



August 18, 2016

Jaime H. McCoy
Vice President Engineering

ET 16-0018

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

- References:
- 1) Letter dated March 12, 2012, from E. J. Leeds and M. R. Johnson, USNRC, to M. W. Sunseri, WCNOC, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events"
 - 2) NRC Interim Staff Guidance JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," Revision 0, August 29, 2012
 - 3) NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, August 2012
 - 4) Letter ET 12-0029, dated October 29, 2012, from J. P. Broschak, WCNOC, to USNRC
 - 5) Letter WO 13-0014, dated February 28, 2013, from R. A. Smith, WCNOC, to USNRC
 - 6) Letter ET 13-0027, dated August 28, 2013, from J. P. Broschak, WCNOC, to USNRC
 - 7) Letter ET 14-0011, dated February 26, 2014, from J. P. Broschak, WCNOC, to USNRC
 - 8) Letter ET 14-0024, dated August 28, 2014, from C. O. Reasoner, WCNOC, to USNRC
 - 9) Letter ET 15-0005, dated February 24, 2015, from J. H. McCoy, WCNOC, to USNRC
 - 10) Letter ET 15-0020, dated August 25, 2015, from J. H. McCoy, WCNOC, to USNRC
 - 11) Letter ET 16-0008, dated February 17, 2016, from J. H. McCoy, WCNOC, to USNRC

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Subject: Docket No. 50-482: Wolf Creek Nuclear Operating Corporation's Seventh Six-Month Status Report for the Implementation of Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events"

Gentlemen:

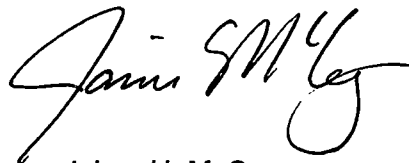
On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Order EA-12-049 (Reference 1) to Wolf Creek Nuclear Operating Corporation (WCNOC). Reference 1 was immediately effective and directs WCNOC to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in the event of a beyond-design-basis external event. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an Overall Integrated Plan (OIP) pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document Nuclear Energy Institute (NEI) 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the WCNOC initial status report regarding mitigation strategies. Reference 5 provided the WCNOC OIP. References 6, 7, 8, 9, 10, and 11 provided the first, second, third, fourth, fifth, and sixth six-month status reports for the implementation of Order EA-12-049, respectively.

Reference 1 requires submission of a status report at six-month intervals following submittal of the OIP. Reference 3 provides direction regarding the content of the status reports. The purpose of this letter is to provide the seventh six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The attached report provides an update of milestone accomplishments since submittal of Reference 11, including any changes to the compliance method, schedule, or need for relief and the basis, if any.

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-4156, or Cynthia R. Hafenstine (620) 364-4204.

Sincerely,

A handwritten signature in black ink, appearing to read "Jaime H. McCoy". The signature is fluid and cursive, with the first name "Jaime" and last name "McCoy" clearly distinguishable.

Jaime H. McCoy

JHM/rit

Attachment

cc: K. M. Kennedy (NRC), w/a
C. F. Lyon (NRC), w/a
N. H. Taylor (NRC), w/a
Senior Resident Inspector (NRC), w/a

STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

Jaime H. McCoy, 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 *Jaime McCoy*
Jaime H. McCoy
Vice President Engineering

SUBSCRIBED and sworn to before me this 18th day of August, 2016.



Gayle Shephard
Notary Public

Expiration Date 7/24/2019

Wolf Creek Nuclear Operating Corporation's (WCNOC) Seventh Six-Month Status Report for the Implementation of Order EA-12-049, "Order to Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events"

1. Introduction

WCNOC developed an Overall Integrated Plan (OIP) (Reference 1), documenting the diverse and flexible strategies (FLEX), in response to Reference 2. This attachment provides an update of milestone accomplishments since submittal of the OIP, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2. Milestone Accomplishments

As of August 01, 2016, the following milestones have been completed since the submittal of the last six-month status report (Reference 3).

- Submittal of the seventh six-month status report (this submittal)
- Procure On-Site FLEX Equipment.

3. Milestone Schedule Status

The following provides an update to Attachment 2 of the OIP. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates and are subject to change as design and implementation details are developed.

The revised milestone target completion dates do not impact the order implementation outage. Italicized text denotes that a Milestone was updated since the sixth six-month status update.

