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10 CFR 50.90
10 CFR 50.12

August 22, 2016

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

R.E. Ginna Nuclear Power Plant
Renewed Facility Operating License No. DPR-18
NRC Docket No. 50-244

Subject: License Amendment Request and 10 CFR 50.12 Exemption Request for the Use of Optimized ZIRLO™ Fuel Rod Cladding

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (EGC) requests an amendment to Renewed Facility Operating License No. DPR-18 for R.E. Ginna Nuclear Power Plant (Ginna). This amendment request proposes to revise Ginna Technical Specifications (TS) 4.2.1, "Reactor Core, Fuel Assemblies," to add Optimized ZIRLO™ as an approved fuel rod cladding material. This change is consistent with the U. S. Nuclear Regulatory Commission (NRC) allowed use of Optimized ZIRLO™ fuel cladding material as documented in the Safety Evaluation included in Addendum 1-A to Westinghouse topical report WCAP-12610-P-A & CENPD-404-P-A, "Optimized ZIRLO™." EGC proposes to revise Ginna TS 5.6.5.b, "Core Operating Limits Report (COLR)," to add the Westinghouse topical report for Optimized ZIRLO™ (i.e., WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A) to the current list of NRC approved analytical methods used to determine the core operating limits, and to revise an approved analytical methodology to reflect the most up to date revision.

To support the change to allow the use of Optimized ZIRLO™, in accordance with 10 CFR 50.12, "Specific Exemptions," EGC is also requesting an exemption from certain requirements of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and Appendix K to 10 CFR Part 50, "ECCS Evaluation Models." This exemption request, a requirement of the first condition of the NRC Safety Evaluation for WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, relates solely to the specific types of cladding material specified in these regulations for use in light water reactors. As written, the regulations presume use of either Zircaloy or ZIRLO® fuel rod cladding. The exemption is required since Optimized ZIRLO™ has a slightly different composition than Zircaloy or standard ZIRLO®.

The attached request is subdivided as follows:

- Attachment 1 provides a description and evaluation of the proposed changes.
- Attachment 2 provides the Exemption Request.
- Attachment 3 provides the markup of the affected TS pages for Ginna.

The proposed changes have been reviewed by the Ginna Plant Operations Review Committee in accordance with the requirements of the EGC Quality Assurance Program.

EGC requests NRC approval of the proposed license amendment request and associated exemption request by August 22, 2017, in support of the core design for the Ginna, Cycle 41 core reload, which is scheduled to begin in the fall of 2018. Once approved, the amendment will be implemented within 60 days.

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

There are no regulatory commitments contained within this letter. Should you have any questions concerning this letter, please contact Ms. Laura A. Lynch at (610) 765-5729.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 22nd day of August 2016.

Respectfully,

David T. Gudger for

James Barstow
Director – Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachments:

1) Evaluation of Proposed Changes
2) Exemption Request
3) Markup of Technical Specifications Pages

cc: NRC Regional Administrator, Region I
NRC Senior Resident Inspector, Ginna
NRC Project Manager, Ginna
A.L. Peterson, NYSERDA

ATTACHMENT 1
Evaluation of Proposed Changes

Subject: **License Amendment Request for Optimized ZIRLO™ Fuel Rod Cladding**

1.0 SUMMARY DESCRIPTION

2.0 DETAILED DESCRIPTION

2.1 TS 4.2.1, "Reactor Core, Fuel Assemblies"

2.2 TS 5.6.5.b, "Core Operating Limits Report (COLR)"

3.0 TECHNICAL EVALUATION

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ATTACHMENT 1
Evaluation of Proposed Changes

1.0 SUMMARY DESCRIPTION

This evaluation supports a request to amend Renewed Facility Operating License No. DPR-18 for R.E. Ginna Nuclear Power Plant (Ginna).

