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10 CFR 50.90

July 21, 2023

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTN: Document Control Desk

Limerick Generating Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Subject: Response to Request for Additional Information for Supplemental License Amendment Request to Revise Technical Specifications and Exemption Request from Requirements of 10CFR50.62 ATWS Rule to Support the Digital Modernization Project Installation

References:
1. Constellation Energy Generation, LLC (CEG) letter to the U.S. Nuclear Regulatory Commission (NRC), "License Amendment Request to Revise the Licensing and Design Basis to Incorporate the Replacement of Existing Safety-Related Analog Control Systems with a Single Digital Plant Protection System (PPS)," dated September 26, 2022 (NRC Agencywide Documents Access and Management System (ADAMS) Accession No. ML22269A5690).

2. Constellation Energy Generation, LLC letter to U.S. Nuclear Regulatory Commission, “License Amendment Request to Revise Technical Specifications and Exemption Request from Requirements of 10CFR50.62 ATWS Rule to Support the Digital Modernization Project Installation,” dated February 17, 2023 (ADAMS Accession No. ML23052A022)

3. Email from Nick Smith, U.S. Nuclear Regulatory Commission to Francis Mascitelli, Constellation Energy Generation, LLC, “RAIs for Limerick Generation Station, Units 1 and 2 - LAR and Exemption Request for Digital I&C Installation Support (EPID L-2023-LLA-0025 and L-2023-LLE-0005), dated June 20, 2023 (ADAMS Accession No. ML23173A063)

In accordance with 10 CFR 50.90, Constellation Energy Generation, LLC (CEG) requested a License Amendment Request (LAR) to replace the Limerick Generating Station, Units 1 and 2 existing safety-related analog control systems with a single digital Plant Protection System (PPS) (Reference 1).

In Reference 2, CEG submitted an Installation Support LAR to facilitate the installation of the new PPS described in Reference 1.

By email dated June 20, 2023 (Reference 3), the NRC notified CEG that additional information is needed to complete its review of the Reference 2 submittal. The attachment to this letter provides a response to the request for additional information contained in the Reference 3 email.

CEG has reviewed the information supporting a finding of no significant hazards consideration, and the environmental consideration, which was previously provided to the NRC in the Reference 2 letter. CEG has concluded that the information provided in this RAI response does not affect the bases for concluding that the proposed license amendments do not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92. In addition, CEG has concluded that the information in this supplemental letter does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendments.

This supplemental letter contains no regulatory commitments.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), CEG is notifying the Commonwealth of Pennsylvania of this supplemental letter by transmitting a copy of this letter to the designated State Official.

If you have any questions regarding this submittal, then please contact Frank Mascitelli at Francis.Mascitelli@constellation.com.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 21st day of July 2023.

Respectfully,

David P. Helker
Sr. Manager - Licensing
Constellation Energy Generation, LLC

Attachment: Response to Request for Additional Information for Supplemental License Amendment Request to Revise Technical Specifications and Exemption Request from Requirements of 10CFR50.62 ATWS Rule to Support the Digital Modernization Project Installation

cc: USNRC Region I, Regional Administrator w/ attachment
USNRC Project Manager, LGS "
USNRC Senior Resident Inspector, LGS "

Director, Bureau of Radiation Protection - Pennsylvania Department
of Environmental Protection "

Attachment

License Amendment Request Supplement

Limerick Generating Station, Units 1 and 2
Docket Nos. 50-352 and 50-353

Response to Request for Additional Information for Supplemental License Amendment Request to Revise Technical Specifications and Exemption Request from Requirements of 10CFR50.62 ATWS Rule to Support the Digital Modernization Project Installation

By letter dated February 17, 2023 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML23052A022), Constellation Energy Generation, LLC (Constellation) submitted to the U.S. Nuclear Regulatory Commission (NRC) a license amendment request (LAR) to revise technical specifications and request an exemption from requirements of Sections 50.62(c)(3), (4) and (5) of Title 10 of the *Code of Federal Regulation* (10 CFR) to support a digital modernization project installation. The proposed amendment would revise the technical specifications to adopt features from NUREG-1433, Revision 5, "Standard Technical Specifications for General Electric BWR/4 Plants," and revise instrumentation requirements to support the installation of a digital modification during upcoming refueling outages. The proposed amendment is not a risk-informed amendment submitted in accordance with Regulatory Guide 1.174. Therefore, the NRC staff does not review the licensee's probabilistic risk assessment models to determine their technical acceptability. However, the NRC staff considers the licensee-provided qualitative risk insights and associated compensatory measures in its decision on the proposed change.

