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

March 14, 2003

Duke Energy Corporation
ATTN: Mr. G. R. Peterson
Site Vice President
Catawba Site
4800 Concord Road
York, SC 29745-9635

SUBJECT: CATAWBA NUCLEAR STATION - NRC INSPECTION REPORT 50-413/02-08 AND 50-414/02-08

Dear Mr. Peterson:

On January 31, 2003, the NRC completed a safety system design and performance capability inspection at your Catawba Nuclear Station Units 1 and 2. The enclosed report documents the inspection findings which were discussed on January 30, 2003, with Mr. M. Glover and other members of your staff. These results were also discussed with Mr. M. Glover and other members of your staff on March 13, 2003.

This inspection was an examination of 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 operating license. Within these areas, this inspection involved selected examination of procedures and representative records, observations of activities, and interviews with personnel.

This report documents one finding related to the adequacy of component cooling water system engineering calculations as an unresolved item. This issue did not present an immediate safety concern, but has potential safety significance greater than very low significance and will be inspected further. In addition, the NRC has identified an issue that was evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that a violation is associated with this issue. However, because of its very low safety significance and because it has been entered into your corrective action program, the NRC is treating this finding as a non-cited violation, consistent with Section VI.A of the Enforcement Policy. If you deny this non-cited violation, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-001, with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-001; and the NRC Resident Inspector at your Catawba Nuclear Station.

An issue was also identified during this inspection concerning the methodology and assumptions used during your design basis reviews for determining the maximum differential pressures for motor operated valves (MOVs) required to be within the scope of Generic Letter (GL) 89-10 for your Catawba facility. Although this issue was not identified as a finding or violation of NRC requirements in the enclosed report, we are concerned that this methodology

would allow you to make changes to your GL 89-10 MOV program without the appropriate consideration of their impact on risk and/or incorporation in the site probabilistic risk analysis.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

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

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

Enclosure: NRC Inspection Report 50-413,414/02-08
(with Appendix of documents reviewed)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-413, 50-414
License Nos.:	NPF-35, NPF-52
Report Nos.:	50-413/02-08, 50-414/02-08
Licensee:	Duke Energy Corporation (DEC)
Facility:	Catawba Nuclear Station, Units 1 & 2
Location:	4800 Concord Road York, SC 29745
Dates:	January 6 - 10, 2003 January 27 - 31, 2003
Lead Inspector:	J. Lenahan, Senior Reactor Inspector
Team:	T. Morrissey, Resident Inspector, Vogtle N. Merriweather, Senior Reactor Inspector M. Thomas, Senior Reactor Inspector C. Barron, P.E., Mechanical Engineer (Contractor)
Approved by:	Charles R. Ogle, Chief Engineering Branch 1 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000413-02-08, IR 05000414-02-08; Duke Power Company; on 1/6 - 10/03 and 1/27 - 31/03; Catawba Nuclear Station; Safety System Design and Performance Capability Inspection.

This inspection was conducted by a team of regional and resident inspectors. One green finding with a related non-cited violation and one finding with significance yet to be determined were identified during this inspection. The significance of most inspection 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 Oversite Process,” Rev. 3, dated July 2000.

Inspector Identified Findings

Cornerstone: Mitigating Systems

- Green. The team identified deficiencies related to the control and quality of design basis engineering calculations. Specific examples of inadequate design calculations included failure to use appropriate and/or current calculation inputs, out of date active design calculations, and the failure to incorporate design changes into the existing design calculations.

  A non-cited violation of 10 CFR 50, Appendix B, Criterion III, “Design Control,” and 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” was identified for inadequate control of design calculations. This finding adversely affects the design control attribute of the mitigating systems cornerstone and is greater than minor because there were multiple examples of Type II calculation deficiencies that were significant enough to require revision of several design calculations to ensure the component cooling water system met design criteria. This finding is of very low safety significance because the resulting design calculation revisions did not show that the component cooling water system was operating outside of it’s design criteria. (Section 1R21.231 b)

Cornerstone: Barrier Integrity

- TBD. A failure to adequately document component cooling relief valve sizing, component cooling containment isolation valve closure capability, and the basis for not considering the reactor coolant pump thermal barrier rupture as a design basis event in design documents was identified.

  This finding is unresolved pending further technical evaluation by the licensee and completion of a significance determination by the NRC. This finding adversely affects the containment functionality design control attribute of the barrier integrity cornerstone. It affects the cornerstone objective and is greater than minor because the licensee’s calculations have not fully demonstrated that, in the event of a reactor coolant pump thermal barrier leak, the plant would perform as designed and licensed to prevent an intersystem loss of coolant accident or be able to achieve containment isolation. (Section 1R21.24 b)

Report Details

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems

1R21 Safety System Design and Performance Capability (71111.21)

This team inspection reviewed components and operator actions that would be used to prevent or mitigate the consequences of a loss of the component cooling water system. This inspection also covered supporting equipment, equipment which provides power to these components, and the associated instrumentation and controls. The loss of component cooling water is a risk-significant event as determined by the licensee's probabilistic risk assessment.

.1 System Needs

.11 Energy Sources

a. Inspection Scope

The team reviewed voltage calculation results and engineering information on normal operating grid voltages to verify that the minimum and maximum expected steady-state voltages on the safety-related 600 volt alternating current (Vac) motor control centers (MCCs) and 4160 Vac switchgear were acceptable for satisfactory operation of the component cooling water (KC) system pump motors and motor operated valves as specified by the equipment specifications. The team also reviewed 5 years of maintenance history on the 4160 Vac safety-related switchgear and breakers associated with the KC pump motors to verify that the equipment was being maintained in accordance with manufacturers' instructions and/or preventive maintenance procedures.

b. Findings

No findings of significance were identified.

.12 Instrumentation and Controls

a. Inspection Scope

The team reviewed elementary drawings, applicable setpoint documents, and calibration procedures for the process instrument channels used to measure KC surge tank level, KC supply header flow to reactor coolant pumps, KC heat exchanger inlet flow, KC minimum flow, and KC heat exchanger outlet temperature in order to verify that the range, accuracy, and setpoints of the instruments were in accordance with the design bases. The team reviewed the latest calibration test records to verify that the instruments had been calibrated in accordance with setpoint documents.

The team reviewed the control logic elementary drawings for KC system pump motors, motor operated valves, and air operated valves to verify that the logic design was consistent with the design basis documents. Specifically, the team reviewed the control

logic for the KC cross-over valves, residual heat removal (RHR) heat exchanger control valves, and KC to RHR heat exchanger supply isolation valves. The controls for the KC cross-over valves were reviewed to verify that the valves would close and provide KC train separation and isolation of all non-essential header loads upon receipt of either a Phase B containment isolation signal or safety injection signal coincident with a low refueling water storage tank level signal. The controls for the RHR heat exchanger control valves and the KC to RHR heat exchanger supply isolation valves were reviewed to verify that the valves would open on a safety injection or Phase B containment isolation signal. In addition, the team reviewed the elementary drawings depicting the design of the KC pump motor start logic to verify that all four pump motors would start on a safety injection signal in accordance with design basis documents.

The team also reviewed procedures and completed test results to verify that the testing performed adequately demonstrated that the controls and indicators, permissives, and interlocks for the pump motors and valves functioned properly and in accordance with design documents. The KC valves reviewed were 1KC1A, 1KC2B, 1KC3A, 1KC18B, 1KC50A, 1KC53B, 1KC230A, 1KC57A, and 1KC82.

b. Findings

No findings of significance were identified.

.13 Heat Removal

a. Inspection Scope

Component Cooling Water Heat Exchangers

The team reviewed design documentation, modifications, drawings, calculations, and test records to verify that KC heat exchangers were capable of removing the required heat load during normal operation and accident conditions. This review included the modifications and calculations associated with retubing two of the four KC heat exchangers with stainless steel tubes. This review also considered the increased maximum standby nuclear service water pond (SNSWP) temperature limit and the actual number of plugged KC heat exchanger tubes.

Charging Pump Cooling

The team reviewed the modification and calculations associated with the addition of a backup cooling water supply to the chemical and volume control (NV) system (charging system) Centrifugal Charging Pump 1A coolers. This review verified that, in the event of a loss of the KC system, the centrifugal charging pump would continue to operate for a limited amount of time required to establish a cooling water supply from the drinking water (YD) system, and that the YD system would provide adequate cooling water to support continued operation of the pump.

b. Findings

No findings of significance were identified.

.2 System Condition and Capability

.21 Installed Configuration

a. Inspection Scope

Mechanical Equipment

The team performed field walkdowns of accessible portions of the KC system and the associated support systems. Equipment examined included the KC pumps, KC heat exchangers, surge tanks, system valves, and piping. Walkdowns were also completed for equipment in the Safe Shutdown Facility (SSF) required to mitigate a loss of KC and NV system seal cooling for any reactor coolant (NC) pump. The field inspections were performed in order to assess material condition, to verify that the installed configurations were consistent with design drawings and to verify that the equipment alignment was consistent with design drawings and operating procedures. The accessibility of valves required to be manually operated was also evaluated by the team during these walkdowns. This included the valves required to align the backup cooling water supply to both Unit 1 and Unit 2 NV system Train A centrifugal charging pump coolers and the valves required to refill the KC surge tanks.

Electrical and Instrumentation

The team conducted walk down inspections of the instruments listed below to verify that they were properly located, installed, and identified in accordance with plant drawings. The team also assessed whether the instruments, conduits, and sensing lines were in good material condition with no visible signs of damage. The instruments examined were:

1KCFE5530	1KCPS5530	1KCTT6070
1KCFT5530	1KCPS5531	1KCTT6080
1KCP5530	1KCPS5540	1KCFE5540
1KCPS5541		

The team performed field walkdown inspections of 600 Vac MCC 1EMXJ to examine the breakers, fuses, contactors, and overload relays installed in compartments R02C, F07A, R03D, F08A, and F08B. These compartments provide control power for safety-related KC system motor operated valves 1KC002B, -18B, -53B, -81B, and -228B, respectively. The breakers, fuses, contactors, and overload relays were examined to verify that they were the correct type and size as specified on design output documents. The compartment internals were examined for signs of broken, frayed, or discolored electrical leads; heat or physical damage to components; and missing parts, dirt, and foreign materials inside the motor control center compartments.

b. Findings

No findings of significance were identified.

