2007006, 05000425/2007006; 4/23/2007 - 4/27/2007, 5/7/2007 - 5/11/2007, 5/21/2007 - 5/25/2007; Vogtle Electric Generating Plant Units 1 and 2; Component Design Bases Inspection.

This inspection was conducted by a team of three NRC inspectors and two NRC contractors. Two Green non-cited violations were identified during this inspection. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a violation of 10 CFR 50, Appendix B, Criterion XI, Test Control, for failure to implement a test program to assure that all installed safety related molded case circuit breakers (MCCBs) will perform satisfactorily in service. Under postulated electrical fault conditions, failure of one of these circuit breakers to operate properly would lead to either a loss of power to safety-related components or lead to a potential for compromising other equipment on a single fault that the MCCB was designed to isolate. The 1A, 1B, 2A, and 2B motor driven auxiliary feedwater pump (MDAFWP) recirculation valve motor operators and the MDAFWP room cooler fans for both trains at both units receive their power through MCCBs.

  This finding is more than minor because it is associated with the Mitigating Systems Cornerstone attribute of Procedure Quality. It impacts the cornerstone objective of ensuring the availability, reliability, and operability of the MDAFW pumps to perform their intended safety function during a design basis event. The inspectors assessed the finding using the SDP and determined the finding was of very low safety significance (Green) because the inspectors found no documented history of in-service failures of MCCBs rendering safety-related equipment inoperative. This issue is documented in the corrective action program as condition report (CR) 2007105855. (Section 1R21.2.9)

- Green. The inspectors identified a violation of 10 CFR 50, Appendix B, Criterion III, Design Control, for failure to evaluate the impact of an increase of the residual heat removal (RHR) system pressure during the RHR pump operation in a minimum flow alignment in determining the maximum dP across the containment emergency sump isolation valves 1/2-HV-8811A/B, which could have challenged the capability of these motor operated valves (MOVs) to open following a small break loss of coolant accident (SBLOCA). Maximum system pressure would occur following a SBLOCA.

This finding is more than minor because it is associated with the Mitigating Systems Cornerstone attribute of Design Control. It impacts the cornerstone objective of ensuring the availability, reliability, and operability of the containment emergency sump isolation valves to perform their safety function during a SBLOCA event. The calculation deficiencies represented reasonable doubt regarding the operability of MOVs 1/2-HV-8811A/B pending the outcome of additional calculations initiated after the inspectors questioned the condition. The lack of an accurately calculated maximum dP across these MOVs created the possibility for repairs or modifications to be performed while using an incorrect dP value as a design input. The inspectors assessed the finding using the SDP and determined the finding was of very low safety significance (Green) because there was not a loss of safety system function based upon the inspector's verification of the SNC analysis that the containment emergency sump isolation valves 1/2-HV-8811A/B were currently operable. This issue is documented in the corrective action program as CR 2007100247 and CR 2007105848. (Section 1R21.2.17)

B. Licensee-Identified Violations

None

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Mitigating Systems and Barrier Integrity

1R21 Component Design Bases Inspection (71111.21)

.1 Inspection Sample Selection Process

The inspectors 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 two or Birnbaum value greater than 1 X10E-6. The components selected were located within the auxiliary feedwater (AFW) system, nuclear service cooling water system (NSCW), emergency diesel generator (EDG), 480 VAC electrical system, 4160 VAC electrical system, 125 VDC electrical system, and the offsite power system. The sample selection included 19 components, five operator actions, and six operating experience items. Additionally, the inspectors reviewed two modifications by performing activities identified in IP 71111.17, "Permanent Plant Modifications," Section 02.02.a. and IP 71111.02, "Evaluations of Changes, Tests, or Experiments."

The inspectors performed a margin assessment and detailed review of the selected risk-significant components to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design issues, margin reductions due to modification, or margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as failed performance test results, significant corrective action, repeated maintenance, maintenance rule (a)1 status, 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 are included in the following sections of the report.

.2 Results of Detailed Reviews

.2.1 Plant Wilson

a. Inspection Scope

The inspectors reviewed design basis documentation, electrical one line diagrams, and the Updated Final Safety Analysis Report (UFSAR) to identify the design and licensing basis requirements for the Plant Wilson power generation and transmission facilities to supply offsite power to Vogtle Units 1 and 2 engineered safety features (ESF) loads when one of the reserve auxiliary transformers (RATs) was taken out of service for maintenance. The review focused on evaluating the capability of the 13.8 KV distribution cable, the distribution substation switchyard equipment, the black-start diesel generator, the combustion turbines, and associated auxiliaries. The inspectors reviewed station blackout (SBO) operating procedures, station drawings, system description documents, equipment specifications, short circuit and voltage profile calculations, and protective relay settings to determine the individual system and component operating requirements to supply offsite power to the standby auxiliary transformer (SAT). The inspectors also reviewed circuit breaker, battery, and relay maintenance and calibration test results to verify that the functional test results satisfied the design basis performance requirements. Completed surveillance test results were also reviewed to verify the capability of the Plant Wilson to supply offsite power to the plant through the SAT during SBO events. The inspectors interviewed system engineers and control room operators to verify that the equipment configuration was consistent with station drawings and to verify that the protocols between the control room operators, Plant Wilson operators, and the transmission system operators were consistent with the operating procedures. Field walkdowns were conducted of the Plant Wilson combustion turbines, associated battery and control rooms, the black-start diesel generator and associated battery and control rooms, switchyard equipment including the 13.8 KV distribution cable terminations, and the associated control house to observe general material conditions. A field walkdown of the Vogtle 13.8 KV/4160 VAC switch yard was also performed to observe the material condition of the 13.8 KV cable terminations.

b. Findings

No findings of significance were identified.

.2.2 Standby Auxiliary Transformer - ANXRA

a. Inspection Scope

The inspectors reviewed drawings, design basis documents and the UFSAR to identify the design and licensing basis requirements for the standby auxiliary transformer (SAT). The inspectors reviewed vendor specifications, nameplate data, one-line diagrams, protective relay settings, short circuit and voltage drop calculations, and ESF loading requirements to evaluate the capability of the SAT to supply the voltage and current requirements to one train of ESF loads. The inspectors performed independent

transformer protective relay trip setpoint calculations to verify that the applied protective relay setting calculations had adequately accommodated for the transformer being energized, through-faults, and maximum loading conditions. The relay settings review included the transformer overall differentials, phase and ground over-currents, and distance relays associated with the 13.8 KV distribution cable from Plant Wilson. The inspectors also reviewed the rating of the transformer neutral grounding resistor to verify that it was adequate. The inspectors reviewed the results of completed transformer preventive maintenance and relay setpoint calibrations to verify that the test results were within their allowed limits. The inspectors performed a visual inspection of the observable portions of the SAT and the associated neutral grounding resistor bank to assess material condition.

b. Findings

No findings of significance were identified.

.2.3 Reserve Auxiliary Transformers – 1NXRA and 1NXRB

a. Inspection Scope

The inspectors reviewed the design basis descriptions, equipment specifications, drawings, equipment name plate data, voltage drop calculations, and short circuit and load flow calculations to determine if the voltage and current requirements of the ESF loads could be powered by Reserve Auxiliary Transformers (RATs) 1NXRA and 1NXRB. The review was also conducted to verify that circuit switchers 1IM1A and 1IM1B, low voltage side feeder cables, and circuit breakers 1AA02 and 1BA03 were adequately sized. Protective relay trip setting calculations were reviewed to verify whether adequate protection coordination margins were provided. The relay settings review included the transformer overall differentials and the ground overcurrent relays. The inspectors also reviewed the ratings of the transformer neutral grounding resistors and verified that the ground relay trip settings were coordinated with the offsite 230KV transmission system relay schemes to prevent inadvertent tripping of circuit breakers or circuit switchers. The inspectors reviewed the results of completed transformer preventive maintenance and relay calibrations to verify that the test results were satisfactory. The loss of voltage and degraded voltage relay settings were also reviewed to verify that they satisfied the requirements of Technical Specifications (TS) 3.8.1. Records of 230KV and 4160V system voltage profiles were reviewed to verify that they were consistent with the design basis assumptions. The inspectors performed a visual inspection of the observable portions of Unit 1 RATs and the associated neutral grounding resistors to assess the installation configuration and material condition. The inspectors also performed walkdowns of the 4160 V switchgear 1AA02 and 1BA03 to verify that the installed local and remote circuit breaker control switches, breaker position indicating lights, and the operator actions for the resetting of the lockout relays were consistent with design drawings.

b. Findings

No findings of significance were identified.

