



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 2016

Mr. Adam C. Heflin
President, Chief Executive Officer,
and Chief Nuclear Officer
Wolf Creek Nuclear Operating
Corporation
Post Office Box 411
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION, UNIT 1 – REPORT FOR THE AUDIT
REGARDING IMPLEMENTATION OF MITIGATING STRATEGIES RELATED
TO ORDER EA-12-049 (CAC NO. MF0788)

Dear Mr. Heflin:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Issuance of Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" and Order EA-12-051, "Issuance of Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). The orders require, in part, that all holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review Overall Integrated Plans (OIPs), including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13070A026), Wolf Creek Nuclear Operating Corporation (WCNOC, the licensee) submitted its OIP for the Wolf Creek Generating Station, Unit 1 (Wolf Creek) in response to Order EA-12-049. By letters dated August 28, 2013, February 26, 2014, August 28, 2014, February 24, 2015, August 25, 2015, and February 17, 2016 (ADAMS Accession Nos. ML13247A277, ML14064A190, ML14246A191, ML15062A033, ML15244B181, and ML16055A113, respectively), WCNOC submitted its first six 6-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the Wolf Creek interim staff evaluation (ISE) on February 6, 2014 (ADAMS Accession No. ML14002A186), and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13071A419), WCNOC submitted its OIP for Wolf Creek in response to Order EA-12-051. The NRC staff issued a request for additional information (RAI) on July 17, 2013 (ADAMS Accession No. ML13197A205). By letters dated August 15, 2013, August 28, 2013, February 26, 2014, August 21, 2014, and February 24, 2015 (ADAMS Accession Nos. ML13232A008, ML13252A238, ML14064A184, ML14246A189, and ML15063A030, respectively), WCNOC submitted its RAI response and first four 6-month updates to the OIP. The NRC staff issued the Wolf Creek ISE on October 29,

A. Heflin

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2013 (ADAMS Accession No. ML13295A681). Since the licensee informed the NRC staff on June 30, 2015 (ADAMS Accession No. ML15190A337), that it had achieved full compliance with the requirements of NRC Order EA-12-051 for Wolf Creek, Unit 1 the NRC staff did not perform an audit of the spent fuel pool instrumentation.

The ongoing audit process allows the NRC staff to review open and confirmatory items from the mitigation strategies ISE, the licensee's integrated plan, and other audit questions. Additionally, the NRC staff gains a better understanding of submitted or updated information, audit information provided on e-portals, and preliminary Overall Program Documents/Final Integrated Plans while identifying additional information necessary for the licensee to supplement its plan, and staff potential concerns.

In support of the ongoing audit of WCNO's OIPs, as supplemented, the NRC staff conducted an onsite audit at Wolf Creek from May 16-19, 2016, as discussed in the audit plan dated March 11, 2016 (ADAMS Accession No. ML16060A015). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies order. The onsite activities included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, and staging and deployment of offsite equipment. The enclosed audit report provides a summary of the activities for the onsite audit portion.

If you have any questions, please contact me at 301-415-1544 or by e-mail at stephen.monarque@nrc.gov.

Sincerely,


Stephen Monarque, Project Manager
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket No.: 50-482

Enclosure:
Audit Report

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO ORDER EA-12-049 MODIFYING LICENSES
WITH REGARD TO REQUIREMENTS FOR
MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS
WOLF CREEK NUCLEAR OPERATING CORPORATION
WOLF CREEK GENERATING STATION, UNIT 1
DOCKET NO. 50-482

BACKGROUND AND AUDIT BASIS

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Issuance of Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" and Order EA-12-051, "Issuance of Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). Order EA-12-049 directs licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a beyond-design-basis external event (BDBEE). Order EA-12-051 requires, in part, that all operating reactor sites have a reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a BDBEE. The orders require, in part, that all holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs), including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13070A026), Wolf Creek Nuclear Operating Corporation (WCNOC, the licensee) submitted its OIP for the Wolf Creek Generating Station, Unit 1 (Wolf Creek) in response to Order EA-12-049. By letters dated August 28, 2013, February 26, 2014, August 28, 2014, February 24, 2015, August 25, 2015, and February 17, 2016 (ADAMS Accession Nos. ML13247A277, ML14064A190, ML14246A191, ML15062A033, ML15244B181, and ML16055A113, respectively), WCNOC submitted its first six 6-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No.