Exelon Generation Company, LLC, (EGC) proposes to revise the Ginna Technical Specifications (TS) to allow the use of Optimized ZIRLO™ fuel rod cladding material. The current acceptable fuel rod cladding materials are identified in Ginna TS 4.2.1, "Reactor Core, Fuel Assemblies." The proposed change revises Ginna TS 4.2.1 to add Optimized ZIRLO™ as an approved fuel rod cladding material. This change is consistent with the U. S. Nuclear Regulatory Commission (NRC) allowed use of Optimized ZIRLO™ fuel cladding material as documented in the Safety Evaluation included in Addendum 1-A to Westinghouse Electric Company LLC (Westinghouse) topical report WCAP-12610-P-A & CENPD-404-P-A, "Optimized ZIRLO™" (Reference 2).

EGC proposes to revise Ginna TS 5.6.5.b, "Core Operating Limits Report (COLR)," to add the Westinghouse topical report for Optimized ZIRLO™ (i.e., WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A) to the current list of NRC approved analytical methods used to determine the core operating limits, and to revise an approved analytical methodology to reflect the most up to date revision.

In addition to the proposed TS changes, in accordance with 10 CFR 50.12, "Specific Exemptions," EGC requests an exemption from certain requirements of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and Appendix K to 10 CFR Part 50, "ECCS Evaluation Models," to allow the use of Optimized ZIRLO™ fuel rod cladding in future core reload applications for Ginna. This exemption request, a requirement of the first condition of the NRC Safety Evaluation for WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A (Reference 2), relates solely to the specific types of cladding material specified in these regulations for use in light water reactors. As written, the regulations presume use of either Zircaloy or ZIRLO® fuel rod cladding. The exemption is required since Optimized ZIRLO™ has a slightly different composition than Zircaloy or standard ZIRLO®. The exemption request is provided in Attachment 2 to this submittal.

EGC currently plans to use Optimized ZIRLO™ as the fuel rod cladding material for Ginna reloads starting with the new fuel introduced for Ginna, Cycle 41, which is scheduled to begin in the fall of 2018.

2.0 DETAILED DESCRIPTION

A specific description of each change is provided below. In addition, TS markups are provided in Attachment 3.

2.1 <u>TS 4.2.1, "Reactor Core, Fuel Assemblies"</u>

Ginna TS 4.2.1, "Reactor Core, Fuel Assemblies," would be revised to add Optimized ZIRLO™ as an approved fuel rod cladding material.

Current Ginna TS 4.2.1

The reactor shall contain 121 fuel assemblies. Each assembly shall consist of a matrix of zircaloy or ZIRLO clad fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zircaloy, ZIRLO, or stainless steel filler rods for fuel rods, in accordance with NRC approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or cycle specific analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

Proposed Ginna TS 4.2.1 (with changes in bold)

The reactor shall contain 121 fuel assemblies. Each assembly shall consist of a matrix of zircaloy**, ZIRLO®, or Optimized ZIRLO™** clad fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zircaloy, ZIRLO, or stainless steel filler rods for fuel rods, in accordance with NRC approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or cycle specific analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

2.2 TS 5.6.5.b, "Core Operating Limits Report (COLR)"

Ginna TS 5.6.5.b, "Core Operating Limits Report (COLR)," currently include a list of 11 documents that define the NRC approved analytical methods used to determine the core operating limits. The proposed revision to Ginna TS 5.6.5.b would add the Westinghouse topical report for Optimized ZIRLO™ (i.e., Addendum 1-A to WCAP-12610-P-A & CENPD-404-P-A (Reference 1)) as TS 5.6.5.b, Reference 12. The proposed revision also updates Reference 10 to reflect the most current revision of the methodology for the LCO.

Current Ginna TS 5.6.5.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:

...

10. WCAP-8745, "Design Basis for the Thermal Overpower Delta T and Thermal Overtemperature Delta T Trip Functions," March 1977. (Methodology for LCO 3.3.1.)

11. WCAP-14710-P-A, "1-D Heat Conduction Model for Annular Fuel Pellets," May, 1998. (Methodology for LCO 3.2.1)

Proposed Ginna TS 5.6.5.b (with changes in bold)

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:

...

