Constellation

4300 Winfield Road
Warrenville, IL 60555
630 657 2000 Office

RS-22-065
August 18, 2022

10 CFR 50.90

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

Dresden Nuclear Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject: License Amendment Request Regarding Transition to GNF3 Fuel

References:

1. Letter from P.R. Simpson (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Request for Licensing Amendment Regarding Transition to GNF3 Fuel," dated September 14, 2021 (ADAMS Accession Nos. ML21257A419 (proprietary) and ML21257A420 (non-proprietary))

2. Letter from P.R. Simpson (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Response to Supplemental Request for Information Related to Request for Licensing Amendment Regarding Transition to GNF3 Fuel," dated November 3, 2021 (ADAMS Accession No. ML21307A444)

3. Letter from P.R. Simpson (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Request to Expand Applicability of PRIME Methods to Evaluate Fuel Centerline Melt and Cladding Strain Compliance for Framatome Fuel at Quad Cities," dated January 20, 2022 (ADAMS Accession Nos. ML22020A398 (proprietary) and ML22020A399 (non-proprietary))

4. Letter from P.R. Simpson (Constellation Energy Generation, LLC) to U. S. Nuclear Regulatory Commission, "Supplement to Request to Expand Applicability of PRIME Methods to Evaluate Fuel Centerline Melt and Cladding Strain Compliance for Framatome Fuel at Quad Cities," dated March 16, 2022 (ADAMS Accession No. ML22075A212 (non-proprietary)

5. Letter from P.R. Simpson (Constellation Energy Generation, LLC) to U. S. Nuclear Regulatory Commission, "Response to Request for Additional Information Regarding Quad Cities Request to Expand Applicability of GNF Thermal Mechanical Analysis Methods to Framatome Fuel," dated August 10, 2022 (ADAMS Accession No. ML22159A310 (non-proprietary)

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Constellation Energy Generation, LLC (CEG) requests an amendment to Renewed Facility Operating License Nos. DPR-19 and DPR-25 for Dresden Nuclear Power Station (DNPS), Units 2 and 3, respectively. The proposed change supports the transition from Framatome, Inc. ATRIUM 10XM fuel to Global Nuclear Fuel – Americas, LLC (GNF/GNF-A) GNF3 fuel at DNPS. This license amendment request is similar to the GNF3 transition request submitted for Quad Cities Nuclear Power Station (QCNPS) (References 1 and 2) in that it uses the same GNF reports to justify specific aspects of the methodologies supporting the fuel transition as QCNPS. This request for DNPS also includes the expansion of the PRIME methodology to cover non-GNF fuel, which was submitted as a separate amendment request for QCNPS (References 3 and 4), as well as the associated response to request for additional information (Reference 5).

General Electric Company (GE) safety analysis methodologies have been previously used at DNPS and remain listed in Technical Specifications (TS) 5.6.5, "Core Operating Limits Report (COLR)." However, in this amendment request CEG proposes to revise TS 5.6.5.b to add the following two reports that support the General Electric Standard Application for Reactor Fuel (GESTAR) analysis methodology to the list of approved methods to be used in determining the core operating limits in the COLR.

1. NEDC-33930P, "GEXL98 Correlation for ATRIUM 10XM Fuel," is added to allow DNPS to use GE methods for the determination of fuel assembly critical power of Framatome ATRIUM 10XM fuel in a mixed core containing both ATRIUM 10XM and GNF3 fuel. This report was previously submitted as Attachments 4 (non-proprietary) and 9 (proprietary) to Reference 1.

2. 006N8642-P, "Justification of PRIME Methodologies for Evaluating TOP and MOP Compliance for non-GNF Fuels," is added to allow DNPS to use GNF thermal-mechanical analysis methods on non-GNF fuel. This report was previously submitted as Attachments 4 (non-proprietary) and 6 (proprietary) to Reference 3.

TS 5.6.5.b contains eight Westinghouse topical reports that will no longer be used to support COLR evaluations after the fall outage in 2023. CEG is proposing to remove these unused references from the TS listing. Attachment 2 provides a revised markup to indicate the removal of the associated Westinghouse references and the addition of the two reports supporting the GESTAR analysis.

CEG also plans to utilize the Framatome RODEX2A methodology with an additional thermal conductivity degradation (TCD) penalty in mixed core thermal-mechanical calculations for the ATRIUM 10XM fuel in the DNPS core during this fuel transition.

This letter includes two attachments in support of this proposed license amendment. Attachment 1 describes the specific aspects of the DNPS fuel transition for which CEG is requesting NRC review, including the justification for why the reports previously submitted for a similar fuel transition at QCNPS are applicable to DNPS, Units 2 and 3. Attachment 2 provides

the marked-up DNPS, Units 2 and 3, Technical Specifications (TS) pages showing the specific proposed changes.

The proposed changes have been reviewed and approved by the Plant Operations Review Committee at DNPS in accordance with the requirements of the CEG Quality Assurance Program.