Enclosure

ML082900195). This audit process led to the issuance of the Wolf Creek interim staff evaluation (ISE) on February 6, 2014 (ADAMS Accession No. ML14002A186), and continues with in-office and onsite portions of this audit.

The licensee informed the NRC staff on June 30, 2015 (ADAMS Accession No. ML15190A337), that it had achieved full compliance with the requirements of NRC Order EA-12-051 for Wolf Creek, Unit 1. As such, the NRC staff did not perform an audit of the spent fuel pool instrumentation.

The ongoing audits allow the NRC staff to review open (OI) and confirmatory items (CI) from the mitigation strategies ISE, the licensee's integrated plans, and other audit questions (AQs). Additionally, the NRC staff gains a better understanding of submitted information, and updated information, audit information provided on e-portals, preliminary Overall Program Documents (OPDs)/Final Integrated Plans (FIPs), while identifying additional information necessary for the licensee to supplement its plan and address staff potential concerns.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at Wolf Creek from May 16 - 19, 2016, as discussed in the audit plan dated March 11, 2016 (ADAMS Accession No. ML16060A015). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies order. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, and staging and deployment of offsite equipment.

Following the licensee's declarations of order compliance, the NRC staff will evaluate the OIPs, as supplemented, the resulting site specific OPDs/FIPs, and, as appropriate, other licensee submittals based on the requirements in the orders. For Order EA-12-049, the NRC staff will make a safety determination regarding order compliance using the Nuclear Energy Institute (NEI) developed guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 2 issued in December 2015 (ADAMS Accession No. ML16005A625), as endorsed, by NRC Japan Lessons-Learned Project Directorate (JLD) interim staff guidance (ISG) 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 1 (ADAMS Accession No. ML15357A142) as providing one acceptable means of meeting the order requirements. For Order EA-12-051, the NRC staff will make a safety determination regarding order compliance using the NEI developed guidance document NEI 12-02, "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12240A307), as endorsed, with exceptions and clarifications, by NRC ISG JLD-ISG-2012-03 "Compliance with Order EA-12-051, 'Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12221A339) as providing one acceptable means of meeting the order requirements. Should the licensee propose an alternative strategy or other method deviating from the guidance, additional NRC staff review will be required to evaluate the alternative strategy in reference to the applicable order.

AUDIT ACTIVITIES

The onsite audit at the Wolf Creek facility was from May 16-19, 2016. The following NRC staff participated in this audit:

Title	Team Member
Lead Project Manager	Stephen Monarque
Technical Support	Garry Armstrong
Technical Support	Joshua Miller
Technical Support	Prem Sahay

The NRC staff executed the onsite portion of the audit pursuant to the three part approach discussed in the March 11, 2016, plan, to include conducting a tabletop discussion of the site's integrated mitigating strategies compliance program, a review of specific technical items, and discussion of specific program topics. Activities that were planned to support the above included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, and staging and deployment of offsite equipment.

AUDIT SUMMARY

1.0 Entrance Meeting (May 16, 2016)

At the audit entrance meeting, the NRC staff introduced itself followed by introductions from the licensee's staff. The NRC staff provided a brief overview of the audit's objectives and anticipated schedule.

2.0 Integrated Mitigating Strategies Compliance Program Overview

As an introduction to the site's program, WCNOG provided a presentation to the NRC staff. The licensee provided an overview of its strategy to maintain core cooling, containment and SFP cooling in the event of a BDBEE, and the plant modifications being done in order to implement the strategies. The licensee also presented the location of the FLEX equipment storage facilities, the FLEX equipment that would be stored there, the interface with the National Strategic Alliance of FLEX Emergency Response (SAFER) Response Center (NSRC), the information regarding communications, and the access routes to the plant.

3.0 Onsite Audit Technical Discussion Topics

Based on the audit plan, and with a particular emphasis on the Part 2 "Specific Technical Review Items," the NRC staff conducted interviews with the WCNOG staff, conducted site walk-downs, and detailed the document review for the items listed in the plan. The results of these technical reviews and any additional review items needed from the licensee are documented in the audit item status table in Attachment 3, as discussed in the Conclusion section below.

