



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

August 5, 2015

Mr. Rafael Flores
Senior Vice President and Chief
Nuclear Officer
Attention: Regulatory Affairs
Luminant Generation Company, LLC
P.O. Box 1002
Glen Rose, Texas 76043

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2 - REPORT FOR THE AUDIT REGARDING IMPLEMENTATION OF MITIGATING STRATEGIES RELATED TO ORDER EA-12-049 (TAC NOS. MF0860 AND MF0861)

Dear Mr. Flores:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "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 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. ML13071A617), Luminant Generation Company LLC (Luminant, the licensee) submitted its OIP for Comanche Peak Nuclear Power Plant, Units 1 and 2 (CPNPP) in response to Order EA-12-049. By letters dated August 28, 2013, February 27, 2014, August 28, 2014, and February 26, 2015 (ADAMS Accession Nos. ML13252A077, ML14071A008, ML14254A402, and ML15069A219, respectively), the licensee submitted its first four six-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 CPNPP interim staff evaluation (ISE) on December 19, 2013 (ADAMS Accession No. ML13225A575) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13071A344), Luminant submitted its OIP for CPNPP in response to Order EA-12-051. By letter dated June 7, 2013 (ADAMS Accession No. ML13141A626), the NRC staff issued a request for additional information (RAI). By letters dated July 3, 2013, August 28, 2013, February 27, 2014, and August 28, 2014 (ADAMS Accession Nos. ML13193A014, ML13252A078, ML14071A009, and ML14253A186, respectively), Luminant submitted its RAI response and first three six-month

updates to the OIP. The NRC staff issued the CPNPP ISE and RAI on November 4, 2013 (ADAMS Accession No. ML13295A674). Since Luminant informed the NRC staff on December 16, 2014 (ADAMS Accession No. ML15016A188) that it had achieved full compliance with the requirements of Order EA-12-051, the NRC staff did not perform an audit of the spent fuel pool instrumentation.

The ongoing audit allows the NRC staff to review open and confirmatory items from the mitigation strategies ISE, the licensee's integrated plans, and other audit questions. Additionally, the NRC staff gains a better understanding of submitted and updated information, audit information provided on ePortals, 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 the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at CPNPP from April 27-30, 2015, as described in the audit plan dated March 26, 2015 (ADAMS Accession No. ML15076A523). 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.

The enclosed audit report provides a summary of the activities for the onsite audit portion. Additionally, this report contains an attachment listing all open audit items currently under NRC staff review.

R. Flores

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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,


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

Docket Nos.: 50-445 and 50-446

Enclosure:
Audit report

cc w/encl: Distribution via Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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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
LUMINANT GENERATION COMPANY
COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2
DOCKET NOS. 50-445 AND 50-446

BACKGROUND AND AUDIT BASIS

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "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 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. ML13071A617), Luminant Generation Company LLC (Luminant, the licensee) submitted its OIP for Comanche Peak Nuclear Power Plant, Units 1 and 2 (CPNPP, Comanche Peak) in response to Order EA-12-049. By letters dated August 28, 2013, February 27, 2014, August 28, 2014, and February 26, 2015 (ADAMS Accession Nos. ML13252A077, ML14071A008, ML14254A402, and ML15069A219, respectively), the licensee submitted its first four six-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

Enclosure

process led to the issuance of the CPNPP interim staff evaluation (ISE) on December 19, 2013 (ADAMS Accession No. ML13225A575) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13071A344), Luminant submitted its OIP for CPNPP in response to Order EA-12-051. By letter dated June 7, 2013 (ADAMS Accession No. ML13141A626), the NRC staff issued a request for additional information (RAI). By letters dated July 3, 2013, August 28, 2013, February 27, 2014, and August 28, 2014 (ADAMS Accession Nos. ML13193A014, ML13252A078, ML14071A009, and ML14253A186, respectively), Luminant submitted its RAI response and first three six-month updates to the OIP. The NRC staff issued the CPNPP ISE and RAI on November 4, 2013 (ADAMS Accession No. ML13295A674). Since Luminant informed the NRC staff on December 16, 2014 (ADAMS Accession No. ML15016A188) that it had achieved full compliance with the requirements of Order EA-12-051, the NRC staff did not perform an audit of the spent fuel pool instrumentation (SFPI).

