WOLF CREEK
NUCLEAR OPERATING CORPORATION

May 16, 2013

John P. Broschak
Vice President Engineering

ET 13-0017

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

References:

1) Generic Letter 2004-02 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," September 13, 2004

2) Letter dated December 23, 2010 from NRC Commissioners to USNRC staff, "Staff Requirements - SECY-10-0113 - Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance"

3) Letter dated May 4, 2012, from J. C. Butler, NEI, to W. H. Ruland USNRC, "GSI-191 – Current Status and Recommended Actions for Closure"

4) Letter dated July 9, 2012, from R. W. Borchardt, USNRC to NRC Commissioners, SECY-12-0093, "Closure Options for Generic Safety Issue –191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance"

5) Letter dated November 15, 2012, from J. C. Butler, NEI, to W. H. Ruland, USNRC, "Nuclear Regulatory Commission Review of Generic Safety Issue-191 Nuclear Energy Institute Revised Schedule for Licensee Submittal of Resolution Path"

6) Letter dated November 21, 2012, from W. H. Ruland , USNRC, to J. C Butler, NEI, "Nuclear Regulatory Commission Review of Generic Safety Issue-191 Nuclear Energy Institute Revised Schedule for Licensee Submittal of Resolution Path"

7) Letter dated December 14, 2012, from NRC Commissioners to USNRC staff, "Staff Requirements - SECY-12-0093 - Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance"

8) Final Safety Evaluation for Pressurized Water Reactor Owners group Topical Report WCAP-16793-NP, Revision 2, "Evaluation of Long-Term Cooling Considering Particulate Fibrous and Chemical Debris in the Recirculating Fluid", April 8, 2013

A116
NRR

Subject: Docket No. 50-482: Wolf Creek Nuclear Operating Corporation Proposed Path to Closure of Generic Safety Issue -191, "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance"

Gentlemen:

The Nuclear Regulatory Commission (NRC) and the NRC staff have provided guidance to licensees on acceptable options for closure of Generic Safety Issue (GSI) – 191, "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance" (References 2, 4, 7, and 8). The Nuclear Energy Institute (NEI) has worked with the NRC staff to develop the schedule and the content of licensee's submittals of resolution paths (References 3, 5, and 6). Attachment I to this letter contains the Wolf Creek Nuclear Operating Corporation (WCNOC) proposed path to closure of GSI-191. The proposed path to closure is Option 2 "Risk Informed Approach" of SECY-12-0093 (Reference 4).

Attachment I includes a summary of margins and conservatisms for completed actions for Generic Letter (GL) 2004-02 (Reference 1). Attachment I also provides a summary of defense-in-depth measures implemented at Wolf Creek Generating Station. The margins, conservatisms and defense-in-depth measures provide support for the extension of time to completely address GL 2004-02 and GSI-191.

Regulatory commitments contained in this letter are included in Attachment II. If you have any questions concerning this matter, please contact me at (620) 364-4085, or Mr. Michael J. Westman at (620) 364-4009.

Sincerely,

John P. Broschak

JPB/rlt

Attachment: I) WCNOC Proposed Path to Closure of GSI-191, "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance," SECY-12-0093 Option 2, Risk Informed Resolution Path
II) List of Regulatory Commitments

cc: A. T. Howell (NRC), w/a
C. F. Lyon (NRC), w/a
N. F. O'Keefe (NRC), w/a
Senior Resident Inspector (NRC), w/a

STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

John P. Broschak, of lawful age, being first duly sworn upon oath says that he is Vice President Engineering of Wolf Creek Nuclear Operating Corporation; that he has read the foregoing document and knows the contents thereof; that he has executed the same for and on behalf of said Corporation with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By John P. Broschak
John P. Broschak
Vice President Engineering

SUBSCRIBED and sworn to before me this 16th day of May, 2013.

Gayle Shepheard
Notary Public

GAYLE SHEPHEARD
Notary Public - State of Kansas
My Appt. Expires 7/24/2015

Expiration Date 7/24/2015

WCNOC Proposed Path to Closure of GSI-191, "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance," SECY-12-0093 Option 2, Risk Informed Resolution Path

Introduction

Wolf Creek Nuclear Operating Corporation (WCNOC) has selected SECY-12-0093 (Reference 1), Option 2, Risk-Informed Resolution Path. WCNOC has determined that performing a risk-informed evaluation of the potential for recirculation sump strainer blockage and in-vessel blockage, following the South Texas Project (STP) Nuclear Operating Company pilot approach, will resolve Generic Safety Issue (GSI)-191, "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance," as identified in SECY-12-0093, for Wolf Creek Generating Station (WCGS).