3.1 Reactor Systems Technical Discussions and Walk-Downs

The NRC staff met with WCNOG to discuss the amount of leakage from the reactor coolant pump (RCP) seals, reactor coolant system (RCS) makeup strategy, the availability of water sources, and the ability to remove heat from the RCS system via the steam generators. The NRC staff reviewed the analysis and flow calculations along with the applicable procedures. The NRC staff also walked down WCNOG's strategies and reviewed plant procedures for implementing the core cooling and makeup strategies.

3.2 Electrical Technical Discussions and Walk-Downs

- a. The NRC staff reviewed the calculations and strategy regarding extending battery life based on load shedding. The NRC staff also walked down panels used for load shedding to evaluate feasibility and timing.
- b. The NRC staff walked connection points and locations for FLEX electrical diesel generators (DGs). The licensee will have a second backup 480 V DG available. These Phase 2 DGs will be stored in FLEX storage buildings located on the Wolf Creek site. The NRC staff reviewed the licensee's load and sizing calculations for the FLEX generators.

3.3 Balance of Plant Technical Discussions and Walk-Downs

The NRC staff reviewed the steam generator (SG) makeup strategy, which involved identifying the designated water sources and mechanical connection points for the FLEX pumps. The NRC staff also reviewed the spent fuel pool (SFP) makeup strategy, which involved identifying the deployment path for the FLEX pump and associated hoses. The NRC staff also walked down the deployment paths and staging areas of the FLEX pumps for the SG, RCS, and SFP makeup strategies to ensure that the primary connections were located within protected pathways. During the site audit, the NRC staff reviewed the hydraulic analysis for the FLEX pumps.

3.4 Other Technical Discussion Areas and Walk-Downs

- a. The NRC staff reviewed the strategy that will be implemented by the licensee to clear the roads of snow and ice to allow for the movement of FLEX equipment.
- b. The NRC staff reviewed the licensee's strategy for deploying portable lights throughout the plant during an ELAP.
- c. The NRC staff reviewed WCNOG's plans to ensure adequate communications, lighting, and personnel access to successfully implement these strategies. The NRC staff observed communications features during the plant walkdown.
- d. The NRC staff toured the area where the FLEX storage buildings are located. These two FLEX buildings were designed to American Society of Civil Engineers 7-10 and

are separated by other plant buildings to protect against tornado missiles. The NRC staff walked down the FLEX equipment haul routes from the FLEX storage buildings to the designated deployment sites and walked down the haul routes from the designated staging areas for equipment that will be delivered from the NSRC.

4.0 Exit Meeting (May 19, 2016)

The NRC staff conducted an exit meeting with WCNOC following the closure of onsite audit activities. The NRC staff discussed the items that were reviewed and noted that the results of the onsite audit trip will be documented in this report.

CONCLUSION

The NRC staff completed all three parts of the March 11, 2016, onsite audit plan. Each audit item listed in Part 2 of the plan was reviewed by NRC staff members while on site. In addition to the list of NRC and licensee onsite audit staff participants in Attachment 1, Attachment 2 provides a list of documents reviewed during the onsite audit portion, and Attachment 3 provides list of audit items currently under NRC staff review.

While this report notes the completion of the onsite portion of the audit as discussed in the audit plan dated March 11, 2016, the ongoing audit process continues as discussed in the letter dated August 28, 2013, to all licensees and construction permit holders for Order EA-12-049.

Attachments:

1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite Audit Documents Reviewed
3. Wolf Creek Audit Items currently under NRC staff review (licensee input needed as noted)

Onsite Audit Participants

NRC Staff:

Prem Sahay	NRR/JLD
Joshua Miller	NRR/JLD

Stephen Monarque	NRR/JLD
Garry Armstrong	NRR/JLD

Wolf Creek Nuclear Operating Corporation and Support Staff:

Alvin Robertson	Westinghouse
Bob Kopecky	WCNOC FLEX Program (General)
Dave Yaksic	WCNOC Seismic Hazards Lead
Lawrence Comfort	WCNOC Flooding Hazards Lead
Bud Freeman	WCNOC SFPI and Condensate Storage Tank Mod
George Boghosian	WCNOC SFPI
Ken Talbot	WCNOC FLEX Modifications (Electrical, Mechanical and Dewatering)
Jim Gilmore	WCNOC FLEX Strategic Guidelines, Training, and Validation
Royce Down	WCNOC FLEX Preventive Maintenance Development and Testing
Jerry Stamey	WCNOC FLEX Equipment and Support Equipment and Vendor Manuals
Dave Bremer	WCNOC FLEX Evaluations Safety Evaluation Tracker

