May 20, 2011

Matthew W. Sunseri, President and
Chief Executive Officer
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION – NRC INSPECTION
PROCEDURE 95002 SUPPLEMENTAL INSPECTION REPORT AND
ASSESSMENT FOLLOWUP LETTER 05000482/2011006

Dear Mr. Sunseri:

On March 31, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection pursuant to Inspection Procedure 95002, "Supplemental Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area," at your Wolf Creek Generating Station facility. The supplemental inspection also covered the performance issues associated with Inspection Procedure 92723, "Follow Up Inspection for Three or More Severity Level IV Traditional Enforcement Violations in the Same Area in a 12-Month Period." The enclosed inspection report documents the inspection results, which were discussed at the exit meeting on April 5, 2011, with yourself and other members of your staff.

As required by the NRC Reactor Oversight Process Action Matrix, this supplemental inspection was performed to address three white performance indicators associated with unplanned scrams, unplanned scrams with complications, and safety system functional failures. These performance issues were documented previously on the NRC public web page (http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/WC/wc_chart.html). The NRC staff was informed on October 29, 2010, of your staff’s readiness for this inspection.

The objectives of this supplemental inspection were to: 1) provide assurance that the root causes and the contributing causes for the risk-significant performance issues were understood; 2) provide assurance that the extent-of-condition and extent-of-cause of the issues were identified; and 3) provide assurance that corrective actions were sufficient to address and prevent the recurrence of the root and contributing causes. This inspection also included independent NRC reviews of the extent-of-condition and extent-of-cause for the three white performance indicators and assessments of whether any safety culture component caused or significantly contributed to the issue. The inspection consisted of examination of activities conducted under your license as they relate to safety, compliance with the Commission's rules and regulations, and the conditions of your operating license.
The inspectors determined that your staff performed a comprehensive evaluation of individual and collective causes of the three White performance indicators. Your staff's evaluation identified root causes of the issues to be: 1) inadequate management oversight/standards enforcement, 2) lack of knowledge across the station concerning the components of nuclear safety culture and crosscutting issues, and 3) inadequate hardware monitoring. The inspectors determined that your staff proposed appropriate corrective actions to upgrade preventative maintenance practices, improve system health through operating experience reviews, improve the effectiveness of management review processes, and address deficiencies related to safety culture which, if successfully implemented, will resolve the identified performance issues. With respect to Inspection Procedure 92723, the inspectors determined that your staff identified the causes of the traditional enforcement violations, performed an adequate review of the extent-of-condition and extent-of-cause, and identified appropriate corrective actions sufficient to address the causes.

On May 3, 2011, using the results of this inspection, the NRC staff completed a quarterly review of plant performance of Wolf Creek Generating Station. The assessment also evaluated the performance indicators and the remaining inspection results for the first quarter of calendar year 2011. We noted that the Safety Systems Functional Failure Performance Indicator returned to Green at the beginning of the second quarter of 2010. This letter supplements, but does not supersede, our end-of-cycle assessment letter issued on March 4, 2011.

Overall, Wolf Creek operated in a manner that preserved the public's health and safety and fully met the cornerstone objectives. All inspection findings for the assessment period were classified as having very low safety significance (Green) and all performance indicators indicated performance within the nominal, expected range (Green). As a result, we have assessed Wolf Creek to be in the Licensee Response column of the NRC's Action Matrix. Therefore we plan to conduct baseline inspection during the remainder of the assessment cycle.

Based on the results of this inspection, the NRC has identified one issue that was evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that a violation is associated with this issue. Because of the very low safety significance and because it is entered into your corrective action program, the NRC staff is treating this finding as a noncited violation consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest any noncited violation in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, United States 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, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's
document system (ADAMS). ADAMS is accessible from the NRC Website at

Sincerely,

/RA/Rick Deese for

Geoffrey B. Miller, Chief
Project Branch B
Division of Reactor Projects

Docket: 50-482
License: NPF-42

Enclosure:
Inspection Report 05000482/2011006
w/Attachment 1: Supplemental Information

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NUCLEAR REGULATORY COMMISSION
REGION IV

Docket: 05000482
License: NPF-42
Report: 05000482/2011006
Licensee: Wolf Creek Nuclear Operating Corporation
Facility: Wolf Creek Generating Station
Location: 1550 Oxen Lane SE
          Burlington, Kansas
Dates: February 7 through March 31, 2011
Inspectors: D. Dumbacher, Senior Resident Inspector (Team Lead)
           B. Correll, Reactor Inspector
           J. Dixon, Senior Resident Inspector
           J. Drake, Senior Reactor Inspector
           N. Makris, Project Engineer
           L. Willoughby, Senior Project Engineer
Approved By: G. Miller, Branch Chief
             Division of Reactor Projects
SUMMARY OF FINDINGS

IR 05000482/2011006, 02/07- 03/31/2011, Wolf Creek Generating Station, Supplemental Inspection - Inspection Procedure 95002.

This supplemental inspection was conducted by two senior resident inspectors, a reactor inspector, a senior reactor inspector, a project engineer, and a senior project engineer. One Green noncited violation was identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." The crosscutting aspect is determined using Inspection Manual Chapter 0310, "Components Within the Cross Cutting Areas." 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 4, dated December 2006.