The ongoing audit allows 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 and updated information, audit information provided on ePortals, and 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 CPNPP from April 27-30, 2015, as described in the audit plan dated March 26, 2015 (ADAMS Accession No. ML15076A523). 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 using the Nuclear Energy Institute (NEI) developed guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" issued in August 2012 (ADAMS Accession No. ML12242A378), 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'" (ADAMS Accession No. ML12229A174). For Order EA-12-051, the NRC staff will make a safety determination using the NEI developed guidance document NEI 12-02, Revision 1, "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 for compliance, additional NRC staff review will be required to evaluate the alternative strategy in reference to the applicable order.

AUDIT ACTIVITIES

The onsite audit was conducted at the CPNP facility from April 27-30, 2015. The NRC staff that participated in this audit was as follows:

Title	Team Member	Organization
Lead Project Manager	Stephen Monarque	NRR/JLD
Technical Support – Electrical	Matthew McConnell	NRR/JLD
Technical Support – Reactor Systems	Joshua Miller	NRR/JLD
Technical Support – Balance of Plant	Garry Armstrong	NRR/JLD
Technical Support – Reactor Systems	Laura Okruhlik	NRR/JLD
Technical Support – Reactor Systems	Austin Roberts	NRR/JLD

The NRC staff executed the onsite portion of the audit pursuant to the three part approach discussed in the March 26, 2015, plan, to include conducting a tabletop discussion of the site's integrated mitigating strategies (MS) compliance program, a review of specific technical review 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 (April 27, 2015)

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, Luminant provided a presentation to the NRC staff titled "NRC Audit Presentation." Luminant discussed its overall FLEX program, the design and location of the FLEX equipment storage facilities, the FLEX equipment, 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 Luminant, 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

- a. The NRC staff wanted to confirm Luminant's strategy to provide primary make-up in order to avoid transitioning to reflux condensation cooling. Luminant's Calculation CN-LIS-12-74 demonstrated that commencement of reactor coolant system (RCS) injection prior to 43.8 hours prevents departure from single-phase natural circulation; therefore, the margin is indeed large enough to avoid transitioning to reflux condensation cooling. The NRC staff has reviewed Luminant's analysis; and did not find any discrepancies. Therefore, ISE CI 3.2.1.1.B is closed.
- b. Luminant provided a response during the site audit regarding the required times for deployment and operation of the FLEX pumps to provide makeup to the steam generator (SG), RCS, and spent fuel pool (SFP).

Regarding the SG makeup, Luminant plans to deploy the auxiliary feedwater (AFW) Low Pressure FLEX pump within 15 hours, but this pump will only be placed into service if the turbine driven (TDAFW) pump fails. Luminant stated that the AFW Low Pressure FLEX pumps were conservatively sized to provide adequate flow to accommodate decay heat removal at approximately one hour after extended loss of alternating current (ac) power following (ELAP) initiation. Luminant's analysis assumes the SGs were depressurized to 300 psig and factors into account the line losses between the AFW FLEX pump and the SGs, as referenced in the Final Design Authorization (FDA-2013-000008-01). The condensate storage tank (CST) and reactor makeup water storage tank (RMWST) will supply the SGs with water for greater than 24 hours. Following depletion of these tanks, any surviving non-robust, non-borated water tank on site would be used as a water source for CST makeup. If none of the non-robust, non-borated water tanks survives the external event, a Multi-Purpose High Flow FLEX pump will be deployed near the Service Water Intake Structure (SWIS), and will feed a deployed ring header that will be aligned to one or both Unit's CSTs. At 24 hours after the BDBEE, low decay heat rates require approximately 140 gallons per minute (gpm) of SG feed from each Unit's CST. The Multi-Purpose High Flow FLEX pump and eductor are capable of providing at least 500 gpm flow to the ring header, exceeding the required flow of 280 gpm for dual unit CST makeup at 24 hours. Luminant indicated that the deployment of the required section of the ring header and Multi-Purpose High Flow pump to the SWIS can be achieved within 24 hours.

Regarding the RCS makeup, Luminant plans to deploy the 10 gpm high pressure RCS injection FLEX pump within 14 hours. Luminant stated that this deployment time is sufficient to achieve an RCS boron concentration to ensure that k_{eff} is less than 0.99 (assuming no xenon) at 24 hours. The pump suction will be initially aligned from the boric acid tank (BAT), then re-aligned to the Refueling Water Storage Tank (RWST) following BAT depletion, which is calculated to occur at 52 hours after ELAP initiation. Because Comanche Peak will use the SHIELD low-leakage reactor coolant pump (RCP) seals, RCS leakage will be limited to 5 gpm, and therefore re-alignment of pump suction from the BAT to the RWST is not a time sensitive task. The high-pressure RCS injection FLEX pump capacity of 10 gpm is sufficient provide RCS makeup, given that expected maximum RCS leakage rate is 5 gpm.