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
Submit 60-Day Status Report	Oct 2012	Complete	-
Submit Overall Integrated Plan	Feb 2013	Complete	-
Submit 6-Month Updates:			
Update 1	Aug 2013	Complete	-
Update 2	Feb 2014	Complete	-
Update 3	Aug 2014	Complete	-
Update 4	Feb 2015	Complete	-
Update 5	Aug 2015	Complete	-
Update 6	Feb 2016	Complete	-
<i>Update 7</i>	<i>Aug 2016</i>	<i>Complete</i>	-
FLEX Strategy Evaluation	Apr 2013	Complete	-
<i>Walk-Throughs or Demonstrations</i>	<i>Sep 2014</i>	<i>On-Going</i>	<i>Sep 2016</i>

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
Perform Staffing Analysis	Dec 2013	Complete	-
Modifications:			
Modifications Evaluation	Apr 2013	Complete	-
N-1 Walkdown	Apr 2014	Complete	-
Design Engineering	Jan 2014	Complete	-
<i>Condensate Storage Tank (CST) Reinforcement - Design Engineering</i>	<i>Oct 2015</i>	<i>On-Going</i>	<i>Oct 2016</i>
Implementation Outage	Feb 2015	As Scheduled	Sep 2016
FLEX Equipment:			
<i>Procure On-Site Equipment</i>	<i>Dec 2014</i>	<i>Complete</i>	-
Develop Strategies with Regional Response Center (RRC)	Nov 2013	Complete	-
<i>Install Off-Site Delivery Station (if necessary)</i>	<i>Sep 2014</i>	<i>On-Going</i>	<i>Nov 2016</i>
Procedures:			
Pressurized Water Reactor Owners Group (PWROG) issues NSSS-specific guidelines	Jun 2013	Complete	-
Create WCGS FLEX Support Guidelines (FSG)	Jun 2014	Complete	-
<i>Create Maintenance Procedures</i>	<i>Jul 2014</i>	<i>Started</i>	<i>Oct 2016</i>
Training:			
Develop Training Plan	Jul 2014	Complete	-
Training Complete	Feb 2015	On-Going	Sep 2016
<i>Submit Completion Report*</i>	<i>Mar 2015</i>	<i>Started</i>	<i>Jan 2017</i>

* The report will be submitted 90 days after the completion of Refueling Outage 21.

4. Changes to Compliance Method

Since the submittal of Reference 3, WCNOG has completed an evaluation for compliance to NEI 12-06, Revision 2 (Reference 18) and will be in compliance upon completion of FLEX implementation activities.

5. Need for Relief/Relaxation and Basis for the Relief/Relaxation

WCNOG requested (Reference 4) relaxation for the implementation of Order EA-12-049. The Wolf Creek Generating Station (WCGS) FLEX strategies rely on the low leakage Reactor Coolant Pump (RCP) seals and a seismic and missile protected Condensate Storage Tank

(CST). Compliance with the original Order EA-12-049 schedule requirement for full completion and implementation of mitigation strategies would have resulted in hardship or unusual difficulty without a compensating increase in the level of safety.

An extension of one additional refueling cycle was requested in Reference 4. Reference 10 approved the relaxation of the order implementation date. This moves the implementation date to completion of the fall 2016 refueling outage, which is still within the maximum allowed timeframe of December 2016.

6. Open Items from Overall Integrated Plan and Interim Staff Evaluation

The following table provides a summary of the open items documented in the OIP and the status of each item. Italicized text denotes that an Open Item was updated since the sixth six-month status update.

Open Item #	Overall Integrated Plan Open Item	Status
OI 1	Finalize the location of the FLEX storage building. The deployment routes, distances, and times provided in this report are bounded for the currently proposed locations but will be updated as necessary.	Closed – The locations of the two FLEX storage buildings have been selected. Construction of both buildings has been completed and the deployment routes and distances have been confirmed. The verification and validation process (Milestone: Walk-Throughs or Demonstrations) will confirm that deployment times are consistent with analysis values.
OI 2	Perform containment evaluation, using GOTHIC, based on the boundary conditions described in Section 2 of NEI 12-06. Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrument function will be developed.	Closed – The Generation of Thermal Hydraulic Information for Containment (GOTHIC) analysis has been completed. The containment structure and instrumentation inside containment critical to coping with an Extended Loss of ac Power (ELAP) event are shown to be acceptable following a 7-day duration (Reference 5).