.22 Operations

a. Inspection Scope

The team evaluated the time critical operator actions associated with a loss of KC and alignment of the alternate cooling water source to the Train A NV Pump as specified in Procedure AP/1/A/5500/21, "Loss of Component Cooling," Rev. 30. The actions of the operators in the training simulator to a loss of component cooling were evaluated. The team, accompanied by a system operator, walked down the manual actions associated with placing the alternate NV cooling water supply in service to verify proper equipment/procedures were staged and the actions could be performed within the designated time.

The team reviewed the actions of SSF security officer in response to a loss of KC and NV cooling for any reactor coolant (NC) pump to verify that they could be completed in the allotted time. The team reviewed the training associated with the SSF security officer and interviewed several officers to determine whether the training was appropriate. The team also walked down the the surge tanks and piping to verify the accessibility of the manual valves required to refill a depleted surge tank. In addition, the team reviewed the impact of and operator actions associated with a loss of instrument air on the KC system to verify that adequate controls were in place for the RHR heat exchanger KC control valve to prevent KC pump operation at runout condition for a significant period of time.

b. Findings

No findings of significance were identified.

.23 Design

.231 Mechanical Design

a. Inspection Scope

KC Surge Tanks

The team reviewed the applicable drawings and design calculations to verify that the capacity of the KC system surge tanks was adequate to mitigate limited KC system pipe breaks and to ensure adequate net positive suction head (NPSH) for the KC pumps. In addition, drawings and calculations were reviewed to verify that a lo-lo water level in one of the KC surge tanks on either Unit 1 or 2 would result in automatic isolation to separate the redundant KC header on that unit from the header with the lo-lo surge tank level and ensure the availability of at least one of the essential KC headers.

KC System Design

The team reviewed design modifications, drawings, calculations, and test records associated with selected KC system design attributes to verify the following: system flow and heat removal capability; the capability of the system to withstand a single failure

without a loss of function; system overpressure protection; the capability of the system to withstand a loss of electrical power and instrument air; and the capability of the system to support normal and plant shutdown operation.

KC Pumps

The team reviewed design modifications, drawings, calculations, test records, and vendor information to verify: that the KC pumps were capable of delivering adequate flow to both units under normal, shutdown, transient, and accident conditions; that NPSH was adequate under all operating conditions; and that the pumps were provided with adequate minimum flow protection. In addition the team reviewed administrative controls to verify that minimum flow protection was considered for pumps affected by strong pump - weak pump interactions.

b. Findings

Introduction

The team identified a Green non-cited violation (NCV) for failure to adequately control and update design basis calculations for the KC system, as required by 10 CFR 50, Appendix B, Criterion III, “Design Control,” and 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings.”

Description

The team identified deficiencies related to the control and quality of design basis engineering calculations. These deficiencies included the failure to use appropriate and/or current calculation inputs and assumptions, the existence of out-of-date calculations of record, and the failure to update existing design calculations when needed due to plant modifications.

The following deficiencies were identified:

KC Pump Impeller Replacements Not Reflected in Calculations

The impellers in seven of the eight KC pumps had been replaced under work orders and/or modifications prior to this inspection. As of 1997, the impellers in five pumps (1A1, 1A2, 1B2, 2A1, and 2B1) had been replaced with refurbished original equipment manufacturer impellers, resulting in a slight increase in pump performance, that is, increased pump flow and efficiency. In 1997, modification CE-8884 was initiated to install new KC pump impellers from another manufacturer. When the first of these new impellers was installed in pump 1B1 in November 2000, the results of post-modification pump testing showed that the performance of pump 1B1 increased. It was determined through testing that pump 1B1 with the new impeller was more efficient (stronger) than the other installed KC pump (1B2) in Unit 1 Train B (Train 1B). The licensee initiated Problem Investigation Process (PIP) C-00-05862 at that time to address operability due to the potential for strong pump - weak pump interactions. Resolution of this PIP concluded that the pump was operable based on changes to operating procedures

which specified administrative actions to preclude strong pump - weak pump interactions. However, the impact of the change in pump performance on calculations or other plant documentation was not addressed in resolution and closeout of PIP C-00-05862. Pump 1B1 was in service with the stronger impeller at the time of the current inspection. In addition, during this inspection, installation of a new trimmed impeller in pump 2B2 resulted in pump 2B2 closely matching the performance of pump 2B1, thereby resolving the strong pump - weak pump interaction on Train 2B. Work orders have been issued to replace additional impellers, as required, to eliminate strong pump - weak pump interaction concerns on the remaining trains.

As a result of these impeller replacements, the maximum pump head and maximum power requirements of these pumps have been increased by various amounts. However, the team determined that calculations CNC-1223.23-00-0015, Rev. 7; CNC-1223.23-00-0041, Rev. 1, CNC-1223.23-00-0040 and CNC-1223.23-00-0045 were still based on the original KC pump performance curves. The team determined that the use of the original KC pump performance curves was non-conservative with regard to determining the maximum KC system pressure. However, the team reviewed these calculations and determined that the impact on the calculation results as a result of considering the revised pump performance of the modified pumps would be negligible and would not result in an operability concern.

In addition to the affected mechanical calculations, discussions with the licensee indicated that the increase in the maximum power requirements had not been included in the applicable electrical calculations. The licensee evaluated these calculations during this inspection and determined that this load change resulted in a reduction of margin, but did not result in any operability concerns.

Heat Load/Heat Transfer Calculations Not Based on Current Design Inputs

The licensee initiated a change to the plant Technical Specifications which increased the maximum allowable operating temperature for the standby nuclear service water pond (SNSWP) from 86.5 F to 91.5 F. In addition, heat exchangers were modified by changing the tube materials from brass to stainless steel in two KC heat exchangers, and by plugging tubes in the other KC heat exchangers. However, the effect of these changes were not incorporated into the design calculations. Examples of calculation deficiencies identified by the team were as follows:

- The design input in calculation CNC-1223.23-00-0012, “Component Cooling Heat Exchanger Verification,” Rev. 5, was based on a maximum SNSWP temperature of 86.5 F, which was less conservative than the Technical Specification limit of 91.5 F. An assumption in the calculation was that 220 KC heat exchanger tubes were plugged. This assumption was non-conservative in that it was less than the actual number of plugged tubes for two of the heat exchangers. In addition, out-of-date inputs from calculation CNC-1223.23-00-0022 were referenced in this calculation.

- The design input in calculation CNC-1223.24-00-0015, “Minimum Allowable RN Flow through the KC Heat Exchangers,” Rev. 1, was also based on a maximum SNSWP temperature of 86.5 F, which was less conservative than the Technical

Specification limit of 91.5 F. In addition this calculation referred to an out-of-date revision of CNC-1223.23-00-0026. However, the team did not find an instance where calculation CNC-1223.24-00-0015 used out-of-date design information from calculation CNC-1223.23-00-0026.

- Calculation CNC-1223.23-00-0022, "Component Cooling Heat Load and Flow Requirements," Rev. 9, used a maximum KC supply temperature of 120 F during shutdown conditions as a design input and referenced calculation CNC-1223.23-00-0012. However, revised calculations indicated the maximum KC supply temperature could exceed 120 F during shutdown conditions, which superseded the information in calculation CNC-1223.23-00-0012. In addition, calculation CNC-1223.23-00-0022 was based on post-LOCA recirculation heat loads from a 1979 Westinghouse letter, which was not consistent with the current accident analyses.

- Calculation CNC-1223.23-00-0015, "Component Cooling System Pressure and Temperature Design Verification," Rev. 7, included references to out-of-date revisions of calculations CNC-1223.23-00-0022 and CNC-1223.23-00-0012. As a result, Calculation CNC-1223.23-00-0015 used out-of-date, non-conservative data from calculation CNC-1223.23-00-0012. The use of an out-of-date revision of calculation CNC-1223.23-00-0022 did not affect calculation CNC-1223.23-00-0015. The calculation was also based on post-LOCA recirculation heat loads which were not consistent with the current accident analyses.

- Calculation CNC-1223.23-00-0011, "Component Cooling System Test Acceptance Criteria," Rev. 13, referred to out-of-date revisions of calculations CNC-1223.23-00-0022 and CNC-1223.23-00-0012. The use of an out-of-date revision of calculation CNC-1223.23-00-0012 resulted in non-conservative inputs to calculation CNC-1223.23-00-0011. In addition, calculation CNC-1223.23-00-0011 stated that the allowable cooling water flow rate to the centrifugal charging pump oil coolers was plus or minus 20 percent of the design value, with no supporting engineering evaluation.

- Calculation CNC-1223.23-00-0042, "Evaluation of Flow Balance of a KC Train in a Cross Train Alignment," Rev. 5, included references to out-of-date revisions of calculations CNC-1223.23-00-0022 and CNC-1223.23-00-0011. The team determined that some heat load and flow requirement values had been revised in later calculation revisions.

The requirements of the licensee's design control program were documented in Duke Power Engineering Directives Manual, EDM-101, "Engineering Calculations/ Analyses," Rev. 10. This procedure required that Type II calculations be reviewed and updated when pre-specified engineering/ design limitations would be exceeded, and required that these calculations be reviewed/ updated for each modification that exceeded the specification limits. The calculations discussed above were classified as Type II calculations. In response to these concerns, the licensee initiated PIPs C-03-00104 and C-03-00384. These PIPs included corrective actions to assess compliance with engineering processes and ensure that future impeller replacements would be correctly documented; to document the electrical load evaluation performed during this inspection

and update the affected diesel generator loading calculations; to review and revise all affected KC system calculations; to review and revise the UFSAR as required; to review and revise the KC System and service water (RN) design basis documents as required to incorporate the new pump curves and reference appropriate design changes; and to revise the KC pump head curve drawings to reflect as-installed performance.

Failure to Update Type I Design Calculations

The team reviewed the current revisions of the following Type I design calculations:

Calculation CNC-1144.29-02-0001, "Civil," Rev. 13, dated March 15, 2001
Calculation CNC-1381.06-00-0046, "Electrical," Rev. 14, dated August 21, 2000
Calculation CNC-1232.00-01-0001, "Mechanical," Rev. 8, dated March 27, 2002

A Type I calculation was defined by the licensee as a calculation which was reasonably expected to involve insignificant changes due to modifications, and had sufficient margin in the design so that the function of affected systems, structures, or components would not be impacted by a design change. Type I calculations were required to be periodically reviewed and updated on a pre-established frequency to verify that the design margin was being maintained and to determine when it was necessary to revise the calculations. The review schedules were documented in the Type I calculations listed above.

