



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

February 22, 2022

Mr. David P. Rhoades
Senior Vice President
Constellation Energy Generation, LLC
President and Chief Nuclear Officer
Constellation Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNIT NOS. 2 AND 3-SITE WALKDOWN FOR THE REVIEW OF PLANT INFORMATION TO PERFORM A RISK ANALYSIS IN ACCORDANCE WITH LIC-504, "INTEGRATED RISK-INFORMED DECISIONMAKING FOR EMERGENT ISSUES," REGARDING HIGH ENERGY ARCING FAULTS (EPID NO. L-2021-NFO-0007)

Dear Mr. Rhoades:

On October 21, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21316A225), the U.S. Nuclear Regulatory Commission (NRC) held a public meeting to provide a status and update on activities related to the potential safety-significance of aluminum high energy arcing faults (AI HEAF). Additionally, the NRC staff explained its plans to use the Office of Nuclear Reactor Regulation (NRR) Office Instruction (LIC) -504, "Integrated Risk-Informed Decisionmaking Process for Emergent Issues" (ADAMS Accession No. ML19253D401), to apply best available information and NRC risk assessment tools to determine whether any regulatory actions should be considered regarding the potential safety-significance of AI HEAF to enhance public safety. During the meeting, the NRC staff noted that the LIC-504 evaluation will include site walkdowns to gather the best available plant information.

The NRC has commenced an evaluation under the process outlined in LIC-504 regarding HEAF events. With coordination with Industry, the NRC staff selected Peach Bottom, Units 2 and 3 to conduct a walkdown the week of March 7, 2022, due to the availability of the staff's fire Standardized Plant Analysis Risk (SPAR) models of the site. Constellation Energy Generation, LLC (the licensee) is voluntarily supporting the staff's efforts and request to perform a walkdown at Peach Bottom. The LIC-504 team consists of NRC staff from NRR, Division of Risk Assessment, the Office of Nuclear Regulatory Research, and an NRC contractor from the Sandia National Laboratory. NRC regional staff may also be present as observers. The site walkdown plan is provided in an enclosure to this letter.

The LIC-504 team has identified information requested prior to the site walkdown. That information is provided in Section 3.0 of the site walkdown plan. In accordance with the schedule in the plan, we will be contacting your staff to set up a teleconference to discuss the information request and site walkdown logistics.

D. Rhoades

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If you have any questions, please contact Reinaldo Rodriguez at 404-997-4498 or me at Jason.Paige@NRC.gov.

Sincerely,

/RA/

Jason C. Paige, Senior Project Manager
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278

Enclosure:
Site Walkdown Plan

cc: Listserv



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PEACH BOTTOM NUCLEAR PLANT, UNIT NOS. 2 AND 3

SITE WALKDOWN FOR THE REVIEW OF PLANT INFORMATION TO PERFORM A RISK

ANALYSIS IN ACCORDANCE WITH LIC-504, "INTEGRATED RISK-INFORMED

DECISIONMAKING FOR EMERGENT ISSUES," REGARDING HIGH ENERGY ARCING

FAULTS (EPID NO. L-2021-NFO-0007)

1.0 BACKGROUND

When safety issues emerge as a result of U.S. or international nuclear operating experience or U.S. Nuclear Regulatory Commission's (NRC) regional inspections, the NRC may identify the potential for plant-specific and/or generic implications for the industry. To assist with emergent issues for which there are no other existing processes, the NRC staff will implement Office of Nuclear Reactor Regulation (NRR) Office Instruction (LIC)-504, "Integrated Risk-Informed Decisionmaking for Emergent Issues." The objective of the LIC-504 review process is to present risk-informed options to disposition emergent safety issues and document the bases of those decisions. In developing risk-informed options, the NRC staff considers the potential impact of the emerging issue on compliance with regulations, defense-in-depth, safety margins, risk, and other matters important to Agency operations.

The LIC-504 analysis process is a two-step process that could result in four different scenarios:

1. Determining whether to take prompt regulatory action, such as issuing an order to shut down the unit(s) or take compensatory measures at the site where the concern is identified.
2. Determining whether it is necessary to take prompt regulatory action for other operating nuclear power plants (i.e., if a generic concern exists), such as issuing shutdown orders or ordering compensatory measures.
3. Developing risk-informed options to resolve the issue at the unit or site where the concern is identified.
4. Developing risk-informed options to resolve the issue at potentially other affected units, as appropriate.

