UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

October 15, 2007

Rick A. Muench, President and
Chief Executive Officer
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION - NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000482/2007006

Dear Mr. Muench:

On July 20, 2007, the U.S. Nuclear Regulatory Commission (NRC) completed a component design bases inspection at your Wolf Creek Generating Station. The enclosed report documents our inspection findings. The preliminary findings were discussed on July 20, 2007, and again on August 31, 2007, 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 team reviewed selected procedures and records, observed activities, and interviewed cognizant plant personnel.

Based on the results of this inspection, the NRC has identified eight findings that were evaluated under the risk significance determination process. Violations were associated with six of the findings. All eight of the findings were found to have very low safety significance (Green) and the violations associated with these findings are being treated as noncited violations, consistent with Section VI.A.1 of the NRC Enforcement Policy.

If you contest any of the noncited violations, or the significance of the violations you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the US Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, US Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Wolf Creek Generating Station.

In accordance with 10 CFR 2.390 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/

William B. Jones, Chief
Engineering Branch 1
Division of Reactor Safety

Dockets: 50-482
License: NPF-42

Enclosure:
Inspection Report 05000482/2007006
w/Attachments: Supplemental Information
Initial Information Request
Second Information Request

cc w/Enclosure:

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	50-482
License:	NPF-42
Report No.:	05000482/2007006
Licensee:	Wolf Creek Nuclear Operating Corporation
Facility:	Wolf Creek Generating Station
Location:	1550 Oxen Lane NE Burlington, Kansas
Dates:	June 11, through July 20, 2007
Team Leader:	R. Deese, Senior Resident Inspector, Arkansas Nuclear One
Inspectors:	M. Murphy, Senior Examiner, Operations Branch S. Rutenkroger, PhD, Reactor Inspector, Engineering Branch 1 L. Owen, Reactor Inspector, Engineeering Branch 1
Accompanying Personnel:	L. Ellershaw, Mechanical Engineer, Contractor J. Leivo, Electrical Engineer, Contractor S. Spiegelman, Mechanical Engineer, Contractor
Approved By:	William B. Jones, Chief Engineering Branch 1 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000482/2007006; 6/11/07 - 7/20/07; Wolf Creek Generating Station: baseline inspection, NRC Inspection Procedure 71111.21, Component Design Basis Inspection.

The report covers an announced inspection by a team of two regional inspectors, one operations examiner, one consultant, two contractors, and one senior resident inspector. Eight findings were identified. All of the findings were of very low safety significance. The final significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, *Significance Determination Process*. Findings for which the significance determination process 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 Findings

Cornerstone: Mitigating Systems

- Green. The team identified a noncited violation of Technical Specification 5.4.1.a, for the licensee's inadequate procedure for remotely starting the emergency diesel generator fuel oil transfer pump following a fire in the control room. Specifically, the governing procedure failed to include the necessary actions to replace the control power fuse in the associated motor control center, which would likely be blown as a result of the fire-induced circuit failures assumed in the licensee's analysis for the control room fire. In addition, the licensee had failed to specify and stage the control power fuse and fuse puller that could be required for timely restoration of the emergency diesel generator fuel oil transfer pump to service following the control room fire. This issue was entered into the licensee's corrective action program as Condition Report 2007-02790.

  The finding was more than minor because it is associated with the mitigating systems cornerstone attribute of procedural quality and affected the associated cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The Phase 1 worksheets in Manual Chapter 0609, "Significance Determination Process," were used to conclude that analysis with Manual Chapter 0609, Appendix F, "Fire Protection Findings Significance Determination Process," was required because the issue involved a degradation in fire protection defense-in-depth strategies. A Phase 3 review was then performed by a senior reactor analyst who determined the finding to be of very low safety significance because of the low probability of a fire in relevant cabinets that would result in a control room evacuation (Section 1R21.b.1).

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," in that, the licensee did not ensure adequate suction submergence for the containment spray pumps by not properly translating vortex design parameters into calculations relative to the refueling

water storage tank. Specifically, the licensee used a non-conservative method to calculate the level required to prevent pump vortexing in the refueling water storage tank. The licensee entered the issue into their corrective action program as Condition Report 2007-02597 and revised the affected calculations.

The finding was more than minor because it is associated with the mitigating systems cornerstone attribute of design control and affected the associated cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding is determined to have very low safety significance because it was a design deficiency that did not result in a loss of operability. The finding had crosscutting aspects in the area of problem identification and resolution associated with the corrective action program (P.1(a)) because the licensee did not identify an issue in a timely manner, commensurate with its safety significance (Section 1R21.b.2).

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the failure to identify and take timely corrective action to correct indications of material wastage at the base of the Refueling Water Storage Tank. Specifically, the licensee did not recognize and take actions to prevent recurring discolored boric acid deposits for approximately 9 years. This issue was entered into the licensee's corrective action program as Condition Report 2007-02742.

  The finding was more than minor because if left uncorrected it would become a more significant safety concern in that continued wastage could impact component operability. Using the Phase 1 worksheets in Manual Chapter 0609, "Significance Determination Process," the finding was determined to have very low safety significance because it did not result in a system or component being inoperabe and it did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding had crosscutting aspects in the area of problem identification and resolution associated with the corrective action program (P.1(c) because the licensee failed to thoroughly evaluate the problem such that the resolution addressed the cause and extent of condition (Section 1R21.b.3).

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the failure of the licensee to ensure that the 125 Vdc safety-related batteries would remain operable if all the intercell and terminal connections were at the resistance value of 150 micro-ohms as allowed by Technical Specification Surveillance Requirement 3.8.4.5. The licensee's design calculation used a non-conservative value. This issue was entered into the licensee's corrective action program as Condition Report 2007-02492.

  The finding was more than minor because it is associated with the mitigating systems cornerstone attribute of design control and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

Using Manual Chapter 0609, “Significance Determination Process,” Phase 1 Worksheet, the finding was determined to have very low safety significance because it was a design deficiency confirmed not to result in a loss of operability. The finding had crosscutting aspects in the area of problem identification and resolution associated with the corrective action program (P.1(a)) because the licensee did not implement a program with a low threshold for identifying this issue and the licensee did not identify the issue completely, accurately, and in a timely manner (Section 1R21.b.4).

- Green. The team identified a noncited violation of Technical Specification 5.4.1.a, for the licensee’s failure to clean electrolyte from the outside surfaces of the 125 Vdc safety-related batteries in accordance with procedures. Specifically, surveillance procedures for the 125 Vdc batteries required appropriate cleaning of electrolyte on battery cell covers following specific gravity checks, however, maintenance personnel did not perform this cleaning. The licensee has entered this issue into their corrective action program as Condition Report 2007-02580.

  The finding was more than minor because if left uncorrected the finding would become a more significant safety concern due to the corrosive effects of electrolyte on battery posts and terminal connections. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to have very low safety significance because it did not result in a design qualification deficiency or loss of function and it did not screen as risk significant due to external events. The finding had crosscutting aspects in the area of human performance associated with work practices (H.4(a)) because of insufficient communication of human error prevention techniques to maintenance personnel, specifically with respect to self and peer checking (Section 1R21.b.5).

- Green. The team reviewed a self-revealing finding associated with the licensee’s failure to correct normal charging pump balance line vibrations in a timely manner. Because the licensee did not address the extended time and periodically increased magnitude of the vibrations, the balance line cracked, rendering the pump inoperable. This issue was entered into the licensee's corrective action program as Condition Report 2007-02339.

  The finding was more than minor because it is associated with the mitigating systems cornerstone attribute of equipment performance and affected the associated cornerstone objective ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to have very low safety significance because the finding did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding had crosscutting aspects in the area of problem identification and resolution associated with the corrective action program (P.1(d)) in that licensee personnel did not take corrective actions to address a safety issue in a timely manner, commensurate with its safety significance (Section 1R21.b.6).

- Green. The team identified a finding associated with the licensee's failure to maintain a procedure which ensured that control building room drains remained available to pass their design flows for postulated flooding events. As a result of the licensee's procedure and practices, debris and items were found in control building room drains. This issue was entered into the licensee's corrective action program as Condition Report 2007-02753.

  The finding was more than minor because if left uncorrected it would become a more significant safety concern. This finding affected the mitigating systems cornerstone. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding is determined to have very low safety significance because the finding did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding had crosscutting aspects in the area of human performance associated with work practices (H.4(b)) because the licensee did not define and effectively communicate expectations regarding procedural compliance and personnel following procedures (Section 1R21.b.7).

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," having very low safety significance for the licensee's failure to account for the effect of emergency diesel generator frequency variation in the diesel loading calculations. Specifically, emergency diesel generator loading was based on nominal 60 hertz operation of pumps and fans and did not account for the 2 percent variation allowed by Technical Specifications. The licensee has entered this issue into their corrective action program as Condition Report 2007-02683.

  The finding was more than minor because it was associated with the mitigating systems cornerstone attribute of design control and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, based on preliminary calculations, the failure to account for frequency variations had more than a minimal effect on the outcome of the analysis in that the continuous load rating for the emergency diesel generators would have been exceeded in the recirculation phase of a loss-of-coolant accident with the assumed loads. The team determined that the finding screened as very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability (Section 1R21.b.8).

B. Licensee-Identified Violations.

None.

REPORT DETAILS

1. REACTOR SAFETY

Inspection of component design bases verifies the initial design and subsequent modifications and provides monitoring of the capability of the selected components and operator actions to perform their design bases functions. As plants age, their design bases may be difficult to determine and important design features may be altered or disabled during modifications. The plant risk assessment model assumes the capability of safety systems and components to perform their intended safety function successfully. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems and Barrier Integrity cornerstones for which there are no indicators to measure performance.

1R21 Component Design Bases Inspection (71111.21)

The team selected risk-significant components and operator actions for review using information contained in the licensee's probabilistic risk assessment. In general, this included components and operator actions that had a risk achievement worth factor greater than two or a Birnbaum value greater than $1x10^{-6}$.

a. Inspection Scope

To verify that the selected components would function as required, the team reviewed design basis assumptions, calculations, and procedures. In some instances, the team performed calculations to independently verify the licensee's conclusions. The team also verified that the condition of the components was consistent with the design bases and that the tested capabilities met the required criteria.

The team reviewed maintenance work records, corrective action documents, and industry operating experience records to verify that licensee personnel considered degraded conditions and their impact on the components. For the review of operator actions, the team observed operators during simulator scenarios, as well as during simulated actions in the plant.

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 because of modifications, and 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 actions; repeated maintenance; 10 CFR 50.65(a)1 status; operable, but degraded 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.

The inspection procedure requires a review of 15-20 risk-significant and low design margin components, 3 to 5 relatively high-risk operator actions, and 4 to 6 operating experience issues. The sample selection for this inspection was 20 components, 3 operator actions, and 4 operating experience issues.