The requirements of the licensee's design control program were documented in Duke Power Engineering Directives Manual, EDM-101, "Engineering Calculations/ Analyses," Rev. 10. Procedure EDM-101 specified that the established frequency for review and update of the above listed Type I calculations was on an annual basis and required that the review should be completed no later than 30 days after the scheduled review date. The licensee initiated PIP C-03-00432 to address failure to review and update calculations CNC-1144.29-02-0001, "Civil," and CNC-1381.06-00-0046, "Electrical," at the established annual frequency. No operability concerns were identified due to this issue.

Although none of the specific deficiencies identified during this inspection resulted in immediate operability concerns, the team concluded that the KC system design basis was not being adequately controlled by the existing calculations.

Analysis

This finding represented a performance deficiency because it involved the licensee's failure to maintain design basis calculations. This finding adversely affects the design control attribute of the mitigating systems cornerstone and is greater than minor because there were multiple examples of Type II calculation deficiencies that were significant enough to require revision of several design calculations to ensure the KC system met design criteria. The failure to review and update the Type I civil and electrical calculations are additional examples of the licensee's failure to adequately maintain design basis calculations. Design basis calculations are routinely used in support of design changes, operating procedures, test acceptance criteria, and operability determinations. Failure to maintain the calculations current could result in

plant operation outside of the design and/or licensing bases if inaccurate information was used when making design changes, establishing limits in plant procedures or assessing system operability. Since this finding does not represent an actual loss of a safety function or screen as potentially risk significant due to a seismic, fire, flooding, or severe weather initiating event, the finding has very low safety significance (Green).

Enforcement

10 CFR 50, Appendix B, Criterion III, "Design Control," requires that measures be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Paragraph E.2.2 of Duke Power Engineering Directives Manual, EDM -101, "Engineering Calculations/ Analyses," Rev. 10, required that Type II calculations be reviewed and updated when pre-specified engineering/ design limitations would be exceeded, and required that these calculations must be reviewed/ updated for each modification that exceeded the specification limits. Contrary to the above, the design basis calculations associated with the KC system were not being adequately controlled to verify the adequacy of design in that several Type II design basis engineering calculations that were based on out-of-date design inputs which used either superseded KC pump performance curves, or incorrect maximum allowable service water temperatures. In addition, Appendix E of EDM-101 requires that calculations classified as Type I must be reviewed/ updated on a pre-established frequency. Contrary to this requirement, the licensee failed to review and update calculations CNC-1144.29-02-0001, "Civil," and CNC-1381.06-00-0046, "Electrical," at the established annual frequency.

The licensee entered these issues into the corrective action program as PIPs C-03-00104, C-03-0384 and C-03-00432. Because these issues have been entered into the licensee's corrective action program and are associated with inspection findings that are characterized by the significance determine process as having very low safety significance (Green), the violation is being treated as a non-cited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 50-413, 414/02-08-01, "Failure to Maintain Control of Design Calculations."

.232 Electrical Design

a. Inspection Scope

The team reviewed motor operated valve (MOV) calculations for several KC MOVs to verify that actuators were adequately sized for the application and to verify that the expected valve actuator output torques at minimum operating voltages were greater than the maximum torque requirements for the specific valve application. The

calculations reviewed included those for MOVs 1KC001A, 1KC002B, 1KC003A, 1KC018B, 1KC050A, 1KC053B, 1KC056A, 1KC081B, 1KC228B, and 1KC230A .

The team also reviewed Duke cable sizing criteria, KC pump run out calculations, and KC pump motor data sheets in order to verify that the KC pump motor and power cables were adequately sized for the application. The emergency diesel generator (EDG) loading analysis was reviewed to verify that under KC pump run out conditions the EDG would still have available margin to pick up the additional loading.

In addition, the team reviewed protective relay calibration procedures, and completed calibration test records to verify that the overcurrent relays for the Unit 1 KC pump motor breakers had been calibrated in accordance with the setpoints specified in the calibration procedures. The team also reviewed PIP C-02-03740, dated July 2, 2002, that described a discrepancy between the existing overcurrent setpoints in the calibration procedure and the latest revision of the setpoint calculation CNC-1381.05-00-0012, Rev. 10. The team reviewed this PIP and the setpoint calculation to verify that the existing overcurrent settings were still acceptable for system operation.

The team reviewed the design basis for sizing of the motor starters (i.e., contactors) used in the KC MOV circuits. Specifically, the team reviewed the product data sheet for the ac magnetic starters used in KC MOV circuits to verify that the starters had been adequately sized for the specific valve actuator motors used.

b. Findings

No findings of significance were identified.

.24 Testing

a. Inspection Scope

The team reviewed test procedures and results of completed surveillance tests and inspections of selected components to verify that the controls and interlocks for KC pump motors and MOVs were functioning properly in accordance with the design and to verify that components required for a loss of component cooling water were being tested to demonstrate operability. The team reviewed the engineered safeguards integrated test procedures and test results for Units 1 and 2 to verify that KC pump motors and MOVs functioned satisfactory in accordance with approved test procedures. Completed tests reviewed included Generic Letter (GL) 89-10 MOV differential pressure testing and inservice testing of KC pumps, MOVs, and check valves. Additionally, completed test and inspection results were reviewed to assess the licensee's actions to verify and maintain the safety function, reliability, and availability of the KC system. Test and inspection results were reviewed to verify that the results were consistent with design specifications and calculations, that test acceptance criteria and test results appropriately considered differences between testing conditions and design requirements during accident conditions, and that test and inspection results met established acceptance criteria. Components reviewed included the KC pumps and selected MOVs and check valves.

The team also reviewed the calibration records for several process instruments in the KC system to verify that the instruments were being calibrated in accordance with setpoint documents and calibration procedures. The procedures were reviewed to verify that the control logic was being tested in accordance with the design and licensing basis. The intervals between calibrations were reviewed to verify consistency with the calibration program and Technical Specifications. The instrument out of tolerance conditions were reviewed to verify that the licensee had properly identified and evaluated the conditions and taken or planned appropriate corrective actions. The last two completed calibration test records were reviewed to verify that negative trends in equipment performance were identified by the licensee's corrective action program.

The team reviewed Calculations CNC-1223.23-00-0015, "Component Cooling System Pressure and Temperature Design Verification," Rev. 7 and CNC-1223.23-00-0003, "Component Cooling System Safety Relief Valves," Rev. 7 to determine if the results and assumptions were consistent with KC system operation as described in the KC system design documents.

b. Findings

Introduction

A finding was identified in that the adequacy of relief valve sizing, KC system containment isolation valve closure capability, and basis for not considering a rupture of the reactor coolant pump thermal barrier as a design basis event were not clearly documented in the design documents. This is an unresolved item (URI) pending completion of the licensee's analysis of these issues, and further review by NRC to determine safety significance.

Description

The team questioned the evaluation of the maximum KC system pressure resulting from the postulated rupture of a reactor coolant pump thermal barrier. Calculation CNC-1223.23-00-0015, "Component Cooling System Pressure and Temperature Design Verification," Rev. 7, included a section to address this postulated event. The calculation appeared to be based on an assumed leakage of cold (liquid) water into the KC system with an open flow path from the thermal barrier to the KC system surge tank. However, it appeared that an actual thermal barrier rupture event could result in a two phase mixture of (liquid) water and steam entering the KC system. In addition, it appeared likely that the operators would close the KC system containment isolation valves so as to isolate the leakage inside containment. With the containment isolation valves closed, KC system relief valve 1(2)KC281 would be required to pass the leakage flow to prevent the KC piping from being overpressurized. Calculation CNC-1223.23-00-0015 did not address this scenario.

Calculation CNC-1223.23-00-0003, "Component Cooling System Safety Relief Valves," Rev. 7, addressed the required capacity of relief valve 1(2)KC281 without discussing the potential of two phase flow. In addition, the available vendor data for valve 1(2)KC281 did not address two phase flow capacity. The team also noted that the GL 89-10 motor operated valve setup for the associated KC system containment isolation valves,

1(2)KC424B and 1(2)KC425A, did not consider the maximum differential pressures associated with this postulated event. In response to team's questions, the licensee verified that these isolation valves were capable of closing with a differential pressure of 135 psid (corresponding to the setpoint of relief valve 1(2)KC281).

The licensee addressed these concerns in PIP C-03-00384, corrective action No. 6. This PIP addressed evaluation of the two phase flow capacity of relief valve 1(2)KC281 and the revision of calculations CNC-1223.23-00-0015 and CNC-1223.23-00-0003 to document this evaluation. The PIP also stated that engineering should evaluate the GL 89-10 operating parameters of KC system containment isolation valves 1(2)KC424B and 1(2)KC425A, documented in calculation CNC-1223.23-00-0040.

In addition, during this inspection, the team questioned the licensee's methodology and assumptions used during the design basis reviews for determining the maximum differential pressures for MOVs required to be within the scope of GL 89-10 for the Catawba facility. Licensee personnel indicated that the differential pressures for the MOVs in the GL 89-10 program were based on the assumption that safety-related MOVs only need to be sized and set to respond to those specific events discussed in Chapter 15 of the Updated Final Safety Analysis Report (UFSAR). The team noted that this assumption was not consistent with the guidance in the generic letter, in that, the generic letter did not limit the design basis reviews to only UFSAR Chapter 15 events. Recommended action (a.) of GL 89-10 requested that, for each MOV in the program, licensees determine the maximum differential pressure expected during both normal operations and abnormal events included in the existing approved design basis. The team further noted that, although UFSAR Chapter 15 is one source of information, it is not the only source (nor may it be the most limiting source) of information to be used in determining the maximum differential pressures during the design basis reviews for sizing and setting safety-related MOVs. Although this issue was not identified as a finding or violation of NRC requirements, the team expressed concern that this methodology could result in the licensee making changes to the MOV program without the appropriate consideration of their impact on risk and/or incorporation in the site probabilistic risk analysis.