As documented in an NRC memo dated October 5, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21272A262), insights from an

international collaborative research program identified that aluminum enhanced high energy arcing faults (AL HEAFs) may release more energy than expected and assumed in the current fire Probabilistic Risk Assessment (PRA) methodology. Therefore, the NRC entered into the LIC-504 process to resolve the AL HEAF issue. The October 5, 2021, memo noted that the NRC has completed the first step of the LIC-504 evaluation and concluded that U.S. plants remain safe without the Agency taking any immediate regulatory action. This conclusion was based on staff insights from a qualitative risk evaluation that considered safety margins and defense-in-depth features associated with fire protection programs and applicable operating experience at U.S. nuclear power plants. The second and final step of the LIC-504 evaluation is ongoing and will determine whether any long-term regulatory actions, such as issuance of a generic communication, should be considered based on the risk evaluation of HEAF events.

As part of the LIC-504 evaluation, the NRC staff is performing a site walkdown at Peach Bottom Atomic Power Station (Peach Bottom), Units 2 and 3 the week of March 7, 2022. With coordination with Industry, the NRC staff selected Peach Bottom, Units 2 and 3 to conduct the walkdown due to the availability of the staff's fire Standardized Plant Analysis Risk (SPAR) models of the site. Constellation Energy Generation, LLC (the licensee) is voluntarily supporting the staff's efforts and request to perform a walkdown at Peach Bottom.

2.0 SITE WALKDOWN (INFORMATION GATHERING) SCOPE OR METHOD

The NRC staff will be performing a risk analysis as part of its LIC-504 activity. The risk assessment from HEAF events at Peach Bottom, Units 2 and 3 will help NRC staff to determine the realistic risk significance, using best-available information and subtracting from the baseline HEAF as established by NUREG/CR-6850 and its Supplement 1 or from the results of the plant's analysis. In addition, the staff will perform sensitivity studies in order to expand the conclusions it reaches to the broader industry. Risk will be represented by delta core damage frequency (Δ CDF) and delta large early release frequency (Δ LERF) and will represent the difference between best-available information on how to represent HEAF events and currently used methodologies.

The output of the analysis will be identified as the risk significance of the reference plant with the understanding that approximations may need to be made to address various uncertainties.

The staff intends to use probabilistic analysis models such as the NRC's SPAR model for Peach Bottom and the Systems Analysis Programs for Hands-on Integrated Reliability Evaluations (SAPHIRE) tool to perform the analysis. The NRC staff will engage with Peach Bottom staff to ensure the SPAR fire PRA model reflects the as-built as-operated plant to the extent required to provide a meaningful analysis.

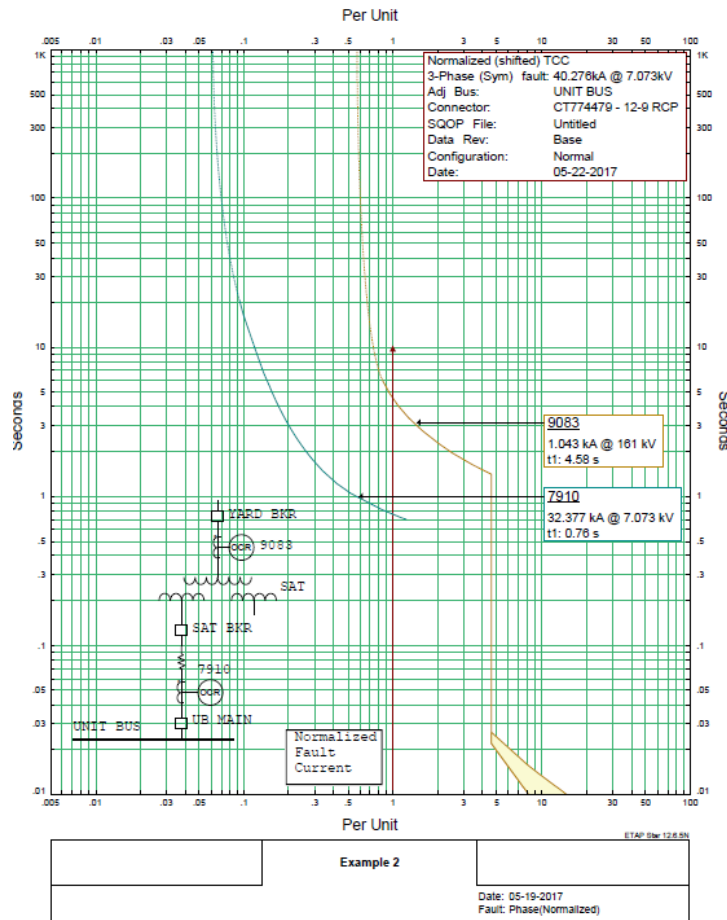
As indicated, the NRC staff will perform sensitivity studies to expand its analysis results and draw risk insights pertaining to the broader industry. To perform these sensitivity analyses, the staff may request information that is not currently evaluated in your PRA. For example, configurations of cabling in the overhead may be assumed for the risk analysis which deviates from your plant. The staff will maintain an understanding that these sensitivity studies do not represent your plant. Also, the staff will remain cognizant of the fact that these sensitivity analysis results are representative of what potentially may be found within the industry.