The components selected for review were:

- Refueling Water Storage Tank (RWST)
- 125 VDC safety related Battery NK-11
- Residual heat removal (RHR) Pump A
- Component cooling water (CCW) Pump B
- RWST discharge valves
- Containment sump discharge valves
- Turbine driven auxiliary feedwater (TDAFW) Pump
- Motor driven auxiliary feedwater (MDAFW) Pump
- Condensate Storage Tank (CST)
- RWST level instrumentation
- 4160 Volt safety related switchgear
- Auxiliary feedwater (AFW) low suction pressure transmitters
- Emergency diesel generator (EDG) fuel oil transfer pumps
- Essential service water (ESW) Traveling Screens
- ESW Pump A
- Normal charging pump
- CCW heat Exchanger A
- EDG B
- EDG exhaust Damper A
- 125 VDC fused disconnect Switch 89NK0404

The scenarios selected for risk-significant, time critical operator action included:.

- Steam generator tube rupture
- Station blackout
- Large break loss of coolant accident

The operating experience issues were:

- NRC Generic Letter 2006-01 - Steam Generator Tube Integrity and associated Technical Specifications.

- NRC Generic Letter 2006-02 - Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power.

- NRC Information Notice 2005-30 - Safe Shutdown Potentially Challenged by Unanalyzed Internal Flooding Events and Inadequate Design.

- NRC Information Notice 2006-06 - Loss of Offsite Power and Station Blackout Are More Probable During Summer Period.

b. Findings

.1 Inadequate Procedure for Restoration of Emergency Diesel Generator (EDG) Fuel Oil Transfer Pump Control Circuit Following a Fire Requiring Control Room Evacuation.

Introduction. The team identified a Green noncited violation (NCV) of Technical Specification 5.4.1.a, for the licensee's inadequate procedures for remotely starting the EDG fuel oil transfer pump following a fire in the control room.

Description. As part of the inspection of the EDG fuel oil transfer pumps, the team reviewed the licensee's procedure for operation of the fuel oil transfer system. From this review the team discovered that the licensee had previously identified a vulnerability of the fuel oil transfer pumps during a fire in the control room. Specifically, control power to the pumps could be lost and action would have to be taken by operators to restore the pumps to service.

The licensee's procedure provided specific instructions for de-energizing the EDG fuel oil transfer pump control circuit, cutting pre-identified control wiring, installing pre-staged jumpers to pre-identified terminals, and restoring control power. However, the team identified that in preparation of this procedure, the licensee had failed to consider that for a fire-induced short-to-ground in the control circuit, the control power fuse would likely blow. The licensee's procedure failed to include the necessary actions to replace the control power fuse in the associated motor control center. In addition, the licensee had failed to specify and stage the control power fuse and fuse puller that would be required for timely restoration of the EDG fuel oil transfer pump to service following the control room fire.

Restoration of the EDG fuel oil transfer pump within sixty minutes was required by the licensee's commitment for actions identified in Letter SLNRC 84-109, "Fire Protection Review." Based on discussions with licensee personnel during the inspection, the team concluded that these actions most likely would not be completed within sixty minutes because the requisite steps for specifying, staging, and replacing the control power fuse had not been provided.

To address the team's concern, the licensee initiated Condition Report (CR) 2007-02790 and an on-the-spot change to Procedure OFN RP-017, "Control Room Evacuation," Revision 23. The on-the-spot change added steps to obtain a previously staged 2 ampere control power fuse and fuse pullers from the Train B EDG emergency locker and for replacing the fuse.

Analysis. The team identified the failure to provide adequate procedural guidance to restore the EDG fuel oil transfer pump to service following a fire requiring evacuation of the control room to be a performance deficiency. This finding was greater 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. The team evaluated the finding using Appendix F, "Fire Protection Significance Determination Process (SDP)," of Manual Chapter (MC) 0609. The team categorized the finding as a post-fire safe shutdown issue with a moderate degradation rating using the SDP. Also, the team

assumed the condition existed for greater than thirty days and had a main control room generic fire frequency of $8x10^{-3}$. With these assumptions, the team determined further analysis was necessary. The team consulted with regional senior reactor analysts who concluded that Phase 2 of the fire protection SDP in Appendix F of MC 0609 was not the most effective tool for this control room evacuation finding. Therefore, regional senior reactor analysts performed a Phase 3 analysis. The analysis assumed the probability of a fire in the relevant cabinets that would result in control room evacuation was $5.1x10^{-5}$ per year. In addition, it was assumed none of the fires postulated in the analysis would cause an unintentional loss of offsite power or preclude its recovery at some time later in the scenario. A bounding value of $1.2x10^{-7}$, very low safety significance (Green), was assessed for this finding.

Enforcement. Wolf Creek Technical Specification 5.4.1.a, requires, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Section 6.p of Regulatory Guide 1.33 requires a procedure for combating a fire in the Control Room or forced evacuation of the Control Room. Procedure OFN RP-017, "Control Room Evacuation," is the licensee's procedure to meet this requirement. Contrary to the above, the licensee did not establish Procedure OFN RP-017, "Control Room Evacuation," Revision 23, specifically with respect to guidance in restoring the EDG fuel oil transfer pump to service following a fire resulting in evacuation of the control room. This inadequate procedure was in effect until identified by the team on July 16, 2007. Because the licensee's actions taken during the inspection to immediately revise this procedure and enter this item into the station corrective action program as CR 2007-02790, this violation was identified as a NCV consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000482/2007006-01, "Inadequate Procedure for Restoration of the Emergency Diesel Generator Fuel Oil Transfer Pump Control Circuit Following a Fire Requiring Control Room Evacuation."

.2 Inadequate RWST Vortexing Calculation

Introduction. The team identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with a non-conservative calculation for the RWST tank empty level that could result in vortexing in the RWST prior to the post-accident swap-over of suction of the containment spray pumps from RWST to the Containment Sump.

Description. During the review of Wolf Creek RWST design documentation, the team questioned if the calculation of the vortex level for the RWST was sufficiently conservative based on available literature describing a more accurate prediction of vortexing than contained in the licensee's calculation. The licensee's calculation was performed during initial plant design and predicted vortexing would occur at a level where actual water level reached the top of the suction pipe. Operating experience and inspection results from other plants also indicated that this level may not be sufficient. After questioning by the team, licensee engineers determined that the RWST empty level (the level designed to assure that the pumps are protected from air entrainment due to vortex formation) should be raised from 6 percent full instrument span to 7 percent full instrument span to assure that air entrainment would be precluded. This change increased the required submergence level by approximately 6 inches.

Analysis. The performance deficiency associated with this finding involved the failure of engineering personnel to properly account for potential vortex formation and subsequent air entrainment in the containment spray pumps prior to the completion of the transfer of the RWST to the containment sump. The team determined that the finding is greater than minor because it is associated with the mitigating systems cornerstone attribute of design control and affects the associated cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to have very low safety significance (Green), because it was a design deficiency confirmed not to result in loss of operability. The finding had crosscutting aspects in the area of problem identification and resolution associated with the corrective action program (P.1(a)) because the licensee did not identify an issue in a timely manner, commensurate with its safety significance.

Enforcement. 10 CFR Part 50 Appendix B, Criterion III, "Design Control," requires, in part, that design control measures be established and implemented to assure that applicable regulatory requirements and the design basis for structures, systems, and components (SSCs) are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, the licensee did not implement design control measures which assured that applicable regulatory requirements for SSCs were correctly translated into specifications. Specifically, from initial plant operation until July 13, 2007, Wolf Creek engineering personnel failed to ensure that the RWST level and resultant level alarm setpoint adequately maintained sufficient RWST level to assure that the containment spray pumps were protected against air entrainment which could have resulted in pump damage because their design calculation did not accurately predict vortex formation. Because this issue was of very low safety significance and has been entered into the licensee's corrective action program (CR 2007-02597), this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000482/2007006-02, "Inadequate Design Control Associated with Vortexing Calculation."

.3 Inadequate Identification of Boric Acid Deposits on the RWST

Introduction. The team identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, for the failure to identify and promptly clean discolored boric acid deposits on the RWST.

Description. On June 12, 2007, during an inspection walkdown, the team noted white and orangish-brown deposits at the base of the RWST. The team questioned the licensee about the deposits as they appeared to contain boric acid. The licensee indicated that their past analysis had determined the deposits to be calcium-silicate insulation which had been used for insulating the RWST. The team questioned this analysis because of the strong resemblance to boric acid deposits.

In response the licensee sampled the deposits and shipped them to an offsite laboratory to determine the content of the deposits. Results of this sample yielded that it contained boron.

The team questioned how long the deposits could have been mistakenly identified as insulation. The licensee had initiated a problem identification Report (PIR) 1998-03860 in 1998. In this PIR, the licensee pursued the nature of the deposits and discovered that the deposits did contain amounts of insulation, but also contained boron. The licensee dismissed the boron as spillage from a samping evolution. On two subsequent occasions after 1998 the deposits were questioned by the licensee and dismissed as insulation based on the 1998 PIR resolution. In each of these cases the deposits were cleaned up and the focus of the PIR was the station's allowance of the poor materiel condition of the area.

Subsequently, the licensee performed inspections of the carbon steel components in the area and determined that no signifcant wastage had occurred and operability of the RWST and its surrounding components was not affected.

Analysis. The performance deficiency associated with this finding involved the licensee's failure to correctly identify the presence of boric acid corrosion. The team determined that the issue was greater than minor because if left uncorrected, the failure to identify the presence of boric acid for extended periods of time would become a more significant safety concern in that continued wastage could impact plant components. The finding affected the mitigating systems cornerstone. Using the Phase 1 worksheets in Manual Chapter 0609, "Significance Determination Process," the team determined that the finding had very low safety significance (Green) because it did not result in a system or component being inoperable and it did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding had crosscutting aspects in the area of problem identification and resolution associated with the corrective action program (P.1(c) because the licensee failed to thoroughly evaluate the problem such that the resolution addressed the cause and extent of condition.

Enforcement. Part 50, 10 CFR Appendix B, Criterion XVI, "Corrective Action," states, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to the above, in 1998 and into 2007, the licensee did not identify the source of the boric acid on the base of the RWST and therefore did not take corrective actions to prevent recurrence. Because of the very low safety significance and because the licensee included this condition in their corrective action program as CR 2007-02742, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000482/2007006-03, "Failure to Identify and Correct Discolored Boric Acid Deposits."

.4 Nonconservative Battery Intercell Connection Resistance Value

Introduction. The team identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the failure of the licensee to ensure that the 125 Vdc safety-related batteries would remain operable if all the intercell and terminal connections were at the resistance value of 150 micro-ohms as allowed by Technical Specification Surveillance Requirement 3.8.4.5.