The NRC staff has determined that additional information is needed to complete its review of the requests. Please note that there are changes to RAI 1, RAI 2, RAI 3, RAI 4, and RAI 6 from the draft RAIs provided to document the guidance to support the methodology used in any staff analyses conducted for the proposed modifications.

Requests for Additional Information

Regulatory Basis for RAIs 1 to 7

Paragraph 50.62(c)(4) of 10 CFR requires, in part, that each boiling water reactor must have a standby liquid control system (SLCS) with the capability of injecting into the reactor pressure vessel a borated water solution at such a flow rate, level of boron concentration and boron-10 isotope enrichment, and accounting for reactor pressure vessel volume, that the resulting reactivity control is at least equivalent to that resulting from injection of 86 gallons per minute of 13 weight percent sodium pentaborate decahydrate solution at the natural boron-10 isotope abundance into a 251-inch inside diameter reactor pressure vessel for a given core design; the SLCS and its injection location must be designed to perform its function in a reliable manner; and the SLCS initiation must be automatic and must be designed to perform its function in a reliable manner.

Paragraph 50.62(c)(5) of 10 CFR requires that each boiling water reactor must have equipment to trip the reactor coolant recirculating pumps (RRCS) automatically under conditions indicative of an Anticipated Transient Without SCRAM (ATWS) and this equipment must be designed to perform its function in a reliable manner.

In the Section 3.5 of the LAR and Section D of the exemption request, Constellation describes operator actions needed to replace the automatic initiation of SLCS and RRCS.

In conducting reviews of the Human Factors Engineering (HFE) aspects of licensing submittals for light water reactor facilities, the NRC staff apply the

guidance of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition" (the SRP). Chapter 18 of the SRP, Revision 3, "Human Factors Engineering," provides guidance for the review of HFE considerations of plant modifications and important human actions.

For circumstances involving both changes resulting from plant modifications and the evaluation of important human actions, SRP Chapter 18 provides guidance regarding the use of NUREG-1764, "Guidance for the Review of Changes to Human Actions," Revision 1. This document provides guidance for reviewing changes in human actions, such as those that are credited in nuclear power plant safety analyses.

RAI 1

Technical Basis

NUREG-1764 Section 4.2 provides criteria regarding the conduct of task analysis, including analyses regarding how personnel will both know when action is necessary and that it is performed correctly. However, the LAR does not provide any discussion of the results of any task analysis for the proposed change.

Information Needed

a. Please describe or provide a list of the guidance document(s) or standard(s) that describe the methods Constellation followed to conduct task analyses of the operator actions mentioned in the amendment request or exemption request.

b. Please provide a description of any task analysis conducted for operator actions affected by the proposed change, including whether the results of any such analysis was that operator tasks would remain unchanged.

CEG Response:

a An informal review was performed by reviewing the tasks being implemented during an ATWS and the loss of the RRCS system during an ATWS condition. That review determined that all of the tasks and the associated training required to implement those tasks was already encapsulated in current operator training. As such, a formal task analysis was not required to determine any changes or additional training that may be required.

Operators are trained on Emergency Operating Procedures (EOPs) including response to an ATWS event. Included in the training is the performance of manual operator actions if the automatic actions fail to occur. Upon recognition of an ATWS, Operators are trained to enter the EOPs and perform initial ATWS actions including ensuring manual

initiation of SLC and lowering of RPV water level. Following initial ATWS actions further actions are taken to mitigate the event including tripping of the Reactor Recirculation pumps. Training is performed on the tasks associated with each of these operator actions during initial and continued licensed operator training and includes malfunctions of the RRCS system which would require manual initiation versus the system automatic initiation. Examples of Simulator Exercise Guides (SEGs) where licensed operators are trained on ATWS tasks include initial licensed operator training SEG ILTSEG-6001 and continuing licensed operator training SEG-6231E.

b As noted above, an informal review was performed since operators are already trained on all the operator actions impacted by this LAR.

RAI 2

Technical Basis

NUREG-1764 Section 4.2 provides criteria regarding staffing, including analyses of effects of the changes in human actions upon the number, qualifications, and staffing levels of operations personnel. However, the LAR does not provide any discussion of the results of any staffing-related analysis for the proposed change.

