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

July 27, 2006

South Carolina Electric & Gas Company
ATTN: Mr. Jeffrey B. Archie
Vice President, Nuclear Operations
Virgil C. Summer Nuclear Station
P. O. Box 88
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION - NRC INSPECTION REPORT NO. 05000395/2006008

Dear Mr. Archie:

On June 23, 2006, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Virgil C. Summer Nuclear Station. The enclosed inspection report documents the inspection findings which were discussed on June 23, 2006, 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 license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

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

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

Sincerely,

/RA/

Tim Hoeg, Acting Chief
Engineering Branch 1
Division of Reactor Safety

Docket Nos.: 50-395
License Nos.: NPF-12

Enclosure: NRC Inspection Report 05000395/2006008
w/Attachment: Supplemental Information

(cc w/encl cont'd - See page 3)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-395
License Nos.:	NPF-12
Report Nos.:	05000395/2006008
Licensee:	South Carolina Electric & Gas (SCE&G) Company
Facility:	Virgil C. Summer Nuclear Station
Location:	P.O. Box 88 Jenkinsville, SC 29065
Dates:	May 22 - June 23, 2006
Inspectors:	R. Moore, Lead Inspector M. Shylamberg, Contractor R. Taylor, Reactor Inspector H. Williams, Reactor Inspector P. Wagner, Contractor
Approved by:	Tim Hoeg, Acting, Chief, Engineering Branch 1 Division of Reactor Safety

SUMMARY OF FINDINGS

IR05000395/2006008; 5/22/2006 - 5/26/2006, 6/5/2006 - 6/9/2006, 6/19/2006 - 6/23/2006; Virgil C. Summer Nuclear Station; Component Design Bases Inspection.

This inspection was conducted by a team of three NRC inspectors and two NRC contractors. Three green findings, which were non-cited violations, were identified during this inspection. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The team identified a non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action. Specifically, the licensee's corrective action to address an industry operating experience issue applicable to their station was inadequate in that the evaluation did not correctly identify the most limiting condition of a small break loss of coolant accident (SBLOCA) on their ability to open the residual heat removal (RHR) system containment suction motor operated valves (MOVs) which was the subject of a previous industry operating experience report from the McGuire Nuclear Station in 2005. The licensee entered the deficiency into their corrective action program for resolution.

  This finding is more than minor because it affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance (Green) because subsequent analysis demonstrated that the valves remained capable of performing their design function. This finding involved the cross-cutting area of Problem Identification and Resolution because the problem evaluation did not correctly identify the most limiting condition for operation of the RHR containment suction MOVs following a SBLOCA scenario. (Section 1R21.2.2)

- Green. The team identified a non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action. Specifically, the licensee's corrective action to evaluate an extent of condition on emergency diesel generator (EDG) A following identification of an EDG B lube oil thermostatic control valve (TCV) malfunction was deficient. The extent of condition review to assess the potential for a similar component malfunction on EDG A was technically inadequate, incomplete, and did not provide assurance that the EDG A remained operable for all possible operating conditions, particularly increased heat sink conditions occurring in the summer. The licensee entered the deficiency into their corrective action program for resolution.

The finding is more than minor because it affected the equipment performance attribute of the mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

This finding is of very low safety significance because the licensee determined that the EDGs were operable based on heat sink temperatures and that TCV performance monitoring would be accomplished when heat sink temperatures are expected to increase. This finding involved the cross-cutting area of Problem Identification and Resolution because the evaluation, specifically the extent of condition review, was inadequate in that it failed to assure that the EDG B component malfunction did not apply to EDG A. (Section 1R21.2.8)

- Green. The team identified a non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion III, Design Control. Specifically, the licensee used non-conservative acceptance criteria for the EDG intercooler performance test, PTP-213.002, Service Water System Heat Exchanger Data Collection. The acceptance criteria for the allowed heat exchanger fouling factor based on tubes plugged was non-conservative and could allow heat exchanger degradation below design limits. Additionally, the wall thickness criteria for tube pitting would allow full penetration to occur between tube inspections. Loss of tube integrity would degrade the ability of the heat exchanger to remove the design heat load of the EDG. The licensee entered the deficiency into their corrective action program for resolution.

  The finding is more than minor because it affected the procedure quality attribute of the mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance because the licensee determined that EDGs were operable based on the affected HX having been recently cleaned; the latest intercooler performance results indicated substantial heat exchanger duty margin; and the proposed monthly trending of the heat exchanger. (Section 1R21.2.8)

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 team selected risk significant components and operator actions for review using information contained in the licensee's Probabilistic Risk Assessment (PRA). In general, this included components and operator actions that had a risk achievement worth factor greater than two or Birnbaum value greater than 1 X10-6. The components selected were located within the safety injection/charging system (SI), residual heat removal (RHR) system, emergency diesel generator (EDG) subsystems, and the safety related instrumentation and temperature monitoring systems for EDG and emergency switchgear spaces. The sample selection included 17 components, 5 operator actions, and 6 operating experience items. Additionally, the team 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 team 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, GL 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 Charging Pump Suction MOVs from VCT (LCV-00115C&E-CS)

a. Inspection Scope

The team reviewed MOV calculations to verify that the design bases, system conditions, and allowable degraded voltage conditions were used as design inputs to size the actuators and establish set point values. Additionally, the translation of design information into MOV test procedure acceptance criteria was reviewed. MOV calculations and related testing documentation were also 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 or inspected and that the design function was maintained. Maintenance history, foreign material exclusion (FME) controls, and design changes were reviewed to assess the potential for flowpath obstruction and material degradation.

b. Findings

No findings of significance were identified.

.2.2 RHR Containment Sump Suction MOVs (XVG08812 A&B-SI)

a. Inspection Scope

The team reviewed MOV calculations, to verify that design basis accident conditions and allowable degraded voltage conditions were incorporated into individual motor actuator set point determinations and determination of individual motor capability. Thermal overload (TOL) calculations and installation work orders were reviewed to determine that installed TOLs were correctly sized. MOV calculations and related testing documentation were reviewed to assure valve performance criteria allowed for anticipated maximum operating pressure conditions and that appropriate torque switch settings were maintained. Maintenance history, foreign material exclusion (FME) controls, and design changes were reviewed to assess the potential for flowpath obstruction and material degradation.

b. Findings

Introduction: The team identified a green, non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action. Specifically, the licensee's corrective action to address an industry operating experience issue applicable to the station was inadequate in that the evaluation did not correctly identify the most limiting condition for a SBLOCA on the ability to open the RHR containment suction MOVs which was the issue of a 2005 McGuire industry operating experience report.