Regarding the SFP makeup, the Safe Shutdown impoundment or any surviving water tank can be used as a water source. Luminant calculated that by using the local Fire Protection hose stations and a diesel driven fire pump to draw suction from a Fire Protection Storage Tank, a SFP makeup rate greater than 250 gpm would be available for SFP makeup. The alternate method would be using the SFP area overhead spray header, in which a SFP makeup rate of approximately 250 gpm to each pool is achievable with a Multi-Purpose High Flow FLEX pump. The design-basis SFP heat load results in the onset of SFP boiling in approximately 4 hours (during a refueling outage), with SFP level approaching 15 ft. above the SFP racks in approximately 16 hours (as discussed in the OIP). During non-refueling outage periods of operation with both Units in Modes 1-4, the SFP heat load will be considerably less with bulk boiling occurring at greater than 7 hours and boil off to a level of 15 feet above the top of the fuel racks at greater than 29 hours. Luminant can deploy the FLEX pump for SFP makeup within these time constraints.

The NRC staff reviewed the above reference documents in addition to FSI-8, "Alternate RCS Makeup," and FSI-11, "Alternate SFP Makeup," to confirm the steps and conditions that would require operators to deploy and align the respective FLEX pumps for the associated makeup sources. The NRC staff also reviewed document LTR-SEE-II-12-70-CP, "FLEX Alternate Cooling Source Evaluation Input Methodology." to identify the vendor's assessment of the flow rates needed and times needed for Comanche Peak to obtain adequate cooling. The NRC staff did not find any discrepancies with Luminant's analysis. AQ 23 is closed.

- c. The NRC staff toured inside and outside the plant and observed aspects of human factors in making connections and hauling equipment. The NRC staff discussed other human factors questions during interviews. These ranged from operator actions during a potentially hazardous event to the effects of the mitigating strategies planning on the current plant operations. Luminant was requested to provide information concerning the qualifications of workers, who will arrive at the site after a BDBEE, to operate debris removal equipment. Safety Evaluation (SE) No. 8 will remain an open item.

3.2 Electrical Technical Discussions and Walk-Downs

The NRC staff reviewed electrical single-line diagram and summaries of calculations for sizing the FLEX DGs and station batteries. The NRC staff also reviewed a summary calculation that addressed the effects of temperature on the electrical equipment credited in the mitigating strategies integrated plan and hydrogen accumulation in the battery rooms as a result of losing heating, ventilation, and air conditioning (HVAC) during an ELAP as a result of a BDBEE. The NRC staff reviewed the isolation and interactions of electrical power sources regarding the protection of Class 1 E equipment from faults in portable FLEX equipment and the design elements that ensure multiple electrical sources do not attempt to simultaneously power electrical buses. The NRC staff also performed a walk down of load shed procedures as well as the areas where the portable and pre-staged electrical equipment will be located, the connection points to the electrical distribution systems, and the cable runs from the portable 480 V and 4160 V FLEX generators. The NRC electrical engineering staff also reviewed the licensee's testing and maintenance program for FLEX equipment.

3.3 Balance of Plant Technical Discussions and Walk-Downs

- a. The NRC staff wanted to confirm Luminant's strategy that a symmetric cooldown, using all four reactor coolant system loops, can be coordinated under ELAP conditions. The licensee indicated that hand-held radios and sound power phone system will be used for symmetric cooldown coordination during an ELAP. The phone sets will be located in the control rooms and will be used for unit specific communications and all plant communications. Luminant indicated that ECA-0.0A/B, "Loss of All AC Power," will direct operators to initiate cooldown of the RCS loops to approximately 425°F within 4 hours. Procedure ECA-0.0A/B also directs the performance of a symmetric cooldown by depressurizing intact steam generators. Headsets and outlets are located in close proximity to the TDAFWP area, the SG atmospheric relief valve (ARV) area and the Control Room for use during the plant cooldown. Each unit operator will be able to communicate with personnel supplying flow to the SGs from the TDAFWP and with personnel controlling the ARVs. As for the environment in the TDAFWP rooms and SG ARV areas, Luminant evaluated these areas for habitability and accessibility during the cooldown. Luminant determined that these areas will remain accessible during the entire period when equipment will be used for cooldown. The NRC staff did not find any discrepancies with Luminant's analysis; therefore, ISE CI 3.2.1.1.D is closed.
- b. The NRC staff audited Luminant's refueling strategy. Luminant stated that the primary source of fuel oil will be the four Emergency Diesel Generator underground Diesel Fuel Oil Storage Tanks on site. Each tank has a nominal storage capacity of 102,000 gallons, but the Technical Specifications credit each tank for 86,000 gallons. The underground tanks are seismically and tornado missile-protected. The fuel can be obtained using a fuel transfer pump and pumped to suitable fuel containers for transport to FLEX equipment. Luminant also indicated that the four underground fuel

oil tanks have adequate capacity to provide the on-site FLEX Equipment with diesel fuel for greater than 30 days. Local offsite resources will be available to replenish onsite fuel oil supplies.