Cornerstones: Initiating Events and Mitigating Systems

The NRC staff performed this supplemental inspection in accordance with Inspection Procedure 95002, "Supplemental Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area," to assess the licensee's evaluations associated with White performance indicators for unplanned scrams per 7000 critical hours, safety system functional failures, and unplanned scrams with complications. Inspection Procedure 92723, "Follow Up Inspection for Three or More Severity Level IV Traditional Enforcement Violations in the Same Area in a 12 Month Period," was also performed.

The inspectors determined that the Wolf Creek staff performed a comprehensive evaluation of the events that led to the degraded Initiating Events Cornerstone and three white inputs in the reactor safety strategic performance area. Wolf Creek's evaluation identified root causes of the collective issues to be related to: 1) inadequate management oversight/standards enforcement, 2) lack of knowledge concerning the components of nuclear safety culture and crosscutting issues, and 3) inadequate hardware monitoring.

In addition to assessing the licensee's evaluations, the inspection team performed an independent extent-of-condition and extent-of-cause review and a focused inspection of the site safety culture as it related to the root cause evaluations. The team concluded that the Wolf Creek root cause evaluations and corrective actions, both completed and planned, addressed the extent-of-condition and extent-of-cause, determined if safety culture contributed to the issue, and established and scheduled corrective actions that are sufficient to address the causes and prevent recurrence of the White performance indicators.

Based on independent inspection, the team also determined that the licensee's assessment of Wolf Creek's safety culture was accurate and reflected the conditions at the site. The root cause evaluations appropriately identified needed improvements associated with safety culture behaviors.
A. **NRC-Identified or Self-Revealing Findings**

Cornerstone: Mitigating Systems

**Green.** The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the failure to follow Procedure AP 28A-0100, "Condition Reports," Revision 13. On February 17, 2011, the licensee received laboratory test results on the emergency diesel generator B fuel oil storage tank and determined that the cloud point parameter was out of specification at -8° Celsius. However, Procedure AP 28A-0100, step 5.13.3, required the licensee to evaluate condition report data to identify and evaluate potential trends. The emergency diesel fuel oil storage tank cloud point parameter had been trending closer to the acceptance criteria over the last several fuel oil additions. The licensee had allowed the original fuel oil vendor to continue to deliver fuel that was out of specification which resulted in a gradual trend toward the limits of the chemistry parameters. This trend was not appropriately evaluated because the licensee had not performed training to ensure that consistent and appropriate evaluations would be performed.

This finding was more than minor because it affected the Mitigating Systems Cornerstone attribute of equipment performance by impacting the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This deficiency directly resulted in emergency diesel generator B being declared inoperable due to its fuel oil storage tank being out of specification. The inspectors performed the significance determination using NRC Inspection Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," because it affected the Mitigating Systems Cornerstone while the plant was at power. The finding was determined to be of very low safety significance (Green) because it was not a design or qualification deficiency; it did not result in the loss of a system safety function; it did not represent the loss of a single train for greater than technical specification allowed time; it did not represent a loss of one or more non-technical specification risk-significant equipment for greater than 24 hours; and it did not screen as potentially risk significant due to seismic, flooding, or severe weather. In addition, this finding had a human performance crosscutting aspect associated with resources in that the licensee did not ensure that the corrective action program coordinators were effectively trained to cognitively and analytically trend condition reports [H.2(b)](Section 4OA4).

B. **Licensee-Identified Violations**

A violation of very low safety significance, which was identified by the licensee, has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee’s corrective action program. This violation and associated condition report numbers are listed in Section 4OA7.
REPORT DETAILS

4. OTHER ACTIVITIES

4OA3 Event Follow-up

1. (Closed) Licensee Event Report 05000482/2010-005-00: Reactor Trip due to Low Steam Generator Level from Trip of Main Feedwater Pump

On March 2, 2010, a trip of the Train A main feedwater pump caused a low-low steam generator water level reactor trip. The trip of the main feedwater pump was due to nonsafety-related inverter PN09 failing to transfer to the alternate supply during preparation for minor maintenance. During performance of Procedure SYS PN-200, "Energizing and Deenergizing Inverters PN09 and PN10," inverter PN09 failed to transfer from the normal to alternate power supply due to sticking of the reed relay on the static transfer switch circuit board after exceeding its design life. The failure to transfer caused a loss of speed signal to main feedwater pump A resulting in an overspeed trip and caused a loss of steam dump capability. The unit received a feedwater isolation signal and an auxiliary feedwater actuation signal.

The inspectors determined the licensee's root cause evaluation inappropriately identified the direct cause as the root cause and incorrectly stated the actions taken to replace the cards were sufficient such that no corrective actions to prevent recurrence were necessary. The NRC inspectors concluded that a contributing cause identified in the root cause evaluation, the decision to continue operating with equipment beyond its design life, was more appropriate as a root cause. The inspectors also identified that the root cause evaluation for extent-of-condition was narrowly focused, in that the licensee only identified other inverters as being within the extent-of-condition. A broader extent-of-condition would have included any electronic circuit boards with design life limitations and would not be limited to inverters. Corrective actions taken by the licensee to address the contributing cause included replacing the circuit cards and preventative maintenance frequency changes to prevent exceeding the design life of the circuit cards. The inspectors determined the corrective actions were appropriate to prevent recurrence.

The inspectors concluded the failure to identify the lowest level root cause and the narrowly focused extent-of-condition determination were a violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," involving a failure to follow root cause Procedure AI 28A-001, "Level 1 CR Evaluation (IIT)," Revision 12. Since the licensee took appropriate corrective actions as part of an identified contributing cause, the inspectors determined this violation was of minor safety significance. Violations of minor safety or security concern generally do not warrant enforcement action but must be corrected.