3.0 INFORMATION AND OTHER MATERIAL NECESSARY FOR THE WALKDOWN

The NRC staff requests access to licensee personnel knowledgeable with the technical aspects of the site's fire PRA modeling. Copies of documentation addressing the questions below is requested to be available to the NRC staff electronically prior to the site walkdown. The staff requests access to this information prior to and after it leaves the site in order to support the analysis that follows.

- 1) A list of all components (ignition sources) that are subject to a HEAF. Which physical analysis units (PAU) are these components in? Indicate those ignition sources subject to a HEAF for scenarios that were not fully developed (screened out), if any. Please provide supporting PRA documentation for these HEAF scenarios.
- 2) For the PAUs identified in question 1, please provide the identification of the cables and the components, and the functions that the cables perform. Please provide the identification of the cable trays and the drawings for PAUs containing cable trays (including drawings containing cable trays with distances from cabinets).
- 3) For the PAUs identified under question 1, please provide the types of cables in the cable trays (i.e., thermoset, thermoplastic, or mixed).
- 4) For those PAUs which contain non-segregated bus ducts, provide the transition points and ventilation openings for those bus ducts. Please include the material used for the bus ducts (steel or aluminum). Also include the architectural drawings for those PAUs to supplement the cable tray drawings.
- 5) For those PAUs identified under question 1, please provide supporting information for new counting rules for HEAF ignition sources which align with the ignition frequencies for each HEAF ignition source. Ignition source information needed are a) number of supply cabinets for low voltage switchgear (SWGR), b) number of banks for medium voltage SWGR, and c) number of transition points and ventilation openings per bus duct.
- 6) For those PAUs identified under question 1, please identify those protected or other cables excluded from fire damage. Also, please identify those fire rated cables which do not assume damage. In addition, please identify electrical raceway fire barrier systems (ERFBS) and HEAF shields.
- 7) Please provide the set of one-line electrical diagrams for the electrical distribution system.
- 8) Please provide the physical location of the bus ducts upstream of the station auxiliary transformer (SAT) and unit auxiliary transformer (UAT).
- 9) Please identify the locations in your plant that assume a full room burn in the HEAF analysis. Are both cabinets and bus ducts modeled as a HEAF source in the model? What is the CDF and LERF due to HEAF in the fire PRA model?
- 10) Please provide the CDF and LERF from your current model for cabinets subject to a HEAF, and the CDF and LERF for bus ducts due to HEAF. The CDF and LERF should be listed for each ignition source. Indicate if NUREG/CR-6850 and FAQ 07-0035 was used to determine the risk metrics and if any alternatives to the methodology were used.

11) The information requested in this item is the same information requested by the Electric Power Research Institute (EPRI) survey of AI HEAF in 2021 to exercise the fire PRA HEAF methodology. Please provide the transformer overcurrent time setting (relay speed of operation) at the point of available normalized fault current for your offsite power transformers. It should be noted that the area of interest is the next breaker upstream of the downstream switchgear bus supply breaker. This is typically the transformer switchyard breakers, but in some cases, a dedicated SAT breaker may exist (see example below). An example is provided below using a time-current-characteristic (TCC) curve. Available fault current has been normalized to 1.0 per unit (40.276kA @ on the SAT secondary voltage of 7kV). The relay of interest is 9083 that trips the SAT breaker (in some cases this relay will trip the switchyard breakers if no SAT breaker exists). The point at which the SAT breaker will trip open is shown as 4.58 seconds on the TCC curve. It is this point of interest to EPRI for your offsite power transformers. For example: GDC-17 credited offsite power circuit SAT, UAT, SST, RAT, etc.