To support use of this path, and continued operation of WCGS for the period required to complete the necessary analysis and testing, WCNOC has evaluated the design and procedural capabilities that exist to detect and mitigate sump strainer and in-vessel blockage. A description of these detection and mitigative measures, as well as a summary of existing margins and conservatisms and a summary of defense-in-depth measures are provided in this document. The margins, conservatisms and defense-in-depth measures provide support for the extension of time to completely address GSI-191 and Generic Letter (GL) 2004-02 (Reference 2).

Characterization of In-Vessel Effects

WCNOC intends to establish in-vessel debris limits for the WCGS-specific plant design through extensive modeling in a risk-informed framework or through efforts currently being undertaken by the Pressurized Water Reactor Owners Group (PWROG), or through a combination of both paths.

Regulatory Commitments

WCNOC currently has two open regulatory commitments to conduct evaluations of the potential impact of the NRC's safety evaluation (SE) of WCAP-16793 (Reference 3) on WCNOC's response to GL 2004-02 (Reference 4). As a result of information contained within this document, the previously established commitments will be closed and will be replaced with the following commitment: Following issuance of the SE for the WCNOC licensing action addressing the risk-informed resolution path as described in this document, WCNOC will evaluate the licensing action SE within 90 days to assess potential impact on interim compensatory measures implemented in accordance with NRC Bulletin 2003-01 (References 5 and 6). The interim compensatory measures will remain in place at a minimum until completion of the evaluation.

WCNOC also has an outstanding response to NRC request for additional information (RAI) dated July 31, 2009 (Reference 7). No further action will be taken at this time to resolve these RAIs based on this letter to pursue the risk-informed approach. Following issuance of the SE for the WCNOC licensing action addressing the risk-informed resolution path as described in this document, WCNOC will evaluate the NRC request for additional information dated July 31, 2009, within 90 days and take action to address the NRC correspondence.

Resolution Schedule

WCNOC will achieve closure of GSI-191 and address GL 2004-02 per the following schedule.

- WCNOC has completed in-situ measurements for insulation replacement. Data gathering and laser scanning were conducted during the most recent WCGS refueling outage, which completed April, 2013.
- Based on resolution periods described in SECY-12-0093 (Reference 1), WCNOC will submit a risk-informed licensing action for resolution of GSI-191 by December 31, 2015.
- Based on resolution periods described in SECY-12-0093 and SRM-SECY-12-0093 (Reference 8), WCNOC will complete insulation replacements or remediation or other identified plant changes necessary to conform to the provisions of the WCNOC licensing action SE that approves the risk-informed resolution approach, prior to startup following Refueling Outage 22, which is currently scheduled to begin Spring, 2018.
- Within six months of receipt of the SE for WCNOC risk-informed licensing action, WCNOC will submit a final updated supplemental response to support closure of GL 2004-02 for WCNOC.
- During the risk-informed evaluation, review and approval process, if WCNOC determines that this Option 2, Risk-Informed Resolution Path, is not viable or poses a substantial negative impact to the general operation of WCGS, WCNOC will complete an alternative resolution path, consistent with SRM-SECY-12-0093 options accepted by the NRC. WCNOC is participating in both the PWROG Comprehensive Analysis and Testing Program for GSI-191 Closure and the PWROG Boric Acid Precipitation Analysis to Support GSI-191 Closure and Evaluation Method Development if a Deterministic Resolution Path is required at WCGS.
- In accordance with 10 CFR 50.71(e), WCNOC will update the current licensing basis (Updated Safety Analysis Report) following issuance of the SE for the WCNOC licensing action that approves the risk-informed resolution approach, and following completion of any identified removal or modification of insulation debris sources in containment per plant modification procedures and processes, if determined to be necessary.

Summary of Actions Completed for GL 2004-02

In response to GL 2004-02 (References 4 and 10), WCNOC has completed the following actions for WCGS:

- New sump strainers were installed in the existing emergency recirculation sump pits in the containment building to accommodate the water levels postulated for post-accident conditions. Each new sump strainer contains stacked plates arranged into modules that maximize the strainer surface area. The strainer plates have perforated stainless steel plate surfaces with 0.045-inch diameter holes to efficiently capture debris that enters the sump pits. While the original containment recirculation sump screens and trash racks had approximately 200 square feet of effective surface area per sump, the new replacement sump strainers have approximately 3300 square feet of effective surface area per sump. This represents a significant increase in strainer capability.
- Debris barrier plates have been installed in openings through the secondary shield wall that are near the emergency recirculation sumps. The barriers prevent the "short path"

flow of debris-laden fluid directly to the sumps and force the fluid to take a longer "tortuous path" through shield wall openings farther away from the sumps to allow more time for the debris to settle out.