.2.4 Emergency Diesel Generators – DG1A & DG1B (Electrical)

a. Inspection Scope

The inspectors reviewed drawings, design basis descriptions and the UFSAR to identify the design and licensing basis requirements for the EDGs. The inspectors reviewed the EDG loading calculations including voltage, frequency, current, and loading sequences during postulated loss of offsite power and loss of coolant accidents to verify the capability of the EDGs to perform their intended safety function. Short circuit calculations were reviewed to ensure that the ratings of the generator output breakers were adequate. The inspectors also performed independent calculations of available phase and ground short circuit currents to ensure that the maximum system short circuit duty was within equipment rating. Protective relay setpoint calculations and setpoint calibration test results were reviewed to assess the adequacy of protection during testing and emergency operations and to ensure that excessive setpoint drift had not taken place. The generator grounding scheme was also reviewed to determine the adequacy of ground overcurrent relay coordination. The electrical drawings and calculations that describe the generator output breaker control logic and interlocks were reviewed to determine whether the breaker opening and closing control circuits were consistent with design basis documents. The inspectors also reviewed surveillance test results to verify that applicable test acceptance criteria and test frequency requirements for the EDGs were satisfied. The inspectors conducted a field walkdown of the electrical relay cabinets, output breaker control switches and breaker position indicating lights to assess material conditions and to verify that the installed configuration was consistent with system drawings. The inspectors also visited the control room to observe meter readings, switch positions, indicating lights and annunciator alarm panels associated with the 1A and 1B EDG to verify that they were consistent with design basis documents and operating procedures. The inspectors also interviewed system engineers regarding design aspects and operating history for the EDGs.

b. Findings

No findings of significance were identified.

.2.5 4160/480 V Load Center Transformer - 1AB05X

a. Inspection Scope

The inspectors reviewed calculations, design basis descriptions, and drawings to verify that the loading of 4160/480 V transformer 1AB05X, 4160 V breaker 1AA0221 and 480 V breaker 1AB0501 was within the corresponding transformer and switchgear ratings. The inspectors reviewed design assumptions and calculations related to short circuit currents, voltage drop and protective relay settings associated with transformer 1AB05X

and the feeder cables to verify that they were appropriate. The inspectors reviewed operating procedures and design drawings to assess the adequacy of the ground detection design of 480 V switchgear 1AB05 and to verify that the grounding equipment ratings would not challenge the control room operator response time to ground alarms. The inspectors reviewed a sample of completed maintenance and functional verification testing results to verify that the high and low voltage cable feeders associated with transformer 1AB05X were capable of supplying the power requirement of the 480 V bus 1AB05 during normal and postulated accident conditions. The inspectors performed a sample of independent short circuit and voltage drop calculations to verify that the values stated in design bases documents were appropriate. The inspectors reviewed system health reports, interviewed system engineers, and conducted a field walkdown of load center transformer 1AB05X, 4160 V circuit breaker 1AA0221, and 480 V circuit breaker 1AB0501 to verify that equipment alignment and nameplate data was consistent with design drawings and to assess the material condition of 1AB05X.

b. Findings

No findings of significance were identified.

.2.6 125 VDC Battery - 1CD1B and Output Breaker - 1CD101

a. Inspection Scope

The inspectors reviewed design calculations, system drawings, the UFSAR and TS requirements for battery 1CD1B to verify that the battery size would satisfy the functional and design basis requirements. These requirements included the safety related and risk significant loads and the worst case minimum voltage. The review also focused on verifying that the battery was adequately sized to supply the design duty cycle of the 125 VDC system for a loss of coolant accident (LOCA) concurrent with a loss of offsite power (LOOP) and SBO scenarios. The battery charger sizing calculation was reviewed to verify whether it was consistent with the design and licensing bases. The inspectors reviewed the short circuit duty and breaker trip settings calculations to verify the calculated fault interrupting duties were within the interrupting current rating of battery output breaker 1CD101 and that adequate protection coordination was provided. The inspectors reviewed completed maintenance and trip setting test results on breaker 1CD101 to verify that the results were within acceptable limits. The inspectors reviewed completed battery capacity test results with particular focus on the applied methodology and acceptance criteria for battery capacity testing and whether the test was terminated only after the battery terminal voltage reached the minimum voltage as specified in IEEE 450-1995, Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications. The inspectors interviewed system and design engineers regarding design aspects and operating history and reviewed a sample of condition reports to verify that material deficiencies were adequately addressed. The inspectors performed a walkdown to evaluate the material condition of the battery and battery chargers.

b. Findings

No findings of significance were identified.

.2.7 125 VDC Switchgear Bus - 1CD1

a. Inspection Scope

The inspectors reviewed drawings, system descriptions, nameplate data, circuit beaker ratings, short circuit and voltage drop calculations to determine the capability of 125 VDC bus 1CD1 to supply required voltage and current. The inspectors reviewed a sample of completed preventive maintenance testing results to verify that the test results were within the allowed limits. The inspectors interviewed system engineers and performed a visual inspection of the observable portions of 125 VDC bus 1CD1 to verify that the installed configuration and instrument readings were consistent with design drawings and procedures. A walkdown was also performed to evaluate the observable material condition.

b. Findings

No findings of significance were identified.

.2.8 125 VDC Motor Control Center - CD1M

a. Inspection Scope

The inspectors reviewed system descriptions, drawings, circuit breaker nameplate data, and calculations of short circuit and voltage drop to verify that 125 VDC MCC CD1M could supply the voltage and current requirements of the safety related loads. The inspectors reviewed a sample of completed preventive maintenance testing results to verify that the test results were within the allowed limits. The inspectors interviewed system engineers to review performance history and conducted a visual inspection of MCC CD1M to verify that the installed configuration was consistent with design drawings and to observe the material condition.

b. Findings

No findings of significance were identified.

.2.9 480 VAC Motor Control Center - 1ABF

a. Inspection Scope

The inspectors reviewed schematic diagrams and associated calculations to verify that bus current, voltage, short circuit capability, and breaker coordination were adequate. The review included verification that the voltage calculations would support equipment operation under worst case conditions, that calculated bus loading did not exceed bus

ratings, and that calculated short circuit conditions did not exist which could exceed the switchgear or circuit breaker ratings. The history of corrective actions and maintenance was reviewed to assess the potential for component degradation and any corresponding impact on design margins or performance. Field walkdowns were also performed to determine the material condition of the switchgear

b. Findings

Introduction. The inspectors identified a finding of very low safety significance involving a violation of 10 CFR 50, Appendix B, Criterion XI, Test Control, for failure to implement a test program to assure that all installed safety related MCCBs will perform satisfactorily in service. Under postulated electrical fault conditions, failure of one of these circuit breakers to operate properly would lead to either a loss of power to safety-related components or lead to a potential for compromising other equipment on a single fault that the MCCB was designed to isolate.

Description. During a walkdown of MCC 1ABF in the 1A EDG building, the inspectors observed rust areas on MCC cubicle doors as well as on and around the operating mechanism of several installed MCCBs. This created questions regarding potential adverse effects that this would have on breaker functional performance and its effect on the electrical fault interrupting capability and assurance of electrical protection coordination. The inspectors reviewed several CRs concerning circuit breakers installed in MCC 1ABF. Two CRs were generated concerning MCCBs which were removed from MCC 1ABF for current trip setpoint changes. In both of these instances, following the trip setting change, the MCCBs failed the post modification functional verification tests and were discarded because the current trip setpoints could not be adjusted. During the walkdown, the inspectors also observed that MCCs 1ABF,1BBF, 2ABF and 2BBF were located in close proximity to a source of outdoor moisture from large dampers located within a few feet of the MCCs. The inspectors determined, based on the history of MCCB failures throughout the industry, that the lack of performance of periodic maintenance and functional verification tests on safety-related MCCBs in a moisture-prone environment subjected these MCCBs to a potentially increased vulnerability to fail to isolate faulted equipment, cause loss of protection coordination, and the potential loss of power to all loads powered from the affected MCC.

The 1A, 1B, 2A, and 2B motor driven auxiliary feedwater pump (MDAFWP) recirculation valve motor operators and the MDAFWP room cooler fans for both trains at both units are powered from MCCs 1ABF, 1BBF, 2ABF, and 2BBF respectively. The MDAFWP recirculation valves are required to be operable to protect the MDAFWP from damage during low flow conditions. The MDAFWP room cooler fans are required to be operable to ensure adequate cooling to the pumps.

