

JAFP-23-0033

June 28, 2023

United States Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

James A. FitzPatrick Nuclear Power Plant  
Renewed Facility Operating License No. DPR-59  
NRC Docket No. 50-333

Subject: License Amendment Request – Technical Specifications (TS) Section 3.3.1.2,  
“Source Range Monitors (SRM) Instrumentation”

Pursuant to 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Constellation Energy Generation, LLC (Constellation) hereby requests an amendment to Renewed Facility Operating License No. DPR-59 for the James A. FitzPatrick Nuclear Power Plant (JAF). Specifically, the proposed change will allow for a lower required count rate for Surveillance Requirement (SR) 3.3.1.2.4 of  $\geq 0.7$  counts per second (cps) with a signal to noise ratio  $\geq 20:1$ .

TS SR 3.3.1.2.4 currently requires SRMs to be  $\geq 3.0$  cps and have a signal to noise ratio  $\geq 2:1$ . The proposed change will allow for a lower SRM count of  $\geq 0.7$  cps if the signal to noise ratio is  $\geq 20:1$

The proposed change has been reviewed by the JAF Plant Operations Review Committee in accordance with the requirements of the Constellation Quality Assurance Program.

Attachment 1 provides the Evaluation of Proposed Changes. Attachment 2 provides the Proposed TS Marked-Up Page.

Constellation requests approval of the proposed amendment by June 30, 2024. Once approved, the amendment shall be implemented within 30 days.

This amendment request contains no new regulatory commitments.

Constellation has concluded that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92.

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In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), Constellation is transmitting a copy of this application and its attachments to the designated State Officials.

Should you have any questions concerning this submittal, please contact Christian Williams at 732-281-9104.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the June 28, 2023.

Respectfully,

*David T. Gudger*

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Dave T. Gudger  
Senior Manager - Licensing & Regulatory Affairs  
Constellation Energy Generation, LLC

Attachments:

1. Evaluation of Proposed Changes
2. Proposed Technical Specification Marked-Up Page
3. Proposed Technical Specification Clean Page

cc:	USNRC Region I, Regional Administrator	w/attachments
	USNRC Senior Resident Inspector, JAF	w/attachments
	USNRC Project Manager, JAF	w/attachments
	A. L. Peterson, NYSERDA	w/attachments

## **ATTACHMENT 1**

License Amendment Request

James A. FitzPatrick Nuclear Power Plant

Docket No. 50-333

Evaluation of Proposed Changes

Subject License Amendment Request – Technical Specifications (TS) Section 3.3.1.2,  
“Source Range Monitors (SRM) Instrumentation”

- 1.0 SUMMARY DESCRIPTION
- 2.0 DETAILED DESCRIPTION
- 3.0 TECHNICAL EVALUATION
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## 1.0 SUMMARY DESCRIPTION

Pursuant to 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Constellation Energy Generation, LLC (Constellation) requests a proposed change to modify Technical Specification (TS) 3.3.1.2, "Source Range Monitor (SRM) Instrumentation" Surveillance Requirement (SR) 3.3.1.2.4.

The proposed change modifies SR 3.3.1.2.4 to incorporate an additional acceptance criterion based on a higher signal to noise ratio as provided in General Electric Service Information Letter (GE SIL) 478 dated December 16, 1988 (Reference 1). Specifically, an "or" statement will be added to SR 3.3.1.2.4 as follows: "[...] or Verify count rate is  $\geq 0.7$  [counts per second] cps with a signal to noise ratio  $\geq 20:1$ ."

## 2.0 DETAILED DESCRIPTION

The proposed change involves revising the operability definition for the source range monitors (SRMs) for the monitoring and indication functions.

During refueling, shutdown, and low power operations, the primary indication of neutron flux levels is provided by the SRMs. The SRMs provide monitoring of reactivity changes during fuel or control rod movement and give the control room operator early indication of unexpected subcritical multiplication that could be indicative of an approach to criticality.

The SRMs have no safety function and are not assumed to function during any Updated Final Safety Analysis Report (UFSAR) design basis accident or transient analysis. However, the SRMs provide the only on-scale monitoring of neutron flux levels during startup and refueling.

SR 3.3.1.2.4 consists of a verification of the SRM instrument readout to ensure that the SRM reading is greater than a specified minimum count rate with the detector full-in, which ensures that the detectors are indicating count rates indicative of neutron flux levels within the core.

For an SRM to be considered operable, the indicated count rate is required to be high enough to be distinguishable from any noise induced into the instrument circuit. GE SIL 478 provides the design basis for the original GE neutron monitoring system and provides the basis for adopting an alternative design basis. The original design bases for the SRM minimum count rate of 3 cps is based on a signal to noise ratio of 2:1. GE SIL 478 provides the technical bases for allowing a minimum count rate of 0.7 cps with a corresponding signal to noise ratio  $\geq 20:1$ .