Open Item #	Overall Integrated Plan Open Item	Status
OI 3	<p><i>The current CST and CST pipe chase are non-seismic. Therefore, WCNOG is currently pursuing two options; the qualification and hardening of the existing CST, or the construction of a new 670,000 gallon seismically qualified and missile protected CST. One of these options must be completed before the volume of the CST can be credited.</i></p>	<p><i>Ongoing – An evaluation was performed to show that the existing CST meets current licensing basis for seismic and tornado missile hazards (References 6, 7, 8, and 9).</i></p> <p><i>Design Change Package (DCP) 14277 is being implemented to harden the CST by welding a layer of plating around the tank in order to withstand a Safe Shutdown Earthquake. Necessary modification work will be complete by the end of Refuel Outage 21.</i></p> <p><i>The CST pipe chase has been evaluated and can withstand the current licensing basis for seismic and tornado missile hazards (Reference 12).</i></p> <p><i>DCP 14864 is being implemented to harden the CST Valve House. The valve house will be replaced with a metal frame steel structure built to withstand missile hazards and Safe Shutdown Earthquake. Necessary modification work will be complete by the end of Refuel Outage 21.</i></p>
OI 4	<p>Modify the RWST to protect it from tornado missiles or identify a borated source that is protected for tornados and can be utilized to provide core cooling when steam generators are not available.</p>	<p>Closed – Identified an alternate source strategy using the Boric Acid Tanks in the Auxiliary Building as the primary source and Refueling Water Storage Tank (RWST) as the alternate source.</p>
OI 5	<p>For non-Class 1E instrumentation that will be repowered using a temporary battery, an analysis will need to be performed to determine battery life and frequency of replacing battery.</p>	<p>Closed – The final plant strategies do not rely on any equipment that is not powered by a Class 1E source.</p>

OI 6	The method for isolating accumulators during Reactor Coolant System [RCS] inventory control has not been finalized.	Closed – It was confirmed that the accumulator isolation valves are on a bus that is being re-powered for the primary electrical FLEX strategy. For the alternate electrical FLEX strategy, nitrogen injection will be prevented by venting the accumulators.
OI 7	The method for repowering the SFP cooling pumps has not been finalized.	Closed – Powering a Spent Fuel Pool (SFP) cooling pump is a Phase 3 action. The pump will be re-powered by a 4160V generator provided by the RRC.

The following table provides a summary of the open items documented in the Interim Staff Evaluation Report (Reference 15) and the status of each item. Italicized text denotes that an Open Item was updated since the sixth six-month status update.

Open Item #	ISE Open Item	Status
3.1.1.2.A	<i>Verify that the potential for liquefaction considerations to impede movement of FLEX equipment following a severe seismic event at Wolf Creek are evaluated.</i>	<i>Closed - A recent re-evaluation of the WCNOG seismic Probabilistic Risk Assessment (PRA) analysis has confirmed that liquefaction is not an issue on-site (References 16 and 17). Thus, there will be no liquefaction concerns for impeding the movement of FLEX equipment on-site following a severe seismic event.</i>
3.1.1.2.B	Verify that power that might be required to deploy equipment, such as power to open roll up doors at a storage location, is evaluated.	Closed – The deployment of FLEX equipment will not require external power. Equipment such as roll up doors will have provisions to be opened manually.
3.2.1.8.A	Verify resolution of the generic concern associated with the modeling of the timing and uniformity of the mixing of a liquid boric acid solution injected into the RCS under natural conditions potentially involving two-phase flow.	Closed – WCNOG will conform to the position expressed by the NRC staff in the letter dated January 8, 2014 to the PWROG (Reference 13). The NRC letter states that the NRC staff has reviewed the information submitted to date and concluded that use of the industry approach in PWROG letter OG-13-284 dated August 19, 2013, (Reference 14) is acceptable with clarifications listed in the letter.