4.0 TEAM ASSIGNMENTS

The site walkdown will be conducted by NRC staff from NRR, Division of Risk Assessment (DRA), and the Office of Nuclear Regulatory Research (RES) who are knowledgeable in PRA, fire modeling and circuit analysis, and fire protection engineering. A contractor from the Sandia National Laboratory (SNL) will support the team members. NRC staff from

other organizations may be assigned to the team as appropriate and others may participate as observers. Observers for the site walkdown may include NRR Project Managers and various Regional Inspectors or Senior Reactor Analysts.

The NRC Site Walkdown team leader will be Reinaldo Rodriguez. The team leader will conduct briefings as necessary on the status of the walkdown and coordinate activities while on site.

The tables below show: (1) milestones and schedule and (2) the planned team composition for the site walkdown.

Milestones and Schedule		
Activity	Timeframe	Comments
Site Walkdown Scheduling/Clarification Call	Jan 20, 2022	Teleconference to provide clarification of logistics and answer questions.
Onsite Kick-Off Meeting	Mar 7, 2022	NRC will present a brief team introduction and discuss the scope of the analysis and walkdown. The licensee should introduce team members and give logistics for the week. In addition, the staff would like to have a brief discussion of the areas in the plant containing switchgear, load centers, and bus ducts subject to HEAFs.
Onsite Walkdown	Mar 7-10, 2022	Walkdowns of areas containing HEAF susceptible SSCs – Switchgear, load centers, and bus ducts. Licensee support needed for walkdowns.
End of Day Briefing	Daily while onsite	Meet with licensee to provide a status of daily activities.
Provide Break-out Areas	When requested while onsite	Facilitate discussion between site and staff technical areas. The staff may discuss specific fire scenario development with the licensee.
Onsite Exit Meeting	Mar 11, 2022	NRC staff will hold a brief exit meeting, with licensee staff to conclude onsite activities

Site Walkdown Team		
Antonios Zoulis	NRR/DRA	Branch Chief
Reinaldo Rodriguez	NRR/DRA	Reliability and Risk Analyst, Team Lead
JS Hyslop	NRR/DRA	Senior Reliability and Risk Analyst, Team Member
Chris LaFleur	SNL	Fire Protection Engineer, Team Member
Nick Melly	RES/DRA	Fire Protection Engineer, Team Member
Ching Ng	NRR/DRA	Reliability and Risk Analyst, Team Member

5.0 LOGISTICS

The site walkdown is planned for the week of March 7, 2022, and will last approximately

five days. A conference call will be scheduled one to two weeks prior to the site walkdown to discuss the details of the site walkdown plan. The dates in the milestone chart are subject to change based on mutual agreement between the licensee and the NRC. An entrance meeting for the site walkdown will be held on the morning of the first day and an exit meeting will be held the final day based on a mutually agreed upon time after receipt of the site walkdown plan. The NRC team leader will provide daily progress reports to licensee personnel on the second and third days of the site walkdown, if requested.

The team activities will take place at a location agreed upon by the licensee and the NRC team leader where: (1) the necessary reference material and (2) appropriate analysts will be available to support the review. Because the site visit includes NRC staff walkdowns of selected plant areas in the protected area, the team activities must be conducted in a location relatively near the plant's protected area. Unescorted access will be requested for the entire audit team. The NRC staff recommends that security paperwork and processing be handled prior to arrival on the first day of the site walkdown week to the extent practical.

6.0 SPECIAL REQUESTS

The NRC team requests the following to support the site walkdown:

- Unescorted access/ badging will be needed for all team members participating in the plant tour.
- Wired or wireless internet access.
- A conference room for the NRC should be set up for 5-10 NRC staff and contractors, including observers.
- Access to licensee personnel knowledgeable in the plant's PRA, fire protection engineering, circuit analysis, and fire modeling.
- Requesting the use of laser measuring tools in the physical analysis units containing HEAF susceptible equipment. If allowed, the NRC will bring their own tool.

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***via e-mail**

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DATE	2/17/22	2/22/22	2/22/22

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