Information Needed

a. Please describe or provide a list of the guidance document(s) or standard(s) that describe the methods Constellation followed to conduct staffing-related analyses of the operator actions mentioned in the amendment request or exemption request.

b. Please provide a description of any staffing-related analysis conducted in support of the proposed change, including whether the results of any such analysis was that operator staffing levels would remain unchanged.

CEG Response:

a As noted in response to RAI 1 above, no changes were made to existing operator tasks required to implement this LAR and therefore no changes to staffing are required. None of the credited actions are outside the Main Control Room or require a dedicated operator which would potentially impact the minimum required staffing levels.

b As noted above there was no change in operator tasks, location or use of dedicated operators which would dictate a change in staffing or require a staffing analysis.

RAI 3

Technical Basis

NUREG-1764 Section 4.3 provides criteria regarding modifications to human-system interfaces (HSIs) as they relate to changes in operator task requirements. However, the LAR does not provide any discussion of modifications to HSIs.

Information Needed

a. For any modification to HSIs, please describe or provide a list of the guidance document(s) or standard(s) that describe the methods Constellation used to assess modifications to HSIs.

b. Please provide a description of any modifications to HSIs (e.g., indications and controls located in the main control room) that will be made in conjunction with the proposed change, including whether no modifications to HSIs will occur in conjunction with the proposed change.

CEG Response:

a No modifications will be made to any HSIs required to implement the operator actions credited to mitigate the ATWS event.

b No modifications will be made to any HSIs required to implement the operator actions credited to mitigate the ATWS event.

RAI 4

Technical Basis

NUREG-1764 Section 4.3 provides criteria regarding modifications to plant procedures as they relate to changes in operator task requirements. Section 3.5.4 of Attachment 1 of the LAR states that both LGS Emergency Operating Procedures (EOPs) T-101, “RPV Control,” and T-117, “ATWS RPV Control,” contain ATWS response actions that operators would be expected to take to mitigate an ATWS event. However, the LAR does not discuss whether modifications will occur to these procedures as part of the proposed change.

Information Needed

a. For any modification to facility EOPs, please describe or provide a list of the guidance document(s) or standard(s) that describe the methods Constellation used to assess modifications to facility EOPs.

b. Please provide a description of any modifications to facility EOPs (e.g., T-101 and T-117) that will be made in conjunction with the proposed

change, including whether no modifications to facility EOPs will occur in conjunction with the proposed change.

CEG Response:

a No modifications were made to any EOPs or EOP strategies. As noted in response to RAI 1 above, the operators are directed to perform ATWS mitigation actions on entry into the EOPs. The actions credited within this LAR are currently directed through the implementation of the EOPs as currently written.

b No modifications were made to any EOPs or EOP strategies. As noted above the operators are directed to perform ATWS mitigation actions on entry into the EOPs. The actions credited within this LAR are currently directed through the implementation of the EOPs as currently written.

RAI 5

Technical Basis

NUREG-1764 Section 4.3 provides criteria regarding modifications to operator training as it relates to operator task requirements. In Section 3.5.4 of Attachment 1 of the LAR, the licensee states that operators are trained to manually initiate the SLCS during initial and continuing training per the EOPs. However, the LAR does not discuss whether the other manual operator actions besides SLCS initiation that are described in the LAR (e.g., lowering RPV water level, running back recirculation pumps, and isolating reactor water cleanup) are trained on or whether modifications to operator training will occur as part of the proposed change.

Information Needed

a. Please provide a description of the operator training that is conducted for the manual operator actions, besides manual SLCS initiation, that are discussed in the LAR, as well as whether any modifications to the operator training program will occur in conjunction with the proposed change.

CEG Response:

a All operator actions described in the LAR are already part of the operator training program and training is provided in accordance with the systematic approach to training. The credited tasks are trained during initial and continuing licensed operator training and cover all aspects of the actions needed to be taken in response to the ATWS without RRCS available including manual initial initiation of SLC, lowering of RPV water level, and tripping the Reactor Recirculation pumps. No modifications are expected to be made to the operator training program in conjunction with the proposed change.

RAI 6

Technical Basis

NUREG-1764 Section 4.4 provides criteria regarding the availability and accessibility of all required components. However, the LAR does not discuss whether the availability and accessibility of those indications and controls needed to support operator actions will be affected by the proposed change.