Description. During a review of operating experience data from an inspection finding at another facility that dealt with a nonconservative Technical Specification SR, the licensee determined that their Technical Specification surveillance requirement

appeared to be similar. A condition had been identified where the design calculations used a reference value for the intercell resistance for the safety-related batteries that was less than the value in the station Technical Specification surveillance requirement. The licensee identified that the design value for safety-related batteries NK-11 and NK-14 was 19 micro-ohms in Calculation NK-E-002, and the Technical Specification surveillance requirement value was less than or equal to 150 micro-ohms.

This issue was reviewed by licensee electrical engineers who concluded that since their existing intercell connection readings were below 19 micro-ohms, the battery was operable. The engineers also concluded that since their procedure for intercell resistance checks called for corrective action if the value exceeded 23 micro-ohms, they would never approach operation with the resistances near the Technical Specification allowed value. The team reviewed the procedure and noted that the type and timeliness of corrective action was not specified and the ultimate acceptance value of 150 micro-ohms was listed in the procedure. As a result, the team did not consider the procedure adequate to control intercell resistances at or below the 19 micro-ohm value.

The team noted that a discussion or evaluation of the surveillance requirement limit being applicable to all of the cells of the battery was not made in the screening, and as such, no discussion of the capability of the batteries to perform their design safety function with the larger resistance values was present. The licensee could not conclusively determine if the battery was capable of performing its design function with all intercell resistances at 150 micro-ohms. As a result, the licensee updated their design calculation using the correct resistances and determined that actual design margin had been decreased from 19 percent to 6 percent. The team considered this a case where a new design basis calculation had to be performed to ensure component capability.

Analysis. The performance deficiency associated with this finding involved the licensee's failure to ensure that the 125 Vdc safety-related batteries would remain operable if all the intercell connections were at the resistance value of 150 micro-ohms as allowed by Technical Specification Surveillance Requirement 3.8.2.3. This finding was greater than minor because it was associated with the mitigating systems cornerstone attribute of design control and affects the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to have very low safety significance because it was a design deficiency confirmed not to result in loss of operability. The finding had crosscutting aspects in the area of problem identification and resolution associated with the corrective action program (P.1(a)) because the licensee did not implement a corrective action program with a low threshold for identifying this issue and the licensee did not identify the issue completely, accurately, and in a timely manner.

Enforcement. 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis for SSCs are correctly translated in specifications, drawings, procedures, and instructions. It further states that design control measures shall provide for verifying or checking the adequacy of design, such as by the

performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, prior to July 17, 2007, the licensee failed to verify that the specified 150 micro-ohm criterion would be sufficient to ensure safety-related battery operability in accordance with the design basis. Because this finding is of very low safety significance and has been entered into the corrective action program as CR 2007-02492, this violation is being treated as an NCV consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000482/2007006-04, "Nonconservative Battery Intercell Connection Resistance Value Specified in Design Calculation."

.5 Battery Surfaces Not Cleaned as Required by Procedure

Introduction. The team identified a Green NCV of Technical Specification 5.4.1.a, for the licensee's failure to clean electrolyte from the outside surfaces of the 125 Vdc safety-related batteries in accordance with procedures.

Description. During a walkdown performed on June 26, 2007, the team observed drops of liquid on top of several cells for safety-related Battery NK-14. The licensee determined the liquid to be electrolyte that was spread during the performance of specific gravity checks during maintenance. In addition, further inspection revealed this condition to be present on all 125 Vdc batteries (Batteries NK11, NK12, NK13, and NK14).

The battery cell covers have a translucent appearance with internal condensation drops covering the inside surface of the cover. This attribute causes electrolyte residing on the outside surface of the cover to be difficult to observe. Since maintenance personnel did not realize that electrolyte was being spread during the specific gravity checks and did not closely inspect the outside battery surfaces after the checks, the splattering had been occurring for an indeterminate amount of time without being subsequently cleaned according to procedure. Specifically, Procedure STS MT-019, "125 VDC Class 1E Quarterly Battery Inspection," stated, "Clean any electrolyte spillage on cell covers or containers with bicarbonate of soda solution or other suitable neutralizing agent. Wipe excessive dirt from cells with a water moistened clean wiper."

By not recognizing that the electrolyte splattering was occurring, and therefore not neutralizing and cleaning the electrolyte from outer battery surfaces, a corrosive environment was being introduced. Although the battery cell cover itself is not susceptible to the electrolyte, the dropping and splattering of electrolyte can impact the battery cell terminal connections and posts. Vendor documentation, "Lucent Technologies LINEAGE® 2000 Round Cell Battery," states, "When taking specific gravity readings, cover the bottom of the tube on the hydrometer with a paper towel while moving it from cell to cell to avoid splashing or throwing the electrolyte." "Corrosion from electrolyte leakage usually is caused by careless handling of the hydrometer syringe when measuring specific gravity" when referring to battery connection corrosion. No corrosion was observed. However the team determined that the splattering of electrolyte when measuring specific gravity would eventually lead to corrosion on the battery terminals.

Analysis. The team determined that the failure to follow the battery surveillance procedures was a performance deficiency. The finding was more than minor because if left uncorrected the finding would become a more significant safety concern. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to have very low safety significance because it did not result in a design qualification deficiency or loss of function and it did not screen as risk significant due to external events. Although the licensee was not following the procedure instructions for cleaning electrolyte on batteries, the station batteries were capable of performing their required safety function as evidenced by successful surveillance testing and lack of corrosion. The finding had crosscutting aspects in the area of human performance associated with work practices (H.4(a)) because of insufficient communication of human error prevention techniques to maintenance personnel, specifically with respect to self and peer checking.

Enforcement. Wolf Creek Technical Specification 5.4.1.a requires, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Section 9.a of Regulatory Guide 1.33 requires, in part, that maintenance that can affect the performance of safety-related equipment be performed in accordance with written procedures appropriate to the circumstances. Contrary to the above, prior to the team's observation of the station's safety-related batteries on June 26, 2007, licensee personnel failed to clean electrolyte from the battery cell covers and containers according to Procedure STS MT-019, "125 VDC Class 1E Quarterly Battery Inspection." Because the violation was of very low safety significance and the licensee entered the finding into their corrective action program as CR 2007-02580, this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000482/2007006-05, "Battery Surfaces Not Cleaned as Required by Procedure."

.6 Normal Charging Pump Balance Line Crack

Introduction. The team reviewed a self-revealing Green finding for the licensee's failure to take appropriate corrective actions for vibrations in the normal charging pump balance line in a timely manner.

Description. During a walkdown on June 13, 2007, the team noted a maintenance tag on the balance line of the normal charging pump. The tag described that the line had developed a crack at one elbow on June 6, 2007, and that the line needed to be repaired. The team questioned the history behind the crack.

The team determined from interviews with licensee personnel that in 2005 vibrations in the balance line of the normal charging pump were identified as increasing. As a result, the licensee initiated Design Change Package 012166 to address the vibrations. The team did not identify a time schedule for implementation of the modification, nor was an assessment made that the line would not experience problems during the time the modification was developed.

Delays were encountered during the modification preparation, including one for improper materials for the modification. These delays were never documented with regard to their effect on extending the exposure time of the balance line to its existing vibrations.

Subsequently, vibrations increased such that the noise made by the pipe support was more pronounced. In this instance, the piping restraints were adjusted. The licensee did not formally document the effect of the increased vibrations.

An apparent result of the extended vibrations was the balance line cracked and a 2 drop per minute leak occurred. The licensee removed the normal charging pump from service to repair the line, rendering the pump unavailable.

Analysis. The performance deficiency associated with this finding involved licensee personnel not adequately evaluating the line vibration which led to a failure of a component important to safety. The finding was greater than minor because it is associated with the mitigating systems cornerstone attribute of equipment performance and affects the associated cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding was determined to have very low safety significance because the finding did not screen as potentially risk significant because it did not represent a loss of system safety function and was not potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding had crosscutting aspects in the area of problem identification and resolution associated with the corrective action program (P.1(d)) in that licensee personnel did not take corrective actions to address a safety issue in a timely manner, commensurate with its safety significance.

Enforcement. While a performance deficiency was identified, there were no violations of NRC requirements identified during the review of this issue, because the normal charging pump is not a safety related component. The licensee has entered this issue into the corrective action program as CR 2007-02339: FIN 05000482/2007006-06, “Normal Charging Pump Balance Line Crack.”

.7 Inadequate Procedure for Maintaining Drains Capable of Functioning

Introduction. The team reviewed a self-revealing Green finding for the licensee’s failure to ensure that the procedure for ensuring that Control Building room drains remain free of debris such that they could perform their design functions.

Description. The team conducted walkdowns with licensee engineers of the electrical switchgear and battery rooms on June 26, 2007, and conducted additional tours throughout the remainder of the inspection. The team focused on the condition of the room drains in these rooms, including the grates and screens over the drainpipes and the observable condition of the drainpipes. During these tours, the team noted the following:

- In safety related battery Room 3405, a pair of pliers was observed to be lodged in the first bend of drainpipe leaving the room.

- In safety related battery Room 3407, debris had accumulated on the screen for the drain such that the effective diameter of the drain was affected.

- In nonsafety related battery Room 3411, debris had accumulated on the screen for the drain and a screwdriver was observed to be lodged in the first bend of the drainpipe leaving the room.

- In safety related switchgear Room 3301, debris had accumulated on one of the screens for the drain such that the team questioned whether the effective diameter of the drain was affected.

The team questioned the licensee about the operability of the room drains and about the preventive maintenance which would allow the drains to be found in these conditions. The team also noted from their review of flooding Calculation LE-M-004, “Flooding in Class 1E Switchgear Room 3301 and 3302 and Battery Room 2 and Battery Room 3,” Revision 0, that the drains in the switchgear and nonsafety related battery rooms were required to pass prescribed water flow rates to prevent water accumulation and room flooding.

Licensee engineers performed a field walkdown to assess the condition of the drains and performed an evaluation on each condition. The licensee concluded that no design flooding condition existed for the safety related battery rooms since no credible flooding source existed in the rooms. For the screen conditions in the other rooms, the licensee was able to ensure operability by analyzing the amount of blockage and accounting for conservatism in the flooding source.

The licensee then addressed the procedures and maintenance schedule which allowed these conditions to persist. Their review determined that the drains were covered by Step 5.7.3 of Procedure AP 12-001, “Housekeeping Control,” which stated that floor drain screens located outside the radiologically controlled area shall be inspected by support personnel to ensure they are not clogged. The licensee concluded that this verbage was ambiguous and entered this condition into their corrective action program as CR 2007-02753.