Event follow-up inspections by NRC inspectors identified two Green findings associated with this event: FIN 05000482/2010002-04 and NCV 05000482/2010002-05. The inspectors reviewed the licensee event report and determined that the report adequately documented the summary of the event, including the potential safety consequences, cause of the event, and corrective actions required to address the performance deficiency. No additional findings were identified. This licensee event report is closed.
On October 17, 2010, a reactor trip occurred due to inadequate steam generator water level control during low power operations. During plant startup following a forced outage, reactor power was increased above 10 percent to approximately 17 percent when starting to roll the main turbine and synchronize to the grid. While rolling the main turbine, feedwater temperature began to drop due to insufficient feedwater preheating. The operators took manual control of steam generator water level but were unable to maintain level below the high-high steam generator water level turbine trip and feedwater isolation signal. Auxiliary feedwater was unable to match steam demand and the reactor tripped on low-low steam generator water level. The inability to control steam generator water level was due to the decreased feedwater temperature caused by insufficient feedwater preheating during the power increase associated with placing the main turbine on line. Operators failed to recognize that feedwater preheating from the main steam system had a capacity limit of 10 percent until the main turbine is brought on line.

The licensee submitted a licensee event report for the reactor trip on December 16, 2010. The licensee made procedure changes to require the main turbine to be synchronized to the grid prior to exceeding 10 percent reactor power. Event follow-up inspections by NRC inspectors identified four Green noncited violations associated with this event; 05000482/2010005-08; 05000482/2010005-09; 05000482/2010005-10; and 05000482/2010005-11. The inspectors reviewed the licensee event report and determined that the report adequately documented the summary of the event including the potential safety consequences, cause of the event, and corrective actions required to address the performance deficiency. No additional findings were identified. This licensee event report is closed.

4OA4 Supplemental Inspection (95002)

Inspection Scope

The NRC staff performed this supplemental inspection in accordance with Inspection Procedure 95002, "Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area," to assess the degraded Initiating Events Cornerstone and the three White inputs to the reactor safety strategic performance area. The team also performed Inspection Procedure 92723, "Follow Up Inspection for Three or More Severity Level IV Traditional Enforcement Violations in the Same Area in a 12 Month Period," in conjunction with the supplemental inspection. The inspection objectives were to:

- provide assurance that the root and contributing causes of risk-significant issues were understood
- provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified and to independently assess the extent-of-condition and extent-of-cause of individual and collective risk-significant issues
- independently determine if safety culture components caused or significantly contributed to the risk significant issues
• provide assurance that the licensee’s corrective actions for risk-significant issues were or will be sufficient to address the root and contributing causes and to preclude repetition

The licensee entered the Degraded Cornerstone Column of the NRC’s Action Matrix in the first quarter of 2010 as a result of three performance indicators crossing the threshold from Green (very low safety significance) to White (low to moderate safety significance). The performance indicators were Unplanned Scrams per 7000 Critical Hours, Unplanned Scrams with Complications, and Safety System Functional Failures.

The licensee staff informed the NRC that Wolf Creek was prepared for the supplemental inspection on October 29, 2010. To determine the causes and organizational attributes that resulted in the three White performance indicators, the licensee performed root cause evaluations documented in Condition Reports 26805 (collective), 23119 (safety system functional failures), 24445 (unplanned scrams) and 25817 (scrams with complications). These condition reports were associated with many individual event condition reports. Altogether the inspection scope and the licensee actions included well over 1000 corrective actions. The team noted that the licensee recovery team performed an overarching safety culture review to determine whether safety culture components and aspects contributed to the performance issues that led to the White NRC performance indicators. The team inspected this effort by reviewing Condition Reports 23032 and 25896. For the traditional enforcement violations, the team reviewed licensee efforts documented in Condition Report 23110. The inspection team reviewed the licensee’s root cause and other supporting evaluations, and the team reviewed corrective actions that were taken or planned to address the identified causes. The inspection team also held discussions with licensee personnel to ensure that the root and contributing causes and the contribution of safety culture components were understood and corrective actions taken or planned were appropriate to address the causes and preclude repetition. The inspection team independently assessed the extent-of-condition and extent-of-cause of the identified issues and performed an assessment of whether any safety culture components caused or significantly contributed to the issues.

.02 Evaluation of the Inspection Requirements

02.01 Problem Identification

a. Identification of the issue (i.e. licensee-identified, self-revealing, or NRC-identified) and the conditions under which the issue was identified

As a result of the multiple reactor scrams and safety system functional failures in 2009 and 2010, the licensee identified three White performance indicators through the NRC's performance indicator reporting process.

The Unplanned Scrams with Complications performance indicator crossed the threshold from Green to White as a result of unplanned scrams in 2009 that were the subject of a Reactor Oversight Process Working Group Frequently Asked Question. On April 28, 2009, the main feedwater regulating valve controller power supply fuses failed, isolating flow to steam Generator B and resulting in a reactor trip from loss of power to a main feed regulating valve controller. Also, on August 19, 2009, a complete loss of offsite power resulted in a complicated scram. Based on the resolution of the Frequently Asked
Question, Wolf Creek reported both of these reactor trips as Unplanned Scrams with Complications, which caused this performance indicator in the Initiating Events cornerstone to be White starting in the third quarter of 2009.