10. **WCAP-8745-P-A**, "Design Basis for the Thermal Overpower Delta T and Thermal Overtemperature Delta T Trip Functions," **September 1986.**
(Methodology for LCO 3.3.1.)

11. WCAP-14710-P-A, "1-D Heat Conduction Model for Annular Fuel Pellets," May, 1998.
(Methodology for LCO 3.2.1).

12. **WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™," July 2006.**
(Methodology for LCO 3.2.1)

3.0 TECHNICAL EVALUATION

3.1 Background Information

As the nuclear industry pursues longer operating cycles with increased fuel discharge burnup and fuel duty, the corrosion performance requirements for the nuclear fuel cladding have become more demanding. Optimized ZIRLO™ material was developed to meet these needs and provide a reduced corrosion rate while maintaining the benefits of mechanical strength and resistance to accelerated corrosion from abnormal chemistry conditions. In addition, fuel rod internal pressures (resulting from the increased fuel duty, use of integral fuel burnable absorbers, and corrosion/temperature feedback effects) have become more limiting with respect to fuel rod design criteria. Reducing the associated corrosion buildup, and thus minimizing temperature feedback effects, provides additional margin to the fuel rod internal pressure design criterion.

EGC currently plans to use Optimized ZIRLO™ as the fuel rod cladding material for Ginna reloads starting with the new fuel introduced for Cycle 41, which is scheduled to begin in the fall of 2018.

3.2 Technical Justification of Acceptability

Westinghouse topical report WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, (Reference 1) provides the details and results of testing of Optimized ZIRLO™ High Performance Fuel Cladding material compared to standard ZIRLO® High Performance Fuel Cladding material as well as the material properties to be used in various models and methodologies when analyzing Optimized ZIRLO™ fuel rod cladding.

The NRC Safety Evaluation for WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, (Reference 2) contains ten conditions and limitations. The first condition requires an exemption from 10 CFR 50.46 and 10 CFR Part 50, Appendix K, which is provided in

Attachment 2 to this submittal. Westinghouse has provided the NRC with information related to test data and models (References 3 through 9) to address conditions and limitations 6 and 7. Conditions and limitations 8.b and 9 do not apply because Ginna does not have a Combustion Engineering (CE) fuel design and is not licensed with LOCBART or STRIKIN-II. The remaining conditions and limitations will be addressed in the Ginna TS changes and evaluations required to support core reload activities. Since plant-specific TS changes are required prior to utilizing Optimized ZIRLO™ fuel rod cladding, no new commitments are necessary to support NRC approval of this request.

The reload evaluations will ensure that acceptance criteria are met for insertion of assemblies with fuel rods clad with Optimized ZIRLO™ material. These assemblies will be evaluated using NRC approved methods and models to address the use of Optimized ZIRLO™ fuel rod cladding.

The ten conditions and limitations provided in the NRC Safety Evaluation for WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, (Reference 2) are listed below. EGC will comply with these conditions and limitations as follows:

1. Until rulemaking to 10 CFR Part 50 addressing Optimized ZIRLO™ has been completed, implementation of Optimized ZIRLO™ fuel clad requires an exemption from 10 CFR 50.46 and 10 CFR Part 50, Appendix K.

   RESPONSE: A request for the required exemption from 10 CFR 50.46 and 10 CFR 50 Appendix K is provided in Attachment 2 to this submittal.

2. The fuel rod burnup limit for this approval remains at currently established limits: 62 GWd/MTU for Westinghouse fuel designs and 60 GWd/MTU for CE fuel designs.

   RESPONSE: For any fuel using Optimized ZIRLO™ fuel rod cladding, the maximum fuel rod burnup limit for Westinghouse fuel designs will continue to be 62 GWd/MTU until such time that a new fuel rod burnup limit is approved for use.

3. The maximum fuel rod waterside corrosion, as predicted by the best-estimate model, will [satisfy proprietary limits included in topical report and proprietary version of safety evaluation] of hydrides for all locations of the fuel rod.