Information Needed

a. For any changes in indications and controls, please describe or provide a list of the guidance document(s) or standard(s) that describe the methods Constellation used to assess availability and accessibility of affected indications and controls.

b. Please provide a description of any effects on the availability and accessibility of required indications and controls that will occur in conjunction with the proposed change, including whether no such components will be affected.

CEG Response:

a No changes to indications and controls are needed to support operator actions required by the proposed change.

b No changes to indications and controls are needed to support operator actions required by the proposed change.

RAI 7

Technical Basis

NUREG-1764 Section 4.4 provides criteria regarding walkthrough activities conducted for human actions to determine that procedures are accurate and usable, that the training program appropriately addressed the changes, and that the human actions can be completed within the required time. In Section 3.5.4 of Attachment 1 of the LAR, Constellation stated the following:

> Initial validation with an operating crew in the simulator showed that operators can reliably initiate SLCS within 5 minutes of the occurrence of an ATWS condition. Full validation of this new time critical action will be completed per OP-AA-102-106 by May 31, 2023.

Information Needed

Please provide a description of the results of the full validation of the new time critical operator action for the initiation of SLCS. As part of this, please include details regarding the following:

- Measures included to create realistic scenario conditions;
- Any issues identified with procedural completeness, technical accuracy, and usability;
- Any training program issues identified;
- Whether the credited operator actions could be completed within the allowed time and whether adequate margin exists between the time required and time allowed;
- Whether any complicating factors that might be expected to affect the crews' ability to perform the credited operator actions were included; and
- How many complete crews of operators participated in the walkthrough scenarios.

CEG Response:

Validation of the new time critical action to manually initiate SLC within 5 minutes of an ATWS event was performed in accordance with OP-AA-102-106, “Operator Response Time Program,” during the third licensed operator requalification training cycle of 2023. The Limerick simulator was used to create realistic scenario conditions with the crews placed "in role" for the validations as is done in any training scenario. Simulator malfunctions were used to simulate RRCS being non-functional. An inadvertent Group 1 (MSIV Closure) ATWS scenario was selected due to it being one of the limiting cases in the updated analysis. All operating crews participated in the simulator scenarios that validated the new time critical operator action for SLC initiation with the crews in their normal training teams. A total of ten simulator runs were completed with all crews manually initiating SLC within the allowed time of five minutes (300 seconds). The longest time for any crew to manually initiate SLC was 129 seconds, and the average time was 79.5 seconds. This shows adequate margin between the time required to manually initiate SLC and the time available. No procedural or training issues were identified with manual SLC initiation. No complicating factors are expected to affect the crews' ability to manually initiate SLC.

RAI 8

Regulatory Basis

Paragraph 50.62(c)(3) of 10 CFR requires, in part, that each boiling water reactor must have an alternate rod injection (ARI) system that is diverse (from the reactor trip system) from sensor output to the final actuation device and the ARI system must be designed to perform its function in a reliable manner and be independent (from the existing reactor trip system) from sensor output to the final actuation device.

One of the special circumstances addressed in the exemption request is 10 CFR 50.12(a)(2)(ii). In Section D of the exemption request, Constellation states that the requirements in 10 CFR50.62(c)(3) are not necessary because of the particular circumstances of the redundant reactivity control system (RRCS) demotion. The particular circumstances are described in both the exemption request and LAR.

Technical Basis

In Section 3.5, "One-Time LCO 3.3.4.1 Applicability Change for ATWS Recirculation Pump Trip Actuation Instrumentation," of the LAR, the licensee stated that it plans to remove both divisions of the RRCS from service 30 days prior to the digital modernization project installation. The licensee stated that the removal of the RRCS digital logic system will result in the loss of the RRCS-initiated automatic functions for SLCS injection and associated reactor water cleanup (RWCU) isolation, ARI system actuation, ATWS recirculation pump trip (ATWS-RPT) actuation, and feedwater runback actuation. The licensee stated that the following automatic and manual functions will be available to supplant those functions that are lost while the RRCS is removed from service, and therefore will be available to mitigate an ATWS event:

- A non-safety-related automatic reactor recirculation pump (RRP) runback on low reactor water Level 3 with more than the minimum analyzed 12 operable main steam relief valves operable. This will supplant the ATWS-RPT trip function.
- The manual start of the SLCS pumps from the main control room no later than 5 minutes post-event. This will supplant the automatic SLCS initiation function.