On March 8, 2010, during a plant start up at approximately 42 percent power, operators manually tripped the reactor following an unplanned trip of the only running feedwater pump. This plant startup was being conducted following a previous reactor trip on March 2, 2010, in which loss of power to an electrical inverter led to a trip of main feedwater Pump A and resultant low steam generator water levels. These reactor trips combined with two others from April 2009 and August 2009 caused the Unplanned Scrams per 7000 Critical Hours performance indicator to be White. Additionally, in April 2010 Wolf Creek reported four safety system functional failures for the first calendar quarter of 2010. Combined with the five others previously reported, these functional failures caused the Safety System Functional Failures performance indicator also to be White.

The inspectors verified that this information was appropriately documented in the licensee’s evaluations.

b. Issue duration and prior opportunities for identification

The degraded Initiating Events Cornerstone and the three White inputs to the reactor safety strategic performance area existed from March 2010 when they were identified by Wolf Creek’s performance indicator submittals. The Complicated Scrams performance indicator crossed the Green/White threshold in the third quarter 2009. The Unplanned Scrams per 7000 Critical Hours performance indicator was White starting in the first quarter of 2010. Both of these performance indicators returned to Green in the second quarter of 2010. The Safety System Functional Failures performance indicator also first crossed the Green/White threshold in the first quarter of 2010 and did not return Green until after the first quarter of 2011. Each of the reactor scrams and safety system functional failures was an opportunity to identify the need for corrective actions to reverse the negative performance trend.

The inspectors concluded that the licensee’s evaluations adequately identified how long each issue existed and prior opportunities for identification of the failures.

c. Licensee documentation of the plant specific risk consequences, as applicable, and compliance concerns associated with the issues both individually and collectively

The inspectors verified that the licensee’s evaluation adequately documented the plant specific risk consequences in qualitative statements that equipment failures directly affect nuclear safety by challenging critical safety functions and operator response. There were no previously documented findings associated with the scrams or safety system functional failures that were more than very low safety significance.

02.02 Root Cause, Extent-of-Condition, and Extent-of-Cause Evaluation

a. Determine that the licensee evaluated the issue using a systematic methodology to identify the root and contributing causes

The licensee used the following methods to complete the root cause evaluation:
• event and causal factor charting
• hazard-barrier-target analysis
• management oversight and risk tree (MORT) analysis
• fault tree analysis

The NRC team concluded the licensee evaluated the issues using systematic methodologies to identify root and contributing causes.

b. **Determine that the licensee's root cause evaluation was conducted to a level of detail commensurate with the significance of the issue**

The licensee’s evaluation identified the root causes of collective issues to be: 1) inadequate management oversight, 2) lack of knowledge concerning components of nuclear safety culture, and 3) inadequate hardware monitoring. The NRC team performed a focused inspection to independently assess the validity of the licensee’s conclusions regarding the extent-of-condition and extent-of-cause of the issues. The NRC inspection team review for each performance indicator, individually and collectively, determined that the licensee’s root cause evaluation level of detail was commensurate with the significance of the problem.

c. **Consideration of prior occurrences of the issue and knowledge of operating experience**

Based on the licensee’s detailed evaluation and conclusions, the inspection team determined that the licensee's root cause analysis included an appropriate consideration of prior occurrences of the issue and knowledge of prior operating experience.

d. **Determine that the licensee's root cause evaluation addresses the extent-of-condition and extent-of-cause of the issues**

The inspectors concluded that the licensee’s root cause analysis appropriately addressed the extent-of-condition and the extent-of-cause of the issue. However, for many of the root cause evaluations the documentation was high-level, difficult to follow, and did not always provide a strong basis for implementation and closure of the individual corrective actions. The team determined that, in these cases, appropriate corrective actions were specified for each root and contributing cause in other condition reports.

e. **Review the licensee's root cause, extent-of-condition, and extent-of-cause evaluations in order to verify that the licensee appropriately considered the safety culture components as described in Inspection Manual Chapter 0305**

Because multiple condition reports and several safety culture aspects were associated with the performance issues, the licensee conducted collective reviews of the past two safety culture assessments and the six significant contributing condition reports. This effort resulted in the licensee creating roll-up Condition Report 26805 to prioritize safety culture corrective actions in September 2010. The team concluded that the prioritization was logical and that the corrective actions, while appropriate, needed increased oversight and reinforcement. In response to the inspection team’s observations, the licensee added specific items to improve safety culture behaviors, trending, and knowledge levels of the operating and engineering departments to the Recovery Change
Management Plan for the upcoming cycle. The licensee also strengthened the safety culture communication plan to reinforce human performance tool usage at all levels.