Two trailer-mounted fuel oil tanks, which will be stored in the FLEX storage building, will each have the capacity of approximately 500 gallons and will include a diesel powered pump for filling the tank from a source and an electric pump for transferring tank contents. The fuel tanks will be deployed from the FLEX storage building to refill the FLEX equipment deployed throughout the site after an ELAP. FSI-5, "Initial Assessment and FLEX Equipment Staging," provides a table of all of the FLEX equipment to be used throughout the site that requires fuel oil as well of each of the consumption rates. The operators are expected to use the table for tracking purposes when each piece of equipment is refueled throughout the ELAP event.

Fuel oil will be monitored through the site's existing preventive maintenance (PM) program, STA-677, "Preventative Maintenance." Luminant plans to evaluate the amount of fuel oil needed for readiness after an ELAP, as part of the development of FLEX equipment preventive maintenance program. Luminant stated that the chemistry staff performs additional testing of the fuel oil samples from the fuel oil tanks and FLEX equipment to ensure fuel oil quality. These tests are to be performed annually. The NRC staff reviewed the above documents regarding the overall fuel strategy and monitoring process for FLEX equipment and confirmed that the licensee has accounted for the storage and deployment of fuel oil as needed for the overall ELAP strategy. The NRC staff also walked down the fuel oil storage locations to confirm that the fuel oil will be in protected areas and will have accessibility for providing fuel to the trailer-mounted fuel tanks. The NRC staff did not find any discrepancies with Luminant's analysis; therefore, ISE CI 3.2.4.9.A is closed

- c. The NRC staff audited Luminant's plans to protect FLEX equipment from high temperatures. Luminant indicated that the FLEX equipment will be located in the FLEX storage building that is designed to meet the guidance of NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," for high temperatures. The FLEX building will have forced ventilation to circulate ambient air in order to address expected extreme summertime design temperatures for the plant site. Luminant also indicated that a separate room inside the FLEX storage building will contain items such as food, water and communication devices, which will be environmentally controlled. The NRC staff walked down the FLEX building to confirm the forced ventilation portions on both sides of the building and the separate room being constructed for the items, as described above. The NRC staff did not find any discrepancies with Luminant's analysis; therefore, AQ-8 is closed.
- d. The NRC staff audited Luminant's assessment that the Reactor Makeup Water Storage Tank (RWMST) and RWST were qualified to withstand effects from a tornado missile. Luminant indicated in its response that the RWMST and RWST are both enclosed within a Seismic Category I structural concrete enclosure designed to withstand the effects of a design-basis Safe Shutdown Earthquake, tornado winds

and tornado generated missiles. The NRC staff walked down both tanks for each unit to confirm that they are protected from both seismic and tornado missile hazards and they will be available for use after ELAP. The NRC staff did not have any additional questions; therefore, AQ-46 is closed.

- e. The NRC staff audited Luminant's plans to protect FLEX equipment from ice. Luminant's plans to have a FLEX storage building that will protect FLEX equipment from design basis snowfall or ice storm. The licensee referenced Calculation CS-CA-0000-5516 Rev. 0, which provided details of the FLEX storage building load combinations and analysis for building design as compared to the design-basis snowfall. The licensee concluded that the FLEX building would be able to withstand any accumulated loads related to snow or ice on the roof, which in turn not impact the FLEX equipment inside the building. The NRC staff walked down the FLEX storage building to confirm the construction of the building to protect from external hazards such as snow and ice. The NRC staff did not have any additional questions; therefore, AQ-48 is closed.

3.4 Containment Systems

The NRC staff reviewed Luminant's evaluation that containment pressure and temperature will remain at acceptable levels without the actuation of the containment spray system. The NRC staff reviewed Luminant's Calculation CN-ISENG-14-3, "Containment Pressures and Temperatures for Comanche Peak Units 1 and 2 During an ELAP Calculated with Modular Accident Analysis Program (MAAP) 4.07", Rev. 0. Cases 2 and 3 of this calculation showed that, with either the legacy or SHIELD Reactor Coolant Pump Seals installed, the containment pressure and temperature remain far below their respective design limits for at least the first 72 hours following the onset of an ELAP while the Unit is operating in Mode 1. The NRC staff has reviewed Luminant's analysis; and did not find any discrepancies. Therefore, ISE CI 3.1.1.2.B and CI 3.2.3.A are closed.