Information Needed

Describe the surveillance testing performed to provide assurance that the non-safety-related RRP runback feature will work automatically during an ATWS condition and provide a summary of past surveillance test results.

CEG Response:

The RRP runback logic described in UFSAR section 7.7.1.3.3.4.7, is not formally surveillance tested.

The digital feedwater control system (FCS) level transmitters described in UFSAR section 7.7.1.4.3.2 that provide input to the RRP runback logic are a fault tolerant design and are routinely surveilled, because they provide the high reactor water level trip signal to the main turbine and feedwater turbine trip.

All the RRP runback logic is digital based, with self-test diagnostic capabilities, except for the surveilled RPV level transmitters and the digital feedwater to digital adjustable speed drive interface analog relay logic. This logic contains two analog relays in parallel and are deenergized to actuate.

The plant testing and a previous plant RRP Runback event on 8/29/18 provide assurance that the non-safety related RRP runback feature will operate as designed during a postulated ATWS event while RRCS is out of service.

Based upon this combination of previous testing, a plant event where the logic performed as designed, and most of the logic being digital based with self-test diagnostics to detect and alert plant personnel to a logic system deficiency, there is adequate assurance that the non-safety related RRP runback feature will

automatically operate as designed during a postulated ATWS event while RRCS is out of service.

RAI 9

Regulatory Basis

Paragraph 50.92(c) of 10 CFR states in part that a proposed amendment must meet three criteria to be considered as having no significant hazards. One of the relevant criteria to determine there is no significant hazard related to the proposed amendment and exemption is:

> Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

RIS 2001-22 provides guidance on the evaluation of the change from an evaluated accident in the updated final safety analysis report to the conditions that would exist if the amendment or exemption is approved. Comparison of the probability and consequence values before and after the change to determine the significance.

Technical Basis

In Section 2.2, of the LAR, the licensee stated that the RRCS system automatically activates the ARI function. In Section 4.2, of the LAR, the licensee stated that the proposed changes do not impact any accident or event precursors and the probability of an ATWS event occurring does not increase due to this proposed change.

Information Needed

Please describe the measures taken to ensure that the removal of the RRCS system does not cause or increase the probability of an inadvertent plant trip (e.g., via the ARI function) and resulting plant transient.

CEG Response:

As mentioned in previous section, since RRCS is energized to actuate, there is very little risk of actuating any of the RRCS functions during the demolition. To safely perform the work, the system will first need to be deenergized. This will prevent any actuation output signals from being generated system wide. The RRCS system is planned to remain de-energized during the entire demolition activity during normal plant operation and will not be re-energized during normal plant operation since it will be physically removed from the plant.

The RRCS maintenance activities and the system demolition are governed by the maintenance rule per 10CFR50.65. The work activity will be developed, and peer reviewed for accuracy to ensure any potential risk is mitigated per CEG procedures, MA-AA-716-010, Maintenance Planning." Operations and the responsible work group will perform a Risk Screening and develop a Risk Mitigation Plan to reduce

and mitigate the overall risk associated with the work to the plant per OP-AA-107, "Integrated Risk Management." The activity will initially take actions to mitigate all potential risk of a plant transient. This will be accomplished by first installing plugs into the ARI valve vents and then disconnecting the electrical signal to these valves. Reactor Recirculation pump breakers will have their ATWS trip logic fuses removed. RRCS Digital Feedwater Runback, SLCS and Reactor Water Clean-up initiation/isolation signals will be disabled outside the boundary of the demolition and re-assembly of the new system to ensure the craft workers do not have the potential to cause a mis-operation of any of the RRCS protective features. The work will be verified to be in a safe condition per OP-AA-109-101, "Personnel and Equipment Tagout Process." The crews will be briefed per HU-AA-1211, "Pre-Job Briefing." In accordance with HU-AA-101, "Human Performance Tools and Verification Practices," a first check will be performed with dispatching authority to ensure the correct equipment will be worked on and a two-minute drill will be performed at the job site identifying hazards and configurable components. Robust operational barriers will be in place per OP-AA-108-117, "Protected Equipment Program," to ensure protected equipment is not compromised during performance of work. Work involving demolition and equipment installation will be performed in accordance with MA-AA-1000, "Conduct of Maintenance Manual, and MA-AA-1002, "Maintenance Technical Skills." The above measures will ensure that the removal of the RRCS system does not cause or increase the probability of an inadvertent plant trip (e.g., via the ARI function) and resulting plant transient.