02.03 Corrective Action

a. Determine that: 1) the licensee specified appropriate corrective actions for each root and/or contributing cause, or 2) an evaluation that states no actions are necessary is adequate

The licensee initiated well over 1000 corrective actions to address the root and contributing causes from the individual and collective cause evaluations. The inspectors concluded that the licensee had specified appropriate corrective actions for each root and/or contributing cause. The inspectors observed some cases where the licensee’s corrective actions could have been more specifically tied to causes and more generally applied to safety culture aspects. These observations are discussed in Section 02.07 of this report.

b. Determine that the licensee prioritized corrective actions with consideration of risk significance and regulatory compliance

The majority of the corrective actions developed by the licensee involved long term maintenance plans and plant modifications. The licensee also prioritized communication of standards and newly formed additional review processes as short term items. These short term items were still in progress at the time of the inspection. The inspection team determined that there were no risk significant immediate corrective actions necessary. The inspection team concluded that the corrective actions identified in the root cause evaluations for the White performance indicators were appropriately prioritized based on risk significance and regulatory compliance.

c. Determine that the licensee established a schedule for implementing and completing the corrective actions

The inspection team found that the licensee’s root cause evaluations established many different, independent schedules for completion of the over 1000 corrective actions. Tracking, evaluating and closing corrective actions was assigned to the licensee recovery team. The NRC inspection team observed that the individual schedules did not appear to be coordinated with one another. To address the inspection team’s observation, the licensee staff compiled and provided a table to the inspectors which tracked each corrective action item milestone with its corresponding completion date. The inspectors concluded the revised schedule was appropriate for effectively implementing and completing the corrective actions.

d. Determine that the licensee developed quantitative and/or qualitative measures of success for determining the effectiveness of the corrective actions to preclude repetition

The measures developed by the licensee for determining the effectiveness of corrective actions included the following:

- Corrective Action and Operating Experience Review Board external reviews
- Increased frequency of quality assurance audits to assess the adequacy of the corrective action program initiatives generated
• Increased frequency of safety culture assessments

The inspection team determined that the quantitative and qualitative measures developed by the licensee for determining the effectiveness of the corrective actions were appropriate.

e. Determine that the licensee’s planned or taken corrective actions adequately address a Notice of Violation that was the basis for the supplemental inspection, if applicable

A Notice of Violation was not the basis for this supplemental inspection.

02.04 Independent Assessment of Extent-of-Condition and Extent-of-Cause

a. Inspection Scope

Inspection Procedure 95002 requires that the inspection staff perform a focused inspection to independently assess the validity of the licensee’s conclusions regarding the extent-of-condition and extent-of-cause of the issue. The objective of this requirement is to independently sample performance, as necessary, within the key attributes of the cornerstones that are related to the subject issue to ensure that the licensee’s evaluation regarding the extent-of-condition and extent-of-cause is sufficiently comprehensive.

The inspectors conducted independent extent-of-condition and extent-of-cause reviews for the issues associated with the White performance indicators. The inspection staff’s independent review focused on the primary root causes associated with the performance indicators in addition to the licensee’s identified contributing causes that involved more specific aspects of the broader root causes. The inspection staff assessed whether the licensee’s extent-of-condition and extent-of-cause evaluations sufficiently identified and bounded all engineering and maintenance organizational issues. The staff also assessed whether the licensee’s extent-of-condition and extent-of-cause evaluations sufficiently determined the actual extent of similar organizational issues that potentially existed in other station departments, programs, and processes. The team independently sampled performance within the key attributes of the Initiating Events and Mitigating Systems Cornerstones that are related to the contributors of the performance issues to ensure that the licensee’s evaluation regarding the extent-of-condition and extent-of-cause were sufficiently comprehensive.

In conducting this independent review, the inspection staff interviewed station management and personnel, reviewed program and process documentation, and reviewed existing station program monitoring and improvement efforts, including review of corrective action documents.

b. Assessment

The team concluded that the licensee had identified all substantive extent-of-condition and extent-of-cause issues. However, the team’s independent extent-of-condition and extent-of-cause review identified some cases where the licensee’s evaluations were narrowly focused. For example, the licensee’s evaluation of scrams with complications in Condition Report 25817 limited the review of main feedwater system health to just the startup feedwater pump, which inappropriately excluded many components with the
potential to affect system performance. The evaluation also did not evaluate the August 2009 loss of offsite power and condensate and heater drain bus event, making instead a statement that a loss of offsite power will always result in a complicated scram. The team identified this as another example where the evaluation of Condition Report 25817 missed an opportunity to improve feedwater system reliability. The team concluded Wolf Creek’s root cause analysis procedures could be improved to enable the licensee to consistently identify systemic causal factors.

As a result of the inspection team’s observations, Wolf Creek reviewed Condition Report 25817 to identify additional interim and long-term corrective actions. This included a review by the Quality group and bringing in additional root cause evaluators to ensure the root cause analysis procedures were improved as needed.

02.05 Safety Culture Consideration

a. Inspection Scope

Inspection Procedure 95002 requires that the inspection team perform a focused inspection to independently determine that the licensee's root cause evaluation appropriately considered whether any safety culture component caused or significantly contributed to any risk significant issue.

The inspection team reviewed condition reports and procedures and conducted interviews with licensee personnel to determine if the licensee properly considered whether any safety culture component caused or contributed to the performance issues. Additionally, the inspectors performed a review of the common cause evaluation.

b. Assessment

As part of the collective root cause evaluation, the licensee evaluated the identified root and contributing causes against the safety culture components that could have contributed to the issues. The licensee's root cause evaluation included a discussion of the 13 safety culture components as described in Regulatory Issue Summary 2006-013, "Information on the Changes Made to the Reactor Oversight Process to More Fully Address Safety Culture."