Analysis. Southern Nuclear Operating Company's (SNC's) failure to perform periodic maintenance and functional verification tests on MCCBs used in safety-related applications on MCCs 1ABF, 1BBF, 2ABF, and 2BBF was a performance deficiency. This finding is more than minor because it is associated with the Mitigating Systems

Cornerstone attribute of Procedure Quality. It impacts the cornerstone objective of ensuring the availability, reliability, and operability of the MDAFW pumps to perform their intended safety function during a design basis event. The inspectors assessed the finding using the SDP and determined the finding was of very low safety significance (Green) because the inspectors found no documented history of in-service failures of MCCBs rendering safety-related equipment inoperative. This finding was reviewed for cross-cutting aspects and none were identified.

Enforcement. 10 CFR 50, Appendix B, Criterion XI, Test Control stated, in part, that test programs shall be established to assure that all testing required to demonstrate that structures, systems and components will perform satisfactorily in services. UFSAR Section 8.1.4.3 C stated that the onsite electrical system was designed in accordance with IEEE 308-1974, Criteria for Class IE Power Systems at Nuclear Generating Stations. This standard recommended periodic tests be performed at scheduled intervals to detect deterioration of equipment and to demonstrate operability of the components that are not exercised during normal operation. Contrary to the above, SNC did not establish adequate test control measures to assure that the protective function of the 480 VAC safety-related MCCBs are periodically verified. This condition has existed since plant initial operation. Because this finding is of very low safety significance and was entered into SNC's corrective action program as CRs 2007105855, this violation is being treated as a non-cited violation (NCV), consistent with Section VI.A.1 of the NRC Enforcement Policy. (NCV 05000424, 05000425/2007006-01, Safety-Related 480 VAC Molded Case Circuit Breakers On MCC 1ABF, 1BBF, 2ABF, and 2BBF Not Tested)

.2.10 NSCW Return Water Valves - 1668A, 1669A and High Temperature Switches

a. Inspection Scope

The inspectors reviewed the MOV calculations for the NSCW return water valves to verify that appropriate design basis event conditions and degraded voltage conditions were used as inputs into the determination of MOV actuator setpoints and actuator sizing. Test results were reviewed to verify valve performance was monitored and that performance degradation could be identified in a timely manner. The inspectors also reviewed the elementary and schematic diagrams of the temperature switches associated with the MOVs to verify that the circuitry satisfied the logic presented in the design basis documentation. The instrument loop uncertainty calculations for the temperature switches were reviewed to verify that plant instrument calibration procedures properly incorporated the set point values delineated in the calculations of record. The inspectors reviewed surveillance procedures and calibration test records for the temperature switches to assess any adverse trends in instrument performance.

b. Findings

No findings of significance were identified.

.2.11 120 VAC Instrument Panel - 1AY2A

a. Inspection Scope

The inspectors reviewed schematic diagrams, design calculations, and vendor specifications of connected loads to verify that panel loading limits, voltage adequacy, short circuit capability, and protection coordination would support satisfactory operation of connected loads. The review included verifying that AC voltage calculations assured satisfactory voltage to the panel under worst case conditions, verifying that panel loading did not exceed the panel rating, and reviewing short circuit calculations to verify that a condition did not exist which could exceed the instrument panel and breaker ratings. The inspectors also reviewed transformer loading calculations and schematic diagrams to verify that the protection scheme would allow manual transfer to regulating transformers and that the regulating transformers could carry the panel loads in the event of the loss of the inverter. A field walkdown was also performed to determine the material condition of the panel.

b. Findings

No findings of significance were identified.

.2.12 Sequencer 48 VDC Power Supply and Input/Output devices

a. Inspection Scope

The inspectors reviewed calculations to verify that the input voltage to the sequencer under degraded voltage conditions would satisfy vendor recommendations. The inspectors reviewed service and performance testing, preventive maintenance procedures, and elementary diagrams for the sequencer. The review was performed in order to verify that the specified acceptance criteria were met and that the equipment capabilities were consistent with the licensing and design bases. The inspectors reviewed uncertainty and setpoint calculations to verify that setpoint values were consistent with TS requirements. A field walkdown was also performed to determine the material condition of the components.

b. Findings

No findings of significance were identified.

.2.13 120/240 VAC Panel - 1AYB1

a. Inspection Scope

The inspectors reviewed schematic diagrams and design calculations to verify that panel loading limits, voltage, short circuit capability, and protection coordination were adequate. The review included verifying that AC voltage calculations would assure adequate voltage to the panel under worst case conditions, verifying that panel loading

did not exceed panel rating, and reviewing short circuit calculations to verify that a condition did not exist which could exceed the instrument panel or circuit breaker. The inspectors reviewed vendor recommendations, maintenance records, CRs, environmental qualification records, and a selected sample of work orders related to the panel. A field walkdown was also performed to determine the material condition of the panel.

b. Findings

No findings of significance were identified.

.2.14 EDG 1A/1B/2A/2B Building Ventilation

a. Inspection Scope

The inspectors reviewed the design basis information and supporting calculations related to heat removal requirements for the diesel generator building ventilation and combustion air supply.

b. Findings

No findings of significance were identified.

.2.15 Diesel Generator Fuel Oil Transfer Pumps - 1/2-2403-P4-001/2

a. Inspection Scope

The inspectors reviewed the design basis documentation to identify design requirements related to flow, developed head, net positive suction head (NPSH), vortex formation, minimum flow and runout protection for all operating conditions. The flow assumptions in the UFSAR accident analysis were verified. Design calculations were reviewed to verify that the design and licensing performance requirements were satisfied. Calculations were reviewed to verify that available NPSH and measures taken to prevent vortexing when the pumps are operating at a minimum diesel fuel storage tank level were adequate.

b. Findings

No findings of significance were identified.

.2.16 NSCW Return Water Valves - 1/2-HV-1668A/B and 1/2-HV-1669A/B

a. Inspection Scope

The inspectors reviewed MOV calculations to verify that the design bases, system conditions, and allowable degraded voltage conditions were used as design inputs to determine adequate motor size for the actuators and establish set point values.

Additionally, the translation of design information into MOV testing acceptance criteria was reviewed. MOV calculations and related testing documentation were reviewed to assure that valve performance criteria allowed for anticipated maximum operating pressure conditions and that appropriate torque switch settings were maintained. Maintenance documentation was reviewed to determine that MOVs were periodically tested and inspected to ensure that the design function was maintained.

b. Findings

No findings of significance were identified.

.2.17 Containment Emergency Sump Isolation Valves - 1/2-HV-8811A/B

a. Inspection Scope

The inspectors reviewed the calculations that analyzed the maximum differential pressure (dP) across the containment emergency sump isolation valves that could still support adequate MOV operation. This review identified that the containment sump suction isolation valves, MOV 1/2-HV-8811A/B, were sized to open against a dP of 57 psid. The 57 psid value was postulated for post large break loss of coolant accident (LBLOCA) conditions.

b. Findings

Introduction: The inspectors identified a violation of 10 CFR 50, Appendix B, Criterion III, Design Control, for failure to evaluate the impact of an increase in the residual heat removal (RHR) system pressure during RHR pump operation in minimum flow alignment to determine the maximum differential pressure (dP) across containment emergency sump isolation valves 1/2-HV-8811A/B, which could have challenged the capability of these motor operated valves (MOVs) to open following a small break loss of coolant accident (SBLOCA). However, maximum system pressure would occur following a SBLOCA.

Description: During the review of calculation X4C1000U01, Differential Pressure Calculations, Rev. 15, the inspectors found that the containment emergency sump isolation valves were sized to open against a dP of 57 psid. The inspectors reviewed the plant computer data of the last RHR pump surveillance test using procedure 14805-2, Residual Heat Removal and Check Valve IST and Response Time Tests, Rev. 31. The inspectors found that following a unit 2 RHR pump A train test on May 6, 2007, the RHR system remained pressurized at a pressure of approximately 293 psig until pressure was reduced to refueling water storage tank static pressure by bleeding off the system in accordance with the step 5.1.22 of the test procedure.

The RHR pump test flow path was identical to what would occur following a Safety Injection (SI) signal starting the RHR pumps during a SBLOCA with the pump operating in a minimum flow alignment. Emergency operating procedure (EOP) 19000-C, E-0 Reactor Trip or Safety Injection, Rev. 32, directs operators to stop the RHR pumps if the

reactor coolant system (RCS) pressure is greater than 300 psig since the RHR pumps would be operating at or near shutoff head and recirculating in a minimum flow alignment. The EOP 19013-C, ES-1.3, Transfer To Cold Leg Recirculation, Rev. 26 directs the operators to open the containment emergency sump isolation valves 1/2-HV-8811A/B to transfer the RHR pump line up from injecting water into the RCS from the RWST to recirculation cooling by taking a suction from the containment sump and injecting this water into the suction of the SI pumps or directly into the RCS. Since the dP across MOVs 1/2-HV-8811A/B would be significantly greater than that determined in calculation X4C1000U01, the valves may not open, thus potentially disabling the ability to take a suction from the containment sump. Plant EOPs do not direct operators to bleed off pressure from the RHR system following the securing of the RHR pumps during accident conditions.