   RESPONSE: The maximum fuel rod waterside corrosion for fuel using Optimized ZIRLO™ fuel rod cladding will be confirmed to be less than the specified proprietary limits for all locations of the fuel rod. Evaluations are performed to confirm that the appropriate corrosion limits are satisfied as part of the normal reload design process.

4. All the conditions listed in previous NRC Safety Evaluation approvals for methodologies used for standard ZIRLO® and Zircaloy-4 fuel analysis will continue to be met, except that the use of Optimized ZIRLO™ cladding in addition to standard ZIRLO® and Zircaloy-4 cladding is now approved.

   RESPONSE: The fuel analysis of Optimized ZIRLO™ fuel rod cladding will continue to meet all conditions associated with approved methods. For Ginna, this is a current requirement, and confirmation of these conditions is required as part of the normal reload design process.

5. All methodologies will be used only within the range for which ZIRLO and Optimized ZIRLO™ data were acceptable and for which the verification discussed in Addendum 1 and responses to RAIs were performed.

   RESPONSE: The application of ZIRLO and Optimized ZIRLO™ cladding in approved methodologies will be made consistent with the approach accepted in WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A (Reference 1). For Ginna, this is a current requirement, and confirmation of these conditions is required as part of the normal reload design process.

6. The licensee is required to ensure that Westinghouse has fulfilled the following commitment: Westinghouse shall provide the NRC staff with a letter(s) containing the following information (Based on the schedule described in response to RAI #3):

   a. Optimized ZIRLO™ LTA data from Byron, Calvert Cliffs, Catawba, and Millstone.

      i. Visual
      ii. Oxidation of fuel rods
      iii. Profilometry
      iv. Fuel rod length
      v. Fuel assembly length

   b. Using the standard and Optimized ZIRLO™ database including the most recent LTA data, confirm applicability with currently approved fuel performance models (e.g., measured vs. predicted).

   Confirmation of the approved models' applicability up through the projected end of cycle burnup for the Optimized ZIRLO™ fuel rods must be completed prior to their initial batch loading and prior to the startup of subsequent cycles. For example, prior to the first batch application of Optimized ZIRLO™, sufficient LTA data may only be available to confirm the models' applicability up through 45 GWd/MTU. In this example, the licensee would need to confirm the models up through the end of the initial cycle. Subsequently, the licensee would need to confirm the models, based upon the latest LTA data, prior to re-inserting the Optimized ZIRLO™ fuel rods in future cycles. Based upon the LTA schedule, it is expected that this issue may only be applicable to the first few batch implementations, since sufficient LTA data up through the burnup limit should be available within a few years.

   RESPONSE: Westinghouse has provided the NRC with information related to test data and models in the following letters:

   - Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-1, January 4, 2007 (Reference 3).

   - Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-58, November 6, 2007 (Reference 4).

- Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-58 Rev. 1, February 5, 2008 (Reference 5).

- Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-08-60, December 30, 2008 (Reference 6).

- Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-10-43, July 26, 2010 (Reference 7).

- Letter from James A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-13-6, February 25, 2013 (Reference 8).

- Letter from James A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "Submittal of Responses to Draft RAIs and Revisions to Select Figures in LTR-NRC-13-6 to Fulfill Conditions 6 and 7 of the Safety Evaluation for WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A (Proprietary/Non-proprietary)," LTR-NRC-15-7, February 9, 2015 (Reference 9).

Lead Test Assembly (LTA) measured data and favorable results from visual examinations of once, twice, and thrice-burned LTAs confirm, up to the fuel rod burnup limit of 62 GWd/MTU, that the current fuel performance models are applicable for Optimized ZIRLO™ clad fuel rods. Through transmittal of the information contained in the above mentioned letters, Westinghouse has fulfilled its obligation to provide additional data from the Optimized ZIRLO™ cladding LTA programs to the NRC. Exelon has confirmed that the requirements of this condition have been met as it applies to Ginna.