Description: The McGuire 2005 industry operating experience item identified that the design differential pressure (delta-P) value assumed for opening the emergency core cooling system (ECCS) recirculation isolation valves was based on a large break loss of coolant accident (LOCA) rather than a SBLOCA and that the SBLOCA value was higher than the LOCA value used for MOV actuator sizing. The licensee's corrective action was to identify the most limiting SBLOCA condition applicable to the Summer Nuclear Station and verify the capability of the station RHR containment suction MOVs (XVG08811A&B and XVG 08812 A&B) to operate under these conditions. However, the licensee's analysis did not identify the most limiting condition and based a conclusion of operability on this incorrect analysis. The team determined that the licensee's conclusion of operability for the RHR containment suction MOVs for a SBLOCA, as documented in CER C-05-3241, was incorrect and non-conservative.

The condition requiring analysis was the sustained increase in RHR pump suction side pressure after the pump was stopped following a pump run in the recirculation mini-flow configuration. This condition would occur on a SBLOCA as the RHR pumps automatically start and then are secured by operators to prevent extended run at reduced flow conditions. This condition was also observed during the routine surveillance run of the RHR pump in the recirculation mini-flow configuration

The licensee's initial evaluation concluded that the MOV actuators were adequately sized based on a derived delta-P of 129.8 psid. The team concluded that the licensee's analysis that determined this delta-P value based on summation of mass and volume conditions to derive a overall post run system density was not consistent with the mass and energy conservation principles applicable to the analyzed system condition. The licensee's analysis did not consider that the RHR pump suction side pressure increase was due to the effects of mass addition to the closed system from compression of existing gas voids during pump recirculation mini-flow operation, which occurred during the routine surveillance test operations and would occur during the beginning of a SBLOCA. The team determined that licensee's conclusion of operability for the RHR MOVs for a SBLOCA, as documented in CER C-06-3241, was incorrect and non-conservative.

Following identification of this non-conservative conclusion by the team, the licensee performed a bounding analysis of the RHR suction side pressure condition using the 450 psig setpoint of the RHR suction side relief valve. They determined that the RHR MOV actuators would provide adequate torque to open their respective valves at the delta-P equivalent to the relief valve setpoint which bounded the most limiting SBLOCA condition. The team concurred with this conclusion.

Analysis: Failure to identify the SBLOCA most limiting condition for verification of RHR MOV operability, and subsequently ensure the capability of the RHR system to provide the accident recirculation mitigation function, is a performance deficiency. This finding is more than minor because it affected the design control attribute of the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance (Green) because subsequent analysis demonstrated that the valves remained capable of performing their design function. This finding involved the cross-cutting area of Problem Identification and Resolution because the problem evaluation did not correctly identify the most limiting condition for operation of the RHR containment suction MOVs due to a SBLOCA at the station.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, states, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified. Contrary to the above, the licensee failed to identify a potential condition adverse to quality in CER C-05-3241, dated September 15, 2005.

Because this failure to comply with 10 CFR 50, Appendix B, Criterion XVI, is of very low safety significance and has been entered into the licensee's corrective action program, as CER C-06-2041, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000395/2006-08-01, Failure to Identify the SBLOCA Most Limiting Condition for Verification of RHR Containment Suction MOV Operability.

.2.3 RHR Pumps/Motors (XPP0031A, XPP0031A-M)

a. Inspection Scope

The team 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 RHR operating conditions. The RHR flow assumptions in the UFSAR accident analysis were verified. Design calculations and periodic test documentation and results were reviewed to verify that the pumps' design and licensing performance requirements were met for the various operating configurations, including the high pressure recirculation (piggy back) configuration in which the RHR pumps provide flow to the suction of the charging pumps. Calculations were reviewed to verify the adequacy of available NPSH and measures taken to prevent vortexing when the RHR pump is taking a suction from the refueling water storage tank (RWST) or containment sump. Maintenance, in-service testing (IST), periodic testing of the pump, corrective action, and design change history were reviewed to assess potential component degradation and impact on design margins or performance.

The team reviewed the capability of the motors to support the design function of the pumps. This included review of brake horse power (BHP) requirements at degraded voltage conditions without exceeding the provided over current protective device settings. The team performed an independent calculation of the necessary ampacity for the pump motors' power supply cables to verify the acceptability of the licensee's cable selection. The settings and coordination of the overcurrent protective relays were also evaluated. The team reviewed elementary and schematic diagrams to verify that the incorporated provisions satisfied the logic presented in the design basis documentation. The testing procedures were reviewed to verify that precautions such as restart restrictions and operating time limits at low flow rates were addressed.

b. Findings

No findings of significance were identified.

.2.4 Charging (SI) Pumps/Motors (XPP0043A, XPP0043A-M)

a. Inspection Scope

The team reviewed the design basis documentation to identify design requirements related to flow, developed head, NPSH, vortex formation, minimum flow and runout protection for all charging pump operating conditions.

Design calculations, in-service and periodic test documentation, and results for the pumps were reviewed to verify that all design performance requirements were met for the various operating configurations, including the high pressure recirculation (piggy back) configuration. Maintenance, in-service testing (IST), corrective action, and design change history was reviewed to assess the potential for component degradation and impact on design margins or performance.

The team reviewed the capability of the motors' BHP to support the design function of the pumps under normal and degraded voltage conditions. The team reviewed the elementary and schematic diagrams of the charging pump motors' control circuit configurations to verify that the circuitry satisfied the logic presented in the design basis documentation. The electrical reviews included an independent verification of the adequacy of the ampacity of the pump motors' power supply cables. In addition, the team walked down portions of the SI system to verify that the installed configuration was consistent with design basis information and visually inspected the material condition of the charging pump motors.

b. Findings

No findings of significance were identified.

.2.5 Piggy Back Valves (RHR pump discharge to charging pump suction) (XVG08706-SI)

a. Inspection Scope

The team reviewed MOV calculations to verify that design bases, system conditions, and allowable degraded voltage conditions were used as design inputs to size the actuators and establish set point values. Additionally, the translation of design information into MOV test procedure acceptance criteria was reviewed. Maintenance documentation was reviewed to verify that MOVs were periodically tested and that appropriate torque switch settings were maintained. Maintenance history, corrective action history, foreign material exclusion (FME) controls and design changes were reviewed to assess the potential for flowpath obstruction and material degradation.

The team reviewed the control circuits for these MOVs to verify that the interlocks and permissives for the high pressure recirculation mode of safety injection system operation would function as described in the design documentation. This review was to verify that interlock circuit provisions were incorporated to ensure that the RCS hot leg suction valves were fully closed before the "piggy back" valves would open and that there was no failure vulnerability having significant consequences by reviewing the licensee's MOV logic testing results. The team also reviewed the licensee's calculations and performed independent calculations to verify proper thermal overload (TOL) selection in addition to verifying proper coordination with the power supply system. The team reviewed Surveillance Test Procedure STP0503.002 TOL Installation, data sheets verify that appropriate TOLs are installed.

b. Findings

No findings of significance were identified.