The licensee initiated condition reports CR 2007100247 and CR 2007105848 to address the questions raised by the inspectors. The licensee conducted an operability evaluation documented in DOEJ-SM-C070401401-001, Maximum Opening Differential Pressure for the Vogtle RHR Sump Valves (1/2HV8811A & B) at Steady State Voltage of 88.5%, dated May 22, 2007, that demonstrated that the maximum available thrust during postulated worst-case degraded voltage conditions would allow these valves to open against a dP of 379 psid.

Analysis: Southern Nuclear Operating Company's failure to include the effect of RHR operation at minimum flow in determining the maximum dP across the containment emergency sump isolation valves 1/2-HV-8811A/B was a performance deficiency. This finding is more than minor because it is associated with the Mitigating Systems Cornerstone attribute of Design Control. It impacts the cornerstone objective of ensuring the availability, reliability, and operability of the containment emergency sump isolation valves to perform their safety function during a SBLOCA event. The calculation deficiencies represented reasonable doubt regarding the operability of MOVs 1/2-HV-8811A/B. Additional calculations, initiated after the inspectors questioned the condition, confirmed that the valves were able to perform their safety function at the higher dP. The lack of an accurately calculated maximum dP across these MOVs created the possibility for repairs or modifications to be performed while using an incorrect dP value as a design input. The inspectors assessed the finding using the SDP and determined the finding was of very low safety significance (Green) because there was not a loss of safety system function based upon the inspector's verification of the SNC analysis that the containment emergency sump isolation valves 1/2-HV-8811A/B were currently operable. This finding was reviewed for cross-cutting aspects and none were identified.

Enforcement: 10 CFR 50, Appendix B, Criterion III, Design Control, states, in part, that design control measures be established and implemented to assure that applicable regulatory requirements and the design basis for structures, systems, and components are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, SNC did not include the effects of RHR operation at minimum flow in determining the maximum dP across the containment emergency sump isolation valves 1/2-HV-8811A/B. Because this finding is of very low safety significance and was

entered into SNC's corrective action program as CR 2007100247 and CR 2007105848, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. (NCV 05000424, 05000425/2007006-02, Maximum Differential Pressure for Containment Emergency Sump Isolation Valves Not Calculated)

.2.18 Turbine Driven Auxiliary Feedwater (TDAFW) Pumps - 1/2-1302-P4-001 and Motor Driven Auxiliary Feedwater (MDAFW) Pumps - 1/2-1302-P4-002/003

a. Inspection Scope

The inspectors reviewed design calculations and completed pump surveillance tests from March 2005 through April 2007 to assess the adequacy of American Society of Mechanical Engineers (ASME) Section XI testing for the TDAFW pumps and MDAFW pumps and to ensure compliance with TS SR 3.7.5.2. TS SR 3.7.5.2 requires a demonstration that the TDAFW and MDAFW pumps develop head at the flow test point greater than or equal to required developed head every 31 days on a staggered basis.

b. Findings

Introduction. The inspectors identified an unresolved item (URI) for failure to evaluate the effects of instrument accuracy, water temperature, or pump speed on surveillance testing of TDAFWP 1/2-1302-P4-001 and MDAFWPs 1/2-1302-P4-002/003 in accordance with TS Surveillance Requirement (SR) 3.7.5.2.

Description. The inspector's review of design calculation X4C1302S12, Auxiliary Feedwater Pump Discharge Line Orifice Sizing, Rev. 1 and calculation X4C1302V04, Auxiliary Feedwater Pumps Technical Specifications Verification, Rev. 5 identified the following concerns:

- The results of calculation X4C1302S12 were not incorporated into calculation X4C1302V04. Specifically, the resistance values for orifices currently installed in the system were not used in the calculation to determine if the system could satisfy the intended safety function by providing above the total minimum flow of 510 gpm. The inspectors determined that the failure to incorporate the results of calculation X4C1302S12 into calculation X4C1302V04 resulted in non-conservative acceptance criteria for the MDAFW pumps.

- The acceptance criterion for the TDAFW pumps was not based on a fluid specific gravity of 1.0. A lower value was used based on an assumed condensate storage tank (CST) temperature of 100 degrees F. This is a non-conservative assumption since the actual CST temperature was lower than this value on every test conducted over the last two years.

- The acceptance criteria for both TDAFW and MDAFW pumps did not include any allowances for instrument uncertainties.

The inspectors's review of 20 completed pump surveillances 14810-1, TDAFW Pump Operability, Response Time and Check Valve IST, Rev. 36.2 and 14810-2, TDAFW Pump Operability, Response Time and Check Valve IST, Rev. 30.2 from March 2005 through April 2007 identified the following concerns:

- The results of the TDAFW surveillances were not corrected for an assumed CST temperature of 100 degrees F.

- The test results were not normalized to a required speed of 4230 rpm. The Terry turbine speed was changed from 4200 to 4230 rpm by a plant change MDD-91-V1M016, Auxiliary Feedwater Rated Speed Change, April 4, 1991 to increase the TS margin. The inspector's review identified that five surveillance tests had recorded the as-found turbine speed to be 4200 rpm. The licensee generated CR 2007105895 on May 23, 2007 to address this issue.

- The test results were not corrected for the applicable instrument error. The licensee generated a documentation of engineering judgment (DOEJ) DOEJ-SJ-C070401401-001, Channel Uncertainty – AFW Pump Suction and Discharge Pressures – P-5110, P-5107, dated May 7, 2007, which demonstrated that the combined instrument uncertainty for both suction and discharge gauges is 28.6 psig, when using information from the plant computer. The licensee also evaluated the effects of the temperature correction and concluded that the recent TDAFWP test results when corrected for both instrument uncertainty and temperature met the acceptance criterion. The licensee generated CR 2007105436 and CR 2007105713 to address the inspector's concerns.

The inspector's review of completed pump surveillances 14807-1, Motor Driven Auxiliary Feedwater Pump and Check Valve In-Service and Response Time Test, Rev. 29.2 and 14807-2, Motor Driven Auxiliary Feedwater Pump and Check Valve In-Service and Response Time Test, Rev. 24.1 from March 2005 through April 2007 identified that similar to the TDAFW pumps, the test results for the MDAFW pumps were not corrected for the instrument error.

Analysis. The inspectors determined that SNC's failure to consider the effects of instrument accuracy, water temperature, or pump speed during surveillance testing of TDAFW pumps 1/2-1302-P4-001 and MDAFW pumps 1/2-1302-P4-002/003 to ensure compliance with TS SR 3.7.5.2 is a performance deficiency. This URI is more than minor because it is associated with the Mitigating Systems Cornerstone attribute of Procedure Quality. It impacts the cornerstone objective of ensuring the availability, reliability, and operability of the MDAFWPs and TDAFWPs to perform their safety function. The inspectors could not make a determination of impact on operability of the AFW pumps due to questions concerning the validity of the system curves and pump curves identified in Section 1R21.2.19.

Enforcement. This URI was entered into the licensee's corrective action program as CR 2007105436, CR 2007105713, CR 2007105870, and CR 2007105895 with actions to evaluate the ability of the AFW pumps to meet the TS SR 3.7.5.2. This issue is

identified as URI 05000424, 05000425/2007006-04, Ability to Satisfy TS SR 3.7.5.2. This item is unresolved pending an NRC review of the effects of instrument uncertainties, water temperature, and pump performance in the evaluation of results of surveillance testing of TDAFW pumps 1/2-1302-P4-001 and MDAFW pumps 1/2-1302-P4-002/003. (URI 05000424, 05000425/2007006-03, Ability To Satisfy TS SR 3.7.5.2)

.2.19 Capability of Auxiliary Feedwater System to Meet Design and Licensing Requirements

a. Inspection Scope

The inspectors reviewed the design basis documentation to identify design requirements related to flow, developed head, available NPSH, vortex formation, minimum flow and runout protection for all AFW system operating conditions. The AFW flow assumptions in the UFSAR accident analysis were also reviewed. Design calculations and periodic test documentation and results were reviewed to verify that the AFW system design and licensing performance requirements were satisfied. Calculations were reviewed to verify the adequacy of available NPSH and measures taken to prevent suction vortexing. Maintenance, in-service testing (IST), periodic surveillance testing, corrective actions, and design change history were reviewed to assess the system for potential component degradation and subsequent impacts on design margins or performance.

b. Findings

Introduction. The inspectors identified an URI for failure to verify the AFW system design was bounded by all operating and design limitations.