CEG requests approval of the proposed changes by August 18, 2023. Once approved, the amendment shall be implemented during the fall 2023 refuel outage.

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

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Mrs. Linda M. Palutsis at (630) 657-2821.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 18th day of August 2022.

Respectfully,

Patrick R. Simpson
Sr. Manager Licensing
Constellation Energy Generation, LLC

Attachments:
1. Evaluation of Proposed Changes
2. Markup of Proposed Technical Specifications Pages

cc: U.S. NRC Region III, Regional Administrator
U.S. NRC Senior Resident Inspector, Dresden Nuclear Power Station
Illinois Emergency Management Agency – Division of Nuclear Safety

ATTACHMENT 1
Evaluation of Proposed Changes

Subject: License Amendment Request Regarding Transition to GNF3 Fuel

TABLE OF CONTENTS

1.0 SUMMARY DESCRIPTION

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Constellation Energy Generation, LLC (CEG) requests an amendment to Renewed Facility Operating License Nos. DPR-19 and DPR-25 for Dresden Nuclear Power Station (DNPS), Units 2 and 3, respectively. The proposed change supports the transition from Framatome, Inc. ATRIUM 10XM fuel to Global Nuclear Fuel – Americas, LLC (GNF/GNF-A) GNF3 fuel at DNPS. This license amendment request is similar to the GNF3 transition request submitted for Quad Cities Nuclear Power Station (QCNPS) (References 6.1 and 6.2) in that it uses the same GNF reports to justify specific aspects of the methodologies supporting the fuel transition as QCNPS. This request for DNPS also includes the expansion of the PRIME methodology to cover non-GNF fuel, which was submitted as a separate amendment request for QCNPS (References 6.3 and 6.4), as well as the associated response to request for additional information (Reference 6.16).

General Electric Company (GE) safety analysis methodologies have been previously used at DNPS and remain listed in Technical Specifications (TS) 5.6.5, "Core Operating Limits Report (COLR)." However, in this amendment request CEG proposes to revise TS 5.6.5.b, to add the following two reports that support the General Electric Standard Application for Reactor Fuel (GESTAR) analysis methodology to the list of approved methods to be used in determining the core operating limits in the COLR.

1. NEDC-33930P, "GEXL98 Correlation for ATRIUM 10XM Fuel," (Reference 6.6) is added to allow DNPS to use GE methods for the determination of fuel assembly critical power of Framatome ATRIUM 10XM fuel in a mixed core containing both ATRIUM 10XM and GNF3 fuel. This report was previously submitted to the NRC and is therefore not included in this submittal.

2. 006N8642-P, "Justification of PRIME Methodologies for Evaluating TOP and MOP Compliance for non-GNF Fuels," (Reference 6.7) is added to allow DNPS to use GNF thermal-mechanical analysis methods on non-GNF fuel. This report was previously submitted to the NRC and is therefore not included in this submittal.

TS 5.6.5.b contains eight Westinghouse topical reports that will no longer be used to determine core operating limits after the 2023 refueling outage. Currently only Unit 2 has Westinghouse fuel, which is schedule to be removed from the core during the 2023 refueling outage. The last Westinghouse fuel bundles were removed from Unit 3 in November 2020. CEG is proposing to remove these references that will no longer be used after the 2023 refueling outage from the TS listing. Attachment 2 provides a revised markup to indicate the removal of the associated Westinghouse references and the addition of the two reports supporting the GESTAR analysis.

CEG also plans to utilize the Framatome RODEX2A methodology with an additional thermal conductivity degradation (TCD) penalty in mixed core thermal-mechanical calculations for the ATRIUM 10XM fuel in the DNPS core during this fuel transition.

2.0 DETAILED DESCRIPTION

2.1 GEXL98 Correlation

General Electric Company (GE) safety analysis methodologies have been previously used at DNPS and remain listed in TS 5.6.5. The proposed change will modify TS 5.6.5.b to add report NEDC-33930P, "GEXL98 Correlation for ATRIUM 10XM Fuel," (Reference 6.6), to the list of analytical methods used to determine the core operating limits. The basic correlation is a critical quality and boiling length (GEXL) correlation, which is used to predict the occurrence of boiling transition in boiling water reactors (BWR) fuel designs. The GEXL correlation requires the development of coefficients for the specific lattice geometry and peaking factors used in the fuel assembly design as part of the GE General Electric Standard Application for Reactor Fuel (GESTAR) II methodology (Reference 6.5). Development of this fuel type specific GEXL correlation for the ATRIUM 10XM fuel is described in Reference 6.6. The addition of this report to TS 5.6.5.b will allow DNPS to use the GEXL98 correlation to analyze the ATRIUM 10XM fuel in transition cores where it will co-exist with the GNF3 fuel.

The specific wording of the proposed TS change is shown below and in the corresponding marked-up TS page provided in Attachment 2. No TS Bases require update as a result of the addition of the new GEXL methodology reference.