3.5 Other Technical Discussion Areas and Walk-Downs

- a. The NRC staff toured the site to review Luminant's construction of its FLEX Building. Luminant informed the staff that this FLEX building will be completed by July 2015 and will be a N+1 building. The NRC staff reviewed CPNPP Station Instruction Manual "FLEX Control and Accountability," Revision 0, Procedure No STI-203.04 DRAFT to determine Luminant's strategy for storing FLEX equipment. The NRC staff has no additional questions and ISE CI 3.1.1.1.A is closed.
- b. The NRC staff toured the route to be traveled by FLEX equipment in order to determine if liquefaction could impede movement following a severe seismic event. The NRC staff reviewed LGC13555 CPNPP FLEX Equipment Storage Building Geotechnical Investigation Report, by Freese and Nicholls, Revision 10, dated January 22, 2014. This report states the probability of liquefaction is less than 5 percent. Luminant informed the NRC staff that the results from the geotechnical investigation core borings under the FLEX building apply to the haul paths.

Therefore, Luminant concluded that liquefaction of the equipment haul paths from the FLEX building to the staging areas around the plant is not a credible concern at CPNPP. The NRC staff did not find any discrepancies with Luminant's analysis; therefore, ISE CI 3.1.1.2.A is closed.

- c. The NRC staff reviewed the Response Center local staging area, evaluation of access routes, and method of transportation to the site. The SAFER Response Plan for Comanche Peak Nuclear Power Plant Revision 0, dated February 23, 2015 provided primary and alternate routes which addressed the potential impact of applicable hazards to the site. The NRC staff has no additional questions and ISE CI 3.1.1.4.A is closed.
- d. The NRC staff reviewed Luminant's FLEX strategy for using portable lights during a BDBEE. The NRC staff observed that Comanche Peak Nuclear Power Plants, Units 1 and 2 Design-Basis Document Station Blackout DBD-ME-026, Revision 11, dated December 22, 2011. Section 5.4.c (8) of this procedure provides for access into and egress out of areas provided by direct current (dc) powered lighting, and provides a strategy for deploying for portable lights and batteries may be needed. The NRC staff observed that Procedure OWI-203, "Operation Department Management Periodic Review", Revision 13, September 6, 2012 administratively controls use of batteries for portable lights. The NRC staff has no additional questions and ISE CI 3.2.4.4.A is closed.
- e. The NRC staff reviewed Luminant's communications assessment program in order to confirm that Luminant has completed implementing upgrades to its communications systems. By letter dated June 1, 2015, Luminant informed the NRC staff that a number of upgrades still needed to be completed. As such, ISE CI 3.2.4.4.B will remain open.

4.0 Exit Meeting (April 30, 2015)

The NRC staff conducted an exit meeting with licensee staff following the closure of onsite audit activities. The NRC staff highlighted items 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 26, 2015, 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.

In support of the continuing audit process, as Luminant proceeds towards Orders compliance for this site, Attachment 3 provides the status of all open audit review items that the NRC staff is evaluating in anticipation of issuance of a combined safety evaluation for both the Mitigation Strategies and Spent Fuel Pool Level Instrumentation orders. The five sources for the audit items referenced below are as follows:

- a. ISE OIs and CIs
- b. AQs
- c. Licensee-identified OIP OIs
- d. SFPI RAIs
- e. Additional SE needed information

While this report notes the completion of the onsite portion of the audit as discussed in the audit plan dated March 26, 2015, 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.

Additionally, while Attachment 3 provides a list of currently open items, the status and progress of the NRC staff's review may change based on licensee plan changes, resolution of generic issues, and other NRC staff concerns not previously documented. Changes in the NRC staff review will be communicated in the ongoing audit process.