Analysis

This finding represented a performance deficiency because it involved the licensee's failure to develop comprehensive calculations. This finding adversely affects the containment functionality design control attribute of the barrier integrity cornerstone. It affects the cornerstone objective and is greater than minor because the licensee's calculations have not fully demonstrated that, in the event of a reactor coolant pump thermal barrier leak, the plant would perform as designed and licensed to prevent an intersystem loss of coolant accident or be able to achieve containment isolation. Potential impacts were identified in piping design pressures and temperatures; pipe hanger design margins, relief valve capacity, and KC system containment isolation valve closing torque.

Enforcement

10 CFR 50, Appendix B, Criterion III, “Design Control” states, in part, “Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions.” The failure of the licensee’s design control program to demonstrate the adequacy of relief valve sizing, component cooling containment isolation valve closure capability, and basis for not considering the reactor coolant valve thermal barrier rupture as a design basis event in the system design documents is considered an unresolved item (URI). Pending completion of the licensee’s analysis of these issues and further review by the NRC to determine the safety significance, this finding is identified as URI 50-413, 414/2002-008-02, “Effect of RCP Thermal Barrier Rupture on MOV Closure and Containment Isolation.”

.3 Inspect Selected Components

.31 Component Degradation/Maintenance

a. Inspection Scope

The team reviewed maintenance and testing documentation, corrective and preventative maintenance histories, and work orders to assess the licensee’s actions to verify and maintain the safety function, reliability, and availability of selected components. The selected components included KC system pumps, (including the 2B2 KC pump impeller replacement), MOVs, and check valves. The team also reviewed documentation for the cleaning of the 2B KC heat exchanger. In addition, the team reviewed the KC maintenance rule performance criteria, selected KC PIPs, and KC system health reports to determine system reliability and availability.

The team also reviewed maintenance history data of the past 5 years for the KC pump motors, KC motor operated valves, and KC pump motor feeder breakers to determine 1) whether adequate preventive maintenance activities were being performed, and 2) whether corrective maintenance activities adequately corrected problems that had been identified. Specifically, the team reviewed applicable induction motor inspection and test procedures, vendor motor technical manuals, and completed work order packages in order to determine if preventive maintenance activities were adequate to prevent and/or identify motor performance problems. The team reviewed the breaker maintenance records to determine if there had been any breaker failures and to look for negative trends in breaker performance. The team also conducted interviews with the system engineer responsible for motor performance monitoring and reviewed “on-line” and “off-line” electrical test results for the KC pump motors to determine if there were any negative trends identified in motor performance.

b. Findings

No findings of significance were identified.

.32 Equipment

a. Inspection Scope

The team reviewed the licensee's Equipment Data Base to verify that the pressure switches installed in the KC Supply Header Flow to NC pump channels were included in the master list of environmentally qualified equipment. The instruments were subject to a harsh environment during design basis accidents inside containment. The switches had a 20-year qualified life and were due to be replaced on Unit 1 this year (2003). The team reviewed two work order packages (i.e. 98472774 and 98472773) that had been prepared to replace the Unit 1 pressure switches by 12/1/2003 in accordance with the environmentally qualified equipment maintenance program.

b. Findings

No findings of significance were identified.

.33 Operating Experience

a. Inspection Scope

The team reviewed the licensee's evaluation and corrective actions for NRC Information Notice (IN) 2002-34, "Failure of Safety-Related Circuit Breaker External Auxiliary Switches at Columbia Generating Station." The team interviewed the breaker engineer, visually inspected a typical breaker and switchgear cubicle equipped with auxiliary switches, and reviewed proposed changes being made to the breaker and switchgear PM program procedures to verify that appropriate insights have been applied to the equipment at Catawba.

The team also evaluated the licensee's review of NRC IN 97-31, "Failures of Reactor Coolant Pump Thermal Barriers and Check Valves in Foreign Plants," for applicability to their facility. Actions taken by the licensee in response to their review of the IN were evaluated by the team in order to verify their responsiveness to industry experience. Additionally, corrective actions developed and implemented by the licensee in response to the thermal barrier check valve problems identified from industry experience were reviewed in order to verify that the corrective actions were adequate for identifying and preventing similar problems at the Catawba site.

b. Findings

No findings of significance were identified.

.4 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed KC system equipment problems to verify that the licensee had entered identified problems into the corrective action program and to verify that the conditions identified were properly corrected and that the apparent cause was identified.

This included the licensee's review and evaluation of design issues identified by the licensee and through industry Operating Experience and selected PIP reports.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Management Meetings

The team presented interim results of this inspection to Mr. M. Glover, and other members of the licensee's staff at an exit meeting on January 30, 2003. A final exit meeting was conducted on March 13, 2003 with Mr. M. Glover and other members of the licensee's staff, to present the final results of this inspection. The licensee acknowledged the findings presented. Proprietary information is not included in this inspection report.

PARTIAL LIST OF PERSONS CONTACTED

KEY POINTS OF CONTACT

Licensee

T. Baumgarner, Senior Operations Specialist
C. Bigham, Mechanical Equipment Supervisor
S. Brown, Operations Superintendent
K. Evans, Mechanical - Civil Engineering Supervisor
G. Gilbert, Regulatory Compliance Manager
M. Glover, Station Manager
W. Green, Work Control Superintendent
P. Herran, Engineering Manager
L. Keller, Safety Review Group Manager
J. McKeown, Component Cooling System Engineer
R. Parker, Maintenance Superintendent
G. Peterson, Catawba Site Vice President
G. Strickland, Regulatory Compliance Specialist
R. Sweigart, Safety Assurance Manager
D. Ward, Systems Engineering Supervisor
H. Williams, Security Support

NRC:

C. Casto, Director, Division of Reactor Safety, Region II
G. DiPaolo, Acting Senior Resident Inspector , Catawba Nuclear Station
M. Giles, Resident Inspector, Catawba Nuclear Station
E. Guthrie, Senior Resident Inspector, Catawba Nuclear Station

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-413, 414/2002-008-01	NCV	Failure to Update and Maintain Control of Design Calculations (Section 1R21.231)
50-413, 414/2002-008-02	URI	Effect of RCP Thermal Barrier Rupture on MOV Closure and Containment Isolation (Section 1R21.24)

Closed

50-413, 414/2002-008-01	NCV	Failure to Update and Maintain Control of Design Calculations (Section 1R21.231)

Attachment

APPENDIX

LIST OF DOCUMENTS REVIEWED

Procedures

AP/1/A/5500/010, Reactor Coolant Leak, Rev. 40
AP/1/A/5500/017, Loss of Control Room, Rev. 43
AP/0/A/5500/20, Loss of Nuclear Service Water, Rev. 26
AP/1/A/5500/21, Loss of Component Cooling, Rev. 30
AP/2/A/5500/21, Loss of Component Cooling, Rev. 24
AP/0O/A/5500/022, Loss of Instrument Air, Rev. 22
EDM-101, Engineering Calculations/ Analyses, Rev. 10
EP/1/A/5000/ECA-0.0, Loss of All AC Power, Rev. 23
IP/1/A/3110/001 A, Calibration Procedure for Component Cooling System Relating to Reactor Coolant Pump A, Rev. 5
IP/2/A/3110/001 A, Calibration Procedure for Component Cooling System Relating to Reactor Coolant Pump A, Rev. 4
IP/0/A/4974/021, Procedure for Motor On-Line Testing, Rev. 3
IP/0/A/4974/032, Induction Motor Inspection and Testing, Rev. 7
IP/1/A/4971/001 A, Calibration Procedure for Brown Boveri ITE 51Y and ITE 51L Relay, Rev. 3
NSD-301, Nuclear Station Modifications, Rev. 23
NSD-503, Station Labeling Standards, Effective Date 8/14/01
OP/1/A/6100/004, Shutdown Outside Control Room From Hot Standby to Cold Shutdown, Rev. 51
OP/1/A/6400/005, Component Cooling System, Rev. 97
OP/1/A/6400/005, Component Cooling System, Rev. 95
OP/0/A/6400/006C, Nuclear Service Water System, Rev. 233
PT/1/A/4200/009 A, Auxiliary Safeguards Test Cabinet Periodic Test, Rev. 213

Drawings

CN-1499-KC.19-00, Instrument Detail Component Cooling System Exchanger Inlet Flow, Rev. 15
CN-1499-KC.21-00, Instrument Detail Component Cooling Surge Tank Level, Rev. 11
CN-1499-KC.23-00, Instrument Detail Component Cooling Heat Exchanger Outlet Temperature Control, Rev. 13
CN-1573-1.0, Flow Diagram of Component Cooling System (KC), Rev. 24
CN-1573-1.1, Flow Diagram of Component Cooling System (KC), Rev. 17
CN-1573-1.2, Flow Diagram of Component Cooling System (KC), Rev. 16
CN-1573-1.3, Flow Diagram of Component Cooling System (KC), Rev. 14
CN-1573-1.4, Flow Diagram of Component Cooling System (KC), Rev. 10
CN-1573-1.5, Flow Diagram of Component Cooling System (KC), Rev. 10
CN-1573-1.6, Flow Diagram of Component Cooling System (KC), Rev. 9