21. NEDC-33930P, Revision 0, "GEXL98 Correlation for ATRIUM 10XM Fuel," Global Nuclear Fuels, February 2021, as approved by the NRC Staff SE dated XXX XX, 20XX.

2.2 Thermal-Mechanical Calculations with RODEX2A and TCD Penalties

In support of the legacy Framatome ATRIUM 10XM during early mixed core operation, fuel rod thermal-mechanical calculations were performed based on RODEX2A methodologies as approved by the NRC and incorporated into DNPS TS 5.6.5.b References 11 and 13, and subsequently modified for the inclusion of TCD effects. No changes to TS 5.6.5 are necessary; however, the use of RODEX2A with TCD effects is considered outside the currently approved use of the RODEX2A methodology at DNPS.

2.3 Thermal-Mechanical Calculations with PRIME

For the evaluation of fuel rod thermal and mechanical performance GESTAR II methods will be utilized for the transition cores that include the use of the PRIME computer code.

The GNF-A PRIME computer code and associated methodologies have been reviewed and approved by the NRC. References 6.8 through 6.11 are the current PRIME licensing topical reports. GNF-A has concluded that the Limitations and Conditions imposed in Section 4.0 of Reference 6.8 currently prevent the application of the PRIME thermal overpower (TOP) / mechanical overpower (MOP) methodologies to demonstrate that non-GNF fuel complies with the acceptance criteria for fuel melt and cladding strain without additional NRC review and approval. The TOP methodology is proposed to be applied to the Framatome ATRIUM 10XM fuel with no changes, while the MOP methodology will be applied with the changes described in

Section 5.2.3 of Reference 6.7 to ensure fuel damage due to fuel melting or excessive cladding strain does not occur as a result of anticipated operational occurrences (AOOs). The proposed methodology allows the indicated criteria of fuel melt temperature and cladding strain to be evaluated directly instead of through a simplification which requires excess conservatism due to the incompatibilities between GNF-A and non-GNF fuel manufacturing vendor methods. This is the same expanded use of PRIME as previously described in References 6.3 and 6.4 for QCNPS, as the same ATRIUM 10XM fuel design is used by QCNPS and DNPS.

CEG is requesting that GNF-A report, 006N8642-P, "Justification of PRIME Methodologies for Evaluating TOP and MOP Compliance for non-GNF Fuels," (Reference 6.7), be added to TS 5.6.5.b to document the expansion of the applicability of PRIME and its associated methodologies to demonstrate that the co-resident non-GNF fuel complies with the acceptance criteria for fuel melt and cladding strain. The specific wording of the proposed TS change is shown below and in the corresponding marked-up TS page provided in Attachment 2. No TS Bases require update as a result of the addition of the new PRIME reference.

22. 006N8642-P, Revision 1, "Justification of PRIME Methodologies for Evaluating TOP and MOP Compliance for non-GNF Fuels," Global Nuclear Fuels, January 2022, as approved by the NRC Staff SE dated XXX XX, 20XX.

3.0 TECHNICAL EVALUATION

DNPS plans to load GNF3 fuel into Unit 2 during the fall 2023 refueling outage and into Unit 3 the following fall. The fuel transition requires a new GEXL correlation, Framatome, Inc.'s RODEX2A methodology with an additional TCD penalty, and GNF-A's PRIME methodology to support the evaluation of the mixed transition cores. Application of GNF's PRIME methodology is intended to directly show compliance to the no fuel melting and cladding strain criteria for non-GNF fuel. This is an alternative method to an already approved approach of using overpower limits provided by the non-GNF fuel vendor.

3.1 GEXL98 Correlation

DNPS intends to use GE methodologies (Reference 6.5) to determine core operating limits for cores containing GNF3 fuel. This change requires an additional analytical correlation for analyzing the Framatome ATRIUM 10XM fuel with the GE methodology. The proposed TS change will allow DNPS to use GE critical power correlations to analyze the ATRIUM 10XM fuel. Development of this correlation is described, and its use justified in Reference 6.6. This new correlation, GEXL98, is the same correlation referenced for use at QCNPS as described in References 6.1 and 6.2 and further clarified in responses to NRC requests for additional information in Reference 6.12. Since these references were previously docketed for the QCNPS GNF3 transition license amendment they are not included in this document.

The GEXL98 correlation (Reference 6.6) was developed to be applicable to sites that have ATRIUM 10XM fuel, which includes both DNPS and QCNPS. Based on previous fuel transition experience developing GEXL correlations for a mixed core design, an expanded hypothetical database was developed and incorporated into the analysis for the GEXL98 correlation. For

convenience, the major technical approaches are summarized below with cross-references to other documents that provide additional technical details.