This amendment request is to incorporate the alternative design bases described in GE SIL 428 into the James A. FitzPatrick Nuclear Power Plant (JAF) SRM design bases.

Marked up TS page 3.3.1.2-3, showing the requested changes, is provided in Attachment 2.

## 3.0 TECHNICAL EVALUATION

The technical justification, as discussed in GE SIL 478 (Reference 1), for a minimum count rate of 0.7 cps with a minimum signal to noise ratio of 20:1 is based on the statistical neutron monitoring confidence provided by the higher signal to noise ratio. The proposed change ensures that the statistical neutron monitoring confidence remains consistent with or better than

what is provided at 3 cps with a signal to noise ratio of 2:1. Further, JAF has demonstrated, based on past performance, that a 20:1 signal to noise ratio is achievable and repeatable at the desired lower count rates for all SRMs A thru D.

From GE SIL 478 (Reference 1):

*“The 3 cps SRM minimum count rate included in Tech Specs is based on an assumed S/N ratio of 2:1. With this level of signal noise, there is a statistical neutron monitoring confidence of 95% that the indicated signal is correct. That is, the neutron monitoring indication has an uncertainty of about 5% as a result of counting errors.*

*In response to inquiries from owners of some operating BWRs, GE has studied the effect of reducing the SRM Tech Spec setpoint to 0.7 cps. The purpose of the study was to determine if the SRMs could monitor neutron counts with the same confidence as in the original design basis with this lower count rate and a S/N ratio of 2:1.*

*The results of the study showed that a S/N ratio of at least 20:1 is required to maintain the original level of uncertainty with a 0.7 cps minimum count rate. The higher S/N ratio is required so that the SRM can distinguish between actual counts and noise at the lower count rates. At a 0.7 cps setpoint and a 2:1 S/N ratio, the level of confidence will be reduced.*

*These studies indicate the importance of signal noise in evaluating the uncertainty of the SRM indication. To maintain the same level of counting uncertainty at lower SRM downscale setpoints, higher S/N ratios are needed.”*

The JAF signal to noise ratio determination test, ST-5H (Reference 2), is performed every 31 days while in Mode 5 (refuel). The surveillance sections of ST-5H perform the signal to noise ratio tests using the Insert/Withdrawal method. These sections verify that the calculated signal to noise ratio is  $\geq 2:1$ . In order to benefit from the proposed change, the site must be able to demonstrate a signal to noise ratio of 20:1 is achievable and repeatable. An evaluation of previous performances of ST-5H verified all four (4) SRMs were able to achieve the desired signal to noise ratio greater than 20:1. By maintaining both the original and proposed criteria in SR 3.3.1.2.4, if the performance of ST-5H cannot demonstrate a 20:1 signal to noise ratio, the higher count rate of 3 cps with a signal to noise ratio of at least 2:1 is adequate to demonstrate operability.

## **CONCLUSIONS/FINDINGS**

Based on information provided in this technical evaluation, combined with the site's demonstration of signal to noise ratio attainability and the Technical Specification Standard included use of both criteria, there is adequate confidence for JAF to adopt the additional criteria.

### **4.0 REGULATORY EVALUATION**

#### **4.1 Applicable Regulatory Requirements/Criteria**

The following regulatory requirements have been considered:

- Title 10 of the Code of Federal Regulations (10 CFR), Section 50.36, "Technical specifications," in which the Commission established its regulatory requirements related to the contents of the TS. Specifically, 10 CFR 50.36(c)(3) states, *"Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."*

The proposed change will continue to provide assurance that control room indication of neutron flux at low power is accurate.

- General Design Criterion 13 Instrumentation and Control  
*"Instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges."*

The SRMs provide monitoring of reactivity changes during fuel or control rod movement and give the control room operator early indication of unexpected subcritical multiplication that could be indicative of an approach to criticality. This function is not impacted by the proposed change.

JAF was evaluated against the Atomic Energy Commission (AEC) Design Criteria, 10 CFR 50.34, Appendix A, General Design Criteria for Nuclear Power Plants, effective May 21, 1971. The evaluation is documented in Section 16.6 of the JAF UFSAR. The proposed change is consistent with Section 16.6 of the JAF UFSAR and the intent of GDC 13.

## 4.2 Precedent

In addition to being the current requirement in the BWR4 Standard Technical Specifications, the NRC has previously approved the use of a minimum of 0.7 cps with an associated signal to noise ratio of at least 20:1 based on GE SIL 478 as documented below:

- NUREG 1433 Rev 5 Vol 1  
The current version of the GE BWR4 Improved Standard Technical Specifications (ITS) allows for a 3 cps minimum count requirement with a signal to noise ratio of at least 2:1 or a 0.7 cps minimum count requirement with a signal to noise ratio of at least 20:1. This has been part of ITS since Revision 0 as the GE SIL 478 predates ITS.
- ML022110078 – Washington Public Power Supply System (WPPSS) Nuclear Project No. 2  
By letter dated April 10, 1992, the NRC issued Amendment 102 to WPPSS. With this amendment the NRC approved WPPSS to incorporate the results of the GE Study

documented in GE SIL 478 as the bases for revising the minimum signal to noise ratio from 2:1 to 20:1 for conditions in which SRM count is  $\geq 0.7$  cps but less than 3 cps. The request and bases for approval as documented in the Safety Evaluation are consistent with this request.