Description. The inspectors reviewed design calculation X4C1302S12, Auxiliary Feedwater Pump Discharge Line Orifice Sizing, Rev. 1 and identified that this calculation established the limiting AFW system flow rates and system resistance values after the system limiting flow orifices were modified during plant pre-operational testing. This calculation developed a hydraulic model for the current configuration of the AFW system. The system resistance was calculated by measuring flows and corresponding dPs. This calculation predicted relatively small margins for the ability to satisfy the intended safety function by providing above the total minimum flow of 510 gpm to intact steam generators while also not exceeding the value of 1050 gpm used as a bounding condition for mass introduction in the containment analysis for a faulted steam generator. For minimum flow cases, this calculation predicted that the TDAFW pumps could deliver a flow of 520.5 gpm and the MDAFW pumps could deliver a flow of 547 gpm. For faulted steam generator cases this calculation predicted a maximum flow of 1038.5 gpm. This review identified the following concerns:

- The accuracy of the AFW system resistance values obtained from plant testing did not evaluate the effect of accuracy of the instrumentation used on the calculation results. Information provided in the calculation states: “In view of the scattered test data, it is obvious that the inaccuracy and uncertainty were involved in pressure / flow measurements. To minimize the effect, the

representative orifice dP (i.e., the average dP) is used for new orifice sizing." In addition to the data averaging, one set of data points was completely discarded because it was not consistent with the other data without any analysis of the reasons for the differences. Considering the fact that a typical instrument error associated with just the flow measurement office is 2 percent and the very small system margins, it is not clear that this analysis can demonstrate the system's ability to satisfy the intended safety function by providing above the total minimum flow of 510 gpm to intact steam generators while not exceeding the value of 1050 gpm used in the containment analysis for a faulted steam generator.

- The inspectors reviewed surveillance procedure 28210-C, Main Steam Line Code Safety Valve Setpoint Verification, Revs. 15, 16, 17, and 18 for the steam generator safety relief valves (SRVs) 1PSV3001, 1PSV3011, 1PSV3021, 1PSV3031, 2PSV3001, 2PSV3011, 2PSV3021, and 2PSV3031 completed from March 2003 through March 2005. This review identified that this procedure established the as-found acceptance criteria for these valves to be a range 1149 to 1209 psig (1185 +3%, -2%) and the as-left 1173 to 1197 psig (1185 +1%, -1%). This allowable band for SRV settings was not applied to the analysis to determine the worst case acceptable high and low steam generator back pressure which could further decrease the available margin for the minimum flow cases for the higher SRV setpoints, while decreasing the available margin for the faulted steam generator case for the lower SRV setpoints.

- The inspectors reviewed modification MDD-91-V1M016, Auxiliary Feedwater Rated Speed Change, dated April 4, 1991, and LDCR 2003034, Revise FSAR to Show Values for AFW System Performance Based on Calculation X4C1302S12, dated November 26, 2003. The review identified that in 1991, the TDAFWP speed setting was changed from 4200 to 4230 rpm by modification MDD-91-V1M016, which did not evaluate the effect of the speed increase on the AFW system's margin for the faulted steam generator containment analysis. In 2003, the UFSAR was changed to reflect the results of calculation X4C1302S12 by LDCR 2003034, which did not evaluate the effects of the cumulative margin reduction changes, lack of the instrument uncertainty considerations by the calculations, effects of the allowable speed variations, and potential negative effects of the allowable SRV set point acceptance criteria.

- The inspectors reviewed minor design change MDC-00-V1M036, 1A AFW Pump Rotating Element Replacement and Thrust Bearing Change, dated September 11, 2000, and identified that when the 1A MDAFW pump rotating element was replaced, the pump characteristics were changed. The effect of the pump's higher TDH and flows on the AFW system margin for the faulted steam generator ccontainment analysis was not evaluated. CR 2007105979 was generated to address this concern.

Analysis. The inspectors determined that SNC's failure to consider the effects of instrument accuracy, speed change, and allowable SRV set point tolerances on the

AFW system capability to perform the intended safety function by providing a total minimum flow of 510 gpm to intact steam generators while not exceeding the value of 1050 gpm used in the containment analysis for a faulted steam generator was a performance deficiency. This URI is more than minor because it is associated with the Mitigating Systems Cornerstone attribute of Design Control. It impacts the cornerstone objective of ensuring the availability, reliability, and operability of the AFW system to perform its safety function in that the licensee lacked information to analyze the capability of the AFW system to ensure the system could satisfy the intended safety function during all conditions. The inspectors could not make a determination of impact on operability of the AFW system due to questions concerning the validity of the system curves and pump curves.

Enforcement. This URI was entered into the licensee's corrective action program as CR 2007105979 with actions to evaluate the ability of the AFW system's ability to satisfy the intended safety function. This issue is identified as URI 05000424, 05000425/ 2007006-05, Capability of Auxiliary Feedwater System to Meet Design and Licensing Requirements. This item is unresolved pending an NRC review of the effects of instrument accuracy, speed change, and potential negative effects of the allowable SRV set point acceptance criteria on the AFW system's ability to satisfy the intended safety function. (URI 05000424, 05000425/2007006-04, Capability Of Auxiliary Feedwater System To Meet Design And Licensing Requirements)

.3 Review of Low Margin Operator Actions

a. Inspection Scope

The inspectors performed a margin assessment and detailed review of five risk significant and time critical operator actions. Where possible, margins were determined by the review of the assumed design basis and UFSAR response times and performance times documented by job performance measures (JPMs). For the selected components and operator actions, the inspectors performed an assessment of the Emergency Operating Instructions (EOIs), Abnormal Operating Instructions (AOIs), Alarm Response Instructions (ARIs), and other operations procedures to determine the adequacy of the procedures and availability of equipment required to complete the actions. Operator actions were observed on the plant simulator and during plant walkdowns.

The following operator actions were observed on the licensee's operator training simulator:

- Recovery of offsite power, actions to recover offsite power utilizing the EDG, RAT, and SAT. (EOP 19100-C, ECA-0.0 Loss of All AC Power, SOP 13145-1, Diesel Generators, and SOP 13427A-1, 4160V AC Bus 1AA02 1E Electrical Distribution System)

- Loss of RHR while shutdown in Mode 5, Mode 6, and midloop. (AOP 18019-C, Loss of Residual Heat Removal.)

- Terminating Safety Injection (SI) following spurious actuation. (EOP 19000-C, Reactor Trip or Safety Injection, and EOP 19011-C, ES-1.1 SI Termination)

Additionally, the inspectors walked down, "table-topped" and reviewed the following operational scenarios:

- Operation of Plant Wilson to provide power to safety buses. (SOP 13418-C, Standby Auxiliary Transformer, and SOP 13419-C, Diesel Generator Extended Allowable Outage Time (AOT))

- Local operation of the TDAFWP without AC or DC power. (SOP 13610-1, Auxiliary Feedwater System.)

b. Findings

No findings of significance were identified.

.4 Review of Industry Operating Experience

a. Inspection Scope

The inspectors reviewed selected operating experience issues that had occurred at domestic and foreign nuclear facilities for applicability at the Vogtle Nuclear Plant. The inspectors performed an independent applicability review, issues that were identified as applicable to the Vogtle Nuclear Power Plant were selected for a detailed review. The issues that received a detailed review by the inspectors included:

- NRC Information Notice (IN), IN 86-14, Overspeed Trips of HPCI, RCIC and AFW Turbines

- IN 95-03, Generic Letter 98-02 Wolf Creek Loss of RCS Inventory while Shutdown

- IN 2005-21,Plant Trip and Loss of Preferred AC Power from Inadequate Switchyard Maintenance

- IN 2006-18, Significant Loss of Safety Related Electrical Power at Forsmark, Unit 1, in Sweden

- IN 90-25, Loss of Vital AC Power with subsequent Reactor Coolant System Heat-up

- IN 2007-014, Loss of Offsite Power and Dual-Unit trip at Catawba Nuclear Generating Station

b. Findings

No findings of significance were identified.