1. The GEXL98 correlation uses the same functional form as previous GEXL correlations with different constraints for correlation coefficient parameters based on a hypothetical database created using Framatome's approved correlation (ACE/ATRIUM 10XM). The critical power data provided by Framatome, Inc. for the development of the GEXL98 correlation were calculated consistent with Framatome's approved methodology, as documented in ANP-10298P, "ACE/ATRIUM 10XM Critical Power Correlation," (Reference 6.14). The data for various conditions are explicitly bounded by the upper and lower values of the domain range in Table 2-1 of Reference 6.14, with additional Framatome-proprietary discussion available in the response to SFNB-RAI-4 included in Reference 6.12. The critical power(s) at dryout determined by the Framatome ACE/ATRIUM 10XM critical power correlation were based on specified boundary conditions. As a result, GEXL98 is not based on any information extrapolated or otherwise inferred from the requested ACE/ATRIUM 10XM critical power data set and is consistent with the application domain of the approved ACE/ATRIUM 10XM correlation methodology.

   The distribution and statistics for multiple sets of random subspaces of the total statistical database (all full-length rods) generated by the final GEXL98 coefficients are GNF-proprietary and found in Table SFNB-RAI-3.1 of Reference 6.12. The statistics are relatively insensitive to the random subspace, including the smaller sized, complementary sets.

2. Generating the critical power database using Framatome's approved correlation (ACE/ATRIUM 10XM) is a reasonable engineering approach to evaluate mixed fuel cores, where neither the fuel dry-out experimental database nor the critical power correlation for the Framatome ATRIUM 10XM fuel is available to GNF.

3. The total uncertainty in the GEXL98 correlation's critical power predictions accounts for the fact that there is uncertainty in the correlation's fit to the Framatome, Inc. data provided to GNF-A. Framatome developed the database using the ACE/ATRIUM 10XM critical power correlation. The uncertainties in the database with respect to the underlying experimental data are not independent and Framatome's critical power correlation for the ATRIUM 10XM fuel is not available to GE.

   The data used to determine the GEXL98 uncertainty was provided in tabular form in Reference 6.15 and amended with additional information in Reference 6.12 as part of the QCNPS GNF3 fuel transition license amendment. The data previously provided are proprietary in their entirety and applicable to the use of GEXL98 at both DNPS and QCNPS.

4. The total uncertainty in the GEXL98 correlation predictions of critical power in ATRIUM 10XM fuel is similar to the NRC approved total uncertainty for GEXL96 (ADAMS Access No. ML012670193) and GEXL97 (ADAMS Accession No. ML033430391) correlation predictions of critical power in ATRIUM-9B and ATRIUM-10 fuel.

Using the review of the GEXL98 correlation for use at QCNPS, the NRC requested additional information regarding implementation of the correlation in computer codes other than GEXLM02 which was used to perform the validation. The response to SFNB-RAI-6 in Reference 6.12 explains the implementation of the GEXL98 correlation in the various GNF-A computer codes. This explanation is also applicable to the use of GEXL98 at DNPS because GEXL98 is a generic correlation for the ATRIUM 10XM fuel design, which is operated at DNPS, and various GNF-A computer codes are confirmed applicable for use at DNPS prior to implementation.

Based on the above discussion, DNPS has determined that the use of the GEXL98 correlation as described in the referenced documents is appropriate for DNPS, Units 2 and 3, and provides an equivalent level of protection as that currently provided.

3.2 Mixed Core Thermal Mechanical Support – RODEX2A

DNPS TS 5.6.5.b currently references both RODEX2A and RODEX4 thermal-mechanical evaluation methods. As described in Reference 6.13, the RODEX2A method, as modified to include a TCD penalty, will be used to analyze the fuel rod for fuel centerline temperature, cladding strain, rod internal pressure, cladding collapse, cladding fatigue, and external oxidation even though RODEX4 is currently used at DNPS. Reference 6.13 demonstrates that the mechanical criteria applicable to the design are satisfied.

3.3 Mixed Core Thermal Mechanical Support – PRIME

The application of PRIME and its approved methodologies is proposed for assessing the fuel melt and cladding strain criteria during fast and slow transients for ATRIUM 10XM fuel for the transition cycles. The key parameters for assessing PRIME's capabilities with respect to these criteria are the ability to reasonably predict fuel temperature and transient cladding deformation.

Justification for the application of PRIME to the co-resident DNPS Framatome ATRIUM 10XM fuel is provided in Reference 6.7 (previously submitted as part of the QCNPS PRIME expansion amendment request) as follows:

- Section 2 addresses the applicability of PRIME for assessing the fuel melt criterion.
- Section 3 addresses the applicability of PRIME for assessing the cladding strain criterion.
- Section 4 addresses the cladding material differences between the GNF3 and ATRIUM 10XM fuel designs in relation to internal PRIME models for irradiation growth and creep. This section also justifies the application of PRIME with non-GNF vendor

supplied Thermal Mechanical Operating Limits (TMOLs) which may have items outside the previously approved applicability of PRIME.