CN-1573-1.7, Flow Diagram of Component Cooling System (KC), Rev. 9
CN-1573-1.9, Flow Diagram of Component Cooling System (KC), Rev. 4
CN-1573-2.0, Flow Diagram of Component Cooling System (KC), Rev. 8
CN-1573-2.1, Flow Diagram of Component Cooling System (KC), Rev. 9
CN-1573-2.2, Flow Diagram of Component Cooling System (KC), Rev. 6
CN-1573-2.3, Flow Diagram of Component Cooling System (KC), Rev. 4
CN-1680-163, KC1B Component Cooling Heat Exchanger Tube Plugging Map, Rev. 0
CN-1680-164, KC1A Component Cooling Heat Exchanger Tube Plugging Map, Rev. 0
CN-1713-04.04, Connection Diagram Right Rear Half Input Cabinet 1IC4, Rev. 9
CN-1713-14.04, Connection Diagram Right Rear Half Input Cabinet 1IC14, Rev. 5
CN-2680-144, KC2A Component Cooling Heat Exchanger Tube Plugging Map, Rev. 1
CN-2680-145, KC2B Component Cooling Heat Exchanger Tube Plugging Map, Rev. 0
CNEE-0115-01.06, Elementary Diagram 4160 V Switchgear 1ETA Unit 6 Component Cooling Water Pmp Mtr 1A1, Rev. 8
CNEE-0115-01.07, Elementary Diagram 4160 V Switchgear 1ETA Unit 7 Component Cooling Water Pmp Mtr 1A2, Rev. 9
CNEE-0115-01.26, Elementary Diagram 4160 V Switchgear 1ETB Unit 6 Component Cooling Water Pmp Mtr 1B1, Rev. 7
CNEE-0115-01.27, Elementary Diagram 4160 V Switchgear 1ETB Unit 7 Component Cooling Water Pmp Mtr 1B2, Rev. 7
CNEE-0142-01.01, Elementary Diagram Component Cooling System (KC) Auxiliary Bldg Non-ESS Return Hdr Isolation Valve 1KC001A, Rev. 10
CNEE-0142-01.02, Elementary Diagram Component Cooling System (KC) Auxiliary Building Non-ESS Return Header Isolation Valve 1KC002B, Rev. 12
CNEE-0142-01.03, Elementary Diagram Component Cooling System (KC) Reactor Building Non-ESS Return Header Isolation Valve 1KC003A, Rev. 11
CNEE-0142-01.04, Elementary Diagram Component Cooling System (KC) Reactor Bldg Non-ESS Return Header Isolation Valve 1KC018B, Rev. 12
CNEE-0142-01.05, Elementary Diagram Component Cooling System (KC) Train 1A Supply To Auxiliary Building Non-ESS Header Isolation Valve 1KC050A, Rev. 11
CNEE-0142-01.06, Elementary Diagram Component Cooling System (KC) Train 1A Recirculating Line Isolation Valve 1KC051A, Rev. 9
CNEE-0142-01.07, Elementary Diagram Component Cooling System (KC) Train 1B Supply To Auxiliary Building Non-Ess Header Isolation Valve 1KC053B, Rev. 11
CNEE-0142-01.09, Elementary Diagram Component Cooling System (KC) ND HX 1A Cooling Water Supply Isolation Valve 1KC056A, Rev. 12
CNEE-0142-01.10, Elementary Diagram Component Cooling System (KC) ND HX 1B Cooling Water Supply Isolation Valve 1KC081B, Rev. 12
CNEE-0142-01.11, Elementary Diagram Component Cooling System (KC) Train 1B Supply To RX Bldg Non-ESS Header Isolation Valve 1KC228B, Rev. 13
CNEE-0142-01.12, Elementary Diagram Component Cooling System (KC) Train 1A Supply To RX Bldg Non-ESS Header Isolation Valve 1KC230A, Rev. 14
CNEE-0142-01.33, Elementary Diagram Component Cooling System (KC) Current Alarms, Rev. 10

CNEE-0142-01.35, Elementary Diagram Component Cooling System (KC) Current Loops Flow Transmitters 1KCFT5530 and 1KCFT5540, Rev. 18
CNEE-0142-01.38, Elementary Diagram Component Cooling System (KC) Aux. Shutdown Panel Controls For KC Valves, Rev. 8
CNEE-0142-01.43, Elementary Diagram Component Cooling System (KC) Miscellaneous Annunciator and Status Light Alarms, Rev. 17
CNEE-0142-01.45, Elementary Diagram Component Cooling System (KC) Aux. Relay Controls, Rev. 7
CNEE-0142-01.54, Elementary Diagram Component Cooling System (KC) Solenoid Valves 1KCSV0570 and 1KCSV0820, Rev. 7
CNEE-0142-01.54-01, Elementary Diagram Component Cooling System (KC) Solenoid Valves 1KCSV0571 and 1KCSV0821, Rev. 0
CNEE-0142-01.56, Elementary Diagram Component Cooling System (KC) Auxiliary Shutdown Panel Receiver Gauge 1KCP5541, Rev. 7
CNEE-0142-01.59, Elementary Diagram Component Cooling System (KC) Surge Tank Isolation Controls, Rev. 4
CNEE-0142-01.62, Elementary Diagram Component Cooling System (KC) Train 1A Recirculation Line Isolation Valve 1KCC037A, Rev. 6
CNEE-0142-01.63, Elementary Diagram Component Cooling System (KC) Train 1B Recirculation Line Isolation Valve 1KC040B, Rev. 5
CNEE-0174-01.30, Elementary Diagram Solid State Protection System (IPE) Auxiliary Safeguards Cabinet, Rev. 0
CNEE-0174-01.31, Elementary Diagram Solid State Protection System (IPE) Auxiliary Safeguards Cabinet, Rev. 0
CNEE-0242-01.56, Elementary Diagram Component Cooling System (KC) Auxiliary Shutdown Panel Receiver Gauge 2KCP5541, Rev. 5
CNEE-0242-01.35, Elementary Diagram Component Cooling System (KC) Current Loops Flow Transmitters 2KCFT5530 and 2KCFT5540, Rev. 10
CNEE-0242-01.43, Elementary Diagram Component Cooling System (KC) Miscellaneous Annunciator and Status Light Alarms, Rev. 13
CNM-1201.06-78, Letdown Reheat H.E., dated 10/28/77
CNM-1205.10-0017 Sheet 012, Consolidated Safety Relief Valve, Rev. D-6
CNM-1205.10-0017 Sheet 026, Consolidated Safety Relief Valve, Rev. D-22
CNM 1314.01-0133-001, Wiring Diagram - SZ1 Clark CFVR Starter W/CPT 600V Non-Penetration, Essential Circuit, Rev. D3
CNM 1399.08-0047-027, SSPS Scheme Output Relays, DN
CNTC-1573-KC.P001-01, KC System Test Acceptance Criteria - Component Cooling Pumps, Rev. 3
CNTC-1573-KC.P002-01, KC System Test Acceptance Criteria - KC Minimum Flow Lines, Rev. 2
CNTC-1573-KC.P003-01, KC System Test Acceptance Criteria - Component Cooling Pump Matching, Rev. 0

Calculations

Calculation No. CNC-1144.03-32-0001, New Concrete Around the Reactor Cavity, Rev. 6, dated 12/3/96
Calculation No. CNC-1144.29-02-0001, Categorization of Civil Design Calculations, Rev. 13, dated 3/15/01
Calculation No. CNC-1150.01-00-0001, Standby Nuclear Service Water Pond - Thermal Analysis During One Unit LOCA and One Unit Shutdown, Rev. 14
Calculation No. CNC 1205.19-00-0048, Generic Letter 89-10 MOV Calculation KC System: 1(2) KC003A and 1(2) KC018B, Rev. 3
Calculation No. CNC 1205.19-00-0049, Generic Letter 89-10 Calculations KC System: 1(2) KC228B and 1(2) KC230A, Rev. 2
Calculation No. CNC 1205.19-00-0110, Generic Letter 89-10 Set-Up Calculation for Valve 1KC001A, Rev. 0
Calculation No. CNC-1205.19-00-0111, Generic Letter 89-10 Set-Up Calculation for Valve 1KC002B, Rev. 0
Calculation No. CNC-1205.19-00-0112, Generic Letter 89-10 Set-Up Calculation for Valve 1KC050A, Rev. 0
Calculation No. CNC-1205.19-00-0113, Generic Letter 89-10 Set-Up Calculation for Valve 1KC053B, Rev. 0
Calculation No. CNC 1205.19-00-0130, Generic Letter 89-10 Set-Up Calculation for Valve 1KC056A, Rev. 1
Calculation No. CNC 1205.19-00-0132, Generic Letter 89-10 Set-Up Calculation for Valve 1KC081B, Rev. 0
Calculation No. CNC-1210.04-00-0014, Component Cooling Water Surge Tank Level Instrument Accuracy Calculation- KC5630/5640, Rev. 4
Calculation No. CNC-1210.04-00-0031, Flow Element Calculation for KC Heat Exchanger A & B Inlet Flow, Rev. 4
Calculation No. CNC-1223.04-00-0092, NV Centrifugal Charging Pump Loss of KC Cooling Flow Evaluation, Rev. 0
Calculation No. CNC-1223.23-00-0003, Component Cooling System Safety Relief Valves, Rev. 7
Calculation No. CNC-1223.23-00-0010, Component Cooling System Non-Safety Instrumentation Ranges and Setpoints, Rev. 9
Calculation No. CNC-1223.23-00-0011, Component Cooling System Test Acceptance Criteria, Rev. 13
Calculation No. CNC-1223.23-00-0012, Component Cooling Heat Exchanger Verification, Rev. 5
Calculation No. CNC-1223.23-00-0015, Component Cooling System Pressure and Temperature Design Verification, Rev. 7
Calculation No. CNC-1223.23-00-0022, Component Cooling Heat Load and Flow Requirements, Rev. 9
Calculation No. CNC-1223.23-00-0023, Component Cooling System Design Verification, Rev. 9
Calculation No. CNC-1223.23-00-0026, Ability of One KC HX to Maintain a Unit in Cold Shutdown, Rev. 3

Calculation No. CNC-1223.23-00-0027, Ability of One Train of KC to Cool Engineering Safeguards Loads after an Accident, Rev. 3
Calculation No. CNC-1223.23-00-0028, KC Hx Heat Capacity Test Analysis, Rev. 1
Calculation No. CNC-1223.23-00-0029, Operability Statements on the KC Heat Exchangers, Rev. 8
Calculation No. CNC-1223.23-00-0031, Parameters for Reactor Coolant Pump Thermal Barrier Cooler Isolation Valves, Rev. 4
Calculation No. CNC-1223.23-00-0033, Supporting Calc for Response to NRC IE Bulletin 88-04, "Potential Safety Related Pump Loss" (Component Cooling Pumps), Rev. 8
Calculation No. CNC-1223.23-00-0040, Operating Parameters for Valves 1(2) KC-338B, 424B, and 425A, Rev. 3
Calculation No. CNC-1223.23-00-0045, Operating Parameters for Valves 1(2) KC-56A and 81B, Rev. 2
Calculation No. CNC-1223.23-00-0041, Evaluation of KC Pump Operation Near Maximum Tested Flow Rates, Rev. 1
Calculation No. CNC-1223.23-00-0042, Evaluation of Flow Balance of a KC Train in a Cross Train Alignment, Rev. 5
Calculation No. CNC-1223.23-00-0047, Pressures on Piping Resulting from NC System Flow into the KC System via the NC Pump Thermal Barrier, Rev. 1
Calculation No. CNC-1223.23-00-0048, Component Cooling Heat Exchanger Verification of Alternate Tubing Material, Rev. 1
Calculation No. CNC-1223.23-00-0051, GOTHIC Peak Containment Pressure Analysis Inputs for the KC System, Rev. 1
Calculation No. CNC-1223.23-00-0052, Documentation of Single Failure Design Study CNDS-185 for the KC System, Rev. 0
Calculation No. CNC-1223.23-00-0054, Hydraulic Model of the Unit 1 YD and KC Systems for NSM CN-11389/00, Rev. 1
Calculation No. CNC-1223.24-00-0015, Minimum Allowable RN Flow through the KC Heat\ Exchangers, Rev. 1
Calculation No. CNC-1223.24-00-0018, Acceptable RNN Flow and Fouling in the KC Heat Exchangers, Rev. 3
Calculation No. CNC-1223.24-00-0045, Single Failure Analysis of the Nuclear Service Water System, Rev. 1
Calculation No. CNC-1223.24-00-0050, KC Heat Exchanger Tubeside Differential Pressure Limitations, Rev. 0
Calculation No. CNC-1232.00-01-0001, Categorization of Mechanical Design Calculations, Rev. 8, dated 3/27/02
Calculation No. CNC-1381.06-00-0033, Categorization of Electrical Design Calculations, Rev. 14, dated 8/21/00