Analysis. The performance deficiency associated with this finding involved the licensee’s failure to maintain a procedure which would ensure that Control Building room drains would be available to perform their design function. The finding is greater than minor because if left uncorrected it would become a more significant safety concern, in that, with the observed practices and procedures, the room drains could have become incapable of passing their required flowrates during a flooding event. This finding affected the mitigating systems cornerstone. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheet, the finding is determined to have very low safety significance because the as-found conditions did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding had crosscutting aspects in the area of human performance associated with work practices (H.4(b)) because the licensee did not define and effectively communicate expectations regarding procedural compliance and personnel following procedures.

Enforcement. While a performance deficiency was identified, there were no violations of NRC requirements identified during the review of this issue, because the Control Building room drains are not a safety related components. The licensee has entered this issue into the corrective action program as CR 2007-02753:

FIN 05000482/2007006-07, “Inadequate Procedure for Maintaining Drains Capable of Functioning.”

.8 Diesel Generator Frequency Variation Not Considered in Loading Calculations

Introduction. The team identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” for the licensee’s failure to account for the effect of frequency variation in the EDG loading calculations.

Description. The team reviewed Drawing E-11005, “List of Loads Supplied by Emergency Diesel Generator,” which supplied the load information used as input for the design analysis results contained in Report M-018-01502, “Engineering Report Wolf Creek NPP 6201 kW Diesel Generator Set.” Report M-018-01502 was a voltage and frequency study of the EDGs during analyzed accident conditions. The team noted that the loading determined in the documents was based on nominal 60 Hertz operation of pumps and fans, and did not account for the 2 percent variation allowed by Technical Specification 3.8.1. The team recalled that mechanical affinity laws show that power demanded by centrifugal pumps and fans increases by the cube of the ratio of the speeds. Since the EDG accident loading was comprised primarily of centrifugal loads, the team questioned the licensee as to why this phenomenon was not considered in the loading calculations. In response to the team’s question, the licensee performed and provided preliminary calculations that showed that EDG loading would increase by approximately six percent. Consequently, when the maximum allowed frequency variation was included, the majority of the available margin for EDGs was removed, and in the case of the category “Recirculation Phase, Total Load on Load Group 2," the calculated continuous load rating of the EDG of 6201 kilowatts was exceeded with an EDG loading at 6226 kilowatts.

In response, the team and licensee engineers held discussions with operations personnel which revealed that implementation of actual plant procedures would result in slightly different loads being energized than assumed in Drawing E-11005. Most importantly, a nonsafety-related 250 Volt Battery Charger, PJ031, would not be manually added to the bus. As a result, the expected EDG loading was preliminarily determined to be 6168 kilowatts, which was within the EDG continuous load rating. This issue was entered into the licensee’s corrective action program as CR 2007-02683.

Analysis. The team determined that the failure to properly account for the effect of frequency variation on diesel generator loading was a performance deficiency which had to be corrected by revising the design loading calculation. The finding was determined to be more than minor because the finding was associated with the design control attribute of the mitigating systems cornerstone and affected the cornerstone’s objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, based on preliminary calculations, the failure to account for frequency variations had more than a minimal effect on the outcome of the analysis in that the continuous load rating for the EDGs would have been exceeded in the recirculation phase of a loss-of-coolant accident with the assumed loads. Using Manual Chapter 0609, “Significance Determination Process,” Phase 1 Worksheet, the finding screened as having very low safety significance (Green)

because the finding represented a design or qualification deficiency confirmed not to result in loss of operability.

Enforcement. Part 50, 10 CFR, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, the licensee had not adequately translated design basis information into the diesel generator loading analysis. Specifically prior to July 16, 2007, the analysis providing the information in M-018-01502, "Engineering Report Wolf Creek NPP 6201 kW Diesel Generator Set," did not properly account for the technical specification allowable diesel generator two percent frequency variation. The licensee failed to consider how the frequency variation could affect the design and licensing basis of the diesel engines. Because the violation was of very low safety significance and the licensee entered the finding into their corrective action program as CR 2007-02683, this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000482/2007006-08, "Diesel Generator Frequency Variation Not Considered in Loading Calculations."

.9 Potential for Damage to TDAFW Pump and ESW System During CST Unavailability

The team reviewed the pertinent design calculations concerning the automatic swapover of the suction source for the auxilary feedwater (AFW) pumps from the condensate storage tank (CST) to the emergency service water (ESW) system. In responding to a loss of offsite power (LOOP), the team noted that the TDAFW pump and EDGs are started immediately on an undervoltage signal, and safety loads are then automatically sequenced after the EDG is ready to accept load. The team questioned the condition if the CST was not available and noted the ESW system would be automatically aligned by a low AFW suction pressure signal to provide suction to the AFW system. Considering the 12 second maximum start time for the diesel, and the subsequent load sequence times, the team noted that the first ESW pump might not be at full flow until about 32 seconds after a LOOP, and the second ESW pump at about 37 seconds. Therefore, if the CST were not available and ESW were the AFW source, the water initially available to the TDAFW pump suction would be limited to the useable volume in the suction piping. The team questioned whether the system had the capability to break a vacuum in the suction piping with sufficient inflow of air. In addition, the team questioned when the ESW pumps are eventually started, if vacuums formed in the piping, whether there would be potential for water hammer in both trains of the ESW system. The licensee responded with their design assumptions and calculations for the systems. The team reviewed the licensee's response and questioned whether the licensee's assumptions were within the design and licensing bases of the plant. Pending further inspection of the licensee's adherence to these bases, this issue was considered an unresolved item (URI): URI 05000482/2007006-09, "Potential for Damage to TDAFW Pump and ESW System During CST Unavailability."

.10 Effect of EDG Frequency Variation on Supplied Equipment

The team identified that during a LOOP event with the EDGs supplying plant loads, the output frequency of the supplied power would be allowed to vary from 58.8 hertz to 61.2 hertz by Technical Specification 3.8.1. The licensee had already begun to address this

allowed frequency variation in specific cases, namely the effect of underfrequency in the emergency core cooling system pumps in PIR 2006-0481 and the effects of frequency variation on motor operated valves in CR 2007-002687. However, the team noted that the general plant-wide effect of the allowed frequency variation had not been completely addressed in the design calculations of the facility. Components such as fans, compressors, and actuators are depended upon to mitigate the effects of design basis accidents and would be affected by the variation in frequency. The team noted that the safety margins for the operation of this equipment could be less than currently analyzed. Examples of affected parameters could include reduced functional capacity, increased power cable loadings/heating, increased net positive suction head requirements, earlier vortex formation, increased and/or decreased draindown/fill times, and increased/decreased required operator action times.

The licensee initiated CR 2007-02734 in order to evaluate this issue. Once the licensee has evaluated the effect of frequency variation and determined the degree of safety margin impact throughout the plant, the NRC can complete the inspection of that analysis in order to close this issue. Pending this review, this issue is considered an URI: URI 05000482/2007006-10, "Effect of Emergency Diesel Generator Frequency Variation on Supplied Equipment."

4. OTHER ACTIVITIES

4OA6 Meetings, Including Exit

On July 20, 2007, the team leader presented the preliminary inspection results to Mr. R. Muench, President and Chief Executive Officer, and other members of the licensee's staff. On August 31, 2007, the team leader presented the inspection results telephonically to Mr. B. Smith, and other members of the licensee's staff. The licensee acknowledged the findings during each meeting. While some proprietary information was reviewed during this inspection, no proprietary information was included in this report.

Attachments: Supplemental Information
Initial Information Request
Second Information Request

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

T. J. Garrett, Vice President, Engineering
S. E. Hedges, Vice President, Operations and Plant Manager
D. Helm, Engineering Team Leader
R. A. Muench, President and Chief Executive Officer
K. Scherich, Director, Engineering
M. Sunseri, Vice President, Oversight
P. Bedgood, Superintendent, Radiation Protection
T. Jensen, Superintendent, Chemistry
S. Koenig, Manager, Chemistry/Radiation Protection
B. Muilenburg, Licensing Engineer, Regulatory Affairs
M. Skiles, Supervisor, Radiation Protection
K. Thrall, Supervisor, Radiation Protection
P. Wagner, Steam Generator Engineer, Engineering

NRC personnel

S. Cochrum, Senior Resident Inspector
C. Long, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000482/2007006-01	NCV	Inadequate Procedure for Restoration of the Emergency Diesel Generator Fuel Oil Transfer Pump Control Circuit Following a Fire Requiring Control Room Evacuation (Section 1R21.b.1)
05000482/2007006-02	NCV	Inadequate Design Control Associated with Vortexing Calculation (Section 1R21.b.2)
05000482/2007006-03	NCV	Failure to Identify and Correct Discolored Boric Acid Deposits (Section 1R21.b.3)
05000482/2007006-04	NCV	Nonconservative Battery Intercell Connection Resistance Value Specified in Design Calculation (Section 1R21.b.4)
05000482/2007006-05	NCV	Battery Surfaces Not Cleaned as Required by Procedure (Section 1R21.b.5)
05000482/2007006-06	FIN	Normal Charging Pump Balance Line Crack (Section 1R21.b.6)

05000482/2007006-07	FIN	Inadequate Procedure for Maintaining Drains Capable of Functioning (Section 1R21.b.7)
05000482/2007006-08	NCV	Diesel Generator Frequency Variation Not Considered in Loading Calculations (Section 1R21.b.8)
05000482/2007006-09	URI	Potential for Damage to TDAFW Pump and ESW System During CST Unavailability (Section 1R21.b.9)
05000482/2007006-10	URI	Effect of Emergency Diesel Generator Frequency Variation on Supplied Equipment (Section 1R21.b.10)

LIST OF DOCUMENTS REVIEWED

Surveillance Tests

Number	Title	Date
ETS-AI-211	TD AFW System Flow Path Verification and Inservice Check Valve	12/2/2003 5/19/2005 11/10/2006
STS AL-212	MD AFW System Flow Path Verification and Inservice Check Valve	11/30/2003 5/15/2005 2/27/2007
STN PE-037A	Essential Service Water A Heat Exchanger Flow and Differential Pressure Trending	2/9/2006
STN PE-037B	Essential Service Water B Heat Exchanger Flow and Differential Pressure Trending	1/28/2004 7/27/2004 7/1/2005 7/25/2005 1/23/2006 10/27/2006 1/22/2007

STS CH-008A	Emergency Fuel Oil Storage Tank A	7/6/2006 8/2/2006 9/7/2006 10/13/2006 11/10/2006 12/7/2006 1/4/2007 1/30/2007 3/8/2007 4/5/2007 5/2/2007 6/7/2007
STS CH-008B	Emergency Fuel Oil Storage Tank B	7/20/2006 8/16/2006 9/21/2006 10/03/2006 10/29/2006 11/15/2006 12/20/2006 1/18/2007 2/15/2007 3/20/2007 4/19/2007 5/17/2007
STS CH-015	Emergency Diesel New Fuel	4/7/2006 5/23/2006 9/21/2006 9/22/2006 10/3/2006 10/4/2006 10/26/2006 10/27/2006 10/29/2006 10/31/2006 1/05/2007 1/17/2007