The NRC requested additional information to QCNPS regarding the application of new correlations within the GNF PRIME fuel analysis methodology to account for the properties and behavior of the Framatome fuel. The responses to the requested information in Reference 6.16 are also applicable to the expanded use of PRIME for assessing fuel melt and clad strain at DNPS.

Application of PRIME method to co-resident non-GNF fuel allows calculating TMOLs directly and is not linked to the approval of RODEX2A method as discussed in Reference 6.13.

3.4 Core Inventory Update Impacts

3.4.1 Alternate Source Term (AST) Calculations

The impact of the GNF3 fission product core inventory was evaluated for impact to the existing AST calculations. The post-Loss of Coolant Accident (LOCA) dose consequences were revised to include the GNF3 core inventory, and the change was approved by the NRC (Reference 6.17). The Fuel Handling Accident (FHA) source inventory and the Control Rod Drop Accident (CRDA) AST source inventory calculation revisions will be implemented at DNPS under 10 CFR 50.59.

3.4.2 Environmental Qualification Impacts

The effect of the GNF3 fission product core inventory was evaluated for impact to the environmental qualification (EQ) program. The change in core inventory has no impact on existing normal or post-accident temperature, pressure, or humidity. It also has no impact on the normal operating doses for EQ (UFSAR Table 3.11-1). The GNF3 reactor core radionuclide inventory developed for the GNF3 fuel was compared to the core inventory used to develop the accident doses for the EQ program. An Engineering Technical Evaluation of individual pieces of EQ equipment, and their supporting calculations, was performed using the GNF3 total integrated dose (TID), including normal and accident dose with margin, to the current qualified TIDs. It was prepared to evaluate the radiological impacts of the fuel transition on the DNPS EQ Program. All EQ program equipment's tested and/or analyzed radiation resistance envelopes the GNF3 fuel's calculated accident radiation dose, calculated or measured normal operating radiation dose, and EQ program required margins.

All EQ program equipment tested and/or analyzed for radiation resistance requirements envelop GNF3 fuel accident doses evaluated for normal operating radiation conditions with applicable margins.

The use of GNF3 fuel will not adversely impact any EQ equipment's ability to perform its intended safety function. This new analysis will be used to update all existing EQ program documents to reflect the impact of the revised TID and ensure continuity of design basis program requirement. The applicable EQ documents will be updated to reflect the as built conditions with the revised fuel TID and will follow approval of the proposed fuel change amendment request.

The change in TID, due to the new fuel, will have no impact on the EQ Zone radiation, thermal, pressure, or humidity conditions. Consequently, the revision to core inventory has no impact on non-safety related equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions by the safety-related equipment. Additionally, no new components are being added to the existing EQ equipment list as a result of the core inventory change.

The statements regarding the impacts of the fuel transition on other environmental parameters such as temperature, pressure, humidity, and chemical spray are based on vendor prepared documentation that was reviewed and accepted under Constellation procedural guidance for use at DNPS. The GNF3 fuel transition has no impact on the ability of any qualified equipment to perform its intended safety function, and thus maintaining compliance with 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to safety for Nuclear Power Plants." Although the existing documents are adequate to support continued compliance with 10 CFR 50.49, the EQ documentation will be evaluated and updated as required, to support its compliance with the existing EQ Program. The EQ documentation will be prioritized to ensure timely revision of applicable documents.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

10 CFR 50.36(c)(5), "Administrative controls," requires that provisions relating to organization and management, procedures, recording keeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner must be included in a licensee's TS. TS 5.6.5, "Core Operating Limits Report (COLR)," provides the list of approved methods to be used in determining the core operating limits. The transition to GNF3 fuel requires the addition of a new topical report, NEDC-33930P, "GEXL98 Correlation for ATRIUM 10XM Fuel," to TS 5.6.5.b to document the GNF-A correlation applicable to the ATRIUM 10XM fuel for use in the previously approved GESTAR II methodologies for performing licensing analysis. Furthermore, the addition of a second new report, 006N8642-P, "Justification of PRIME Methodologies for Evaluating TOP and MOP Compliance for non-GNF Fuels," to TS 5.6.5.b is necessary to document the expansion of the applicability of using PRIME and its associated methodologies to demonstrate that non-GNF fuel complies with the acceptance criteria for fuel melt and cladding strain.

10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants," identifies requirements for establishing a program for qualifying electric equipment that is important to safety as defined in 10 CFR 50.49(b). No new equipment needs to be added to the EQ Program and no existing EQ zone classifications change as a result of the revised source term.