The inspection team independently confirmed the licensee’s conclusion that improving safety culture behaviors should be a high priority item for the recovery effort. The documented station reviews indicated that every safety culture component was a contributor to the performance issues, and all were significant contributors with the exception of self- and independent-assessments. The inspection team concluded all the safety culture components were significant contributors. The inspection team confirmed that the licensee established appropriate corrective actions to address safety culture. The team identified challenges to Wolf Creek’s ensuring long-term promotion of a positive safety culture. Specifically:

- Although safety concept is a recognized value in the organization, it is inconsistently accepted and understood across all levels of personnel. Some problems still exist in the transmission, comprehension, and implementation of the safety message.
Some individuals readily accept responsibility for and take ownership of problems, while others are still reluctant to do so.

Observed safety behaviors were not consistently integrated into all activities in the organization. Processes and programs are in various stages of transition, which often reduces their effectiveness.

An integrated and cohesive organizational safety leadership process does not yet exist. The values and attitudes of the workforce are generally positive, but the team identified that personnel are not yet aligned with a common set of values.

02.06 Evaluation of Inspection Manual Chapter 0305 Criteria for Treatment of Old Design Issues

The licensee did not request credit for self-identification of an old design issue; therefore, the risk-significant issue was not evaluated against the Inspection Manual Chapter 0305 criteria for treatment of an old design issue.

02.07 Findings and Observations


Description. On February 17, 2011, the licensee received laboratory test results on the Train B emergency diesel generator fuel oil storage tank and determined that the cloud point parameter was out of specification at -8° Celsius. The specification limit for cloud point was no higher than -9° Celsius. The licensee subsequently declared the emergency diesel generator inoperable and entered Technical Specification 3.8.3. As part of the review of the event, the licensee sent an additional sample from the fuel oil storage tank to the same laboratory, as well as to an additional laboratory for comparison. The licensee also sent samples from the Train A emergency diesel generator fuel oil storage tank to determine the extent-of-condition. These actions are documented in Condition Report 33750.

Procedure AP 28A-0100, step 5.13.3, required licensee personnel to evaluate condition report data to identify and evaluate potential trends. The emergency diesel fuel oil storage tank cloud point parameter had been trending closer to the acceptance criteria over the last several fuel oil additions. In various condition reports over the past two years, the licensee documented that the cloud point parameter had been out of specification in new fuel oil shipments. In addition to the sample in February 2011, Condition Reports 21044, 25018 and 26345 documented the cloud point parameter being an issue in October 2009, April 2010 and June 2010, respectively. Condition Report 26345 did not receive an appropriate review to identify that the adverse trend, if not resolved promptly, could result in the emergency diesel generator becoming inoperable. Corrective actions from Condition Report 26345 included purchasing fuel oil from a new vendor that would provide a low cloud point, but this was not implemented in a timely manner to prevent the unplanned technical specification entry. As a result, on February 17, 2011, the Train B fuel oil storage tank cloud point parameter went out of specification requiring the licensee to withdraw fuel oil and replace it with in-specification fuel oil from the new vendor. Two tanker loads of new fuel oil were placed into the
storage tank and a multilevel sample of the resulting mixture was analyzed to ensure that all chemistry parameters were within specification. The licensee had allowed the original fuel oil vendor to continue to deliver fuel that was out of specification which resulted in a gradual trend toward the limits of the chemistry parameters. This trend was not appropriately evaluated because the licensee had not performed training to ensure that consistent and appropriate evaluations would be performed.

**Analysis.** Failure to track and trend the emergency diesel generator chemistry parameters as required by the corrective action program procedure was a performance deficiency. The finding was more than minor because it affected the Mitigating Systems Cornerstone attribute of equipment performance by impacting the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This deficiency directly resulted in emergency diesel generator B being declared inoperable due to its fuel oil storage tank being out of specification. The inspectors performed the significance determination using NRC Inspection Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," because it affected the Mitigating Systems Cornerstone while the plant was at power. The finding was determined to be of very low safety significance (Green) because it was not a design or qualification deficiency; it did not result in the loss of a system safety function; it did not represent the loss of a single train for greater than technical specification allowed time; it did not represent a loss of one or more non-technical specification risk-significant equipment for greater than 24 hours; and it did not screen as potentially risk significant due to seismic, flooding, or severe weather. In addition, this finding had human performance crosscutting aspects associated with resources in that the licensee did not ensure that the corrective action program coordinators were effectively trained to cognitively and analytically trend condition reports [H.2(b)].

**Enforcement.** Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented procedures of a type appropriate to the circumstances and shall be accomplished in accordance with these procedures. Procedure AP 28A-0100, "Condition Reports," step 5.13.3 requires the licensee, in part, to evaluate condition report data to identify and evaluate potential trends. Contrary to this, from October 2009 to February 19, 2011, the licensee failed to evaluate condition report data to identify and evaluate potential trends in emergency diesel generator fuel oil storage tank chemistry parameters. As a result, the station entered Technical Specification 3.8.3 for a high cloud point on the Train B emergency diesel generator fuel oil storage tank. Immediate corrective actions included withdrawing fuel oil and replacing it with new fuel oil until the cloud point could be reduced to below the maximum value. Since this violation was of very low safety significance and was documented in the licensee's corrective action program as Condition Reports 33395, 33435, and 33750, it is being treated as a noncited violation consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000482/2011006-01, "Failure to Trend Emergency Diesel Generator Chemistry Parameters Results in an Unplanned Technical Specification Entry."
b. **NRC Team Observations**

1) **Maintenance to Improve Equipment Reliability**

The inspection team noted that the licensee’s corrective actions for improving equipment reliability focused primarily on preventative maintenance improvements. The team determined this focus initially may not result in protecting the functionality of the key systems inputting to the safety system functional failure performance indicator in the short term. The team concluded that a broader root cause of inadequate maintenance in general, versus just improved preventative maintenance, may be more appropriate to address equipment reliability issues. This action is consistent with the licensee roll-up root cause of tolerance for known degraded equipment conditions. The team determined that the recent refueling water storage tank and emergency diesel generator fuel oil storage tank degraded chemistry issues, emergency diesel generator fuel rack pin inoperability, and component cooling water system voiding were examples that demonstrated the importance of improvement in general maintenance practices and represented conditions that could challenge the safety system functional failure performance indicator.