STS EF-100A	Essential Service Water System Inservice Pump A & Essential Service Water A Discharge Check Valve Test	3/11/2004 6/10/2004 9/10/2004 12/9/2004 3/10/2005 4/30/05 6/8/2005 9/9/2005 12/8/2005 3/9/2006 6/7/2006 9/8/2006 12/8/2006 3/9/2007
STS EF-100B	Essential Service Water System Inservice Pump B & Essential Service Water B Discharge Check Valve Test	2/19/2004 5/21/2004 8/19/2004 11/19/2004 2/23/2005 5/20/2005 8/18/2005 10/17/2005 11/18/2005 2/15/2006 5/19/2006 8/18/2006 10/26/2006 11/17/2006 2/16/2007 5/18/2007
STS-KJ-015A	Manual/Auto Fast Start, Sync, and Loading of Emergency Diesel Generator NE01	3/2006
STS-KJ-015A	Manual/Auto Fast Start, Sync, and Loading of Emergency Diesel Generator NE01	6/2006
STS-KJ-015A	Manual/Auto Fast Start, Sync, and Loading of Emergency Diesel Generator NE01	9/2006 10/2006 12/2006 3/2007 6/2007

STS-KJ-015B	Manual/Auto Fast Start, Sync, and Loading of Emergency Diesel Generator NE02	2/2006 5/2006 8/2006 10/2006 11/2006 2/2007 5/2007

Procedures

Number	Title	Revision/Date
AP 21G-001	Control of Locked Component Status	43B
AP 23F-001	Check Valve Reliability Improvement Program	10
AI 29B-002	Check Valve Condition Monitoring Program	4
MGE EOOP-05	Insulation Resistance Testing	15
MPM EF-002	Essential Service Water Traveling Water Screens Preventive Maintenance Activity	11
OFN RP-017	Control Room Evacuation, Attachment F, Monitoring and Filling of EDG B Fuel Oil Day Tank	23
OTSC 07-0043	On the Spot Change, OFN RP-017, Control Room Evacuation	July 16, 2007
STN PE-037B	Essential Service Water B Heat Exchanger Flow and Differential Pressure Trending	13
STS AL-101	MDAFW Pump A Inservice Pump Test	35
STS AL-103	TDAFW Pump Inservice Pump Test	42
STS AL-210A	MDAFW Pump A Inservice Check Valve Test	6
STS AL-211	Turbine Driven Auxiliary Feedwater System Flow Path Verification and Inservice Check Valve Test	19
STS CH-008A	Emergency Fuel Oil Storage Tank A	21A
STS CH-008B	Emergency Fuel Oil Storage Tank B	20A
STS CH-015	Emergency Diesel New Fuel	21A
STS EF-100A	ESW System Inservice Pump A and ESW A Discharge Check Valve Test	30

STS EF-100B	ESW System Inservice Pump B and ESW B Discharge Check Valve Test	28
STS EG-100A	Component Cooling Water Pumps A/C Inservice Pump Test	20A
STS EG-100B	Component Cooling Water Pumps B/D Inservice Pump Test	17
STS-KJ-011A	Diesel Generator 24 Hour Run: Fuel Oil Consumption Rate Determination	16
STS-KJ-011A	Diesel Generator 24 Hour Run: Fuel Oil Consumption Rate Determination	17
STS VT-001	Verification of OMN-1, MOV Exercise Requirements	3A
SYS JE-201	Emergency Fuel Oil Storage Tank Filling	17A
AP 05-005	Design, Implementation & Configuration Control of Modifications	11A
AP 21B-003	Control of Temporary Equipment	6
CNT-MC-905	DOW Corning 3-6548 Silicone RTV Foam Seals and Elastomer Top Cap	3
MCE BA-001	Battery Connector Assembly Maintenance	13
RNM C-0503	Instantaneous Solenoid Overcurrent Relay Type PJC11AV1A	3
RNM C-0521	Induction Disc Voltage Relay Type IAV53L	4
RNM C-0552	Generator Differential Relay Type SA-1	7
RNM C-0577	General Electric IAC Induction Disc Overcurrent Relay	3
STN IC-805A	Channel Calibration Diesel Generation Trips KKJ01A	11
STS IC-802A	4KV Loss of Voltage and Loss of Offsite Power Channel Calibration Train A	5
STS IC-803A	4KV Undervoltage – Grid Degraded Undervoltage Channel Calibration NB01 Bus	4
STS MT-018	Weekly Inspection of 125 VDC Lead-Calcium Batteries	16
STS MT-019	125 VDC Class 1E Quarterly Battery Inspection	13

STS MT-020	125 Volt DC Battery Inspection/Charger Operational Test	21
STS MT-021	Service Test for 125 VDC Class 1E Batteries	15
STS MT-058	Modified Performance Test for 125 VDC Class 1E Batteries	4
SYS KJ-123	Post Maintenance Run of Emergency Diesel Generator A	36A

Calculations

Number	Title	Revision
10466-M-21-151	Ingersoll Rand Pump Performance Test Record, SN#1134	4/17/1979
10466-M-21-146	Ingersoll Rand(SD#-1081) Pump Performance Curves	11/13/1978
10466-M-021147	Ingersoll Rand Performance Test Data, Sheet for 4HMTA-9 Pump IN0576147	11/13/1978
AL-30-WC	AFW System Setpoints: Pump Suction Pressure; Automatic ESW Switchover; and CST Low Level	3
AL-30-WC-003	Calculation Change Notice, AFW System Setpoints: Pump Suction Pressure; Automatic ESW Switchover; and CST Low Level	2/27/2001
AL-M-007	Thrust / Torque Calculation for Valves ALHV0005, ALHV0007, ALHV0009, ALHV0011	5
AL-M-007	Thrust / Torque Calculation for Valves ALHV0005,ALHV0007, ALHV0009, ALHV0011	6 (Draft)
AL-02W	AFW Max Allowable Recirculation for the Motor Driven Pumps	0
AL-06-W	Auxiliary Feedwater Pumps	W0
AL-07-W	Auxiliary Feedwater Pumps	W0
Al-16--W	Determine the Available NPSH for the Auxiliary Feedwater Pumps, with Dissolved Nitrogen in the Condensate Tank	
AL-24	Auxiliary Feedwater Pumps	0

AL-30-WC	AFW System Set-points, Pump Suction Pressure, Automatic ESW Switchover, and CST Low Level	
AL-39	AFWMD Pump Head Requirements	1
AL-40	AFW Flow to ruptured Steam Generator (to be used in S/G flood analysis being performed by SNUPPS)	0
AN-94-052	Revised Aux FW Flow-rate Requirements	00
AN-97-003	Evaluation of Motor Driven Auxiliary Feedwater Pump Performance	
AN-97-047	Water Inventory Available and Requirements in the TDAFWP Suction Piping for Accidents Coincident with Loss of Offsite Power	0
AN 98-001	Uncertainty for Refueling Water Storage Tank (RWST) Level-Low, (Lo-Lo-1) Automatic Switchover Setpoint and Technical Specification Changes	0
AN-99-025	Steam Generator Tube Rupture Overfill Analysis with Revised Operator Action Times	7/27/2001
BJ-M-013	Thrust and Torque Calculation for EJ8811A and V8811B	5
BN-23	Blockage of RWST Vent to Atmosphere, Part III	2
BN-J-001	RWST Level Transmitter Density Errors	0
BN-M-011	Thrust and Torque Calculation for EJ8812A and V8812B	
BN-M-013	RWST Volume Requirements for Injection, ECCS, and Containment Spray Pumps Transfer and Time Available for Operator Actions	3/18/1999
ECCS-47	SI Pumps NPSH from RWST	0
EF-06-W	Essential Service Water Component Flow Velocities	0
EF-10-W	Essential Service Water Flows at 90 deg F – Normal Mode Operation	1
EF-35	Essential Service Water Pump Head Requirement	2
EF-M-030	Determine Required Essential Service Water Warming Line Flow	1
EF-M-039	Pre-lubrication Line to Essential Service Water Pump	0

EF-M-043	Essential Service Water Make-up Flow Rate to Auxiliary Feedwater – Test Acceptance Criteria	0
EF-M-046	Ultimate Heat Sink Analysis with Initial Lake Temperature up to 94 deg F	0
EG-06-W	Component Cooling Water System	W-4
EG-09-W	Tube Plugging for Component Cooling Water Heat Exchangers EEG01A/B Maximum CCW Temperature – LOCA	0
EG-M-032	Component Cooling Water Heat Exchanger Performance During Normal Operations, Shutdown at Four Hours (and Twelve Hours), and Post-LOCA Recirculation	0
EJ-30	Residual Heat Removal Pumps (RHR) REJ01B, Net Positive Suction Head (NPSH)	
EJ-30-WC	AFW System Set-points: Pump Pressure: Automatic ESW Switchover and Low CST Level	3
EN - 33	Containment Spray NPSH	1
FL-01	Flooding of the Auxiliary Building	8/30/1993
J-K-SA-06	Instrument Loop Uncertainty Estimate: System AL, Loops 37, 38, 39	1
J1GEN	Instrument Loop Uncertainty Estimates	1
J2A08	Accuracy: Foxboro Dynamic Compensator (Lead / Lag) 2AC+DYC	0
J2A10	Accuracy: Voltage-to-Current Converter, Foxboro 2AO-V2I	0
J2C01	Accuracy: Pressure Transmitters, Rosemount 1153 Series B	1
J2G01	Accuracy: CCC Bistable and Sensing Resistor	0
JE-208	Emergency Fuel Oil Flow Diagram and Transfer Pump	0
JE-356	Emergency Fuel Oil System Pressure Drop Calculation	0