4.2 No Significant Hazards Consideration

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Constellation Energy Generation, LLC (CEG) requests an amendment to Renewed Facility Operating License Nos. DPR-19 and DPR-25 for Dresden Nuclear Power Station (DNPS), Units 2 and 3, respectively. Specifically, CEG requests the following changes in support of the transition from Framatome, Inc. ATRIUM 10XM fuel to Global Nuclear Fuel – Americas, LLC (GNF/GNF-A) GNF3 at DNPS:

- Revise Technical Specifications (TS) 5.6.5, "Core Operating Limits Report (COLR)," paragraph b, to add NEDC-33930P, "GEXL98 Correlation for ATRIUM 10XM Fuel," and 006N8642-P, "Justification of PRIME Methodologies for Evaluating TOP and MOP Compliance for non-GNF Fuels," as references that support the GESTAR II analysis methodology to the list of approved methods to be used in determining the core operating limits.

- Revise TS 5.6.5, "Core Operating Limits Report (COLR)," paragraph b, to remove eight Westinghouse Topical Report references that will no longer be used after the 2023 refueling outage from the list of approved methods to be used in determining the core operating limits.

- Utilize fuel rod thermal-mechanical calculations for legacy Framatome ATRIUM 10XM fuel using RODEX2A methodologies modified for the inclusion of thermal conductivity degradation (TCD) effects.

CEG has evaluated the proposed change against the criteria of 10 CFR 50.92(c) to determine if the proposed change results in any significant hazards. The following is the evaluation of each of the 10 CFR 50.92(c) criteria:

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

   Response: No

   TS 5.6.5, "Core Operating Limits Report (COLR)," lists NRC approved analytical methods used at DNPS to determine core operating limits. The proposed changes will add two additional references to the list of administratively controlled analytical methods and remove eight references that will no longer be used in TS 5.6.5. Transition core evaluation will also use the Framatome RODEX2A method as modified to include a TCD penalty to evaluate thermal-mechanical aspects of the mixed transition cores.

   DNPS Unit 2 is scheduled to load Global Nuclear Fuel – Americas, LLC (GNF/GNF-A) fuel during the fall 2023 outage. The proposed changes to TS 5.6.5 will support the initial insertion of GNF3 fuel by defining the correlation used to model Framatome ATRIUM 10XM in the GESTAR II methodology and adding an alternative method to

determine the core operating limits and overpower limits for the transition cores. The addition of two references to TS 5.6.5 has no effect on any accident initiator or precursor previously evaluated and does not change the manner in which the core is operated. The correlation is an input to previously approved GE methods and PRIME is a previously approved GE method whose application is being extended to allow two additional assessments for a non-GNF fuel design in use at DNPS. Both applications have been reviewed to ensure that the output accurately models predicted core behavior, have no effect on the type or amount of radiation released, and have no effect on predicted offsite doses in the event of an accident.

Similarly, the use of the RODEX2A plus TCD methodology for thermal-mechanical evaluation has no effect on any accident initiator or precursor previously evaluated and does not change the manner in which the core is operated.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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 methodology changes to evaluate the mixed transition cores do not affect the performance of any DNPS structure, system, or component credited with mitigating any accident previously evaluated. The insertion of a new generation of fuel, which has been analyzed with NRC approved methodologies, will not affect the control parameters governing unit operation or the response of plant equipment to transient conditions. The proposed changes do not introduce any new modes of system operation or failure mechanisms.

   Therefore, the proposed changes do 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 change removes eight references that will no longer be used and adds two additional references to the list of administratively controlled analytical methods in TS 5.6.5 that can be used to determine core operating limits and expands the use of RODEX2A as modified with a TCD penalty to evaluate the thermal-mechanical behavior of the mixed transition cores. The proposed changes do not modify the safety limits or setpoints at which protective actions are initiated, and do not change the requirements governing operation or availability of safety equipment assumed to operate to preserve the margin of safety. Therefore, DNPS has determined that the proposed change provides an equivalent level of protection as that currently provided.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, CEG concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusion

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 to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

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, or would change an inspection or surveillance requirement. 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 effluents 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(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 REFERENCES

6.1 Letter from P.R. Simpson (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "Request for Licensing Amendment Regarding Transition to GNF3 Fuel," dated September 14, 2021 (ADAMS Accession Nos. ML21257A419 (proprietary) and ML21257A420 (non-proprietary))

6.2 Letter from P.R. Simpson (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "Response to Supplemental Request for Information Related to Request for Licensing Amendment Regarding Transition to GNF3 Fuel," dated November 3, 2021 (ADAMS Accession No. ML21307A444)

6.3 Letter from P.R. Simpson (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "Request to Expand Applicability of PRIME Methods to Evaluate Fuel Centerline Melt and Cladding Strain Compliance for Framatome Fuel at Quad Cities," dated January 20, 2022 (ADAMS Accession Nos. ML22020A398 (proprietary) and ML22020A399 (non-proprietary))

6.4 Letter from P.R. Simpson (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "Supplement to Request to Expand Applicability of PRIME Methods to Evaluate Fuel Centerline Melt and Cladding Strain Compliance for Framatome Fuel at Quad Cities," dated March 16, 2022 (ADAMS Accession No. ML22075A212 (non-proprietary))