The team concluded that corrective actions to develop a preventative maintenance optimization plan, improve operating experience reviews, and perform significant main feedwater modifications were appropriate. However, the corrective actions to add digital feedwater controls will not be complete until Fall 2015.

The licensee identified inadequate equipment performance monitoring and trending as a maintenance improvement item, but initiated actions for "new" systems/components only. The team concluded a broader application of this action would be more appropriate. For example, the team identified that the station thermography tool is not being used to its full extent. This was similar to the previous limited use of ultrasonic testing and guided wave technology for essential service water corrosion issues. The licensee initiated Condition Report 33435 to evaluate additional corrective actions for equipment performance and monitoring.

2) **Corrective Action Documentation**

The team identified several instances where the documentation of corrective actions was not clearly defined through the corrective action program, which could provide challenges to the timely completion of the actions and to the ability of the licensee’s quality control organization to perform effectiveness reviews. For example, corrective actions for root causes in Condition Report 23119 (safety system functional failures) were contained in Condition Report 24445, but were not listed as corrective actions to prevent recurrence in Condition Report 24445. This could lead to closure of the actions without sufficient reviews to ensure effective corrective actions occurred. As a second example, overall station roll-up Condition Report 26805 contained no documented corrective actions. Instead, this condition report provided a prioritization of the common causes in the other six high level individual event roll-up condition reports (see Attachment 2). The documentation of the corrective actions for the causes and safety culture component concerns are embedded in various other condition reports. The team identified this as a challenge to correctly implementing and closing out the individual corrective actions. The licensee took actions to address this issue, including initiating Condition Reports 33722 and 33958 and developing additional root cause
evaluators to improve documentation standards and reduce root cause evaluation backlogs.

The team also identified that two key licensee initiatives (each a corrective action to prevent recurrence), the Preventative Maintenance Optimization Plan and the Ops Focus Plan, were essentially mission statements and lacked the details necessary to guide implementation. As a result of the team inspection, the licensee developed revisions to these plans to provide better detail and clarity.

3) Training as a Corrective Action

The licensee identified a corrective action of improved training, modeled after previous changes made to improve the technical program for engineers and operators, to address performance issues associated with both the safety system functional failures and unplanned scrams performance indicators. However, training provided as a corrective action for risk assessments failed the licensee's initial effectiveness review. This was one of the first effectiveness reviews performed by the licensee, and it identified that the training corrective action was narrowly focused and not likely to reach everyone affected. The team identified some additional examples where training as a corrective action had not yet been fully effective, including:

- A corrective action review board graded the root cause evaluation of "inadequate clearances orders due to not isolating the energy source," as acceptable without a training corrective action when the cause was an inability to read prints.
- At the time of the inspection, neither engineering nor training departments had been trained on the updated operating experience process.
- The team observed some cases where system engineer knowledge levels were not broad or integrated.
- Root cause team member training was not consistently producing thorough extent-of-cause results.
- The team received interview comments indicative of operations and training department dissatisfaction with support by the other department. Other comments also identified cases where managers may have decided not to assign training related corrective actions based on limited training resources.

The team concluded that broader training, improvements for both engineers and operators is needed. The licensee initiated Condition Reports 34280 and 34281 to address engineering and operations department training issues.

4) Problem Identification

The team concluded the various review board initiatives, specifically the corrective action review board challenge meetings, apparent cause evaluation level corrective action and collegial operating experience review boards, were positive efforts. However, individual level behavior changes will be needed to identify trends or deficiencies in equipment and engineering performance. The team noted some cases where the threshold for
identifying and trending degraded conditions in the plant could be improved. Examples include:

- A high level alarm indicative of actual rising essential service water vault water level was initially assumed to be invalid in Fall 2010. This resulted in delaying an operability assessment over two shifts.

- The team identified that self- and independent-assessments were not being effectively used to identify and correct problems. The licensee initiated condition report 34076 and directed the quality assurance department to perform an additional surveillance of the corrective action program to address this issue.

- The team noted two examples of initial failure to act on contracted engineering evaluations. The first example involved a contractor evaluation of the feedwater pump suction strainer in December 2010 that stated the strainer could introduce new failure mechanisms. The inspection team noted a failed strainer could release debris which could impact the feedwater regulating and isolation valves. The licensee initiated Condition Report 32445 to evaluate this condition. The second example was previously identified in an NRC inspection of essential service water and involved a deficient in-house engineering analysis accepted without action despite outside contractor evaluations stating that water hammer stresses were significant enough to warrant inclusion in the system design calculations. At the close of the inspection the licensee was reevaluating both of these issues.

- The team identified some process programs that may result in tracking and correcting problems outside of the corrective action program. One example is the PILOT system used to record and trend management field observations. The licensee initiated Condition Report 33316 to address this concern.