Attachments:

1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite Audit Documents Reviewed
3. MS/SFPI Audit Items currently under NRC staff review

Onsite Audit Participants

NRC Staff:

Matthew McConnell	NRR/JLD
Joshua Miller	NRR/JLD
Garry Armstrong	NRR/JLD

Austin Roberts	NRR/JLD
Stephen Monarque	NRR/JLD
Laura Okruhlik	NRR/JLD

Luminant and Support Staff:

D. M. Ambrose	Technical Support Manager
J. Dreyfuss	Director Organizational Effectiveness
T. A. Hope	Regulatory Affairs Manager
Bobby Clark	Unit Supervisor
Ronnie Flowers	NEO
Jim Brau	
Terry Jank	
Mike Osterman	Technical Support Flooding Lead
Ken Halpain	
Norman Terrel	
Justin Bragg	
Bruce Henley	
Jeff Hull	
Dick Kissinger	
Jonathan Bain	Electrical Program Reliability Manager
Ijaz Ahmad	
Carl Corbin	
Brian Guthrie	Westinghouse
Gavin Hawk	CBI Mechanical Modification Engineering
Kevin Tully	
Dave Lowrie	
Rick Hibbeler	
Bob Reible	
Ned Harris	Nuclear Security Supervisor
Craig Montgomery	
Jim Scirocro	
Garry Struble	Operations Training
Steve Ard	Operations Training
Tim Hope	Manager Regulatory Affairs
Richard Swanson	Consulting Nuclear Auditor
David Keating	Operations Support
Alan Hall	Work Control Manager
Mike Stakes	Director Maintenance
Doug Davis	Organizational Effectiveness

Comanche Peak Nuclear Power Plant, Units 1 and 2

Documents Reviewed

- CPNPP Station Instruction Manual "FLEX Control and Accountability" Revision 0 Procedure No STI-203.04, DRAFT
- LGC13555 "CPNPP FLEX Equipment Storage Building Geotechnical Investigation Report, by Freese and Nicholls," Revision 10, dated January 22, 2014
- SAFER Response Plan for Comanche Peak Nuclear Power Plant, Revision 0, dated February 23, 2015
- Comanche Peak Nuclear Power Plants, Units 1 and 2 "Design Basis Document Station Blackout DBD-ME-026," Revision 11, dated December 22, 2011
- Calculation CN-ISENG-14-3, "Containment Pressures and Temperatures for Comanche Peak Units 1 and 2 During an ELAP Calculated with MAAP 4.07", Revision 0
- ECA-0.0A Unit 1, "Loss of All AC Power," DRAFT, dated April 6, 2015
- ECA-0.0B Unit 2, "Loss of All AC Power," DRAFT, dated April 6, 2015
- STA-677, "Preventative Maintenance Manual," Revision 11, dated March 9, 2015
- Calculation CS-CA-0000-5516, "FLEX Equipment Storage Building: Loadings, Load Combinations, Frequency Analysis and Analysis for Buildings; Design of Columns and Roof Slab," Revision 0, dated January 30, 2014
- Final Design Authorization (FDA)-2013-000008-01-02, "Unit 1 AFW System FLEX primary and Secondary Connections," Revision 2, dated October 22, 2014
- Flex Support Guidelines (FSI)-6.0, "Alternate CST Makeup," DRAFT, dated February 26, 2015
- Flex Support Guidelines (FSI)-8.0A, "Alternate RCS Makeup," DRAFT, dated April 15, 2015
- Flex Support Guidelines (FSI)-8.0B, "Alternate RCS Makeup," DRAFT, dated April 15, 2015
- Flex Support Guidelines (FSI)-11.0, "Alternate SFP Makeup," DRAFT, dated February 26, 2015
- Westinghouse Document LTR-SEE-II-12-70-CP, "FLEX Alternate Cooling Source Evaluation Input Methodology," dated December 6, 2013
- Final Design Authorization (FDA)-2013-000008-28 Design Details Attachment 2, "Panelboard Upgrade Cable Block Diagram, DCP-14-000011," Revision 0
- Flex Support Guidelines (FSI)-4.0A, "DC Bus Load Management and Phase 2 480 VAC Generator Alignment," Revision 0, DRAFT, dated March 25, 2015
- Flex Support Guidelines (FSI)-4.0B, "DC Bus Load Management and Phase 2 480 VAC Generator Alignment," Revision 0, DRAFT, dated March 25, 2015
- Mark-up of SK-0004-13-000008-28-00, "Common Normal Load 480/208/120V/30 One Line Diagram," Revision 0, DRAFT, dated February 26, 2015
- Flex Support Guidelines (FSI) 5.0, "Initial Assessment and FLEX Equipment Staging," Revision 0, DRAFT, dated February 26, 2015

- Westinghouse Proprietary Class 2 Calculation CN-LIS-12-74-REDACTED, "Comanche Peak Unit 1 and Unit 2 (TBX/TCX) Reactor Coolant System (RCS) Inventory, Shutdown Margin, and Mode 5/6 Boric Acid Precipitation Control (BAPC) Analyses to Support the Diverse and Flexible Coping Strategy (FLEX)," Revision 0, dated October 9, 2013