.2.6 ECCS Flow Path Check Valves (XVC08998-SI, XVC08974-SI, XVC08926-SI, XVG08716-RH)

a. Inspection Scope

The team reviewed the design, installed orientation, and licensee actions to monitor potential degradation of the check valves. This included the licensee's internal inspection documents as well as their periodic in-service flow testing documents to demonstrate full open, closure, and allowable leakage verification. Additionally, the team reviewed the material components to assess the applicability of an industry issue related to dissimilar metals in swing check valves.

b. Findings

No findings of significance were identified.

.2.7 RHR Heat Exchanger Discharge and Bypass Valves (FCV00603-RH, FCV00605-RH)

a. Inspection Scope

The team reviewed these air operated valves (AOVs) to verify they were qualified to perform their safety related function and their failure modes supported the design basis accident conditions. Maintenance, modification, and corrective action history of the AOVs was reviewed to verify that component degradation would be identified. The team reviewed the design, operation, and routine maintenance of the non-safety related valve positioners to assess their reliability to position the valves for decay heat removal. Additionally, the team reviewed the independence of the positioners' air supply and control power to assess the potential for common cause failure of the positioners.

b. Findings

No findings of significance were identified.

.2.8 EDG Cooling System

a. Inspection Scope

The team reviewed the vendor requirements, design basis information and supporting calculations to identify the heat removal requirements for the EDG intercooler, jacket water cooler, and lubricating oil cooler. Maintenance, inspection, and performance testing documents were was reviewed to verify the capability of the coolers to support EDG operation. This included the licensee's performance testing to identify cooler degradation and actions to maintain adequate cooling flow to the coolers by verifying

proper operation of the thermostatic control valves (TCVs) used to regulate cooling on the lube oil, jacket water, and intercooler heat exchangers on the EDGs. Condition evaluation reports (CERs) related to the EDGs were reviewed to assess the identification and resolution of degraded cooler component conditions.

b. Findings

Deficient Extent of Condition Review for EDG B Lube Oil TCV

Introduction: A Green NCV was identified for inadequate corrective action due to a deficient extent of condition review on EDG A following identification of an EDG B lube oil TCV malfunction. The extent of condition review to assess the potential for a similar component malfunction on EDG A was technically inadequate, incomplete, and did not provide assurance that the EDG A function was not degraded for all possible operating conditions, particularly increased heat sink conditions occurring in the summer.

Description: On April 16, 2006, EDG B lube oil TCV function was identified as being degraded. The component malfunction, corrective actions, apparent cause evaluation, and extent of condition review were documented in CER C-06-1301. The defective component was sent to the vender for failure analysis but the assumed cause was aging of the power pills. All TCVs on both EDGs were last replaced in 2002. The extent of condition review included in the apparent cause evaluation concluded that all TCVs on EDG A were operable. However, this review was technically inadequate in that it evaluated the EDG A lube oil TCV flow characteristics as diverting flow which is incorrect; this valve characteristic is to blend flow. The extent of condition review was incomplete in that the similar jacket water TCV was not addressed. The intercooler TCV was addressed appropriately in related CER C-06-1091. The licensee's analysis did not provide assurance that the age related TCV failure on EDG B did not also exist on the opposite train EDG A.

During the inspection the licensee provided information based on recent heat exchanger performance testing and preliminary vendor analysis of the malfunctioning TCV indicating that the other TCVs should be considered functional.

Additionally, the licensee revised CER C-06-1301 to add a corrective action to monitor TCV performance during heat exchanger performance testing in the coming July/August period. The licensee also initiated CER C-06-2034 with corrective actions to address past operability once testing of the power pills is completed and to revise the apparent cause evaluation to address selection methodology.

Analysis: The team concluded that corrective action for the April 16, 2006, EDG B lube oil TCV malfunction was inadequate in that it did not adequately assess the potential impact on EDG A. That is, the extent of condition review did not provide an adequate basis to support the conclusion that the similar TCVs on EDG A were fully functional to ensure that EDG performance was not degraded. The finding is more than minor because it impacts the mitigating cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent

undesirable consequences and is associated with the cornerstone attribute of equipment performance. This finding is of very low safety significance (Green) because the licensee was able to provide adequate information to support the EDGs were operable based on present heat sink temperatures and that TCV performance monitoring would be accomplished when heat sink temperatures are expected to increase. This finding involved the cross-cutting area of Problem Identification and Resolution because the evaluation, specifically the extent of condition review, was inadequate in that it failed to assure the identified malfunction did not also apply to EDG A.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, states, in part, that measures shall be established to assure that conditions adverse to quality such as malfunctions and defective equipment are promptly identified and corrected. Contrary to the above, on April 16, 2006, adequate measures were not established to assure that the age related malfunction of EDG B thermostatic control valve did not also exist on the opposite train EDG. Because this failure to comply with 10 CFR 50, Appendix B, Criterion XVI, is of very low safety significance and has been entered into the licensee's corrective action program, as CER C-06-2034, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000395/2006-08-02, Deficient Extent of Condition Review for EDG B Lube Oil TCV Malfunction.

Inadequate Acceptance Criteria for EDG Intercooler Performance Testing

Introduction: A Green NCV of 10 CFR 50, Appendix B, Criterion III, Design Control, was identified for non-conservative acceptance criteria for the EDG intercooler performance test, PTP-213.002, Service Water System Heat Exchanger (HX) Data Collection. The acceptance criteria for the allowed heat exchanger fouling factor based on tubes plugged was non-conservative in that it could allow heat exchanger degradation below the design limiting condition.

Additionally, the wall thickness criteria for tube pitting would allow full penetration to occur between tube inspections. Loss of tube integrity would further degrade the ability of the heat exchanger to remove the design heat load due to the transfer of the service water to the shell side; and thus, decrease overall heat transfer capability.

Description: As a result of tube pitting identified in the EDG B intercooler (IC) tubes, the licensee established heat performance acceptance criteria to address increased tube plugging that was non-conservative and did not assure that the design basis cooler capability would be maintained. Additionally, the tube wall thickness acceptance criteria did not assure that through wall pitting would not develop before tubes were inspected and plugged.

On May 5, 2005 eddy current testing identified multiple pitting indications in the EDG B IC heat exchanger tubes. The component malfunction, corrective actions and extent of condition review were documented in CER C-05-1588. Based on the results of the eddy current testing the licensee plugged 38 tubes. The acceptance criterion for tube plugging was 70% of through wall pitting.

This acceptance criterion was derived by consensus and had no formal basis. Two tubes were left in service with a measured through wall pitting of 69%. When questioned about acceptability of the 70% through wall pitting acceptance criterion and leaving in service two tubes with through wall pitting of 69% the licensee provided the following information. The mean growth rate was 63% in 3 cycles of operation, or 21% per cycle. With 10% margin for eddy current error added, the resulting degradation rate of 31% per cycle would not cause any tube left in service to exceed 100% through wall prior to the next inspection. The team determined this to be non-conservative, since it was based on the mean pitting value (some of the tubes which were removed and had the actual pit depth measured in excess of 90%); but it also allowed a potential for a full tube penetration at the end of the cycle. Although this condition would have not impacted the structural integrity of the heat exchanger; the through wall leak would allow the impurities from the service water to be transported to the clean shell side. Degradation of the shell side water quality could further exacerbate the ability of the heat exchanger to perform its safety related function.