.5 Review of Permanent Plant Modifications

a. Inspection Scope

The inspectors reviewed two modifications related to the selected risk significant components in detail to verify that the design bases, licensing bases, and performance capability of the components have not been degraded through modifications. The adequacy of design and post modification testing of these modifications was reviewed by performing activities identified in IP 71111.17, "Permanent Plant Modifications," Section 02.02.a. Additionally, the inspectors reviewed the modifications in accordance IP 71111.02, "Evaluations of Changes, Tests, or Experiments," to verify the licensee had appropriately evaluated them for 10 CFR 50.59 applicability. The following modifications were reviewed:

- DCP 2019003401, Replace TDAFWP Turbine Speed Control Panel and associated components
- 92-VAN0203/C929020301, Replace 1E Transformers 1AB04X, 1AB05Xm 1AB15X

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4AO6 Meetings, Including Exit

Exit Meeting Summary

On May 25, 2007, the inspectors presented the inspection results to Mr. T. Tynan, Site Vice President, and other members of the licensee staff. The inspectors returned all proprietary information examined to the licensee. No proprietary information is documented in the report.

On June 4, 2007, a telephone exit was conducted to disposition two items related to the AFW system as URIs (Section 1R21.2.18 and 1R21.2.19) to Mr. J. Williams and other members of the licensee staff.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

M. Agcaoili, Engineer II, Engineering Support
R. Burns, Senior Engineer, Engineering Support
M. Byrd, Senior Engineer, SNC Corporate Vogtle Support
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R. Moye, Project Planning Supervisor, SNC Corporate Vogtle Support
R. Reddy, Senior Engineer, SNC Corporate Vogtle Support
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K. Stokes, Senior Engineer, Engineering Support
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H. Thompson, Assistant Team Leader, Assistant Plant Manager Support
S. Waldrup, Operations Support Superintendent, Operations
A. Wesley, Engineering Supervisor, Engineering Support
J. Williams, Site Support Manager, Assistant Plant Manager Support

NRC

G. McCoy, Senior Resident Inspector, Vogtle Nuclear Plant
M. Cain, RII, Engineering Branch 1, Chief (Acting)

ITEMS OPENED, CLOSED, AND DISCUSSED

Open/Closed

05000424, 05000425/2007006-01	NCV	Safety-Related 480 VAC Molded Case Circuit Breakers On MCC 1ABF, 1BBF, 2ABF, and 2BBF Not Tested. (Section 1R21.2.9)
05000424, 05000425/2007006-02	NCV	Maximum Differential Pressure for Containment Emergency Sump Isolation Valves Not Calculated. (Section 1R21.2.17)
05000424, 05000425/2007006-03	URI	Ability to Satisfy TS SR 3.7.5.2. (Section 1R21.2.18)

Attachment

05000424, 05000425/2007006-04	URI	Capability of Auxiliary Feedwater System to Meet Design and Licensing Requirements. (Section 1R21.2.19)

DOCUMENTS REVIEWED

Calculations

1XCF02, 1E Battery Sizing, Rev. 16
MX3CA27, Degraded Grid/Undervoltage Relay Setting for Unit 1 and Unit 2, Rev. A01
X3CA03, Reserve Auxiliary Transformer Sizing, Rev. 5
X3CA18, Vogtle Unit 1 Load Study, Rev. 7
X3CA26, Unit 1 and Unit 2 Relaying, Rev. 6
X3CF07, DC Breaker Sizing, Rev. 14
X3CH01, 120 Vac Vital Bus Loading and Cable Sizing, Rev. 6
X3CK03-C, Control Cable Sizing Details for Cutler-Hammer Freedom Series Starters, Rev. 2
X3CT08,Fire Event Safe Shutdown Circuit Analysis, Rev. 15.
X4C1000U01, Differential Pressure Calculations, Rev. 15
X4C1202S16, NSCW Flows & Pressures Post-Accident Conditions, Rev. 1
X4C1202V11, NSCW Sys-P/T & Flows During Normal Operation, Rev. 5
X4C1302S12, Auxiliary Feedwater Pump Discharge Line Orifice Sizing, Rev. 1
X4C1302S08, FSAR Auxiliary Feedwater System, Rev. 5
X4C1302T01, Condensate Storage Tanks, Rev. A
X4C1302V04, Auxiliary Feedwater Pumps Technical Specifications Verification, Rev. 5
X4C1302V06, Condensate Storage Tank Verification, Rev. 1
X4C2107V01, Diesel Generator Building - Normal and Emergency Operation, Rev. 3
X4C2107V03, Diesel Generator Building Minimum Ventilation Requirements, Rev.1
X4C2403V02, Verification of Diesel Fuel Oil Transfer, Rev.0
X5CP1668, NSCW Cooling Tower Spray Header Shutoff and Bypass Valve Controls Train “A” and Train “B”, Rev. 6

Operating Procedures

13011-1, Residual Heat Removal System, Rev. 65
13145-1, Diesel Generators, Rev. 65
13415-1, Reserve Auxiliary Transformers, Rev. 12.4
13419-C, Diesel Generator Extended AOT, Rev. 6.2
13427A-1, 4150V AC Bus 1AA02 1E Electrical Distribution System, Rev. 3.1
13431-1, 120V AC 1E Vital Instrument Distribution System, Rev. 8
13481-C, Standby Auxiliary Transformer, Rev. 15
13610-1, Auxiliary Feedwater System, Rev. 41
18019-C, Loss of Residual Heat Removal, Rev. 25
18034-1, Loss of Class 1E 125V DC Power, Rev. 8
19000-C, E-0 Reactor Trip or Safety Injection, Rev. 32
19011-C, ES-1.1 SI Termination, Rev. 26.1
19100-C, ECA-0.0 Loss of All AC Power, Rev. 31
ABW 2901, Plant Wilson Blackstart Procedure, Rev. 16
13415-1, Reserve Auxiliary Transformers, Rev. 12.4
13418-C, Standby Auxiliary Transformer, Rev. 15
17033-2, Annunciator Response Procedures for ALB33 on EAB Panel, Rev. 17
17036-1, Annunciator Response Procedures for ALB36 on EAB Panel, Rev. 17

NMP-AD-006, Frequently Performed Test and Evolutions, Rev.2
00656-C, Vehicle Control, Rev. 6

Operations Training Related Documents

RQ-JP-18034-001, Locally Remove Diesel Generator From Service, Rev. 9
RQ-JP-18032-001, Respond to Loss of 120V AC Instrument Power 1AY1A (RO Actions), Rev. 16
RQ-JP-18032-002, Respond to Loss of 120V AC Instrument Power (BOP Actions), Rev. 15
RQ-JP-13427-001, Return ESF Bus From Diesel Generator to Normal Supply, Rev. 17
RQ-JP-13418-002, Energize the Standby Auxiliary Transformer (SAT), Rev. 6
RQ-JP-13418-003, Aligning the SAT to Class 1E 4160VAC Bus, Rev. 9
RQ-JP-18034-002, Turbine Driven AFW Pump Local Manual Control Without DC Power, Rev. 1
RQ-JP-13610-001, Reset of the TDAFW Pump Trip and Throttle Valve, Rev. 6
RQ-JP-13610-002, Locally Operate TDAFW Pump Using HV-5106, Rev. 4
RQ-JP-13610-003, Locally Operate TDAFW Pump Using HV-5106 With Inability to Maintain Speed Control, Rev. 4
V-LO-TX-16001, Primary Systems, Rev. 3.0
V-RQ-SE-07106, Inadvertent Safety Injection, Rev. 0

Test Procedures

14805-2, Residual Heat Removal and Check Valve IST and Response Time Tests, Rev. 31
14807-1, Motor Driven Auxiliary Feedwater Pump and Check Valve In-Service and Response Time Test, Rev. 29.2
14807-2, Motor Driven Auxiliary Feedwater Pump and Check Valve In-Service and Response Time Test, Rev. 24.1
14810-1, TDAFW Pump Operability, Response Time and Check Valve IST, Rev. 36.2
14810-2, TDAFW Pump Operability, Response Time and Check Valve IST, Rev. 30.2
22505-C, Switchgear Panel Voltmeter Calibration, 09/30/06, 09/29/06
23202-C, G.E. IAC Overcurrent Relay Calibration, Rev. 19, for DG1A, performed 1/22/07
23202-C, G.E. IAC Overcurrent Relay Calibration, Rev. 18, for 1NXRA, performed 3/26/05
23222-C, General Electric Type IAV53K Over and Under Voltage Relay Calibration, Rev. 14 03/1605
23226-C, G.E. Type ICW51 Power Relay Calibration, Rev. 6, for DG1A, performed 1/21/07
23230-C, G.E. Model INC77B Negative-Phase Sequence Time Overcurrent Relay calibration, Rev. 7.1, for DG1A, performed 1/24/07
23232-C, G.E. Type IJCV51A and IJCV51B TOC with Voltage Restraint Calibration, Rev. 5, performed 1/21/07
23244-C, G.E. Type IJD Percentage Differential Relay Calibration, Rev. 8, for DG1A, performed 1/24/07
23250-C, Westinghouse Type HU & HU-4 Differential Relay Calibration, Rev. 14, for 1NXRA, performed 3/25/05
23278-C, Westinghouse Type KF Underfrequency Relay Calibration, Rev. 8 for DG1A, completed 1/24/07
24613-1, Safety Features Sequencer Train A Channel Operational Test and Channel Calibration, Rev. 27.3, performed 10/13/06