7. The licensee is required to ensure that Westinghouse has fulfilled the following commitment: Westinghouse shall provide the NRC staff with a letter containing the following information (Based on the schedule described in response to RAI #11):

   a. Vogtle growth and creep data summary reports.
   b. Using the standard ZIRLO® and Optimized ZIRLO™ database including the most recent Vogtle data, confirm applicability with currently approved fuel performance models (e.g., level of conservatism in Westinghouse rod pressure analysis, measured vs. predicted, predicted minus measured vs. tensile and compressive stress).

Confirmation of the approved models' applicability up through the projected end of cycle burnup for the Optimized ZIRLO™ fuel rods must be completed prior to their initial batch loading and prior to the startup of subsequent cycles. For example, prior to the first batch application of Optimized ZIRLO™, sufficient LTA may only be available to confirm the models' applicability up through 45 GWd/MTU. In this example, the licensee would need to confirm the models up through the end of the initial cycle. Subsequently, the licensee would need to confirm the models, based upon the latest LTA data, prior to re-inserting the Optimized ZIRLO™ fuel rods in future cycles. Based upon the LTA schedule, it is expected that this issue may only be applicable to the first few batch implementations since sufficient LTA data up through the burnup limit should be available within a few years.

RESPONSE: Westinghouse has provided the NRC with information related to test data and models in the following letters:

- Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-1, January 4, 2007 (Reference 3).

- Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-58, November 6, 2007 (Reference 4).

- Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-58 Rev. 1, February 5, 2008 (Reference 5).

- Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-08-60, December 30, 2008 (Reference 6).

- Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-10-43, July 26, 2010 (Reference 7).

- Letter from James A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-13-6, February 25, 2013 (Reference 8).

- Letter from James A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "Submittal of Responses to Draft RAIs and Revisions to Select Figures in LTR-NRC-13-6 to Fulfill Conditions 6 and 7 of the Safety Evaluation for WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A (Proprietary/Non-proprietary)," LTR-NRC-15-7, February 9, 2015 (Reference 9).

The data from three cycles of operation has been evaluated. The fuel rod creep models from fuel rod design codes have been used to predict the growth and creep performance and have confirmed the models applicability to predict grown and creep performance satisfactorily. Through transmittal of the information contained in the above mentioned letters, Westinghouse has fulfilled its obligation to provide additional data regarding test data and performance models to the NRC. Exelon has confirmed that the requirements of this condition have been met as it applies to Ginna.

8. The licensee shall account for the relative differences in unirradiated strength (YS and UTS) between Optimized ZIRLO™ and standard ZIRLO® in cladding and structural analyses until irradiated data for Optimized ZIRLO™ have been collected and provided to the NRC staff.

   a. For the Westinghouse fuel design analyses:

      i. The measured, unirradiated Optimized ZIRLO™ strengths shall be used for Beginning of Life (BOL) analyses.

      ii. Between BOL up to a radiation fluence of 3.0×10^{21} n/cm^2 (E>1MeV), pseudo-irradiated Optimized ZIRLO™ strength set equal to linear interpolation between the following two strength level points: At zero fluence, strength of Optimized ZIRLO™ equal to measured strength of Optimized ZIRLO™ and at a fluence of 3.0×10^{21} n/cm^2 (E>1MeV), irradiated strength of standard ZIRLO® at a fluence of 3.0×10^{21} n/cm^2 (E>1MeV) minus 3 ksi.

      iii. During subsequent irradiation from 3.0×10^{21} n/cm^2 up to 12×10^{21} n/cm^2, the differences in strength (the difference at a fluence of 3.0×10^{21} n/cm^2 due to tin content) shall be decreased linearly such that the pseudo-irradiated Optimized ZIRLO™ strengths will saturate at the same properties as standard ZIRLO® at 12×10^{21} n/cm^2.

   b. For the CE fuel design analyses, the measured, unirradiated Optimized ZIRLO™ strengths shall be used for all fluence levels (consistent with previously approved methods).