To support the operability of plugging 38 tubes, the licensee performed cleaning of the remaining heat exchanger tubes; established a new acceptance criterion for the heat exchanger performance testing based on a maximum allowed fouling as a function of the number of tubes left in service; and increased the testing frequency from quarterly to monthly. Additionally, the licensee had performed metallurgical testing in order to establish the reason for the tube degradation and is planning to re-tube this heat exchanger. However, the team's review of this acceptance criterion identified the following non-conservative assumptions: (1) the maximum allowed base line fouling; (2) the minimum base line IC (shell side) flow rate; and (3) the minimum base line service water (tube side) flow rate.

The maximum allowed base line fouling was derived by averaging end of the cycle fouling values from the previous tests. The end of the cycle fouling depends on a number of environmental factors which cannot be controlled or predicted. Furthermore, the data set was very small containing only 4 data points with the maximum value (0.003743) more than double of the minimum value (0.001782). Therefore, use of an averaged value instead of a maximum value was non-conservative.

The as tested fouling value is used to determine if the heat exchanger will be able to reject the design basis heat load (duty) at the limiting design basis conditions. However, both the shell side and the tube side flow rates used to evaluate the design duty were not conservative. The minimum shell side flow was assumed to be 800 gpm and was based on the initial EDG vendor data. The IC pump which provides the motive force for the shell side flow is not in the surveillance and testing program; thus its degradation as a result of approximately 30 years of operation is unknown. Additionally, in 1982 in response to Part 21 Report the seals on the TCVs were removed; this led to decrease of the flow to the shell side of the HX. Therefore, the minimum shell flow assumption of 800 gpm is non-conservative. The minimum tube side flow rate was assumed to be 900 gpm; since this flow rate had not been adjusted for the allowable pump degradation was non-conservative.

During the inspection the licensee provided information based on recent heat exchanger performance testing which indicated a substantial margin between the required and the maximum allowed fouling due in part to the March 2006 cleaning of the heat exchanger. Hence, the heat exchanger was presently operable. Also the licensee is currently testing this heat exchanger on a monthly basis which should provide sufficient trend data to assure its continued operability. Additionally, the licensee initiated CER C-06-2035 with corrective actions to establish tube plugging criteria per EPRI Guide TR-108009 and to reconstitute the design basis limiting conditions for all three EDG heat exchangers.

Analysis: Failure to establish appropriate acceptance criteria for EDG intercooler wall tube thickness and performance testing to ensure the design base limiting conditions are not exceeded is identified as a performance deficiency. The finding is more than minor because it impacts the mitigating cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences and is associated with the cornerstone attribute of procedure quality. This finding is of very low safety significance (Green) because the licensee was able to provide adequate information to support that the EDGs were presently operable based on the fact that the affected HX was recently cleaned; the latest intercooler performance results indicated substantial heat exchanger duty margin; and monthly trending of the heat exchanger performance.

Enforcement: 10 CFR 50 Appendix B, Criterion III, Design Control, requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into procedures and instructions and includes the delineation of acceptance criteria for inspection and tests of safety systems and components. Contrary to the above, measures were not established to assure that the design basis was correctly translated into the EDG intercooler performance test procedure, PTP-213.002, acceptance criteria, in that the design basis limiting condition which established the criteria assumed flows that did not account for degradation from original values and selected the base fouling factor from an average of past conditions rather that the worst case condition. Subsequently, the established test acceptance criteria did not assure that the intercooler performance would not degrade below design basis limiting conditions before being identified and corrected. Additionally, acceptance criteria for tube wall pitting did not assure that through wall pitting would not occur with potential to degrade the heat removal capability of the cooler. Because this failure to comply with 10 CFR 50, Appendix B, Criterion III, is of very low safety significance and has been entered into the licensee's corrective action program, as CER C-06-2035, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000395/2006-08-03, Inadequate Acceptance Criteria for EDG Intercooler Performance Testing.

.2.9 RHR Suction MOV from RWST (XVG08809-SI)

a. Inspection Scope

The team reviewed MOV calculations for the RHR pump RWST suction valves A/B to verify that appropriate normal and accident system parameters, including accident pressure and degraded voltage were used as design input for motor actuator set point determinations, motor sizing, and MOV testing acceptance criteria. Test results, maintenance and corrective action histories were reviewed to determine if performance or margin degradation was identified and addressed. MOV calculations and related testing documentation were reviewed to ensure that valve performance was verified for anticipated maximum operating pressure conditions and to verify that appropriate torque switch settings were maintained. The team also reviewed the elementary and schematic diagrams to verify that the provided provisions and interlocks satisfied the logic presented in the design basis documentation. This review included verification that the TOL function would be bypassed if an SI signal was initiated.

b. Findings

No findings of significance were identified.

.2.10 RHR Heat Exchangers (XHE0005A/B)

a. Inspection Scope

The team reviewed the heat exchanger specification information, design basis information and supporting calculations to identify the heat removal requirements for the RHR heat exchangers. This included the tube plugging limits, basis for the limits and the number of tubes presently plugged. The maintenance, inspection, and performance testing were reviewed to verify the capability of the heat exchangers to remove the design heat load and the adequacy of flow testing for both the shell side and tube side of the heat exchangers.

b. Findings

No findings of significance were identified.

.2.11 Instrument Air to Containment Isolation Air Operated Valve (AOV) (XVA02659-IA)

a. Inspection Scope

The team reviewed the design and maintenance documentation for this AOV to verify it was capable to perform its safety related active function - isolate instrument air to containment. Maintenance, modification, and corrective action history of the AOV was reviewed to verify that component degradation would be identified.

The team reviewed AOV calculations which established the maximum expected differential pressure and surveillance procedures which implemented testing of this valve to assure that it can close under the accident conditions.

b. Findings

No findings of significance were identified.

.2.12 Charging Pump Discharge MOV to RCS Cold Leg (XVG08885-SI)

a. Inspection Scope

The team reviewed the MOV calculations and testing results for the charging pump discharge MOV to verify that appropriate design basis event conditions and degraded voltage conditions were used as inputs into the motor actuator set points and motor actuator sizing. MOV calculations and related testing documentation were reviewed to determine if valve performance was verified for anticipated maximum operating pressure conditions and to determine if appropriate torque switch settings were maintained. Additionally, MOV test plans, “as left” test data, and valve margin calculation results were reviewed to verify acceptance criteria were met and performance degradation would be identified.

b. Findings

No findings of significance were identified.