- In order to maintain and control containment debris inventories WCNOC has implemented changes to programmatic controls for (1) design change process procedures, (2) containment entry and material control procedures, (3) clearance orders procedures, (4) work request procedures, and (5) scaffold construction and use procedures.
- WCNOC has implemented changes to surveillance procedures to ensure that the installed replacement strainers will not have openings in excess of the maximum designed strainer opening.
- WCNOC has implemented and completed actions to assess containment latent debris, which utilized swipe sampling to determine the amount of latent debris in the containment building. Housekeeping and foreign materials exclusion procedures have been revised to target containment building cleaning based on the results of the swipe sampling survey.
- WCNOC has implemented a containment coatings assessment program for monitoring and assessing the condition of the qualified and acceptable coatings in the containment building, including administrative controls on conducting coating examinations, including deficiency reporting criteria and documentation requirements.
- WCNOC implemented interim compensatory measures at WCGS in accordance with NRC Bulletin 2003-01 (References 5 and 6). These measures will remain in place at a minimum until WCNOC has completed its evaluation of the potential impact or Generic Letter GL 2004-02 is resolved.

Summary of Margins and Conservatisms for Completed Actions For GL 2004-02

A summary description of the margins and conservatisms associated with the resolution actions taken to date were provided in WCNOC responses to GL 2004-02 (References 4 and 10). The margins and conservatisms were provided based on methods and technologies available at the time to provide a high confidence that issues described in GL 2004-02 had been adequately addressed and support for the extension of time required for GL 2004-02 closure. WCNOC acknowledges that subsequent improvements to analytical methodologies and test protocols may require refinement to some of the margins and conservatisms described in References 4 and 10. These refinements, as applicable, will summarily be addressed utilizing the risk-informed approach in order to achieve GL 2004-02 closure.

Summary of Defense-In-Depth (DID) Measures

The following describes the plant specific design features and procedural capabilities that exist for detecting and mitigating a strainer blockage or a fuel blockage condition. These measures provide additional assurance that the health and safety of the public would be maintained. These measures also provide support for the extension of time required to completely address GL 2004-02 for WCNOC.

It should be noted that these defense-in-depth measures are not expected to be needed based on the very low probability of an event that would challenge either the capability of the strainer to provide the necessary flow to the emergency core cooling and containment spray systems, or the very low probability of an event that would result in significant quantities of debris being transported to the reactor vessel that would inhibit the necessary cooling of the fuel.

Defense-In-Depth Measures for Strainer Blockage

- WCGS has within the Emergency Operating Procedure (EMG) framework, specific steps for monitoring for indications of sump strainer blockage and actions to be taken if blockage occurs. These actions are described in the WCNOC response to NRC Bulletin 2003-01 dated August 8, 2003 (Reference 5) and the subsequent response to the NRC request for additional information dated November 5, 2004 (Reference 6). The actions taken in response to the Bulletin 2003-01 are still in effect at WCGS.

Defense-In-Depth Measures for Fuel (Core) Blockage

Detection of Core Blockage

Multiple methods exist for detection of a core blockage condition as manifested by an inadequate reactor coolant system (RCS) inventory or inadequate core heat removal. The primary methods include core exit thermocouples (CET) and reactor vessel level indication system (RVLIS). This monitoring is initiated early in the event in the EMG procedures through the Critical Safety Function Status Trees which is performed continuously after completion of diagnosis of the event. Emergency response personnel in the Technical Support Center (TSC) or Emergency Operations Facility (EOF) will also maintain oversight of plant status through review of Safety Parameter Display System that includes both CET and RVLIS data. An additional method for detection of a core blockage condition includes monitoring of containment radiation levels by the TSC or EOF staff and/or if a radiation alarm setpoint is exceeded resulting in an alarm in the control room.

In addition to the defense in depth measures listed above, WCNOC is currently evaluating the recommendations made by Westinghouse in DW-12-013 (Reference 11). If changes are required to address DW-12-013, WCNOC will implement required changes, including EMG procedure changes and associated training, if required, no later than May 1, 2014.

Mitigation of Core Blockage

Upon identification of an inadequate RCS inventory or core heat removal condition, the EMG procedures direct the operators to take actions to restore cooling flow to the RCS including:

- Reduce RCS injection flow rate to meet minimal heat removal requirements.
- Refill the Refueling Water Storage Tank (RWST).
- Provide core cooling by steaming through the steam generators.
- Use of hot leg injection flow path.
- Establish alternate injection paths to recover the core.
- Restart Reactor Coolant Pumps (RCP).
- Flood containment using fire protection equipment.