3.2.4.8.B	<p>Verify that instrumentation that will be used to monitor portable/FLEX electrical power equipment ensures that: 1) the electrical equipment remains protected (from an electrical power standpoint – e.g., power fluctuations) and, 2) the operator is provided with accurate information to maintain core cooling, containment, and spent fuel cooling strategies.</p>	<p>Closed – The FLEX 500kW generator used to power 480 Vac Load Centers NG001 and NG002 are provided with complete protection. The generators built in voltage regulator provides voltage control and generator protection. Protection consists of but is not limited to: Generator Over and Undervoltage, Loss of Excitation, Instantaneous Field Overcurrent, Over Excitation and Under Frequency.</p> <p>The FLEX 500kW generator also includes a separate Electronic Modular Control Panel (EMCP) 4.4 Generator Controller. This unit provides additional protection including but not limited to: Generator phase sequence, Over/Under voltage (27/59), Over/Under Frequency (81 O/U), Reverse power (32), Overcurrent (50/51), and Current Balance (46).</p> <p>The protections from these two (2) independent devices are active at all times and prevent the generator set from generating power that fluctuates in amplitude or is low or high frequency.</p> <p>The generic FLEX Support Guidelines (FSGs) developed via the PWROG contain sufficient guidance to control the plant using installed and/or portable FLEX equipment based on the requirement to monitor actual plant processes. The DRAFT FSGs conform to the requirements detailed in the generic FSGs by monitoring installed plant instruments required for FLEX coping via Draft EMG C-0, Loss of All AC Power – Attachment H, Assessment Of Vital Instruments.</p> <p>Additionally, Draft Procedure EMG C-0, Attachment H directs initiation of FSG-7, Loss Of Vital Instrumentation Or Control Power, if minimum plant instruments are not available. Draft FSG-7 provides guidance for plant control when certain instruments are lost. FSG-7 also provides a primary and backup method for obtaining process readings using portable instruments.</p>
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3.4.A	Verify the licensee has fully addressed considerations (2) through (10) of NEI 12-06, Section 12.2, Minimum Capability of Off-Site Resources, which requires each site to establish a means to ensure the necessary resources will be available from off-site.	Closed - Our National SAFER Response Center (NSRC) playbook is complete and was loaded onto the STARS E-portal.
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References

1. WCNOC Letter WO 13-0014, "Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," February 28, 2013. ADAMS Accession No. ML13070A026.
2. Letter from E. J. Leeds and M. R. Johnson, USNRC, to M. W. Sunseri, WCNOC, "Issuance of Order to Modify Licenses with Regard to Requirements For Mitigation Strategies for Beyond-Design-Basis External Events," March 12, 2012. ADAMS Accession No. ML12054A735.
3. WCNOC Letter ET 16-0008, "Wolf Creek Nuclear Operating Corporation's Sixth Six-Month Status Report for the Implementation of Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events'," February 17, 2016. ADAMS Accession No. ML16055A113.
4. WCNOC Letter WO 14-0023, "Request for Schedule Relaxation of NRC Order EA-12-049, Requirement IV.A.2, at Wolf Creek Generating Station," March 31, 2014. ADAMS Accession No. ML14097A072.
5. CN-OA-13-7, Revision 1, "Wolf Creek ELAP Containment Heat-Up," June 16, 2014.
6. 020542.13.01-C-001, Revision 0, "Condensate Storage Tank and Refueling Water Storage Tanks Tornado Missile Impact Analyses," November 2013.
7. 020542.13.01-C-002, Revision 0, "Structural Analysis of Condensate Storage Tank," November 2013.
8. 020542.13.01-C-003, Revision 0, "Condensate Storage Tank Valve House and Refueling Water Storage Tank Valve House Missile Impact and Seismic Analysis," December 2013.
9. 020542.13.01-C-004, Revision 0, "Condensate Storage Tank Pipe Stress Analysis," December 2013.

10. Letter from E. J. Leeds, USNRC, to A. C. Heflin, WCNOC, "Wolf Creek Generating Station, Unit 1 – Relaxation of the Schedule Requirements for Order EA-12-049 'Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events'," May 20, 2014. ADAMS Accession No. ML14104A029.
11. 020542.13.01-C-008, Revision 0, "Refueling Water Storage Tank Pipe Stress Analysis," December 2013.
12. 020542.13.01-C-009, Revision 0, "Condensate Storage Tank Pipe Tunnel Evaluation," December 2013.
13. Letter from J. Davis, USNRC, to N. J. Stringfellow, PWROG, January 8, 2013. ADAMS Accession No. ML13276A183.
14. PWROG Letter OG 13-284, "Submittal of LTR-FSE-13-46, Revision 0, P-Attachment, "Westinghouse Response to NRC Generic Request for Additional Information (RAI) on Boron Mixing in Support of the Pressurized Water Reactor Owners Group (PWROG)" (Proprietary) (PA-ASC-1184)," August 19, 2013.
15. Letter from J. S. Bowen, USNRC, to A. C. Heflin, WCNOC, "Wolf Creek Generating Station, Unit 1 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies)(TAC NO. MF0788)," February 6, 2014. ADAMS Accession No. ML14002A190.
16. GEI Consultants for Stevenson & Associates, "Liquefaction Evaluation - Power Block Structures Wolf Creek Nuclear Generating Station," July 9, 2015.
17. GEI Consultants for Stevenson & Associates, "Liquefaction Evaluation - ESW Pumphouse and Marine Discharge Structure Wolf Creek Nuclear Generating Station," July 15, 2015.
18. NEI 12-06, Revision 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," December 2015.