.2.13 EDG & Emergency Switchgear Rooms Temperature Indication and Alarm Instrumentation

a. Inspection Scope

The team reviewed the temperature instrumentation installed in the EDG and switchgear rooms for its ability to provide accurate indication of the space temperatures and provide appropriate alarm notifications. The installed sensing instrumentation was reviewed to determine if the installation was consistent with vendor recommendations and design assumptions. The installations were inspected during plant walk downs to determine if the sensors were acceptably positioned. Test and calibration documentation was also reviewed to verify that the instrumentation function was being appropriately maintained.

b. Findings

No findings of significance were identified.

.2.14 EDG Diesel Electronic Control System

a. Inspection Scope

The team reviewed the electrical control schematics for the EDG start circuit to confirm the capability to actuate the air system to start the diesels within the time period required by Technical Specifications (TS). This included review of the start logic to confirm that all of the potential start signals were incorporated into the circuitry and were consistent with the current design basis documentation. The team also reviewed the ability to flash the generator field and performed an independent calculation to verify the adequacy of the ampacity of the electrical cables used to provide battery voltage for field flashing power to the generators.

The team's review of the 125 Volt dc batteries included an evaluation of previous test results to verify the ability of the batteries to provide sufficient voltage at the end of the design coping time for functions such as EDG field flashing and circuit breaker actuations. The team performed a visual inspection of the 125 Volt dc batteries to assess the material condition and evaluate any potential personnel or equipment hazards.

In addition, the team evaluated the ability of the portable cart mounted battery bank to locally flash the EDG field if the 125 Volt dc system was not available. The evaluation included the review of the design calculations, initial testing of the battery and its charging system, the procedures for utilizing the system. The team participated in discussions with electrical maintenance personnel and performed physical examinations of the equipment.

b. Findings

No findings of significance were identified.

.2.15 Volume Control Tank (VCT) Level Indication

a. Inspection Scope

The team reviewed the VCT level instrumentation to determine if the provisions presented in the design basis documents had been incorporated into the circuitry. The team reviewed the design basis for establishing the set point for automatic switchover from the VCT to the refueling water storage tank (RWST) for the charging pump suction to assure that the provisions adequately accounted for charging pump NPSH and vortex considerations. The team reviewed component and impulse tubing isometric drawings, loop diagrams, and schematic diagrams to verify that the set point calculations included scaling, uncertainty and drift considerations. The team also reviewed the logic functional testing for the switchover function and reviewed test results. The calibration results were reviewed to verify set point accuracy was maintained.

b. Findings

No findings of significance were identified.

.2.16 Turbine Driven Feedwater Pump Control Instrumentation

a. Inspection Scope

The team reviewed the design and testing of the turbine driven emergency feedwater (TDEFW) pump control instrumentation to verify its ability to start the pump as required for accident mitigation. The electrical control schematics were reviewed to verify that the start logic was consistent with the design bases requirements. The installed configuration was inspected to determine if it was consistent with the design documentation; to identify any observable material degradation of components; and identify potential adverse interaction of components with adjacent equipment. The team reviewed the pump's start circuitry to verify that no electrical power supply or instrument air was required to initiate operation of the TDEFW pump. The team also evaluated the potential effects of elevated temperatures resulting from turbine operation on the electrical controls and indication components.

The team reviewed the steam supply configuration for the TDEFW pump turbine and the capability of the provided backup air supply (accumulator) to maintain the main steam valve closed. The review evaluated the installed piping configuration, proper system test alignment, and the results of the accumulator check valve leak tests.

b. Findings

No findings of significance were identified.

.2.17 Reactor Vessel Level Indication Instrumentation (RVLIS)

a. Inspection Scope

The team reviewed the RVLIS to ensure that all of the provisions presented in the UFSAR and Design Basis Documents had been properly incorporated. The team evaluated the ranges and compensation of the three level indicating circuits including the ratings of the components and their documented, installed locations as well as impulse and capillary tubing routing. The team reviewed scaling information to verify that the relative installation elevations had been considered. The team also reviewed the calibration procedures for the various sensing and signal processing components that were installed in the system to verify that uncertainty and drift had been included.

b. Findings

No findings of significance were identified.

.3 Review of Low Margin Operator Actions

a. Inspection Scope

The team performed a margin assessment and detailed review of fiveof 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 (JPM) results. For the selected components and operator actions, the team performed an assessment of the Emergency Operating Procedures (EOPs), Abnormal Operating Procedures (AOPs), Annunciator Response Procedures (ARPs), 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 reviewed:

- Recovery of Offsite Power
- Manual TDEFW Pump Operation
- Termination of SI on Steam Line Break
- Gravity Feed from RWST to RCS on Loss of RHR.
- Mitigation of Intersystem LOCA

b. Findings

No findings of significance were identified.

.4 Review of Industry Operating Experience

a. Inspection Scope

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

Westinghouse Safety Advisory Letter NSAL 04-07, Containment sump line fluid inventory ©-04-3724)
Westinghouse NSAL 05-03, CCP runout during safety injection
OE 20979/OE 19931, RHR pump suction piping air accumulation during pump Op runs using min re-circulation flow sub system ©-05-3474)
C-06-1133, MOV calculations do not support the ability to realign an operating RHR train to ECCS injection
OE 18296, EDG failed to manually start due to failed relay ©-04-1592)
OE 20884, Potentially Unanalyzed Scenario for SBLOCA - McGuire 4/28/05

b. Findings

No findings of significance were identified.

.5 Review of Permanent Plant Modifications

a. Inspection Scope

The team 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 team 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:

ECR 50485, Relocate Temperature Switch ITS09717B-VL
ECR 50176, Diesel Generator Fuel Oil Strainer DPI Sensing Line Redesign

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4AO6 Meetings, Including Exit

Exit Meeting Summary

On June 23, 2006, the team presented the inspection results to Mr. Archie, Vice President Nuclear Operations, and other members of the licensee staff. The team returned all proprietary information examined to the licensee. No proprietary information is documented in the report.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee
J. Archie, Vice President Nuclear Operations
A. Cribb, Supervisor, Nuclear Licensing
L. Cunningham, Supervisor, Quality Assurance
M. Findlay, Manager, Nuclear Protection Services
M. Fowlkes, General Manager, Engineering Services
D. Gatlin, General Manager, Nuclear Plant Operations
D. Lavigne, General Manager, Operational Effectiveness
G. Moffit, Manager, Nuclear Operations Training
K. Nettles, General Manager, Nuclear Support Services
B. Stokes, Manager, Design Engineering
W. Stuart, Manager, Plant Support Engineering
R. Sweet, Manager, Licensing

NRC
K. Landis, Chief, Branch 5, Division of Reactor Projects, Region II
J. Zeiler, Senior Resident Inspector
M. Cain, Resident Inspector