6.5 GE Licensing Topical Report NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel (GESTAR II, Main)," Revision 31, dated November 2020 (ADAMS Accession No. ML20330A199 (non-proprietary))

6.6 NEDC-33930P, Revision 0, "GEXL98 Correlation for ATRIUM 10XM Fuel," dated February 2021 (Attachments 4 (non-proprietary) and 6 (proprietary) to Reference 6.1)

6.7 Global Nuclear Fuel 006N8642-P, Revision 1, "Justification of PRIME Methodologies for Evaluating TOP and MOP Compliance for non-GNF Fuels," dated January 2022 (Attachments 4 (non-proprietary) and 6 (proprietary) to Reference 6.3)

6.8 Global Nuclear Fuel NEDC-33256-P-A, Revision 2, "The PRIME Model for Analysis of Fuel Rod Thermal – Mechanical Performance Part 1 – Technical Bases," dated October 2021 (ADAMS Accession No. ML21279A283 (non-proprietary))

6.9 Global Nuclear Fuel NEDC-33257-P-A, Revision 2, "The PRIME Model for Analysis of Fuel Rod Thermal – Mechanical Performance Part 2 – Qualification," dated October 2021 (ADAMS Accession No. ML21279A283 (non-proprietary))

6.10 Global Nuclear Fuel NEDC-33258-P-A, Revision 2, "The PRIME Model for Analysis of Fuel Rod Thermal – Mechanical Performance Part 3 – Application Methodology," dated October 2021 (ADAMS Accession No. ML21279A283 (non-proprietary))

6.11 Global Nuclear Fuel NEDC-33840-P-A, Revision 1, "The PRIME Model for Transient Analysis of Fuel Rod Thermal-Mechanical Performance," dated August 2017 (ADAMS Accession No. ML17230A012 (non-proprietary))

6.12 Letter from P.R. Simpson (Constellation Energy Generation, LLC) to U.S Nuclear Regulatory Commission, "Response to Request for Additional Information Related to the License Amendment Request to Transition to GNF3 Fuel," dated April 11, 2022 (ADAMS Accession Nos. ML22101A146 (non-proprietary) and ML22101A147 (proprietary))

6.13 Framatome Report ANP-3918P, Revision 0, "ATRIUM 10XM Fuel Rod Thermal-Mechanical Evaluation with RODEX2A for Quad Cities and Dresden," dated April 2021 (ADAMS Accession No. ML21257A419 (proprietary version))

6.14 Framatome Licensing Topical Report ANP-10298P-A, "ACE/ATRIUM 10XM Critical Power Correlation," Revision 1, dated March 2014 (ADAMS Accession No. ML14183A734 (non-proprietary))

6.15 Letter from P.R. Simpson (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information for the GNF3 Fuel Transition License Amendment Request," dated January 11, 2022 (ADAMS Accession Nos. ML22011A320 (proprietary version) and ML22011A319 (non-proprietary))

6.16 Letter from P.R. Simpson (Constellation Energy Generation, LLC) to U. S. Nuclear Regulatory Commission, "Response to Request for Additional Information Regarding Quad Cities Request to Expand Applicability of GNF Thermal Mechanical Analysis Methods to Framatome Fuel," dated August 10, 2022 (ADAMS Accession No. ML22159A310 (non-proprietary)

6.17 Letter from R. Haskell (U. S. NRC) to B. Hanson (Exelon Generation Company, LLC), "Dresden Nuclear Power Station, Units 2 And 3 - Issuance of Amendment Nos. 272 And 265 To Increase Allowable Main Steam Isolation Valve Leakage (EPID L-2019-LLA-0232)," dated October 23, 2020

ATTACHMENT 2

Markup of Proposed Technical Specification Pages

Dresden Nuclear Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-19 and DPR-25

REVISED TECHNICAL SPECIFICATIONS PAGES

5.6-3
5.6-4
5.6-5

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

3. The LHGR for Specification 3.2.3.

4. Control Rod Block Instrumentation Setpoint for the Rod Block Monitor—Upscale Function Allowable Value for Specification 3.3.2.1.

5. The OPRM setpoints for the trip function for SR 3.3.1.3.3

b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel."

2. NEDO-32465-A, "Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications," August 1996.

~~3. CENPD-300-P-A, "Reference Safety Report for Boiling Water Reactor Reload Fuel."~~

~~4. WCAP-16081-P-A, "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2."~~

~~5. WCAP-15682-P-A, "Westinghouse BWR ECCS Evaluation Model: Supplement 2 to Code Description, Qualification and Application."~~

~~6. WCAP-16078-P-A, "Westinghouse BWR ECCS Evaluation Model: Supplement 3 to Code Description, Qualification and Application to SVEA-96 Optima2 Fuel."~~

~~7. WCAP-15836-P-A, "Fuel Rod Design Methods for Boiling Water Reactors - Supplement 1."~~

~~8. WCAP-15942-P-A, "Fuel Assembly Mechanical Design Methodology for Boiling Water Reactors, Supplement 1 to CENPD-287."~~

~~9. CENPD-390-P-A, "The Advanced PHOENIX and POLCA Codes for Nuclear Design of Boiling Water Reactors."~~

(continued)

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

~~10.~~ ~~WCAP-16865-P-A, "Westinghouse BWR ECCS Evaluation Model Updates: Supplement 4 to Code Description, Qualification and Application," Revision 1, October 2011.~~

3 → ~~11.~~ XN-NF-81-58(P)(A) Revision 2 and Supplements 1 and 2, "RODEX2 Fuel Rod Thermal-Mechanical Response Evaluation Model," Exxon Nuclear Company, March 1984.