JE-MW-001	Fuel Oil Storage Tank Volume and Adequacy Check	0
M-JE-321	Emergency Diesel Storage Tank and Day Tank Volumes and Level Limits	2
M-AP-03	Condensate Storage Tank Low-Low Level	1
M-BN-23	Blockage of Refueling Water Storage Tank	2
NK-E-001	Class 1E DC Voltage Drop	2
NK-E-002	Class 1E Battery Sizing	4
NK-E-003	Class 1E Battery Short Circuit Study	1
SA-89-017	Evaluation of CCW and RHR Heat Exchange Performance for the Extended Fuel Operating Cycle (18 months)	0
SA-91-013	Determination of IHSI Flow rate Delivered to the RCS through the IHSI Pump Cross Connect Line	0
TR 06-0627-TR-1	Investigation of Air Entrainment of the Containment Spray Piping on the Operation of the Containment Spray Pump	0
AN-98-001	Uncertainty for Refueling Water Storage Tank (RWST) Level-Low, (Lo-Lo-1) Automatic Switchover Setpoint and Technical Specification Changes	0
BN-20	RWST Volumes/Level Set Points	2
BN-J-001	RWST Level Transmitter Density Errors	0
BN-J-002	Total Loop Uncertainty Calculation System BN, Loops 0930, 0931, 0932, and 0933	0
H-8	System NB Protective Relays	5
H-10	System NE Relay Settings	5
NK-E-001	Class 1E DC Voltage Drop	2
NK-E-002	Class 1E Battery Sizing	4
NK-E-003	Class 1E 125V DC Batteries Short-Circuit Study	1
XX-E-004	AC Motor Operated Valve Minimum Terminal Voltage	13
XX-E-006	AC System Analysis	5

XX-E-009	System NB, NG, PG Undervoltage/Degraded Voltage Relay Setpoints	1
XX-E-012	Safety-Related MCC Control Circuit Allowable Wire Lengths	2

Drawings

Number	Title	Revision/Date
10466-M-021-149-01	Ingersoll Rand Co, Performance Test Data Sheet 6HMTA-6 Pump S/N 0076190	12/4/1978
10466-M-771-0064-03	Safety Class 1E Differential Pressure Indicator with Switches (Qualification Group B), Sub. 4	
A8942	Control Valve, 20,000 Series Butt Welded Ends, Quick Change –Anti-Cavitation Trim	A
E-11NB01	Lower Medium Voltage System Class 1E 4.16 kV Single Line Meter and Relay Diagram	2
E-11NG20	Low Voltage System Class 1E Motor Control Center Summary	241
E-11NK01	Class 1E 125 V DC System Meter & Relay Diagram	9
E-13AL02A	Schematic Diagram, Motor Operated Valves	5
E-13AL02B	Schematic Diagram, Motor Operated Valve	5
E-13AL04A	Schematic Diagram, Motor Operated Valves	7
E-13AL04B	Schematic Diagram, Motor Operated Valves	8
E-13JE01	Schematic Diagram, Emergency Fuel Oil Transfer Pumps	5
E-K3EF01	Schematic Diagram, Essential Service Water Pump A	18
E-K3EF01A	Schematic Diagram, Essential Service Water Pump B	10
E-K3EF02	Schematic Diagram, Traveling Water Screens	16
J-04BN03(Q)	Instrument Isometric Drawing, Refueling Water Storage Tank Level Transmitter BN-LT-930	3
J-04BN04(Q)	Instrument Isometric Drawing, Refueling Water Storage Tank Level Transmitter BN-LT-931	1
J-04BN05(Q)	Instrument Isometric Drawing, Refueling Water Storage Tank Level Transmitter BN-LT-932	0

J-04BN06(Q)	Instrument Isometric Drawing, Refueling Water Storage Tank Level Transmitter BN-LT-933	1
J-14AL20(Q)	Instrument Isometric Drawing, ESFAS Low Suction Pressure	0
J-14AL21(Q)	Instrument Isometric Drawing, ESFAS Low Suction Pressure	1
J-14AL22(Q)	Instrument Isometric Drawing, ESFAS Low Suction Pressure	0
J-14EJ05(Q)	Instrument Isometric Drawing, RHR Pump 1A Discharge (EJ-FIS-610)	2
J-14EJ06(Q)	Instrument Isometric Drawing, RHR Pump 1B Discharge (EJ-FIS-611)	2
KD-7496	One Line Diagram	32
M-021-0153	Terry Turbine Pump Head Curves	1/14/1980
M-082-029-06	Essential Service water Pump Curves	12/9/1969
M-12AL01	P&ID Auxiliary Feedwater System	10
M -12BN01	P&ID, Borated Refueling Water Storage System	12
M-12EF01	Essential Service Water System	20
M-12EF02	Essential Service Water System	23
M-12EG02	Piping & Instrumentation Diagram Component Cooling Water System	23
M -12EN01	P&ID Containment Spray System	12
M-12FB01	Piping & Instrument Diagram, Auxiliary Steam System	17
M -12FC02	P&ID Auxiliary Turbines, Auxiliary feedwater pump turbine	20
M -13AL01	Piping Isometric, Aux Feedwater, Suction Piping	10
M -13AL02	Piping Isometric, Motor Driven Aux Feedwater Pump A Discharge Piping	3
M -13AL03	Piping Isometric, Motor Driven Aux Feedwater Pump B Discharge Piping	4
M -13AL04	Piping Isometric, Turbine Driven Aux Feedwater Pump Discharge Piping	1

M -13AL05	Piping Isometric, Aux Feedwater Pumps, Recirculation Piping	4
M -13-BN01	Piping Isometric, Borated Refueling Water Storage Sys, Auxiliary Building	1
M-109-0003-W09	Refueling Water Storage Tank	7
M-1HX001	Heat Exchanger Tube Sheet Map - Component Cooling Water Heat Exchanger “A”	37
M-1HX001	Heat Exchanger Tube Sheet Map - Component Cooling Water Heat Exchanger “B”	47
M-225-00006	12" 150 Welded Ends Stainless Steel, Flex Wedge Gate Valve with SMB-00 Limitorque Operator	1
M-225-00002	12" 150 Welded Ends Stainless Steel, Flex Wedge Gate Valve with SMP Limitorque Operator	8
M-724-00293	Motor operated Gate Valve MOD 08000GM82FBB 0D)	6
M-724-00696	Motor Operated Gate Valve M00 1402GN84FEHOEO	5
M-724-00697	Motor Operated Gate Valve MOD 14002GM84FEB0E0	2
M-766-00923	Motor Operated Gate Valve MOD 14002GM84FEB0E0	4
M-766-00948	Motor Operated Valve 8811A	1
M-K2EF01	Essential Service Water System	48
M-KC0911	Essential Service Water System Pumphouse Piping Sections	18
MS-02	Piping Class Sheets	48
Vendor	Pacific Pumps Division, Dresser Industries Drawing 300-VN49768, *Pump and Motor Outline*, Pump Data, Sheet 3	7
11873956	Instrument List SNUPPS - 700001	8
C-OCO213 (Q)	Refuel’g Wtr. Stg. Tank & Valvehouse Conc. Neat Line and Reinf. Plans and Sections	4
E-02NB02 (Q)	Logic Diagram ESF XFMR XNB02 Feeder Brkr	5
E-02NB03 (Q)	Logic Diagram NB01 & NB02 Bus Feeder Brkrs	7

E-02NB04 (Q)	Class IE 4.16KV System Notes and References	6
E-02NG02 (Q)	Logic Diagram 480 V LC Main Feeder Breakers	5
E-02NG03 (Q)	Logic Diagram 480 V LC Tie Breakers	5
E-02NG04 (Q)	Logic Diagram 480 V System Notes & Ref.	5
E-051-00058 W06	3 Phase SCR Controlled Battery Charger Schematic	1
E-11005	List of Loads Supplied by Emergency Diesel Generator	31
E-11013	Installation, Inspection and Testing Details for Electrical Equipment and Cable	19
E-11023	Relay Setting Tabulation and Coordination Curves System NB	5
E-11024	Relay Setting Tabulation & Coordination Curves Systems NG/PG	2
E-11025	Relay Setting Tabulation and Coordination Curves System NE	13
E-11028	Relay Setting Tabulation Systems NK & NN	5
E-11028 (Q)	Relay Setting Tabulation Systems NK & NN, Sheet 1	4
E-11028 (Q)	Relay Setting Tabulation Systems NK & NN, Sheet 2	5
E-11028 (Q)	Relay Setting Tabulation Systems NK & NN, Sheet 3	4
E-11028 (Q)	Relay Setting Tabulation Systems NK & NN, Sheet 4	3
E-11028 (Q)	Relay Setting Tabulation Systems NK & NN, Sheet 5	0
E-11NB01	Lower Medium Voltage Sys. Class 1E 4.16 kV Single Line Meter and Relay Diagram	2
E-11NB02	Lower Medium Voltage Sys. Class 1E 4.16 kV Single Line Meter and Relay Diagram	2
E-11NG01	Low Voltage System Class 1E 480V Single Line Meter & Relay Diagram	9
E-11NG02	Low Voltage System Class 1E 480V Single Line Meter & Relay Diagram	8

E-11NK01	Class 1E 125V DC System Meter & Relay Diagram	9
E-11NK02	Class 1E 125V DC System Meter & Relay Diagram	7
E-12NB01	Logic Diagram ESF XFMR XNB01 Protection	0
E-12NF01 (Q)	Load Shedding and Emergency Load Sequencing Logic	3
E-13JE01	Schematic Diagram Emergency Fuel Oil Transfer Pumps	3
E-13JE01	Schematic Diagram Emergency Fuel Oil Transfer Pumps	4
E-13KJ03A	Schematic Diagram Diesel Gen. KKJ01B Engine Control (Start/Stop Circuit)	12
E-13KJ03A	Schematic Diagram Diesel Gen. KJ01A Engine Control (Start/Stop Circuit)	13
E-13NK10	125 Volt DC Class 1E Power System Schematic	3
E-13NK10B	125 Volt DC Class 1E Power System Schematic, Train B	1
E-13NN01	Class 1E Instrument AC Schematic	3
E-1R8900	Raceway Notes Symbols and Details	22
E-KR0231	Raceway Plot Plan Essential Service Water System Plan & Sections	9
KD-7496	One Line Diagram	32
KL1909	Logic Block Diagram Load Shedding & Emergency Load Sequencing System (LSELS)	E
M-12BN01	Piping & Instrumentation Diagram Borated Refueling Storage Water System	12
M-1G051	Equipment Locations Control & Diesel Gens. Bldgs. & Comm. Corridor Plan El. 2000’-0” & El. 2016’-0”	10

Miscellaneous Documents

J-301-00064 W11 (Rosemount Report 108025 Revision H), *Qualification Report for Pressure Transmitters, Rosemount Model 1153 Series B*, Section 7.1.7, Ambient Temperature Limits; Section 7.1.8, Humidity, July 7, 2000.

J-301-00129, Specification and Outline Dimension Drawing for Absolute Pressure Transmitter Model 1153AB, March 26, 1999.

Letter KNPLB 84-095, Subject: Setpoint Information, Attachment 1, M&TE Uncertainty, Attachment 2, M&TE Calculations, November 21, 1984.

OE-AL-07-003, Operability Evaluation, AL Auxiliary Feedwater System, July 18, 2007.

E-mail from Bruce S. Herman, P.E., Siemens Water Technologies Corp., Subject: Wolf Creek Traveling Screen, July 2, 2007.