**Comanche Peak Nuclear Power Plant, Units 1 and 2
Mitigation Strategies/Spent Fuel Pool Instrumentation 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 3.2.1.2.A	Regarding the RCP seals, the only O-ring of interest with the safe shutdown low-leakage (SHIELD) installed is the RCP seal sleeve to shaft O-ring. Qualification of the RCP seal sleeve to shaft O-ring will be tracked as part of the SHIELD redesign to confirm the delayed cooldown, as documented in the Integrated Plan, is acceptable. Luminant will align with testing results to be documented in the forthcoming SHIELD white paper.	Luminant to provide information on O-ring material.
ISE CI 3.2.4.4.B	The NRC staff has reviewed the licensee's communications assessment in response to the March 12, 2012 10 CFR 50.54(f) request for information letter, and as documented in the NRC staff's analysis, and the NRC staff has determined the communications assessment is reasonable. Confirm that upgrades to the site's communications systems have been completed.	Complete the regulatory commitments as described in the June 1, 2015 letter.
AQ 27	Please provide a detailed summary of the evaluation that demonstrates the adequacy of the ventilation provided in the battery room to protect the batteries from the effects of extreme high and low temperatures in each Phase of an ELAP event.	The NRC staff has requested that Luminant provide a justification for the EQ of battery rooms for an indefinite duration of ELAP.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 30	<p>The licensee's plan for personnel habitability/accessibility in an elevated temperature environment did not provide reasonable assurance that the plan conforms to the guidance of NEI 12-06, Section 3.2.2, Paragraph (11), because there is insufficient information to determine that the habitability limits will be maintained and/or operator protective measures will be employed in all Phases of an ELAP to ensure operators will be capable of FLEX strategy execution under adverse temperature conditions. Examples of areas of concern are the control room, TDAFW pump room, ARV manual operator area, SFP area, and charging pump room. Please provide a detailed summary of the analyses and/or technical evaluations on personnel habitability/accessibility in all elevated temperature environments as it relates to execution of FLEX strategies.</p>	<p>Licensee to evaluate building room temperature potentially impacting implementation of Phase 2 electrical strategy.</p>

Audit Item Reference	Item Description	Licensee Input Needed
SFPI RAI No. 2	<p>Based on the response to the previous RAI, the NRC staff found that the SFP level instrument channel arrangement does not satisfy the separation requirement of the NRC Order EA-12-051. According to Attachment 2 of the letter, within the Fuel Building, the X-01 primary and backup signal cables are routed side by side from the southwest corner of the south pool to the wall penetration to the Auxiliary Building (AB). Similarly, the X-02 primary and backup signal cables are routed side by side from the northwest corner of the north pool to the wall penetration to the AB. In addition, the pull boxes for each instrument channel are mounted side by side. It is not clear whether the cable routing portions and the pull boxes described above have missile barriers installed. The NRC staff requests additional information demonstrating that the SFP level instrument channels within the Fuel Building are either physically separated or missile protected to minimize the probability that damage due to internal missiles.</p>	<p>By letter dated June 11, 2015, Luminant provided a response to the NRC staff's follow-up RAI. The NRC staff are reviewing the response.</p>

Audit Item Reference	Item Description	Licensee Input Needed
SFPI RAI No. 3	<p>Based on the response to the previous RAI, the NRC staff found that the CPNPP Seismic Category II mounting for SFP level instrument does not meet the Order EA-12-051 mounting requirement. Even though the SFP level instrumentation system is non-safety related, the mounting shall be designed considering the maximum seismic ground motion to the design-basis of the SFPI structures to meet the requirements of the order. The NRC staff requests additional information demonstrating that the SFP level instrument mountings meet the mounting requirements of Order EA-12-051. For each mounting and mounting support, information should be provided including CPNPP documentation with site specific assumptions, such as the site's design-basis response spectrum for each elevation, pool sizes, etc. accounted for. Please make available on e-portal for NRC staff review the site-specific seismic calculations for the following: Probes and mounting brackets including sloshing calculation; Pull Boxes; Transmitter mountings; Electronics enclosures; and Conduit supports.</p>	<p>By letter dated June 11, 2015, Luminant provided a response to the NRC staff's follow-up RAI. The NRC staff are reviewing the response.</p>