The operators will also inform the TSC of the condition. The TSC will evaluate the condition and recommend the actions, as necessary, to the operators to restore core heat removal.

Conclusion

WCNOC expects that the GSI-191 resolution path for WCGS is acceptable, based on the information and conditions provided in this document. The execution of the actions identified in this document will result in successful resolution of GSI-191 and closure of GL 2004-02.

References

1. Letter from R. W. Borchardt, USNRC to NRC Commissioners, SECY-12-0093 - "Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance," July 9, 2012. ADAMS Accession No. ML121310648.
2. Generic Letter 2004-02 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," September 13, 2004. ADAMS Accession No. ML042360586.
3. Final Safety Evaluation for Pressurized Water Reactor Owners group Topical Report WCAP-16793-NP, Revision 2, "Evaluation of Long-Term Cooling Considering Particulate Fibrous and Chemical Debris in the Recirculating Fluid", April 8, 2013. ADAMS Accession No. ML13084A152.
4. WCNOC Letter ET 08-0053, "Revision 1 to Wolf Creek Nuclear Operating Corporation Response to Request for Additional Information RE: Response to Generic Letter 2004-02: "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors"," December 22, 2008. ADAMS Accession No. ML090060877.
5. WCNOC Letter WO 03-0049, "Response to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors"," August 8, 2003. ADAMS Accession No. ML032260636.

6. WCNOC Letter WM 04-0050, "Response to NRC Request for Additional Information Related to Bulletin 2003-01," November 5, 2004. ADAMS Accession No. ML043200157.

7. Letter from B. K. Singal, USNRC to R. A. Muench, WCNOC, "Request for Additional Information Regarding Response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors" (TAC NO. MC4731)," July 31, 2009. ADAMS Accession No. ML092030628.

8. Letter from NRC Commissioners to USNRC staff, "Staff Requirements - SECY-12-0093 - Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance," December 14, 2012. ADAMS Accession No. ML121310648.

9. Memorandum from J. L. Birmingham, USNRC, to C. Carpenter, USNRC, "Summary of July 26-27, 2001 Meeting with Nuclear Energy Institute (NEI) and Industry on ECCS Strainer Blockage in PWRs," August 14, 2001. ADAMS Accession No. ML012270168.

10. WCNOC Letter ET 08-0003, "Wolf Creek Nuclear Operating Corporation Response to Request for Additional Information RE: Response to Generic Letter 2004-02: "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors"," February 29, 2008. ADAMS Accession No. ML080700356.

11. Pressurized Water Reactor Owners Group (PWROG) Direct Work Item DW-12-013, transmitted April 15, 2013.

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Wolf Creek Nuclear Operating Corporation in this document. Any other statements in this letter are provided for information purposes and are not considered regulatory commitments. Please direct questions regarding these commitments to Mr. Michael J. Westman, Manager Regulatory Affairs at Wolf Creek Generating Station, (620) 364-8831 ext. 4009.

REGULATORY COMMITMENT	DUE DATE
Following issuance of the SE for the WCNOC licensing action addressing the risk-informed resolution path as described in this document, WCNOC will evaluate the licensing action SE within 90 days to assess potential impact on interim compensatory measures implemented in accordance with NRC Bulletin 2003-01. The interim compensatory measures will remain in place at a minimum until completion of the evaluation.	Within 90 days following issuance of the SE for the WCNOC licensing action addressing the risk-informed resolution path
Following issuance of the SE for the WCNOC licensing action addressing the risk-informed resolution path as described in this document, WCNOC will evaluate the NRC request for additional information dated July 31, 2009, and take action to address the NRC correspondence.	Within 90 days following issuance of the SE for the WCNOC licensing action addressing the risk-informed resolution path
Based on resolution periods described in SECY-12-0093 (Reference 1), WCNOC will submit a risk-informed licensing action for resolution of GSI-191.	By December 31, 2015
Based on resolution periods described in SECY-12-0093 and SRM-SECY-12-0093, WCNOC will complete insulation replacements or remediation or other identified plant changes necessary to conform to the provisions of the WCNOC licensing action SE that approves the risk-informed resolution approach.	Prior to startup following Refueling Outage 22, which is currently scheduled to begin Spring, 2018
WCNOC will submit a final updated supplemental response to support closure of GL 2004-02 for WCNOC.	Within six months of receipt of the SE for the WCNOC risk-informed licensing action
If changes are required to address DW-12-013, WCNOC will implement required changes, including EMG procedure changes and associated training if required.	No later than May 1, 2014