25506-C, Motor Control Center Preventive Maintenance, Rev. 16, performed 10/13/00
25506-C, Motor Control Center Preventive Maintenance, Rev. 28, performed 31/5/05
27710-C, 125 VDC Circuit Breaker Inspection and Testing, Rev. 38, for 1CD101, performed 3/18/05
27710-C, 125 VDC Circuit Breaker Inspection and Testing, Rev. 39, for 1CD111, performed 4/8/05
27731-C, 480 Volt Switchgear Cubicle/Transformer Maintenance, Rev. 26, 03/16/05
27828-C, SCI Non-1E 7.5KVA Inverter Calibration, 10/04/06, 10/01/06
28210-C, Main Steamline Code Safety Valve Setpoint Verification, Rev. 15, 16, 17, and 18
28705-C, 4.16KV/13.8KV Circuit Breaker Inspection and Testing, Rev. 23, for 1AA0221, performed 3/23/05
28705-C, 4.16KV/13.8KV Circuit Breaker Inspection and Testing, Rev. 22.1, for Incoming 1AA02 Feeder Breaker, performed 1/24/05
28707-C 480V Air Circuit Breaker Maintenance and 60 Month Check, Rev. 27, performed 3/17/05
28816-C, Class 1E Battery Modified Performance Test, performed 9/27/06
54727-1, Device 451NRA1, RAT 1NXRA Neutral Backup Ground Relay Functional Test, Rev 2, performed 3/22/05
55026-C, Calculation of Breaker Trip Settings and Trip Test Data for 125V DC Switchgear Breakers, Rev. 8, for breakers 1CD101 and 1CD111, performed 11/13/88 and 3/5/99
ABW 2902, Plant Wilson 18 Month Blackstart Test Procedure, Rev. 7, performed 4/15/06
ABW 2902, Plant Wilson 18 Month Blackstart Test Procedure, Rev. 7

Design Changes/Modifications

92-VAN0203, Replace 1E Transformers 1AB04X, 1AB05Xm 1AB15X
C929020301, Replace 1E Transformers 1AB04X, 1AB05Xm 1AB15X, 07/28/93
DCP 2019003401, Replacement of TDAFW Pump Turbine Speed Control Panel and Associated Components, Version 1.0
MDD-91-V1M016, Auxiliary Feedwater Rated Speed Change, April 4, 1991
MDC-00-V1M036, 1A AFW Pump Rotating Element Replacement and Thrust Bearing Change, September 11, 2000

Design Basis Documents

DC-1202, Nuclear Services Cooling Water System, Rev. 12
DC-1202-A, Nuclear Safety Cooling Tower, Rev. 11
DC-1217, Auxiliary Component Cooling Water System, Rev. 3
DC-1302, Auxiliary Feedwater Water System, Rev. 14
DC-1566, Diesel Generator Building HVAC System, Rev. 4
DC-18000E, General Design Criteria, Rev. 15
DC-1801 Offsite Power System, Rev. 7
DC-1804, 4160 VAC System, Rev. 10
DC-1805, 480 VAC System, Rev. 12
DC-1806, Class 1E dc System, Rev. 11
DC-1807, 120 VAC Power System, Rev. 9
DC-1809, Cable System, Rev. 19

DC-1810, Raceway System, Rev. 14
DC-1821, Standby Power System, Rev. 12
DC-2402, Emergency Diesel Generator Systems, Rev. 9
DC-2403, Emergency Diesel Generator, Rev. 9

Condition Reports (CRs)

2005100563, 1ABF Material condition is degrading
2005101944, Control Room received 1ND3A 125VDC Ground Annunciator
2005102348, Discharge Test of battery 1Nd1B
2005102356, Failure of the K1 relay to reset, maintains diesel generator field shorted
2006110873, RAT 1B (1NXRB) Gassing trend
2006111881, Battery Charger 1AD1CA ac input breaker tripped
2006112084, Battery Charger 1AD1CA ac input breaker tripped

Work Orders

10202438, PM REG XFMR 1BBB40RX
10203021, Inspect, Clean, and Measure Grounding Resistors (RAT), performed 9/29/05
10203022, Inspect, Clean, and Measure Grounding Resistors (RAT), performed 10/4/03
10203252, Implement 480V MCC breaker cubicle 1ABF05 changes, performed 2/4/03
10203253, 480 V MCC breaker cubicle 1ABF14 phase B failed trip test, performed 1/31/03
10203410, PM REG XFMR 1ABB40RX
1030093101, Functional Test of Transformer 1AB05X
1053523801, PM Essent AC Inverter 1ND3I2
1053523701, PM Essent AC Inverter 1ND3I3
106045201, PM Sequencer Board Train A

Drawings

1X3D-AA-A01A, Main One Line Unit 1, Rev. 25
1X3D-AA-B02A, One Line Diagram Relays & Meters, RAT, Rev. 7
1X3D-AA-C01A, One Line Diagram 4160V/13.8KV Switchgear ANA04/ANAA, Rev. 0
1X3D-AA-C01A, One Line Diagram 13800V Switchgear 1NAA, Rev. 20
1X3D-AA-D02A, One Line Diagram 4160V Switchgear 1AA02, Rev. 12
1X3D-AA-D02B, One Line Diagram 4160V Switchgear 1AA02, Rev. 8
1X3D-AA-F16A, One Line Diagram 480V Motor Control Center 1ABb 1-1805-S3-ABB, Rev.18
1X3D-AA-F36A, One Line Diagram 480V Motor Control Center 1ABF, Rev. 15
1X3D-AA-G01A, Main One Line Class 1E 125V DC and 120V Vital AC Systems, Rev. 10
1X3D-AA-H04A, One Line Diagram 125V DC Class 1E Distr. Train C, Rev. 23
1X3D-AA-M03A, UNIT 1 Power Transformer Data &Tap Settings, Rev. 0
1X3D-AA-M04A, UNIT 1 Load Center Transformer Data and Tap Settings, Rev.5
AX3D-AA-M06A, Unit A Standby Auxiliary Transformer Data and Tap Settings, Rev. 1
1X3D-AA-M08A-13, UNIT 1 Relaying Data, Rev. 1
1X3D-AA-M08A-14, UNIT 1 Relaying Data, Rev. 1
1X3D-AA-M08A-15, UNIT 1 & 2 Relaying Data, Rev. 1
1X3D-AA-M08A-16, UNIT 1 & 2 Relaying Data, Rev. 2