ITEMS OPENED, CLOSED, AND DISCUSSED

Open/Closed

NCV 05000395/2006-08-01	NCV	Failure to Identify the SBLOCA Most Limiting Condition for Verification of RHR MOV Operability (1R21.2.2)
NCV 05000395/2006-08-02	NCV	Deficient Extent of Condition Review for EDG B Lube Oil TCV Malfunction (1R21.2.8)
NCV 05000395/2006-08-03	NCV	Inadequate Acceptance Criteria for EDG Intercooler Performance Testing (1R21.2.8)

Attachment

DOCUMENTS REVIEWED

Calculations

DC0152A-031, Determination of the Limiting Line Pressure and Maximum Expected Differential Pressure for Air-Operated Valves: XVA02659-IA & XVT02660IA, Rev. 0
DC0152A-032, KVAP Analysis for Air-Operated Valves XVA02659-IA & XVT02660IA, Rev. 0
DC00040-077, Design Basis Time lines for Completing Transition from Injection to Re-circulation Phase During a LOCA, Rev. 3
DC01520-047, Maximum Differential Pressures for RH System MOV Operators, Rev. 2
DC01520-049, Maximum Differential Pressures for Safety Injection System MOV Operators, Rev. 5
DC01520-053, Minimum Required Thrust for Rising Stem MOV's in the RH, Rev. 8
DC01520-059, Minimum Required Thrust for Rising Stem MOV's in the Safety Injection System, Rev. 9
DC01520-067, Design Requirement and Capability of Rising Stem MOV's in the CS, RH, and SI System, Rev. 14
DC04390-008, RHR Flow IFE00605 Scaling for ECR-50079 RHR Pump Curve Test, Rev. 1
DC04410-001, Calculations to Support ECCS Flow Balancing, Rev. 5
DC04410-009, ECCS Flow Model Inputs, Rev. 1
1-OSP-SI-002, Rev. 3 - OTO1, Charging Pump Head Curve Verification, Performed 11/06/04 and 05/11/03
DC 01520-069, MOV Thermal Overload Relay Evaluation, Rev. 0
DC 08040-012, Low Voltage Switchgear Coordination Appendix D, dated 4/4/94
DC 09620-025, Volume Control Tank Level Instrumentation Uncertainties and Setpoints, Rev. 0
DC01520-049, Maximum Differential Pressure for SI System MOV Operation, Rev. 5
DC01520-042, Maximum Differential Pressure for CVCS System MOV Operation, Rev. 5
DC01520-067, Review and Capability of Rising Stem MOV's in the CS, RH, and SI System, Rev. 14
DC00040-077, Operator Time lines for Switch From RWST Injection to Recirculation, Rev. 3
DC01520-047, Minimum Differential Pressures for RH System Operation, Rev. 2
DC01520-053, Minimum Required Thrust for Rising Stem MOVs in the RH System, Rev. 8

Operating Procedures

SAP-207A, Development of Emergency Operating Procedures, Rev. 4
OAP-103.2, Emergency Operating Procedure Setpoint Document, Rev. 0
OAP-101.2, Development of Abnormal Operating Procedures, Rev. 1
OAP-103.4, EOP/AOP User's Guide, Rev. 0
OAP-101.3, Timeline Validation of Required Operator Actions, Rev. 0
AOP-102.2, Loss of Charging, Rev. 0
AOP-304.3, Loss of all Balance of Plant Buses, Rev. 3
AOP-101.1, Loss of Reactor Coolant Not Requiring SI, Rev. 1
AOP-115.5, Loss of RHR with RCS Not Intact (Mode 5), Rev. 5
AOP-115.1, RHR Pump Vortexing, Rev. 4
AOP-600.1, Control Room Evacuation , Rev. 2
AOP-101.2, Reactor Coolant Pump Seal Failure, Rev. 0

AOP-118.1, Total Loss of Component Cooling Water, Rev. 2
SOP-313, Local Switchgear Breaker Operations, Rev. 4
SOP-311, 125 VDC System, Rev. 12
SOP-302, 230 KV Substation, Rev. 13
SOP-211, Emergency Feedwater System, Rev. 13
SOP-101, Section G, Gravity Fill from the RWST, Rev. 26
SOP-101, Section II, Precautions, Rev. 26
SOP-101, Section III,A, Reactor Coolant Pump Startup, Rev. 26
SOP-101, Section III.P, Starting a RCP After Seal Injection Flow has been Terminated, Rev. 26
EOP-6.0, Loss of all ESF AC Power, Rev. 19
EOP-6.1, Loss of all ESF AC Power Recovery Without SI Required, Rev. 13
EOP-6.2, Loss of all ESF AC Power Recovery With SI Required, Rev. 11
EOP-2.5, LOCA Outside Containment, Rev. 7
EOP-2.0, Loss of Reactor or Secondary Coolant, Rev. 13
EOP-1.0, Reactor Trip/Safety Injection, Rev. 19
EOP-1.2, Safety Injection Termination, Rev. 14
EOP-12.0, Monitoring of Critical Safety Functions, Rev. 12
GOP, Appendix A, Generic Operating Precautions, Rev. 8
PSEG-08, Technical Support Center Duties, Appendix T, Rev. 10
EPP-027, Hostile action, Rev. 1
FEP-4.0, Control Room Evacuation Due to Fire, Rev. 3
ARP, RCP A#1 SL INJ FLO LO, Rev. 7
ARP, RCP A CCW FLO LO, Rev. 5

Maintenance Procedures

ARP-016, Panel XCP-6210-LCB5 Alarm Response, Rev. 1J
ARP-016, Panel XCP-6210-LCB6 Alarm Response, Rev. 1H
ARP-016, Panel XCP-6210-LCB7 Alarm Response, Rev. 1G
EMP-100.010, Emergency Field Flash of EDG, Rev. 0
EMP-115.040, Setup and Operation of DG Emergency Field Flash Battery Charger, Rev. 0
EMSI-NCN2928-1, Electrical Maintenance Special Instruction - Reduced Voltage Field Flash of EDG, Rev. 0
GMP-100.016, VCT Level Instruments Scaling Document, Rev. 0
GMP-100.016, VCT Pressure Instrument Scaling Document, Rev. 0
ICP-130.001, VCT Level Instrument LT112 Control, Rev. 4
ICP-130.002, VCT Pressure Instrument LT115 Control, Rev. 4
ICP-130.008, VCT Pressure Instrument Control, Rev. 4
IPC-130.008, VCT Pressure Instrument Control, Rev. 4A
IPC-240.129, Generic Temperature Switch Calibration, Rev. 5B
IPC-350.009, RHR Pump Differential Pressure Switch Calibration, Rev. 5
STP-120.006, Emergency Feedwater Valves Backup Air Supply Test, Rev. 7
STP-205.004, RHR Pump and Valve Operability Test, Rev. 6
STP-399.008, Reactor Vessel Level System Train A Calibration, Rev. 7
STP-501.001, Battery Weekly Test, Rev. 10
STP-501.002, Battery Quarterly Surveillance Test, Rev. 9
EMP-445.007, Baseline Testing of Motor Operated Valves With MOVATS System, Rev. 11