- ML003759720 – LaSalle County Station Unit 1 and Unit 2  
By letter dated October 10, 2000, the NRC issued Amendment 142 and Amendment 128 for LaSalle County Station (LCS) Unit 1 and 2 respectively. With these amendments the NRC approved LCS to incorporate the results of the GE Study documented in GE SIL 478 as the bases for revising the signal to noise ratio from 2:1 to 20:1 for conditions in which SRM count is  $\geq 0.7$  cps but less than 3 cps. The request and bases for approval as documented in the Safety Evaluation are consistent with this request.

#### 4.3 No Significant Hazards Consideration

Constellation has evaluated the proposed change to the Technical Specifications (TS) for James A. FitzPatrick Nuclear Power Plant (JAF) and has determined that the proposed change does not involve a significant hazards consideration and is providing the following information to support a finding of no significant hazards consideration.

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

Response: No.

The proposed change to TS SR 3.3.1.2.4 will increase the minimum SRM signal to noise ratio from  $\geq 2:1$  to  $\geq 20:1$ , when the SRM count rate is  $\geq 0.7$  cps and less than 3 cps.

The operation of the SRM does not influence the probability of any accident previously evaluated. Thus, the probability of any accident previously evaluated is not increased.

##### **2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No.

The proposed change does not alter the Nuclear Instrumentation system design, create new failure modes, or change any modes of operation. The proposed change does not involve a physical alteration of the plant; and no new or different kind of equipment will be installed. Consequently, there are no new initiators that could result in a new or different kind of accident.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

**3. Does the proposed amendment involve a significant reduction in a margin of safety?**

Response: No.

The proposed changes to SR 3.3.1.2.4 will result in maintaining or improving the statistical neutron monitoring confidence that the indicated signal is correct when the SRMs indicate in the range from 0.7 cps to 3 cps. A SRM signal to noise ratio of 2:1 provides a statistical neutron monitoring confidence of 95% that the indicated signal is correct with a minimum count rate of 3 cps. A study was performed which concluded that a SRM signal to noise ratio of  $\geq 20:1$  is required to provide a statistical neutron monitoring confidence of 95% that the indicated signal is correct at 0.7 cps.

Thus, the proposed changes do not involve a significant reduction in a margin of safety.

**4.4 Conclusions**

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or the health and safety of the public.

**5.0 ENVIRONMENTAL CONSIDERATION**

Constellation has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, "Standards for Protection Against Radiation." However, the proposed amendment does not involve: (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," paragraph (c)(9). Therefore, pursuant to 10 CFR 51.22, paragraph (b), no environmental impact statement or environmental assessment needs to be prepared in connection with the proposed amendment.

## **6.0 REFERENCES**

1. General Electric (GE) Service Information Letter (SIL) No. 478, "SRM Minimum Count Rate Dated December 16, 1988.
2. James A. FitzPatrick Nuclear Power Plant Procedure: ST-5H "SRM Signal to Noise Ratio Determination Test" Revision 5

**ATTACHMENT 2**

License Amendment Request

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PROPOSED TECHNICAL SPECIFICATION MARKED-UP PAGES

Revised TS Page

3.3.1.2-3

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.3.1.2.2 ----- NOTE -----</p> <ol style="list-style-type: none"> <li>1. Only required to be met during CORE ALTERATIONS.</li> <li>2. One SRM may be used to satisfy more than one of the following.</li> </ol> <p>-----</p> <p>Verify an OPERABLE SRM detector is located in:</p> <ol style="list-style-type: none"> <li>a. The fueled region;</li> <li>b. The core quadrant where CORE ALTERATIONS are being performed, when the associated SRM is included in the fueled region; and</li> <li>c. A core quadrant adjacent to where CORE ALTERATIONS are being performed, when the associated SRM is included in the fueled region.</li> </ol>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.3.1.2.3 Perform CHANNEL CHECK.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.3.1.2.4 ----- NOTE -----</p> <p>Not required to be met with less than or equal to four fuel assemblies adjacent to the SRM and no other fuel assemblies in the associated core quadrant.</p> <p>-----</p> <p>Verify count rate is <math>\geq 3.0</math> cps with a signal to noise ratio <math>\geq 2:1</math>.</p> <p>or</p> <p>Verify count rate is <math>\geq 0.7</math> cps with a signal to noise ratio <math>\geq 20:1</math>.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)