1X3D-AA-M08A-17, UNIT 1 & 2 Relaying Data, Rev. 0
1X3D-AA-M08A-28, UNIT 1 Relaying Data, Rev. 1
1X3D-AA-MO8A-32, UNIT 1Relaying Data, Rev. 1
1X3D-AA-M08A-35, UNIT 1 Relaying Data, Rev. 1
1X3D-AA-M08A-36, UNIT 1 Relaying Data, Rev. 2
1X3D-AA-M08A-37, UNIT 1 Relaying Data, Rev. 1
1X3D-AA-M08A-56, UNIT 1 Relaying Data, Rev. 3
1X3D-AA-K01A, Diesel Generator 1A & 1B Relays & Meters, Rev. 5
1X3D-BA-D02B, E/D 4160V SWGR 1AA02 1NCM BRKR 1NXRA, Rev.12
1X3D-BA-D02D, E/D 4160V 1NCM BRKR 152-1AA0219, from EDG 1A, Rev. 11
1X3D-BA-D02L, E/D 4160V SPLY FOR BRKR TO XFMR 1AB05X, Rev. 4
1X3D-BB-B01P, Elementary Diagram Electrical System, Generator Tripping, Rev. 7
1X3D-BB-B01V, Elementary Diagram Electrical System, Generator Tripping, Rev. 6
1X3D-BB-B01R, Elementary Diagram Electrical System, Generator Tripping, Rev. 2
1X3D-BC-F04A, Elementary Diagram Aux. Feedwater System 1-1302-P4-003-M01, Rev. 11
1X3D-BC-Q04B, Elementary Diagram Main Steam System Safety Actuation Signal, Rev. 11
1X3D-BD-K05U, Elementary Diagram Nuclear Service Water System 1HV-1668A, Rev.14
1X3D-BD-K05W, Elementary Diagram Nuclear Service Water System 1HV-1669A, Rev.11
1X3D-BD-L01E, Elementary Diagram Component Cooling Water System 1-1203-P4-005-M01, Rev. 10
1X3D-BG-G03A, Elementary Diagram Aux. FDW Pump House HTG & Vent System 1-1593-B7-001-M01, Rev. 8
1X3D-BG-F01M, Elementary Diagram DSL Gen Building HVAC System 1HV-12050, 12051, 12053, 12054, Rev.4
1X3D-BH-G03C, Elementary Diagram Diesel Engine Control DGA1, Rev. 7
1X3D-BH-G03D, Elementary Diagram Diesel Engine Control DGA1, Rev. 8
1X3E13-00005-2, Diesel Generator SFS Load Sequencer Logic Diagram, Rev. 2
1X4AH04-2-8, Component Cooling Water Surge Tank & Auxiliary Component Cooling Water Surge Tank, Dated 1/30/80
1X4DB122, Residual Heat Removal System No. 1205, Ver. 49.0
1X4DB133-1, Nuclear Services Cooling Water System, System No. 1202, Ver. 49.0
1X4DB133-2, Nuclear Services Cooling Water System, System No. 1202, Ver. 55.0
1X4DB134, Nuclear Services Cooling Water System, System No. 1202, Ver. 29.0
1X4DB135-1, Nuclear Services Cooling Water System, System No. 1202, Ver. 29.0
1X4D 135-2, Nuclear Services Cooling Water System, System No. 1202, Ver. 34.0
1X4DB136, Component Cooling Water System, System No. 1203, Ver. 32.0
1X4DB137, Component Cooling Water System, System No. 1203, Ver. 18.0
1X4DB138-1, Auxiliary Component Cooling Water System, System No. 1217, Ver. 30.0
1X4DB138-2, Auxiliary Component Cooling Water System, System No. 1217, Ver. 19.0
1X4DB139, Auxiliary Component Cooling Water System, System No. 1217, Ver. 29.0
1X4DB161-1, Auxiliary Feedwater Water System, Condensate Storage & Degasifier System, System No. 1302, Ver. 44.0
1X4DB161-2, Auxiliary Feedwater Water System, System No. 1302, Ver. 27.0
1X4DB161-3, Auxiliary Feedwater Water System (Aux Feedwater Pump Turbine Driver), System No. 1302, Ver. 40.0
1X4DB170-1, Diesel Generator System, Train A, System No. 2403, Ver. 43.0
1X4DB217-1, Diesel Generator Building HVAC, System No. 1566, Ver. 16.0

1X5DN089-1, Control Logic Diagram, Nuclear Services Cooling Tower System, Rev. 7
1X5DN089-2, Control Logic Diagram, Nuclear Services Cooling Tower System, Rev. 4
1X5DN089-3, Control Logic Diagram, Nuclear Services Cooling Tower System, Rev. 10
1X5DT0026, Level Setting Diagram, ACCW Comp. CW Surge Tk., Rev. 4
AX3D-AA-A03A, Vogtle-Wilson Main One Line Diagram, Rev. 4

Miscellaneous Documents

AX3AC02-01668-6, Low Voltage (480V Load Center) Power Circuit Breaker Instruction Manual, 11/08/99
AX3AC03-00920, Instruction Manual & Parts List for 480Vac MCC, Rev. 11
AX3AD01-00025, Instruction Manual, C&D Batteries, Rev. 5
AX3AD01-00084, Instruction Manual, AutoReg Chargers, Rev. 3
AX3AD02-00120, Instruction Manual, Cutler-Hammer Motor Control Centers, Rev. 4
AX3AD03-05020, Instruction Manual, Brown Boveri 125 VDC Switchgear, Rev. 11
AX3AE13-00001, Safety Features Sequencer Functional Requirements, Rev. 4
AX3AQ03A-00027, 10KVA Inverter Instruction and Operating Manual, Rev.1
DCP 02-VAN0017, Inverters BD1I12 and 1AD1I1 Functional Test
DG1A A.C. Synchronous Generator Data, dated 6/1/78
DOEJ-SJ-C070401401-001, Channel Uncertainty - AFW Pump Suction and Discharge Pressures - P-5110, P-5107
DOEJ-SM-C070401401-001, Maximum Opening Differential Pressure for the Vogtle RHR Sump Valves (1/2HV8811A and B) at Steady State Voltage of 88.5 percent
General Electric Application Guide, A-C Ground Indication, SA-75, 12/20/1974
Health Report, 125 Volt Direct Current System, 1st QTR 2007
Health Report, 4160 Volt Alternating Current System, 1st QTR 2007
Health Report, 480 Volt Alternating Current System, Reporting Period 4th QTR 2005-4th QTR 2006
Health Report, Emergency Diesel Generator Systems, 1st QTR 2007
Health Report, High Voltage Switchyard, 1st QTR 2007
LDCR 2003034, Revise FSAR to Show Values for AFW System Performance Based on Calculation X4C1302S12, November 26, 2003
Letter from Southern Company Services to Vogtle Project Nuclear Operations dated July 6, 2000
Letter from J.G. Aufdenkampe to S.C. Swanson dated May 11, 2007
Operating Experience Program Evaluation for NRC IN 95-03, Loss of RCS Inventory and Potential Loss of Emergency Mitigation Functions While in a Shutdown Condition
Procedure 50028-C Engineering Maintenance Rule, Performance Monitoring and Evaluation for Offsite Power and High-Voltage Switchyard, Reporting Period 1/1/2005 through 3/1/2007
RM-0287, Power Circuit Breakers Type AKR, Rev. 1
Summary of VDGP Response to Supplement 2 to NRC Information Notice 86-014, Overspeed Trips of AFW, HPCI and RCIC Turbines
S&C Data Bulletin 711-90, Circuit –Switchers-Mark V, 6/3/1991
S&C Instruction Sheet 711-600, Circuit-Switchers- Mark V, 6/26/1982
S&C Specification Bulletin 711-31, Circuit-Switchers- Mark V, 2/520/07
Summary of the Plant Wilson Engine Generator Battery Capacity Test, performed 11/29/2000
Voltage Profile, 4160 Volt Bus 1AA02, for the period 5/14/06 through 5/1420/07

Voltage Profile, 125 Volt Battery 1CD1, for the period 5/14/06 through 5/1420/07
X7GH14-V500, Vogtle Plant Response to IN 07-14, “Dual unit Loss of Offsite Power”

Corrective Action documents initiated due to CDBI activity:

CR 2007100218, Cable size on the low side of the standby auxiliary transformer (13.8KV/4160V)
CR 2007100247, Corporate Level CR to Address that Following RHR Pump Test the Actual dP is Greater than the Assumed dP, May 17, 2007
CR 2007100263, Address the apparent absence of an NPSHa calculation for the AFW system pumps.
CR 2007104981, Evaluation not performed for toolbox chained to the control panel in the TDAFWP room.
CR 2007104983, Eyewash stations and metal racks not secured in the EDG buildings.
CR 2007105409, Transformer 1AB05X impedance value shown on drawing does not match.
CR 2007105413, NPSH calculation for the AFW pumps is missing
CR 2007105428, IPC point jumps in indicated temperature and remains high.
CR 2007105436, NRC questioned method of satisfying the TDAFW pump surveillance requirement.
CR 2007105463, Generate work orders to replace the neutral grounding resisitors on UAT and RAT.
CR 2007105469, Pneumatic tubing on EDG building 1A HVAC recirculation damper is not properly installed.
CR 2007105563, Rust around operating levers on breakers in panel MCC 1ABF.
CR 2007105624, Reference files are support documentation and cannot be found.
CR 2007105713, Incorporation of Instrument Uncertainty and Density Corrections Into Technical Specifications Surveillance Acceptance Criteria.
CR 2007105769, Routine maintenance such as continuous current and interrupting rating of 230 KV circuit switchers not performed.
CR 2007105779, Review of the need for routine maintenance of safety related level switches.
CR 2007105833, Review to confirm ACCW surge tank safety related level switched should be listed as safe shutdown component.
CR 2007105848, Pressure increase after RHR pump testing.
CR 2007105855, Walkdown MCC 1ABF.
CR 2007105859, Walkdown MCC 1ABF.
CR 2007105870, Potential exists for diesel generator frequencies to vary.
CR 2007105895, Initial Speed for TDAFW Pump Recorded at 4200 rpm.
CR 2007105905, TDAFWP has limited flow margin in some analyzed accidents.
CR 2007105979, Replacement of MDAFW Rotating Element Was Not Completely Evaluated Against the MSLB Design Basis, May 25, 2007