Test Procedures

STP-205.004 EPT-1801-01, RHR Pump and Valve Operability Test, Train A, Results for 03/16/06
STP-205.004 EPT-1801-01, RHR Pump and Valve Operability Test, Train B, Results for 03/16/06
PTP-213.002, Service Water System Heat Exchanger Data Collection, Rev. 3
EMP-445.007, Baseline Testing of Motor Operated Valves with Movats System, Rev. 11
ICP-240.169, Valve Diagnostic Procedure, Rev. 0
STP-230.006D, Charging Valve Operability Testing, Rev. 7
STP-130.005D, Charging and Alternate Spray Valve Operability Testing, Rev. 5
STP-230.007, RHR Pump and Check Valve Full Flow Test, Rev. 2
STP-230.006E, Closure Testing of XVC08926-SI, Rev. 7
STP-230.006C, ECCS RHR Valve Operability Testing, Rev. 9
STP-230.006A, ECCS/Charging Pump Operability Testing, Rev. 5
STP-215-008, SI and RH System Valve Leakage Test, Rev. 4
STP-130.005H, SI Valve Operability Testing, Rev. 6
GTP-302, In service Testing of Valves Third Ten Year Interval, Rev. 14
STP-205.004, RHR Pump Valve OPerability Test, Rev. 6

Design Changes/Modifications

ECR 50485, Relocate Temperature Switch ITS09717B-VL, Rev. 4
ECR 50176, Diesel Generator Fuel Oil Strainer DPI Sensing Line Redesign, Rev. 2
ECR-5016, Automatic Closure of the RWST Valves when the Sump Suction Valves are Open, 05/10/04.

Design Basis Documents

120 Volt Class 1E Vital AC Electrical System (EV), Rev. 2
125 Volt DC Electrical System (ED), Rev. 4
Diesel Generator Engine Support and Control Systems (DG), Rev. 7
Electrical Power System (ES) - Class 1E Portion, Rev. 5
Emergency Feedwater System (EF), Rev. 4
Instrument Air and Service Air Systems (IA), Rev. 2
Miscellaneous I&C (MI) - RVLIS Sections, Rev. 2
Reactor Cooling System (RC), Rev. 7

Condition Evaluation Report (CERs)

0-C-04-3724, Westinghouse Nuclear Safety Advisory Letter NSAL-04-7; Containment Sump Fluid Inventory
0-C-05-1588, Eddy Current Examination Reveals Multiple Pit Like Indications in Ten of the “B” Intercooler Heat Exchanger Tubes
0-C-05-3241, Potentially Unanalyzed Scenario for SBLOCA - McGuire Nuclear Station

0-C-05-3474, OE20979 - Update to OE19931 - Millstone 3: RHR Pump Suction Piping Air Accumulation During Pump Operation Runs Using the Minimum Recirculation Flow Sub-System
0-C-06-0064, XHE0017B-HE3 thermal performance has degraded and is at the administrative limits
0-C-06-0822, Westinghouse Nuclear Safety Advisory Letter NSAL-06-2; Refueling Water Air Entrainment
0-C-06-1091, Intercooler Heat Exchanger (XHE0017B-HE3) does not meet the Design Basis Limiting Conditions of ES-560.211 due to apparent fouling on the shell site of the component
0-C-06-1133, OE22268 - MOV Calculations Do Not Support the Ability to Realign an Operating RHR Train to ECCS Injection - Catawba Nuclear Station
0-C-06-1301, Thermal Performance of Lube Oil Heat Exchanger (XHE0017B-HE1) has provided indication that the Temperature Control Valve (ITV15400B-DG) may not be operating properly.
0-C-06-1537, Isolator I/O Cabinet AX 1EA Feeder Breaker, 5/6/06
0-C-06-1656, Isolator I/O Cabinet Channel AX, 5/18/06
0-C-06-1883, Battery Testing Discrepancy (incorrect “k” factor), 6/7/06

Drawings

D-302-011, Main Steam (Nuclear), Rev. 39
D-302-083, Feedwater (Nuclear), Rev. 51
D-302-85, Emergency Feedwater (Nuclear), Rev. 40
E-302-601, Reactor Coolant, Rev. 18
E-302-602, Reactor Coolant System, Rev. 26
D-302-612, Component Cooling System, Rev. 24
D-302-614, Component Cooling System to NSSS Pumps, Rev. 14
E-302-641, Residual Heat Removal, Rev. 19
D-302-651, Spent Fuel Cooling, Rev. 41
E-302-693, Safety Injection, Rev. 21
E-206-005, Plant Electrical Distribution, Rev. 20
D-302-651, Spent Fuel Cooling, Rev. 41
D-302-661, Reactor Building Spray System, Rev. 32
1MS-32-078, DG A Power Rectifier Diagram, Rev. 8
1MS-32-079, DG A Control Chassis Diagram, Rev. 4
1MS-32-086, DG A Exciter Interconnection Diagram, Rev. 17
1MS-32-104, Sheet 4, DG A Wiring Diagram, Rev. 15
1MS-32-104, Sheet 7, DG A Wiring Diagram, Rev. 19
1MS-32-104, Sheet 8, DG A Wiring Diagram, Rev. 19
1MS-32-138, DG B Turbopak Schematic, Rev. 2
1MS-32-140, DG B Exciter Interconnection Diagram, Rev. 17
1MS-32-141, Sheet 4, DG B Wiring Diagram, Rev. 4
1MS-32-141, Sheet 7, DG B Wiring Diagram, Rev. 1
1MS-32-141, Sheet 8, DG B Wiring Diagram, Rev. 3
1MS-51-556, Reactor Vessel Water Level Installation Schematic, Rev. 10
1MS-51-572, Reactor Vessel Level System Process Block Diagrams, Rev. 2
1MS-51-682, RVLIS Capillary Schematic with Pressure Transmitter, Rev. 3