4 → ~~12.~~ ANF-89-98(P)(A) Revision 1 and Supplement 1, "Generic Mechanical Design Criteria for BWR Fuel Designs," Advanced Nuclear Fuels Corporation, May 1995.

5 → ~~13.~~ EMF-85-74(P) Revision 0 Supplement 1 (P)(A) and Supplement 2 (P)(A), "RODEX2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model," Siemens Power Corporation, February 1998.

6 → ~~14.~~ BAW-10247PA Revision 0, "Realistic Thermal-Mechanical Fuel Rod Methodology for Boiling Water Reactors," AREVA NP, February 2008.

7 → ~~15.~~ XN-NF-80-19(P)(A) Volume 1 and Supplements 1 and 2, "Exxon Nuclear Methodology for Boiling Water Reactors - Neutronic Methods for Design and Analysis," Exxon Nuclear Company, March 1983.

8 → ~~16.~~ XN-NF-80-19(P)(A) Volume 4 Revision 1, "Exxon Nuclear Methodology for Boiling Water Reactors: Application of the ENC Methodology to BWR Reloads," Exxon Nuclear Company, June 1986.

9 → ~~17.~~ XN-NF-80-19(P)(A) Volume 3 Revision 2, "Exxon Nuclear Methodology for Boiling Water Reactors, THERMEX: Thermal Limits Methodology Summary Description," Exxon Nuclear Company, January 1987.

10 → ~~18.~~ EMF-2158(P)(A) Revision 0, "Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2," Siemens Power Corporation, October 1999.

11 → ~~19.~~ EMF-2245(P)(A) Revision 0, "Application of Siemens Power Corporation's Critical Power Correlations to Co-Resident Fuel," Siemens Power Corporation, August 2000.

(continued)

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

12 → ~~20.~~ EMF-2209(P)(A) Revision 3, "SPCB Critical Power Correlation," AREVA NP, September 2009.

13 → ~~21.~~ ANP-10298P-A Revision 1, "ACE/ATRIUM 10XM Critical Power Correlation," AREVA, March 2014.

14 → ~~22.~~ ANP-10307PA Revision 0, "AREVA MCPR Safety Limit Methodology for Boiling Water Reactors," AREVA NP, June 2011.

15 → ~~23.~~ XN-NF-84-105(P)(A) Volume 1 and Volume 1 Supplements 1 and 2, "XCOBRA-T: A Computer Code for BWR Transient Thermal–Hydraulic Core Analysis," Exxon Nuclear Company, February 1987.

16 → ~~24.~~ ANF-913(P)(A) Volume 1 Revision 1 and Volume 1 Supplements 2, 3, and 4, "COTRANSA2: A Computer Program for Boiling Water Reactor Transient Analyses," Advanced Nuclear Fuels Corporation, August 1990.

17 → ~~25.~~ EMF-2361(P)(A) Revision 0, "EXEM BWR-2000 ECCS Evaluation Model," Framatome ANP, May 2001.

18 → ~~26.~~ EMF-2292 (P)(A) Revision 0, "ATRIUM™-10: Appendix K Spray Heat Transfer Coefficients," Siemens Power Corporation, September 2000.

19 → ~~27.~~ ANF-1358(P)(A) Revision 3, "The Loss of Feedwater Heating Transient in Boiling Water Reactors," Framatome ANP, September 2005.

20 → ~~28.~~ EMF-CC-074(P)(A) Volume 4 Revision 0, "BWR Stability Analysis: Assessment of STAIF with Input from MICROBURN-B2," Siemens Power Corporation, August 2000.

The COLR will contain the complete identification for each of the TS referenced topical reports used to prepare the COLR (i.e., report number, title, revision, date, and any supplements).

(continued)

21. NEDC-33930P, Revision 0, "GEXL98 Correlation for ATRIUM 10XM Fuel," Global Nuclear Fuels, February 2021, as approved by the NRC Staff SE dated XXX XX, 20XX.
22. 006N8642-P, Revision 1, "Justification of PRIME Methodologies for Evaluating TOP and MOP Compliance for non-GNF Fuels," Global Nuclear Fuels, January 2022, as approved by the NRC Staff SE dated XXX XX, 20XX.