M-771-00144, p. 116, [excerpt from Westinghouse document*, Precautions, Limitations, and Setpoints*, p. 71, *Residual Heat Removal System*].

M-771-00260, Specification Sheet 03810, FE 610, FE 611; Specification Sheet 04631, FIS 610, FIS 611, Revision 1.

WCAP-8687, *Qualified Life of Westinghouse Motors with Theramlastic Epoxy Insulation System*, July 1981.
1007461, Terry Turbine Maintenance Guide, AFW Application, November 1,2004

Plant Health Committee, Top Equipment Issue, Turbine Driven Auxiliary Feedwater Turbine Control Speed, 5/11/2007

NUREG/CR-2761, Results of Vortex Suppressor Tests, Single Outlet Sump Tests and Misc. Sensitivity Tests, Undated

Change Pkg 11779, EJHV8701A Evaluation of Valve Components

Change Pkg 11779, EJHV8701A Pre3ssure Locking during RF14

JPGC2001, PWR-19010, Air Entrainment in a Partially Filled Horizontal Pump Suction Line, June 4-5, 2001

00251-L-002, Altran Report - Gas Transportation Study in ECCS System

CSRV Log, Valve 8811 Maintenance Log

NSAL-06-2, RWT Air Entrainment, 10/31/2006

RWST Discharge Valve- Maintenance Log

Turbine Driven Auxiliary Feedwater Pump Maintenanced Log

Motor Driven Auxiliary Feedwater Pump Maintenance Log

JPGC2001/CR2761 Air Entrainment in Partially Filled Horizontal PipeSuction Line

WCOP-02, “WCGS Inservice Testing Program, Third Ten-Year Interval,” Revision 14

ASME OM Code Case OMN-1, “Alternate Rules for Preservice and Inservice Testing of Certain Motor-Operated Valve Assemblies in Light-Water Reactor Power Plants, OM Code-1995, Subsection ISTC”

Design Change Package 09971, Snubber Reduction for Class 2 and 3 Lines Inside/Outside Containment, dated June 28, 2003

Interoffice Correspondence, dtd 6/8/05, subject: Safety Analysis and Probabilistic Safety Assessment (PSA) Time Critical Operator Action Assumptions

Letter dtd 1/31/07, subject: Docket No. 50-482: Response to NRC Request for Addtional Information Regarding NRC Generic Letter 2006-02, “Grid Reliability and the Impact on Plant risk and the Operability of Offsite Power”

Letter dtd 3/31/06, subject: Docket No. 50-482: 60-day Response to NRC Generic Letter 2006-02, “Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power”

Wolf Creek Revision 3 PSA Model - Operator Action Risk Ranking by Risk Achievement Worth

Letter dtd 2/14/06, subject: Docket No. 50-482: Response rto NRC Generic Letter 2006-01

Letter dtd 11/3/05, subject: Docket No. 50-482: Application for Technical Specification Improvement Regarding Steam Generator Tube Integrity Using the Consolidated Line Item Improvement Process

Letter ET 07-0007, WCNOC to USNRC, Subject: Docket No. 50-482: 90 day response to NRC Generic Letter 2007-01, Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients, May 2, 2007.

Letter SLNRC 81-10 dated February 19, 1981, SNUPPS to USNRC, Subject: SNUPPS Auxiliary Feedwater System Meeting.

Letter SLNRC 81-39 dated June 3, 1981, SNUPPS to USNRC, Subject: Auxiliary Feedwater System.

Letter SLNRC 81-44 dated June 8, 1981, SNUPPS to USNRC, Subject: Reliability Analysis of the SNUPPS Auxiliary Feedwater System.

Work Orders

99-212649-000	04-261091-001	05-274546-000	06-290814-000
99-214431-000	04-263287-000	05-274547-000	06-290815-000
00-221114-000	04-263296-000	05-276050-001	07-292761-000
00-221114-002	04-265132-000	05-276564-000	07-292962-000
02-243824-000	04-265692-000	05-278964-000	07-293322-000
02-245755-000	04-266369-000	06-284921-000	07-296894-000
03-251876-000	04-266629-000	06-286007-000	07-297659-000
03-257068-000	04-266699-000	06-286300-000	07-297817-000
04-258886-000	05-269979-000	06-288299-000	
04-258887-000	05-270742-000	06-288431-000	
04-258888-000	05-272378-000	06-290430-000	
04-258889-000	05-272378-001	06-290431-000	
04-259388-001	05-272482-000	06-290638-000	
04-260912-000	05-272729-000	06-290638-001	
04-261091-000	05-273332-000	06-290638-002	

Work Requests

07-062654
06-289275
06-289426

Condition Reports

2006-01866	2007-02580	2007-02752	2007-02802
2006-01900	2007-02597	2007-02776	2007-02810
2006-02369	2007-02659	2007-02783	2007-02813
2006-02974	2007-02666	2007-02786	2007-02820
2006-03244	2007-02683	2007-02789	2007-02821
2007-00022	2007-02687	2007-02790	2007-02840
2007-02331	2007-02704	2007-02792	
2007-02549	2007-02734	2007-02795	
2007-02577	2007-02750	2007-02798	

Problem Identification Reports

1996-3256	1999-2045	2003-1870	2005-2525
1997-1778	2000-1105	2003-2853	2005-2879
1997-2546	2001-2745	2003-3752	2006-0481
1997-3197	2002-0242	2004-1224	2006-0489
1997-4040	2002-1401	2004-2182	2006-0754
1997-4056	2002-1544	2004-2502	2006-0808
1997-4057	2002-2389	2005-1365	2007-0226
1997-4058	2002-2471	2005-1430	2007-0930
1997-4059	2003-0242	2005-1722	2007-2597
1997-4063	2003-0479	2005-1736	2007-2813
1998-1008	2003-1352	2005-1801	
1998-3675	2003-1595	2005-2107	
1998-3677	2003-1867		
1999-1629	2003-1868		

Inservice Tests (Pumps and Valves)

The inservice tests were comprised of the specified tests for the identified components in ASME OM Code 1998 Edition through 2000Addenda. The tests for the identified MOVs were as specified in ASME OM Code Case OMN-1, “Motor Operated Valve Exercise Requirements.”

Component	Test Dates
MOV ALHV0030	2/23/2006
MOV ALHV0031	1/12/2006
MOV ALHV0032	9/13/2005
MOV ALHV0033	9/14/2005
MOV ALHV0034	2/22/2000
MOV ALHV0035	1/13/2006
MOV ALHV0036	3/17/2005
MOV EJHV8804A	3/30/2002
MOV EJHV8804B	4/13/2002
ESW Pump A - PEF 01A and Discharge Check Valve EF-V001	9/9/2005 12/9/2005 3/9/2006 6/8/2006 9/8/2006 12/8/2006 3/9/2007 6/9/2007
ESW Pump B - PEF01B and Discharge Check Valve EF-V004	11/17/2006 2/16/2007 5/18/2007
Component Cooling Water Pumps A and C	12/2/2005 3/2/2006 6/1/2006 8/31/2006 11/29/2006 2/28/2007 5/25/2007
Component Cooling Water Pumps B and D	12/20/2005 3/23/2006 6/23/2006 9/20/2006 12/21/2006 3/22/2007
MDAFW A - PAL01A and Discharge Check Valve AL-V042	7/16/2005 10/12/2005 1/13/2006 4/13/2006 7/12/2006 10/5/2006 1/10/2007 4/10/2007

TDAFW Pump - PAL02	3/14/2007 6/13/2007
TDAFW Discharge Check Valve, AL-V054	11/10/2006
ESW Suction Check Valve AL-V009	1/13/2006 3/10/2006 6/20/2006 9/8/2006 12/5/2006 3/7/2007

Completed Calibrations and Tests

RNM C-0521	Bus NG01 27B Undervoltage Relay	03/11/98
RNM C-0521	Bus NG02 27B Undervoltage Relay	03/06/98
RNM C-0521	Bus NG04 27B Undervoltage Relay	03/06/98
RNM C-0552	DG NE01 Generator Differential Relay (Differential 187/DG)	12/09/04
RNM C-0552	DG NE02 Generator Differential Relay (Differential 187/DG)	08/23/04
RNM C-0552	DG Spare 187 Generator Differential Relay	08/25/04
RNM C-0552	DG Spare 187 Generator Differential Relay	12/10/04
RNM C-0577	Aux Feedwater PpA Ph A Overcurrent Relay (150-151/M)	05/08/07
RNM C-0577	Aux Feedwater PpA Ph B Overcurrent Relay (150-151/M)	05/08/07
RNM C-0577	Aux Feedwater PpA Ph C Overcurrent Relay (150-151/M)	05/08/07
RNM C-0577	Aux Feedwater PpB Ph A Overcurrent Relay (150-151/M)	05/22/07
RNM C-0577	Aux Feedwater PpB Ph B Overcurrent Relay (150-151/M)	05/22/07
RNM C-0577	Aux Feedwater PpB Ph C Overcurrent Relay (150-151/M)	05/22/07
RNM C-0577	ESW Pump DPEF01A Ph A Overcurrent Relay (150-151/M)	06/01/04
RNM C-0577	ESW Pump DPEF01A Ph B Overcurrent Relay (150-151/M)	06/01/04
RNM C-0577	ESW Pump DPEF01A Ph C Overcurrent Relay (150-151/M)	06/01/04

RNM C-0577	ESW Pump DPEF01B Ph A Overcurrent Relay (150-151/M)	05/23/07
RNM C-0577	ESW Pump DPEF01B Ph B Overcurrent Relay (150-151/M)	05/23/07
RNM C-0577	ESW Pump DPEF01B Ph C Overcurrent Relay (150-151/M)	05/23/07
RNM C-0577	RHR Pump DPEJ01A Ph A Overcurrent Relay (150-151/M)	05/10/07
RNM C-0577	RHR Pump DPEJ01A Ph B Overcurrent Relay (150-151/M)	05/10/07
RNM C-0577	RHR Pump DPEJ01A Ph C Overcurrent Relay (150-151/M)	05/10/07
RNM C-0577	RHR Pump DPEJ01B Ph A Overcurrent Relay (150-151/M)	04/25/07
RNM C-0577	RHR Pump DPEJ01B Ph B Overcurrent Relay (150-151/M)	04/25/07
RNM C-0577	RHR Pump DPEJ01B Ph C Overcurrent Relay (150-151/M)	04/25/07
RNM C-0503	Aux Feedwater PpA Ground Overcurrent Relay (150G/M)	05/08/07
RNM C-0503	Aux Feedwater PpB Ground Overcurrent Relay (150G/M)	05/24/01
RNM C-0503	Aux Feedwater PpB Ground Overcurrent Relay (150G/M)	05/18/04
RNM C-0503	Aux Feedwater PpB Ground Overcurrent Relay (150G/M)	05/22/07
RNM C-0503	ESW Pump DPEF01A Ground Overcurrent Relay (150G/M)	06/01/04
RNM C-0503	ESW Pump DPEF01B Ground Overcurrent Relay (150G/M)	05/23/07
RNM C-0503	RHR Pump DPEJ01A Ground Overcurrent Relay (150G/M)	05/10/07
RNM C-0503	RHR Pump DPEJ01B Ground Overcurrent Relay (150G/M)	04/25/07

The team provided the following information request in writing to the licensee prior to the inspection.