B-208-004, Sheet 164, DG B Room Supply Fan A Schematic, Page A, Rev. 6
B-208-004, Sheet 164, DG B Room Supply Fan A Schematic, Page B, Rev. 5
B-208-004, Sheet 164, DG B Room Supply Fan B Schematic, Page A, Rev. 8
B-208-004, Sheet 164, DG B Room Supply Fan B Schematic, Page A, Rev. 7
B-208-004, Sheet 170, HVAC Annun. Alarm Inputs Schematic, Rev. 7
B-208-021, Sheet 5, Charging Pump A Elementary Diagram, Page A, Rev. 8
B-208-021, Sheet 5, Charging Pump A Elementary Diagram, Page B, Rev. 8
B-208-021, Sheet 8, Charging Pump C Elementary Diagram, Page A, Rev. 11
B-208-021, Sheet 8, Charging Pump C Elementary Diagram, Page B, Rev. 10
B-208-021, Sheet 8, Charging Pump C Elementary Diagram, Page C, Rev. 10
B-208-021, Sheet 26, Charging Pump Discharge Header Isolation Valve Elementary Diagram, Rev. 9
B-209-328, Sheet 3, 'TR' Device Wiring Diagram, Rev. 0
B-209-329, Sheet 1, Local Relay Panel for DG B Wiring Diagram, Rev. 8
B-209-329, Sheet 2, Local Relay Panel for DG B Wiring Diagram, Rev. 6
B-229-054, Electrical One Line Diagram - 230 kV Substation, Rev. 7
B-814-067, Reactor Vessel Level Instrument Diagram, Rev. 4
D-302-085, EFW Flow Diagram, Rev. 40
D-912-134, Diesel Generator Areas Vent System Diagram, Rev. 11
D-912-157, ESF Switchgear Room Cooling Systems Diagram, Rev. 12
VCS-IFT03525-EF, Instrument Loop Diagram - TDEFW Flow, Rev. 1
VCS-IFT03531-EF, Instrument Loop Diagram - EFW to SG A Flow, Train B, Rev. 3
VCS-IFT03561-EF, Instrument Loop Diagram - EFW to SG A Flow, Rev. 3
VCS-IFT03561A-EF, Instrument Loop Diagram - EFW to SG A Flow, Train B, Rev. 1
VCS-IFT03563-EF, Instrument Loop Diagram - EFW to SG A Pressure, Rev. 1
VCS-1LT00112-CS, VCT Level Instrument Loop Diagram, Rev. 2
VCS-1LT00115-CS, Sheet 1, VCT Level Instrument Loop Diagram, Rev. 2
VCS-1LT00115-CS, Sheet 2, VCT Level Instrument Loop Diagram, Rev. 2
VCS-1LT01310-RC, Reactor Vessel Upper Plenum Level Instrument Loop Diagram, Rev. 4
VCS-1LT01311-RC, Reactor Vessel Narrow Range Water Level Instrumentation Loop Diagram, Rev. 3
VCS-1LT01312-RC, Reactor Vessel Wide Range Water Level Instrument Diagram, Rev. 4
VCS-1PT000117-CS, VCT Pressure Instrument Loop Diagram, Rev. 4
E-302-675, Chemical and Volume Control, Rev. 24
E-302-691, Safety Injection, Rev. 12
E-302-692, Safety Injection, Rev. 12

Miscellaneous Documents

JPP-12B, Locally Start "B" Emergency D/G During a Loss of Offsite Power, Rev. 8
JPP-012A, Locally Start "A" Emergency D/G During a Loss of Offsite Power, Rev. 0
JPS-025, Start and Load "B" Emergency Diesel Generator, Rev. 5
JPP-063A, Locally Operate a 7.2 KV Breaker, Rev. 2
JPP-068, Reset the Turbine Driven Emergency Feed Pump, Rev. 4
JPP-171A, Isolate Emergency Feedwater Flow to Faulted Steam Generator "A", Rev. 1
JPP-021, Locally Control EFW Flow, Rev. 7
JPS-042, Identify and Isolate RCS Leak to CCW, Rev. 6

JPS-082, Align the Idle RHR Loop to the RWST (AOP 115.1), Rev. 3
JPS-062, Respond to RHR Pump Vortexing, Rev. 7
JPS-064, Transfer RB Sump Water to the RWST (AOP-115.5), Rev. 4
JPP-066, Locally Isolate RCP Seals During a Total Loss of ESF Power, Rev. 5
JPS-013, Respond to RCP #1 Seal Failure, Rev. 6
JPP-055NRC, Locally Start the Turbine Driven Emergency Feedwater Pump and Throttle Emergency Feedwater Flow as Directed, Rev. 0
TS-12, Theory of Normal Transients and Selected Abnormal Transients, Rev. 4
TS-16, System Response to Selected Accident Conditions, Rev. 4
AB-9, Introduction to Engineered Safety Features, Rev. 6
SB-9, Electrical Breakers, Rev. 1
SG-1, Service Power System, Rev. 12
SG-12, Switchyard and Substation, Rev. 9
SG-2, Safeguards Power, Rev. 11
AB-7, Residual Heat Removal System, Rev. 16
EP-1, Introduction to Emergency Operating Procedures, Rev. 2
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LOR-ST-201, 100% Power, MOL, Manual Gen Voltage Control, Gen Trip, Degraded Voltage, Loss of Grid, Rev. 0
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LOR-SA-001, 100% Power, MOL, NI-43 FL, PT-475FL, Stator Water Runback, SGTR, Rev. 2
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EOP-6.1, Rev.13, Loss of all ESF AC Power Recovery Without SI Required Lesson Plan, Rev. 13
SAP-999, Corrective Action Procedure, Rev. 1
TR04620-001, Engineering Services Technical Report, Hydraulic Study of RWST for Vortexing, 03/13/00
TR04650-001, Engineering Services Technical Report, Model Study of Reactor Containment Sump Flow Characteristic, 08/30/00
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1MS-94B-750, Colt Diesel Generator No. 13-206152, Rev. 19
1MS-94B-839, Barton Model 752 Differential Pressure Transmitter, Rev. 0
1MS-94B-1253, C&D Batteries Manual No. 12-800, Rev. 2

CERs initiated or revised due to CDBI activity:

0-C-06-2035 Design Eng. to establish tube plugging criteria per EPRI Guide TR-108009 and reconstitute design basis limiting condition for all three EDG heat exchangers.
0-C-06-2034, Add action to CER 06-1301 to address past operability on EDG B when failure analysis of lube oil TCV is completed.
0-C-06-2036, 10 CFR 50.59 screening and evaluation for RWST automatic switch over contains multiple programmatic and technical errors.
0-C-06-2033, FSAR statement concerning the limiting single failure for RWST to Recirculation sump switch over for cold leg recirculation is inaccurate.
0-C-06-2030, FSAR revision notice for ECR 50316 not initiated although modification is installed.
0-C-02-2106, IN 97-90, Use of Non-conservative Acceptance Criteria in SR Pump Surveillance Tests, - revised to include impact of allowed EDG frequency and voltage variation on RH and SI pumps.
0-C-06-1301, Thermal performance of EDG B lube oil cooler indicates TCV malfunction - revised to add action item to review past operability
0-C-06-2022, The RWST time line calculation, DC 00040-077, does not address single failure of the solid state protection system logic train resulting in a single train of RH and Containment spray sump MOVs not opening on demand.
0-C-06-1746, Design engineering investigating possible existence of gas void in RHR system.
0-C-06-1883, Incorrect temperature correction factor used in STP-501004, STTS 0401737, Battery Discharge Test.
0-C-06-1812, Drawing discrepancy on vender drawings 1-MS-32-140 and 1-MS-32-086.
0-C-06-2041, Technical deficiencies noted in VCS evaluation for CER 05-3241 for OE20884 related to unanalyzed MOV design condition for SBLOCA