Problem Investigation Progress (PIP) Reports

C-94-00356, URI 94-04-02 - Thermal barrier heat exchanger check valve reliability
C-99-01452, Time Critical Operator Actions
C-00-01618, Error discovered in Calculation CNC-1223.23-00-0033

C-00-01619, Error discovered in calculation resulted in larger weak-strong pump mismatch for 2A KC train pump
C-00-03366, Unexpected entry into Tech Specs due to 1RN-3A showing intermediate indication, 7/3/00
C-00-05862, New Impeller in the 1B1 KC Pump has made it Stronger which Creates Pump Interaction Concerns, dated 11/16/00
C-01-01083, KC out of tolerance identified on Work Order 98348206-01, dated 3/7/01
C-01-01853, On/Off indication was lost on 1RN229B, dated 4/25/01
C-01-02222, Discolored oil in 2KC PU A1 outboard bearing
C-01-02229, 2A KC pump new baseline
C-01-02631, RN minimum flow setpoints accelerate RN supply header degradation, dated 6/14/01
C-01-04616, 2B1 KC pump head curve data exceeded acceptance criteria
C-01-04622, Absence of Impeller Specifications Needed for Purchasing of New KC Impellers, dated 9/29/01
C-01-04625, Poor quality of Goulds pump parts
C-02-01667, KC out of tolerance identified on Work Order 98487021-01, dated 4/4/02
C-02-03740, Revise relay settings for 4 kV motor feeders, 7/2/02
C-02-05024, Unexpected entry into TSAIL due to breaker for 2KC-18B tripping when valve went open during auxiliary safeguards testing, 9/13/02
C-02-05052, KC heat exchanger failed quarterly flow test
C-02-05573, KC HX Clam Test Method is Flawed, Resulting in Unnecessary Failed Test, dated 10/14/02
C-02-05663, Excessive number of RN pit level instrumentation out of tolerances in last two and a half years, dated 10/17/02
C-02-06062, KC out of tolerance identified on Work Order 98546844-01, dated 11/14/02
C-02-06149, KC Train 2B could possibly exceed performance criteria by end of cycle due to HX cleanings
C-02-06286, KC out of tolerance identified on Work Order 98550132-01, dated 12/302
C-03-00047, Pinhole Leak in 24" Supply Piping to the 2B KC Heat Exchanger, dated 1/7/03
C-03-00060, Incorrect Impeller Issued for Installation in KC Pump 2B2, dated 1/7/03
C-03-00082, KC Pump 2B2 did not Meet Performance Flow Test Acceptance Criteria, dated 1/9/03
C-03-00087, Head Curve Testing of KC Pump 2B2, dated 1/9/03
C-03-0160, Post cleaning inspection of KC heat exchanger 1A

PIPs Written During This Inspection

PIP C-03-00064, KC and NI Design Basis Documents need to be revised to reflect current information for relief valves and check valves, dated 1/8/03
PIP C-03-00104, Assess compliance with the administrative Engineering processes by which new rotating elements were installed into seven of the eight CNS KC pumps, dated 1/9/03
PIP C-03-00384, Track revisions to calculation identified in the NRC Component Cooling SSDI audit, dated 1/28/03
PIP C-03-00432, During the KC SSDI it was pointed out that the Civil and Electrical Type I controlling calcs have not been updated every year, dated 1/29/03

Completed Surveillance Procedures

IP/1/A/3110/001 A, Calibration Procedure for Component Cooling System Relating to Reactor Coolant Pump A, Completed 5/3/02
IP/2/A/3110/001 A, Calibration Procedure for Component Cooling System Relating to Reactor Coolant Pump A, Completed 10/7/01
PT/1/A/4200/09, Engineered Safety Features Actuation Periodic Test, Rev. 168 (Performed 5/9/02, 5/10/02, 5/12/02, 6/3/02, and 6/18/02)
PT/1/A/4200/09A, Auxiliary Safeguards Test Cabinet Periodic Test, Completed 11/8/02, 12/20/02
PT/2/A/4200/09, Engineered Safety Features Actuation Periodic Test, Rev. 143 (Performed 10/10/01 and 10/14/01)
PT/1/A/4200/021A, KC Valve Inservice Test (QU), Completed 3/31/01, 7/13/01, 7/14/01, 7/15/01, 9/8/01, 11/9/01, 6/2/02, 11/22/02, 12/6/02
PT/1/A/4400/003, KC System Essential Header Flow Balance, Rev. 004 (Train A, completed 7/31/02)
PT/1/A/4400/003, KC System Essential Header Flow Balance, Rev. 004 (Train B, completed 11/12/02)
PT/2/A/4400/003, KC System Essential Header Flow Balance, Rev. 003 (Train A, completed 7/31/02)
PT/2/A/4400/003, KC System Essential Header Flow Balance, Rev. 003 (Train B, completed 11/12/02)
PT/2/A/4400/003, KC System Essential Header Flow Balance, Rev. 003 (Train B, completed 11/12/02)
PT/2/A/4400/003A, Component Cooling (KC) Train 2A Performance Test, Completed 4/10/01, 5/18/01, 7/5/01, 10/3/01, 12/20/01, 3/13/02, 6/5/02, 8/28/02, 11/21/02
PT/2/A/4400/003B, Component Cooling (KC) Train 2B Performance Test, Completed 1/29/01, 4/23/01, 7/16/01, 12/31/01, 3/26/02, 6/17/02, 9/9/02, 12/9/02, 1/9/03
PT/2/A/4400/003F, Head Curve Test for KC Pumps 2A1, 2A2, 2B1, 2B2, Rev. 13, Completed 1/9/03
PT/1/A/4400/006C, KC Heat Exchanger 1A Heat Capacity Test, Rev. 10, Completed 10/24/00

Completed Functional Tests and Calibrations

Work Order (WO) 98120448-01, CALIBRATION OF ITE 51Y AND ITE 51L RELAYS ON BREAKERS 1ETA6 AND 1ETA 7, 2/24/99
WO 9815524-01, CALIBRATION OF ITE 51Y AND ITE 51L RELAYS ON BREAKERS 1ETB6 AND 1ETB7, 6/2/99
WO 98187670-01, 2KCPS9180 CALIBRATION DATA SHEET, 3/31/00
WO 98187690-01, 2KCPS9170 CALIBRATION DATA SHEET, 4/1/00
WO 98274386-01, 1KCPS9170 CALIBRATION DATA SHEET, 11/9/00
WO 98355375-01, CALIBRATION OF ITE 51Y AND ITE 51L RELAYS ON BREAKERS 1ETA6 AND 1ETA7, 3/12/01
WO 98359344-01, 1KCLP5640 CAL KC SURGE TANK 1B LEVEL, 6/21/01

WO 98363989-01, 2KCLP5630 CAL KC SURGE TANK 2A LEVEL, 6/5/01
WO 94047393, Inspect check valve 1KC-344 for possible wear/degradation, 8/30/96
WO 94047401, Inspect check valve 1KC-363 for possible wear/degradation, 5/1/99
WO 94047408, Inspect check valve 2KC-344 for possible wear/degradation, 11/2/95
WO 94047410, Inspect check valve 2KC-363 for possible wear/degradation, 9/15/98
WO 94047413, Inspect check valve 2KC-393 for possible wear/degradation, 9/15/98
WO 94047415, Inspect check valve 2KC-412 for possible wear/degradation, 9/15/98
WO 9409430901, 1EPC: INSP/MAINTENANCE ON 1ETA BUS, 2/24/95
WO 9705184701, 1EPC: REFURBISH BREAKER 1ETB-7, 9/23/97
WO 97052747, Perform GL 89-10 MOV VOTES testing on valve 1KC-364B, 12/3/97
WO 97063353, Perform comprehensive Limitorque PM on valve 1KC-364B, 12/3/97
WO 97063354, Perform comprehensive Limitorque PM on valve 1KC-413B, 12/4/97
WO 97063381, Perform limited Limitorque PM on valve 1KC-345A, 12/4/97
WO 98115577, Perform limited Limitorque PM on valve 1KC-345A, 5/4/99
WO 98115578, Perform limited Limitorque PM on valve 1KC-364B, 5/12/99
WO 98115580, Perform limited Limitorque PM on valve 1KC-413B, 5/4/99
WO 98370518-01, 2KCLP5640 CAL KC SURGE TANK 2B LEVEL, 7/18/01
WO 98375102-01, 2KCPS9170 CALIBRATION DATA SHEET, 10/7/01
WO 98380795-01, CALIBRATION OF ITE 51Y AND ITE 51L RELAYS ON BREAKERS 1ETB6 AND 1ETB7, 5/29/01
WO 98380795-01, CALIBRATION OF BROWN BOVERI GR-5 GROUND SHIELD RELAY ON BREAKERS 1ETB6 AND 1ETB7, 5/29/01
WO 98404811-01, 1KCLP5540 STRING CHECK DATA SHEET, 12/4/01
WO 98429987-01, 2KCLP5540 STRING CHECK DATA SHEET, 3/25/02
WO 98433878-01, 1KCLP5630 CAL KC SURGE TANK 1A LEVEL, 2/18/02
WO 98436518-01, 2KCLP5531 STRING CHECK DATA SHEET, 1/27/02
WO 98436519-01, 2KCLP5630 CAL KC SURGE TANK 2A LEVEL, 4/12/02
WO 98438498-01, 1KCLP5640 CAL KC SURGE TANK 1B LEVEL, 6/18/02
WO 98445908-01, 1KCPS9170 CALIBRATION DATA SHEET, 5/1/02
WO 98466549-01, 1KCLP5530 STRING CHECK DATA SHEET, 2/11/02
WO 98494416-01, 2KCLP5640 CAL KC SURGE TANK 2B LEVEL, 6/19/02
WO 98515549-01, 1KCLP5540 STRING CHECK DATA SHEET, 8/14/02
WO 98529435-01, 1KCLP5530 STRING CHECK DATA SHEET, 10/21/02
WO 98532412-01, 2KCLP5530 STRING CHECK DATA SHEET, 10/9/02
WO 98546844-01, 2KCLP5540 STRING CHECK DATA SHEET, 10/13/02
WO 98550132-01, 1KCLP5630 CAL KC SURGE TANK 1A LEVEL, 11/25/02