WOLF CREEK GENERATING STATION, UNIT 1

DOCUMENTS REVIEWED

"Liquefaction Evaluation - Essential Service Water Pumphouse and Marine Discharge Structure," Wolf Creek Nuclear Generating Station, July 15, 2015

NRC letter dated December 24, 2015, "Wolf Creek Generating Station - Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request Flood Causing Mechanism Reevaluation"

Calculation, CN-RAM-15-044, "Wind-borne Missile Impact Probabilities for Wolf Creek Generating Station," Revision 0 and Calculation 020542.13.01-C-014, "Condensate Storage Tank Tornado Missile Impact Analyses," Revision 0

AREVA, Inc Engineering Information Record 51-9233078-001, "Wolf Creek Generating Station SAFER Response Plan," dated August 13, 2015 NSRC-005, Revision 001

Wolf Creek Procedure C-O, "Loss of All AC Power," DRAFT 2014, Attachment H Assessment of Vital Instruments

(FLEX Support Guideline) FSG-1, "Long Term RCS Inventory Control," DRAFT

FSG-3, "Alternate Low Pressure Feedwater," DRAFT

FSG-5, "Initial Assessment and FLEX Equipment Staging," DRAFT

FSG-6, "Alternate CST Makeup," DRAFT

FSG-7, "Loss of Vital Instrument or Control Power," Revision 0

FSG-8, "Alternate RCS Boration," DRAFT

FSG-11, "Alternate SFP Makeup and Cooling," DRAFT

FSG-14, "Shutdown RCS Makeup," DRAFT

Evaluation FD-13-008, "RCS FLEX Hydraulic Evaluation," Revision 0

Evaluation FD-13-007, "AFW FLEX Hydraulic Evaluation," Revision 0

Evaluation FD-13-006, "FLEX CST Makeup Hydraulic Evaluation," Revision 0

Wolf Creek Nuclear Operating Corporation AP 21-001, "Conduct of Operations," Revision 77,
dated April 26, 2016

Wolf Creek

Mitigation Strategies Safety Evaluation Audit Items:

Audit Items Currently Under NRC Staff Review, Requiring Licensee Input As Noted

Audit Item Reference	Item Description	Licensee input Needed
ISE CI 3.2.4.7.A	Confirm that seismic and high wind hazard evaluations for the CST [condensate storage tank], and the high wind hazard evaluation for the refueling water storage tanks are completed.	The NRC staff requested WCNOG provide additional information on missiles that could impact the CST and the CST heaters.
Audit Question 22	The licensee was requested to address the guidelines of NEI 12-06 Section 11.3 Consideration 6, for the FLEX RCS makeup pump.	WCNOG to provide alternate FLEX RCS pump strategy to conform with NEI 12-06 or provide justification for the alternative strategy. This discussion should include electrical diversity, diverse flowpaths, pump protection from internal flooding, as well as the ability to inject the required amount of boron on time.
14-E	During an ELAP, with loss of ventilation, what is the impact of higher temperature on electronic and electrical equipment located in the main control room, electrical switchgear room, battery charger room, direct current switchboard room, and control cabinet room.	Licensee to discuss impact of higher temperature.
15-E	The licensee is to develop a procedure for connecting Phase 3 generators to the existing 4160 VAC buses.	Licensee to provide procedure.

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If you have any questions, please contact me at 301-415-1544 or by e-mail at stephen.monarque@nrc.gov.

Sincerely,

/RA/

Stephen Monarque, Project Manager
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket No.: 50-482

Enclosure:
Audit plan

cc w/encl: Distribution via Listserv

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ADAMS Accession No. ML16168A254

* via email

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DATE	07/01/2016	06/22/2016	07/06/2016
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NAME	JQuichocho (KRoche for)	MHalter	SMonarque
DATE	07/06/2016	07/06/2016	07/06/2016

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Letter to Adam C. Heflin dated July 6, 2016

SUBJECT: WOLF CREEK GENERATING STATION, UNIT 1 - REPORT FOR THE AUDIT
REGARDING IMPLEMENTATION OF MITIGATING STRATEGIES RELATED TO
ORDER EA-12-049 (CAC NO. MF0788)

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