Initial Information Request
Component Design Basis Inspection (71111.21)
Wolf Creek

Please provide the following information in order to support the NRC's component design basis inspection effort at your facility. If there are problems obtaining any of this information, please call the Team Leader, Rick Deese at (479) 968-3290 to discuss alternate arrangements. We would like to have the information ready when we arrive on site for the "bag-man" portion of the inspection on June 11, 2007.

We prefer, but it's not required, that the information be provided electronically and in a searchable format, such as Adobe, Word, Word Perfect, or Excel. Other licensee's have found that providing the information on a CD is effective and efficient.

1. The risk ranking of components from your site specific probabilistic safety analysis sorted by Risk Achievement Worth, Fussell-Veseley, and by Birnbaum Importance.

2. A list of your top 500 cutsets from your probabilistic safety analysis.

3. Risk ranking of operator actions from you site specific probabilistic safety analysis sorted by Risk Achievement Worth. Provide copies of your human reliability worksheets for these items (you may limit this list to the 100 most risk significant actions).

4. If you have an external events or fire probabilistic safety analysis model, provide the information requested in Items 1 and 2 for external events and fire.

5. Any pre-existing evaluation or list of components and calculations with low design margins (i.e. pumps closest to the design limit for flow or pressure, diesel generators close to design required output, heat exchangers close to rated design heat removal etc.)

6. For the last two years, a list of operating experience evaluations, modifications and corrective actions sorted by component or system. A one line, or short, description is acceptable.

7. A list of any common-cause failures of components in the last 5 years at your facility.

8. A list of Maintenance Rule functions.

9. A list of your Maintenance Rule a(1) components.

10. A list of your current temporary modifications.

11. A current list of "operator work arounds."

12. Piping and instrument drawings for your emergency core cooling systems, auxiliary feedwater system, emergency diesel generators, and off-site power supplies. At this time, only the mechanical piping drawings are needed for the emergency core cooling systems and the emergency diesel generators. A one line drawing of your AC electrical distribution system is needed (showing offsite sources, EDGs, 4160 loads and transformers to 480VAC loads).

13. Licensee Event Reports from your site since 2002

14. System Health Reports for the last two years

15. A list of time dependent operator actions

In addition to the above, if available electronically, please provide a copy of each of the following on CD.

1. Final/Updated Safety Analysis Reports

2. Technical Specifications

3. Design Bases Documents for the emergency core cooling systems (including auxiliary feedwater), emergency diesel generators and off-site power supplies

4. System descriptions or operator training manuals for the emergency core cooling systems, emergency diesel generators and off-site power supply systems

Thank you for your cooperation in these matters.

The team provided the following information request in writing to the licensee during the inspection.

Second Information Request
Component Design Basis Inspection
Wolf Creek

Please provide the following information in order to support the NRC's component design basis inspection effort at your facility. If there are problems obtaining any of this information, please call the Team Leader, Rick Deese at (479) 264-6700 to discuss alternate arrangements. We would like to have the information ready when we arrive on site for the first on-site week portion of the inspection on June 25, 2007.

We prefer, but it's not required, that the information be provided electronically and in a searchable format, such as Adobe, Word, Word Perfect, or Excel. Other licensee's have found that providing the information on a CD is effective and efficient. When naming the electronic files, please identify the component and requested item number (for example, the file containing the refueling water storage tank volume calculation would be titled something like "RWST3").

Refueling Water Storage Tank (RWST)

1. Tank drawing including internal piping (if any)
2. Inlet and outlet piping drawing and isometric to HHSI and Spray Pumps
3. Tank volume calculation
4. Tank vent drawing – including any vent components
5. List of other pertinent tank calcs (flooding, stress analysis, etc.)
6. Corrective action program document list (of significance) for the past 4 years
7. Level measurement tests for the past 3 years + trends as available
8. Please schedule an interview of the responsible design and systems engineer
9. Operating procedure for switchover
10. Design Change list for the past 5 years
11. Calculation(s) of record that establish the scaling, instrument uncertainties, and setpoints for the low-level RWST switchover from injection to recirculation mode, as well as RWST level "setpoints" used in EOPs.
12. Instrument installation details for RWST level transmitters, showing impulse line configuration, tap elevations, instrument enclosures, heat tracing, and process system interfaces (tank dimensions and nozzle locations, overflow line, vent, internal structures, etc.)

Motor Driven Auxiliary Feedwater Pumps (MDAFWP)
Turbine Driven Auxiliary Feedwater Pump (TDAFWP)
Essential Service Water Pumps (ESWP)
Component Cooling Water Pumps (CCWP)
Emergency Diesel Generator Fuel Oil Transfer Pumps (EDGFOTP)

1. Vendor Manual for the pump and motor
2. Copy of maintenance log
3. Piping drawings and isometrics to the 2nd valve
4. Inservice test reports since January 2004 and test procedures

5. Calculations (flow requirements + calculation of flow)
6. Corrective action program document list (significant CRs) for the past years
7. Design Change list for the past 5 years
8. Industry operating experience/issues list for the past 3 years
9. Discussion with the design and systems engineer
10. Piping and Instrumentation Diagram
11. Industry issues identified and evaluated – past 5 years
12. Operating Procedures
13. Current Margins
14. Applicable Requests for Relief and associated NRC approvals
15. Current pump curves
16. Degradation history/reconciliation with decrease in pump flow
17. All Generic Communications and applicable responses

Power Operated Relief Valve (PORV)

1. Corrective action program document list (significant CR's) for the past 3 years
2. Valve manual
3. Valve drawing
4. Piping and Instrumentation Diagram
5. Test reports – past 5 years
6. Maintenance Logs – Past 3 years or 2 outages
7. List of Design Changes – Past 5 years
8. Isometrics – if any
9. Industry issues identified and evaluated

Containment Recirculation Sump Valve (CSRV)
Emergency Core Cooling System Piggy Back Valve (ECCSPV)
Refueling Water Storage Tank Discharge Valve (RWSTDV)

1. Valve Margin Calculation(s)
2. Corrective action program document list (significant CR's) for the past 3 years
3. Valve manual
4. Valve Drawing
5. Piping and Instrumentation Diagram
6. Test reports – past 5 years
7. Maintenance Logs – Past 3 years or 2 outages
8. List of Design Changes – Past 5 years
9. Isometrics – if any
10. Industry operating experience/issues identified and evaluated
11. Piggyback valve and AFW - EOP and/or AOP
12. Current Margins
13. Check Valve Reliability Program data and/or IST data since January 2004
14. Applicable Requests for Relief and associated NRC approvals
15. Applicable Surveillance Test Procedures
16. All Generic Communications and applicable responses

Component Cooling Water Heat Exchangers (CCWHX)

1. Design Bases and supporting calculations
2. Are there any GL 89-13 commitments associated with this heat exchanger?
3. Test Data since January 2004
4. Applicable Requests for Relief and associated NRC approvals
5. Degradation history
6. Maintenance Program history/status
7. History - repairs/modifications
8. Industry Operating Experience (if any) for each of the components
9. All Generic Communications and applicable responses
10. Piping and Instrumentation Diagrams containing the applicable components

Emergency Diesel Generator (EDG)

1. Calculation(s) of record that determined and evaluated steady-state loading for the standby diesel generator having the lowest margin.
2. Calculation(s) of record that determined and evaluated transient loading for the standby diesel generator having the lowest margin.

Class 1E 125 Vdc Battery (BATT)

1. Calculation(s) of record that determined and evaluated design basis minimum voltage at the terminals of safety-related 125 Vdc loads (for the safety division having the lowest voltage margin at load terminals); calculation(s) should include the basis for determination of the 8-hour “best-estimate” SBO duty cycle identified in PSA Evaluation PSA-05-0003.

Class 1E 125 Vdc Fused Disconnect Switch 89NK0404 (FUSE)

1. Calculation(s) of record that determined the basis for ratings and coordinated electrical protection associated with fused disconnect switch 89NK0404 and the loads served by the devices.
2. Procedures that govern the use of this device.

Auxiliary Feedwater Low suction Pressure Transfer Instrumentation & Circuits (AFWIC)

1. Calculation(s) of record that determined the scaling, instrument uncertainties, and setpoints for the low AFW suction pressure switchover from CST to essential service water.
2. Instrument installation details for AFW suction pressure instrumentation, showing impulse line configuration, tap elevations, instrument configuration, and process system interfaces.
3. Schematic diagrams for the AFW suction pressure auto-transfer circuits and associated MOVs

Residual Heat Removal Flow Interlock / Control Loop [EJFIS0611] (RHRIC)

1. Calculation(s) of record that determined the scaling, instrument uncertainties, and setpoints for RHR flow instrument EJFIS0611.
2. Instrument installation details for RHR flow instrument EJFIS0611, showing impulse line configuration, tap elevations, instrument installation configuration, and process system interfaces
3. Schematic diagrams for the control loop and valve.

Essential Service Water Traveling Screen Drive [TZEF-1A1B] (ESWTS)

1. Calculation(s) of record that determined the minimum voltage available at the motor terminals under degraded voltage conditions.
2. Schematic diagrams for the control loop and drive motor.
3. Calculation (s) of record that determined the electrical protection settings for the screen drive circuits.
4. Calculation(s) of record that determined the scaling, instrument uncertainties, and setpoints for dp and / or other instrumentation used for automatic operation of the screen drive or for indication / alarm of a blocked screen.
5. Instrument installation details for the screen dp and associated instrumentation, showing impulse line configuration, tap elevations, instrument installation configuration, process system interfaces, and support equipment.
6. Drawings showing the overall configuration and layout / location of the traveling screens and associated instrumentation.

Emergency Diesel Generator Exhaust Damper (EDGXD)

1. Design Bases and supporting calculations
2. Safety Functions
3. Current Margins
4. Check Valve Reliability Program data and/or IST data since January 2004
5. Applicable Requests for Relief and associated NRC approvals
6. Applicable Surveillance Test Procedures
7. History - repairs/mods
8. Maintenance Program history/status
9. Industry Operating Experience (if any) for each of the components
10. All Generic Communications and applicable responses
11. Piping and Instrumentation Diagrams containing the applicable components

Information (corrective action program documents, Calculations, etc) regarding “newly discovered scenario” on valve EJHV8811 A/B, M