Completed Work Orders

WO 93035323, INSPECTION AND MAINTENANCE OF 5 HK AIR CIRCUIT BREAKER 1ETA7, 10/10/02
WO 9305193701, 1EPC: INSP/MAINTENANCE ON 1ETB BUS, 11/18/93
WO 9409430901, 1EPC: INSP/MAINTENANCE ON 1ETA BUS, 2/24/95
WO 9705184701, 1EPC: REFURBISH BREAKER 1ETB-7, 9/23/97
WO 97106187 1, 1KC003A* PERFORM LIMITED ROTORK PM, 1/26/1998

WO 97112202 1, 1KC018B* PERFORM LIMITED ROTORK PM, 3/2/1998
WO 98001544 1, 1KC228B* PERFORM LIMITED ROTORK PM, 3/9/1998
WR 98014903, 1KC-18B: I/R ACTUATOR OIL LEAK, 5/27/1998
WO 98026066 1, 1KC056A* PERFORM LIMITED LIMITORQUE PM, 4/2/1998
WR 98026125, CE09327 WU03, 1KC003A; PFM 89-10 MOV TEST, 10/12/1998
WR 98026127, CE09327 WU04, 1KC018B, PFM 89-10 MOV TEST, 11/17/1998
WO 98031565 1, 1KC018B, I/R ACTUATOR OIL LEAK, 5/27/1998
WO 98036240 1, 1KC001A* PERFORM LIMITED LIMITORQUE PM, 5/18/1998
WO 98036241 1, 1KC050A* PERFORM LIMITED LIMITORQUE PM, 5/18/98
WR 98038162, 1KC-53B, I/R OAC INDICATION, 8/18/1998
WO 98038676 1, 1KC053B* PERFORM LIMITED LIMITORQUE PM, 5/27/1998
WO 98038807 1, 1KC081B* PERFORM LIMITED LIMITORQUE PM, 5/28/1998
WO 98038808 1, 1KC002B* PERFORM LIMITED LIMITORQUE PM, 5/28/1998
WO 98052810 1, CE09327 WU04; 1KC018B, PFM 89-10 MOV TEST, 11/12/1998
WO 98052810 2, 1KC018B; BENCH TEST NEW ACTUATOR, 11/5/1998
WO 98052810 3, 1KC018B; CUT NEW DRIVE BUSHING, 7/21/1998
WO 98052810 10, 1KC018B: INSTALL LIFT LUG, 8/3/1998
WO 98052810 13, 1KC018B, GROUT OLD ANCHOR HOLES, 10/21/1998
WO 98052812 2, 1KC003A; BENCH TEST NEW ACTUATOR, 8/17/98
WO 98052812 3, 1KC003A; CUT NEW DRIVE BUSHING, 7/22/1998
WO 98052812 10, 1KC003A; INSTALL LIFTING LUG, 8/3/1998
WO 98052812 1, CE09327 WU03, 1KC003A; PFM 89-10 MOV TEST, 10/6/1998
WO 98054776 1, 1KC230A* PERFORM LIMITED ROTORK PM, 7/16/1998
WO 98068645 1, 1KC018B* PERFORM COMPREHENSIVE ROTORK PM, 11/11/1998
WO 98070384 1, 1KC003A* PERFORM COMPREHENSIVE ROTORK PM, 10/5/1998
WO 98076910 1, 1KC-53B, I/R OAC INDICATION, 8/20/1998
WR 98089959, 1KC228B, PFM 89-10 MOV VOTES TEST, 8/3/1999
WR 98089961, 1KC230A, PFM 89-10 MOV VOTES TEST, 8/3/1999
WO 9811398701, 1EPC: SWAP BREAKER 1ETA-7 W/REFURBED BKR, 1/26/99
WO 98118110 1, 1KC228B* PERFORM LIMITED ROTORK PM, 2/8/1999
WO 98127127 1, 1KC053B* PERFORM LIMITED LIMITORQUE PM, 3/1/1999
WO 98132951 1, 1KC056A* PERFORM LIMITED LIMITORQUE PM, 3/22/1999
WR 98134022, 1KCOO1A; REPLACE TORQUE SWITCH ASSY., 11/27/2000
WO 98135160 1, 1KC002B* PERFORM LIMITED LIMITORQUE PM, 3/29/1999
WO 98137392 1, 1KC081B* PERFORM LIMITED LIMITORQUE PM, 4/5/1999
WO 98142664 1, 1KC001A* PERFORM LIMITED LIMITORQUE PM, 4/19/99
WO 98142665 1, 1KC050A* PERFORM LIMITED LIMITORQUE PM, 4/19/1999
WR 98148616, 1KC056A, R/R & PFM 89-10 MOV BENCH TEST, 9/18/2000
WR 98148617, 1KC081B, R/R & PFM 89-10 MOV BENCH TEST, 9/18/2000
WR 98157206, CE70488 WU2, 1KC001A, PFM 89-10 MOV TEST, 2/19/2001
WR 98157208, CE70488 WU3, 1KC002B, PFM 89-10 MOV TEST, 2/5/2001
WR 98157209, CE70488 WU4; 1KC050A, PFM 89-10 MOV TEST, 2/21/2001
WR 98157210, CE70488 WU5, 1KC053B, PFM 89-10 MOV TEST, 2/9/2001
WO 98159322 1, 1KC230A* PERFORM LIMITED ROTORK PM, 6/15/1999
WO 9816305701, 1EPC: SWAP BKR 1ETB-6 W/REFURBED BKR, 6/28/99

WO 98173543 1, 1KC003A* PERFORM LIMITED ROTORK PM, 8/2/1999
WR 98176763, 1KC053B; I/R VALVE HAS NO OPEN/CLOSE IND., 7/25/2001
WO 98177563 1, 1KC018B* PERFORM LIMITED ROTORK PM, 8/16/1999
WR 98179503, 1KC-50A: I/R VALVE LEAKS PAST SEAT, 5/7/2001
WO 98185115 1, 1KC228B, PFM 89-10 MOV VOTES TEST, 10/13/1999
WO 98185116 1, 1KC230A, PFM 89-10 MOV VOTES TEST, 11/2/1999
WO 9819384701, 1EPC: SWAP BKR 1ETA-6 W/REFURBED BKR, 10/4/99
WO 98196254 1, 1KC228B* PERFORM COMPREHENSIVE ROTORK PM, 10/12/1999
WO 98202633 1, 1KC230A* PERFORM COMPREHENSIVE ROTORK PM, 11/2/1999
WO 98220345 1, 1KC056A* PERFORM LIMITED LIMITORQUE PM, 12/27/1999
WO 98240785 1, 1KC081B* PERFORM LIMITED LIMITORQUE PM, 3/6/2000
WO 98229340 1, 1KC053B* PERFORM LIMITED LIMITORQUE PM, 1/3/2000
WO 98257827 1, 1KC002B* PFM COMPREHENSIVE LIMITORQUE PM, 4/25/2000
WO 98269620 1, 1KC001A* PFM COMPREHENSIVE LIMITORQUE PM, 6/5/2000
WO 98271593 1, 1KC050A* PFM COMPREHENSIVE LIMITORQUE PM, 6/12/2000
WO 98271659 1, 1KC003A* PERFORM LIMITED ROTORK PM, 6/12/2000
WO 98274030, Perform comprehensive Limitorque PM on valve 1KC-345A, 10/31/00
WO 98279298, Perform limited Limitorque PM on valve 1KC-364B, 10/29/00
WO 98279299, Perform limited Limitorque PM on valve 1KC-413B, 10/29/00
WO 98283472 1, 1KC001A; REPLACE TORQUE SWITCH ASSY., 11/27/2000
WO 98283859 1, 1KC018B* PERFORM LIMITED ROTORK PM, 7/19/2000
WO 98302259 1, 1KC228B* PERFORM LIMITED ROTORK PM, 9/18/2000
WO 98314471 1, 1KC230A* PERFORM LIMITED ROTORK PM, 10/21/2000
WO 98316290 1, 1KC056A; R/R & PFM 89-10 MOV BENCH TEST, 4/20/2001
WO 98316290 8, 1KC056A; PREP/BENCH TEST SPARE ACT., 4/10/2001
WO 98316291 1, 1KC081B; R/R & PFM 89-10 MOV, 11/9/2001
WO 98323546 1, 1KC056A* PERFORM LIMITED LIMITORQUE PM, 11/27/2000
WO 9832901101, 1EPC BK ETB-6: REPLACE CONTROL DEVICE, 11/4/00
WO 9832901301, 1EPC BK ETB-7: REPLACE CONTROL DEVICE, 11/4/00
WO 9832902701, 1EPC BK ETA-6: REPLACE CONTROL DEVICE, 11/18/00
WO 9832902801, 1EPC BK ETA-7: REPLACE CONTROL DEVICE, 1/25/02
WO 98333261 1, CE70488 WU5, 1KC053B, PFM 89-10 MOV TEST, 2/8/2001
WO 98333261 4, 1KC053B; PFM PACKMATE TEST, 1/3/2000
WO 98333261 7, CE70488 OCG MOD REVIEW (1KC-053B), 12/19/2000
WO 98333262 1, CE70488 WU4; 1KC050A, PFM 89-10 MOV TEST, 2/21/2001
WO 98333262 4, 1KC0050A; PFM PACKMATE TEST, 1/3/2000
WO 98333262 7, CE70488 OCG MOD REVIEW (1KC-050A), 12/19/2000
WO 98333263 2, 1KC0002B; PFM PACKMATE TEST, 1/3/2000
WO 98333263 7, CE70488 OCG MOD REVIEW (1KC-002B), 12/19/2000
WO 98333264 1 CE70488 WU2, 1KC001A; PFM 89-10 MOV TEST, 2/19/2001
WO 98333264 2, 1KC0001A; PFM PACKMATE TEST, 1/3/2000
WO 98333264 7, CE70488 OCG MOD REVIEW (1KC-001A), 12/19/2000
WO 98344783 1, 1KC053B* PFM COMPREHENSIVE LIMITORQUE PM, 2/8/2001
WO 98344789 1, 1KC002B* PFM COMPREHENSIVE LIMITORQUE PM, 2/5/2001
WO 98348210 1, 1KC050A* PFM COMPREHENSIVE LIMITORQUE PM, 2/21/2001