5) Management Oversight and Leadership

In Condition Report 26805, "Collective Significance of Degraded Cornerstone Performance," the licensee identified Management/Oversight/Standards Enforcement as one of the overall root causes of the site’s performance issues. The team concluded that licensee actions to address improving management oversight were appropriate. However, the team identified that the additional review boards requiring management participation had the unintended consequence of reducing the amount of time available for managers and supervisors to conduct plant tours and field observations. The team also identified some cases where review boards accepted quality assurance reports of effective program performance despite identified repeat findings, and cases where the review boards did not consistently challenge extent-of-condition and extent-of-cause issues in root cause evaluations.

To address the team’s observations the licensee developed initiatives to improve standards for leadership meetings, division manager alignment meetings and plant wide communication efforts.
4OA6  Meetings

Exit Meeting Summary

On April 5, 2011, the inspectors presented the inspection results to Mr. M. Sunseri and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors identified that proprietary information was reviewed but would not be retained following report issuance or included in the inspection report.

4OA7  Licensee-identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section 2.3.2 of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a noncited violation.

- Title 10 CFR 50.65 a(4) requires, in part, that before performing maintenance activities, the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. Contrary to the above, during the weeks of November 29, 2010, December 27, 2010 and January 17, 2011, Wolf Creek failed to properly identify and take appropriate risk management actions for medium and high risk maintenance activities as required by station Procedure AP 22C-007, "Risk Management and Contingency Planning," Revision 4. The inspectors performed the significance determination using NRC Inspection Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," and Manual Chapter 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process" and determined the finding was of very low safety significance (Green) because it related only to risk management actions and did not result in an increase in core damage probability. This licensee entered this issue into the corrective action program as Condition Reports 00032886 and 00032887.
SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

L. Bell, Systems Engineering
M. Blow, Operations
S. Hedges, Site Vice President
D. Hooper, Supervisor, Licensing
T. Jensen, Manager, Chemistry
S. Koenig, Manager Corrective Action
W. Norton, Manager IPS/Scheduling
L. Parmenter, Assistant to Manager, Operations Department
G. Pendergrass, Director, Plant Engineering
L. Ratzlaff, Supervisor, Support Engineering
E. Ray, Manager Quality
L. Rockers, Licensing Engineer
R. Smith, Plant Manager
M. Sunseri, President and Chief Executive Officer
S. Wahlmeier, Systems Engineering
J. Yunk, Manager, Human Resources

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000482/2011006-01 NCV Failure to Trend Emergency Diesel Generator Chemistry Parameters Results in an Unplanned Technical Specification Entry (Section 4OA4)

Closed

05000482/2010-005-00 LER Reactor Trip due to Low Steam Generator Level from Trip of Main Feedwater Pump (Section 4OA3)
05000482/2010-012-00 LER Reactor Trip due to Operator's Inability to Control Steam Generator Level Oscillations at Low Power (Section 4OA3)

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PIR 2008-1105  PIR 2008-003802

*Condition Reports generated during the inspection

**DRAWINGS**

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<td>Manual Reactor Trip due to Loss of Steam Generator Level</td>
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<td>Loss of Offsite Power Event When the Reactor was Defueled</td>
<td>November 11, 2009</td>
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<td>Two Residual Heat Removal Trains Inoperable in Mode 3 due to Check Valve Leakage</td>
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<td>Potential for Residual Heat Removal Trains to be Inoperable during Mode Change</td>
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2008-008-02  Potential for Residual Heat Removal Trains to be Inoperable during Mode Change  August 25, 2009
2009-001-00  Reactor Protection System Actuation and Reactor Trip due to Main Feedwater Regulating Valve Failing Closed June 24, 2009
2009-002-00  Loss of Offsite Power due to Lightning October 17, 2009
2009-005-00  Loss of Both Diesel Generators with all Fuel in the Spent Fuel Pool December 21, 2009
2009-009-01  Defeating Feedwater Isolation on Low Tavg Coincident with P-4 Function Results in Missed Mode Change March 3, 2010
2010-001-00  Automatic Start of Motor Driven Auxiliary Feedwater Pumps Inoperable During Startup in Mode 1 March 22, 2010
2010-002-00  Turbine Trip Function of Reactor Trip, P-4 Interlock Defeated During Entry into and in Mode 3 March 29, 2010

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09-316730-000  09-317186-000  09-317187-000  09-317188-000  09-317189-000  09-317190-000  09-317749-000  09-317750-000  09-317752-000  09-317753-000
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09-321572-000  09-321573-000  09-322495-000  09-322503-000  10-324684-000  10-325088-000  10-325088-001  10-325205-000  10-326827-057  10-331761-000
10-332022-000  10-332233-000  10-332233-001  10-332631-000  10-332731-000  11-337163-002

MEETING NOTES

MEETING  DATE
OE Collegial Review  February 10, 2011
Level 4 Challenge Board  February 23, 2011
Corrective Action Challenge Board  February 24, 2011
### MISCELLANEOUS

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<td>Amendment to Wolf Creek Generating Station Operating Agreement</td>
<td>August 13, 2010</td>
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<td>November 2010</td>
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<td>FID Assignments for Fire Pumps, PN09, and PB03</td>
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<td>Letter ET 10-0011, dated March 4, 2010, from T. J. Garrett WCNOC to NRC</td>
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<td>List of PRA Top Ten Systems</td>
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