Audit Item Reference	Item Description	Licensee Input Needed
SFPI RAI No. 4	<p>As to the concern the NRC staff raised in SFPI RAI No. 3, CPNPP Seismic Category II mounting for SFP level instrument does not meet the mounting requirements of Order EA-12-051. Even though the SFP level instrumentation system is non-safety related, the mounting shall be designed considering the maximum seismic ground motion to the design-basis of the SFP structures to meet the order requirement. The NRC staff requests additional information demonstrating that the SFP level instrument mountings meet the mounting requirements of the order. For each mounting and mounting support, information should be provided including CPNPP documentation with site-specific conditions/assumptions such as the site's design-basis response spectrum for each elevation, pool sizes, etc. accounted for. Please make available on e-portal for NRC staff review the site-specific seismic calculations for the following: Probes and mounting brackets including sloshing calculation; Pull Boxes; Transmitter mountings Electronics enclosures; and Conduit supports.</p>	<p>By letter dated June 11, 2015, Luminant provided a response to the NRC staff's follow-up RAI. The NRC staff are reviewing the response.</p>

Audit Item Reference	Item Description	Licensee Input Needed
SFPI RAI No. 7	By letter dated December 16, 2014, Luminant submitted a response to RAI No 7. The NRC staff evaluated Luminant's response and has determined that since shock and vibration testing was not performed by Westinghouse, Luminant needed to demonstrate that the transportation and installation of the SFP level instrument did not impact the system designed configuration and performance. Luminant is requested to make available on e-portal for NRC staff review the Site Acceptance Test report, including the system's post installation as-found accuracy and tolerance.	By letter dated June 11, 2015, Luminant provided a response to the NRC staff's follow-up RAI. The NRC staff are reviewing the response.

Audit Item Reference	Item Description	Licensee Input Needed
SFPI RAI No. 8	<p>The NRC staff found that the CPNPP Seismic Category II mounting for SFP level instrument does not meet the mounting requirements of Order EA-12-051. Even though the SFP level instrumentation system is non-safety related, the mounting shall be designed considering the maximum seismic ground motion to the design-basis of the SFP structures to meet the order requirement. The NRC staff requests additional information demonstrating that the SFP level instrument mountings meet the order mounting requirement. For each mounting and mounting support, information should be provided including CPNPP documentation with site-specific conditions, such as the site's design-basis response spectrum for each elevation, pool sizes, etc. accounted for. Please make available on e-portal for NRC staff review the site-specific seismic calculations for the following: Probes and mounting brackets including sloshing calculation; Pull Boxes; Transmitter mountings Electronics enclosures; and Conduit supports.</p>	<p>By letter dated June 11, 2015, Luminant provided a response to the NRC staff's follow-up RAI. The NRC staff are reviewing the response.</p>
SFPI RAI No. 9	<p>The NRC staff needs further information on how the SFPI level instruments are powered from Train A lighting panel EAB1 and Train B lighting panel EAB2. Please make available on e-portal for the NRC staff the review procedure(s) containing the instructions for powering SFP level instruments before the batteries are depleted.</p>	<p>By letter dated June 11, 2015, Luminant provided a response to the NRC staff's follow-up RAI. The NRC staff are reviewing the response.</p>

Audit Item Reference	Item Description	Licensee Input Needed
SFPI RAI No. 12	The SFPI Level Instrumentation probe mounting brackets for each side may have different profiles and therefore requires a specific calibration procedure for in-situ testing. Please make available on e-portal for NRC staff review the CPNPP calibration procedure, which includes, but is not limited to, the following: In-situ testing; Acceptance criteria for accuracy and tolerance; Functional check; and Channel check.	By letter dated June 11, 2015, Luminant provided a response to the NRC staff's follow-up RAI. The NRC staff are reviewing the response.
SE-2	Provide a discussion on the EQ of equipment located within containment that is relied upon during an ELAP. Specifically, show that the containment pressure/temperature profile bounds the EQ profile for necessary equipment for the duration of the ELAP event.	Luminant to provide additional information that shows the design of equipment envelopes ELAP conditions.
SE-8	Verify that appropriate human factors are applied for the implementation of the FLEX strategies.	Luminant to provide information on qualifications of workers to operate the debris removal equipment.

Audit Item Reference	Item Description	Licensee Input Needed
SE-10	Please provide an analysis with a table listing all possible pool interconnections and separation conditions with gate combinations, and the available number(s) of level indication for each pool under those conditions. The analysis should also consist the following: Assuming one instrument is out-of-service, describe in detail the compensatory measures to assure that reliable level monitoring still exists for each pool under those gate operating conditions; Assuming more than one instrument out-of-service, describe in detail the compensatory measures to assure that reliable level monitoring still exists for each pool under those gate operating conditions.	By letter dated June 11, 2015, Luminant provided a response to the NRC staff's follow-up RAI. The NRC staff are reviewing the response.

R. Flores

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 Nos.: 50-445 and 50-446

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