WO 98348226 1, 1KC001A* PFM COMPREHENSIVE LIMITORQUE PM, 2/19/2001
WO 98369672 1, 1KC056A* PFM COMPREHENSIVE LIMITORQUE PM, 4/19/2001
WO 98370357, Inspect check valve 2KC-412 as PM and ensure proper operation with no corrosion buildup or binding, 9/23/01
WO 98370362, Inspect check valve 2KC-393 as PM and ensure proper operation with no corrosion buildup or binding, 10/8/01
WO 98370363, Inspect check valve 2KC-363 as PM and ensure proper operation with no corrosion buildup or binding, 10/7/01
WO 98370364, Inspect check valve 2KC-344 as PM and ensure proper operation with no corrosion buildup or binding, 9/23/01
WO 98370460 1, 1KC081B* PFM COMPREHENSIVE LIMITORQUE PM, 11/9/2001
WO 98376071 1, 1KC053B; I/R VALVE HAS NO OPEN/CLOSE IND., 7/25/2001
WO 98377473 1, 1KC003A* PERFORM LIMITED ROTORK PM, 5/17/2001
WO 98382157 1, 1KC050A: I/R VALVE LEAKS PAST SEAT, 5/7/ 2001
WO 98387373 1, 1KC018B* PERFORM LIMITED ROTORK PM, 6/18/01
WO 98394038 1, 1KC230A* PERFORM LIMITED ROTORK PM, 7/10/2001
WO 98431208 1, 1KC228B* PERFORM LIMITED ROTORK PM, 11/12/2001
WO 98445909, Perform comprehensive Limitorque PM on valve 1KC-345A, 5/6/02
WO 98445910, Perform comprehensive Limitorque PM on valve 1KC-364B, 5/7/02
WO 98445911, Perform comprehensive Limitorque PM on valve 1KC-413B, 5/6/02
WO 98480001 1, 1KC003A* PERFORM LIMITED ROTORK PM, 4/16/2002
WO 98490649 1, 1KC018B* PERFORM LIMITED ROTORK PM, 5/28/2002
WO 98508970 1, 1KC228B* PERFORM LIMITED ROTORK PM, 7/22/02
WO 9852233601, 1ETB-7: PM BREAKER (1B2 KC PMP MTR), 10/10/02
WO 98522467 1, 1KC230A* PERFORM LIMITED ROTORK PM, 9/3/2002

Modifications:

CE-3157, Revise KC Pump Low-Flow Setpoint, Rev. 0
CE-7141, Machine Repair of KC Pump Components, Rev. 0
CE-7923, Revise KC DBD to Reflect Flow Balance Test Information, Rev. 0
CE-8389, Revise KC DBD to Address Potential Inoperability of NW System, Rev. 0
CE-8624, Revise Setpoint for Low KC Flow through the ND Heat Exchangers, Rev. 0
CE-8884, KC Pump Impeller Replacement, Rev. 0
CE-8924, Revise Flow Diagrams to add Continuation Flags to the NW System, Rev. 0
CE-9492, Resolve KC DBD Discrepancies, Rev. 0
CE-10582, Revise Test Acceptance Criteria (TAC) Sheets for KC Head/ Flow Testing, Rev. 0
CE-10875, Generate Heat Exchanger Tube Plugging Maps to Formally Document Tubes that are Plugged, Rev. 0
CE-60105, Revise RN and KC Test Acceptance Criteria to Allow Reduced RN Flow to KC Heat Exchangers, Rev. 0
CE-61508, Revise KC DBD to Include References to Applicable 50.59 Evaluations and Other Changes, Rev. 0
CE-70768, Remove Valves From the Generic Letter (GL) 89-10 Program per the Associated Calculation

CN-11372, Revise the Runout Setpoint for KC Single Pump and Two Pump Operation to Allow Operating Only One Pump During Normal Operation, Rev. 0
CN-11389, Provide Backup Cooling for the NV System Centrifugal Charging Pump (CCP) 1A Motor Coolers Pump Oil Coolers, Rev. 0
CN-50450, Retube KC HX 1A with Corrosion Resistant Stainless Steel and Apply a Protective Epoxy Coating to the Tubesheet and Endbells, Revision 0

Design Basis Specifications

CNS-1569.NW-00-0001, Containment Valve Injection Water System (NW) Design Basis Specification, Rev. 12
CNS-1573.KC-00-0001, Component Cooling System (KC) Design Basis Specification, Rev. 21
CNS-1574.RN-00-0001, Nuclear Service Water System (RN) Design Basis Specification, Rev. 24
DPS-1205.19-00-0003, Motor Operated Valve Design Basis Review Guidelines, Rev. 4

Updated Final Safety Analysis Report (UFSAR)

Section 6.2.2, Reactor Building Heat Removal System
Section 9.2.1, Nuclear Service Water System, dated 10/22/01
Section 9.2.2, Component Cooling System, dated 10/22/01
Table 9-6, Component Cooling System Heat Load and Flow Requirements, dated 10/22/01
Section 15.7.4, Fuel Handling Accidents in the Containment and Spent Fuel Storage Buildings, dated 10/22/01

Technical Specifications

Section 3.6.5, Containment Air Temperature
Section 3.7.9, Standby Nuclear Service Water Pond (SNSWP), Amendment Nos. 173/165
Basis Section B 3.7.9, Standby Nuclear Service Water Pond (SNSWP), Rev. 1
Section 3.9.3, Refueling Operations - Containment Penetrations, Amendment Nos. 198/191
Basis Section B 3.9.3, Refueling Operations - Containment Penetrations, Rev. 2

Miscellaneous Documents

Inservice Testing (IST) Program for Pumps and Valves - Manual Update, Rev. 25, dated 8/17/99
OTMP 6.0, Training Programs, Rev. 15
OP-CN-CP-ADS-003, Establish NC Pump Seal Injection From the SSF (U-2 KC) (JPM) Rev. 4
OP-CN-CP-ADS-007, Establish NC Pump Seal Injection From the SSF (U-1 KC) (JPM) Rev. 1
Fragnet for KC Pump 2B2 Rebuild, Rev 1
Weekly Risk Profile, Unit 2 January 6-12, 2003
CNLT-1752-01.01, MCC 1EMXA One-Line List, Rev. 37
CNLT-1752-01.09, MCC 1EMXJ One-Line List, Rev. 33

CNM 1201.05-0264 001, Component Cooling Pumps Certified H/Q Curves Unit 1
CNM 1201.05-0273.001, Component Cooling Water Pumps Vendor Manual
CNM 1201.05-0327, Component Cooling Pumps Motor Data, dated 1/15/80
CNM 1318.22-1, Squirrel Cage Induction Motor Data Sheet For Motors Rated 100 HP and Above, 9/17/74 (12/10/74)
CNM-1318.22-0021-001-WC2, Induction Motor Inspection and Testing, Rev. 7
CNS-1573.KC-00-0001, Component Cooling System (KC) Design Basis Specification, Rev. 21
Maintenance Rule: SSC Summary Sheets - KC System
List of Qualified SSF Security Personnel
Loss of NV Pump Cooling Action in AP/20 and AP/21 JITT Training package, Rev. 2
Alternate Cooling to 1A NV Pump Job Performance Measure, Rev. 2
OEDB 97-014071, NRC Information Notice (IN) 97-31, Failures of Reactor Coolant Pump Thermal Barriers and Check Valves in Foreign Plants
OEDB 02-029087 NRC IN 2001-19, Improper Maintenance and Reassembly of Automatic Oil bubblers
OEDB 02-029608, OE13430, Strong pump - weak pump interaction
OEDB 02-029687, OE13464, CCW pump bearing degradation due to inadequate lubrication
OEDB No. 02-029608, Strong Pump - Weak Pump Interaction Between Component Cooling Water Pumps, dated 3/18/02
OEDB No. 02-030434, Component Cooling Pump Deadheading, dated 6/18/02
KC - Component Cooling Health Report (3rd quarter 2002)
KC-Component Cooling Health Report, 2001Q1
KC-Component Cooling Health Report, 2001Q2
KC-Component Cooling Health Report, 2001Q3
KC-Component Cooling Health Report, 2001Q4
KC-Component Cooling Health Report, 2002Q1
KC-Component Cooling Health Report, 2002Q2
KC-Component Cooling Health Report, 2002Q3
KC-Component Cooling Health Report, 2000Q4
Lesson Plan - Component Cooling System, CNOA85, Rev. 41
Lesson Plan - Nuclear Service Water, CNOA87, Rev. 38
RN-Nuclear Service Water Health Report, 2002Q2
RN-Nuclear Service Water Health Report, 2002Q3
SDQA-00056-CNS, Software and Data Quality Assurance Document - KC Heat Capacity, Rev. 6
Joslyn Clark Controls, Inc. Bulletin 6030-TM, AC Magnetic Starters
Generic Letter (GL) 89-10, Safety-Related Motor Operated Valve Testing and Surveillance, dated 6/28/89
GL 89-10, Supplement 1, Results of the Public Workshops, dated 6/13/90
GL 89-10, Supplement 6, Information on Schedule and Grouping, and Staff Responses to Additional Public Questions, dated 3/8/94
GL 89-10, Supplement 7, Consideration of Valve Mispositioning in Pressurized Water Reactors, dated 1/24/96