   RESPONSE: Ginna uses a Westinghouse fuel design; therefore, condition 8.b does not apply.

The fuel analysis of Optimized ZIRLO™ clad rods for Ginna will use the yield strength and ultimate tensile strength as modified per Conditions 8.a.i, 8.a.ii, and 8.a.iii until such time that irradiated data for Optimized ZIRLO™ cladding strengths have been collected and provided to the NRC. Exelon will confirm that the requirements of this condition will be met as it applies to Ginna during the normal reload process.

Westinghouse has provided the NRC with information related to irradiated data for Optimized ZIRLOTM cladding strengths in the following letter:

- Letter from James A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "Submittal of Response to Condition 8.a of the Safety Evaluation Report (SER) on WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A, 'Optimized ZIRLO TM,' (Proprietary/Non-Proprietary)," LTR-NRC-15-84, September 29, 2015 (Reference 10).

9. As discussed in response to RAI #21, for plants introducing Optimized ZIRLO™ that are licensed with LOCBART or STRIKIN-II and have a limiting PCT that occurs during blowdown or early reflood, the limiting LOCBART or STRIKIN-II calculation will be rerun using the specified Optimized ZIRLO™ material properties. Although not a condition of approval, the NRC staff strongly recommends that, for future evaluations, Westinghouse update all computer models with Optimized ZIRLO™ specific material properties.

   RESPONSE: Ginna is not licensed with LOCBART or STRIKIN-II. Therefore, this condition does not apply.

10. Due to the absence of high temperature oxidation data for Optimized ZIRLO™, the Westinghouse coolability limit on PCT during the locked rotor event shall be [proprietary limits included in topical report and proprietary version of safety evaluation].

    RESPONSE: For implementation of Optimized ZIRLO™ fuel cladding, the Peak Cladding Temperature (PCT) calculated for the locked rotor event will be assessed relative to the Westinghouse Optimized ZIRLO™ cladding PCT limit. For subsequent core reload designs, the calculated PCT will be reassessed as part of the normal reload design process.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The proposed changes have been evaluated to determine whether applicable regulations and requirements continue to be met.

- 10 CFR 50.46 provides acceptance criteria for emergency core cooling systems for light-water nuclear power reactors.

- Appendix K to 10 CFR Part 50 establishes the required and acceptable features of the ECCS evaluation models.

- By letter dated June 10, 2005, the NRC issued a safety evaluation approving Addendum 1 to Westinghouse Topical Report WCAP-12610-P-A & CENPD-404-P-A, "Optimized ZIRLO™," wherein the NRC approved the use of Optimized ZIRLO™ as an acceptable fuel cladding material for Westinghouse and Combustion Engineering (CE) fuel designs (Reference 2).

EGC evaluated the proposed change to determine whether applicable regulations and requirements continue to be met. This determination found that the proposed change to allow the use of Optimized ZIRLO™ fuel rod cladding material requires an exemption from 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and Appendix K to 10 CFR 50, "ECCS Evaluation Models."

Attachment 2 provides the basis and justification for exemption from these regulations.

4.2 Precedent

As part of the industry focus to minimize the potential for fuel failure, the following licensees have received staff approval to use Optimized ZIRLO™ fuel cladding:

- Letter from J. Wiebe (U. S. Nuclear Regulatory Commission) to Bryan Hanson (Exelon Generation Company), "Byron Station, Unit Nos. 1 and 2, and Braidwood Station, Units 1 and 2 – Exemption from the Requirements of 10 CFR PART 50, Section 50.46 and Appendix K to Allow the Use of OPTIMIZED ZIRLO™ Clad Fuel Rods (CAC NOS. MF7399, MF7400, MF7401 AND MF7402)," June 20, 2016 (ADAMS Accession No. ML16126A061).

- Letter from J. G. Lamb (U. S. Nuclear Regulatory Commission) to K. Walsh (NextEra Energy Seabrook, LLC), "Seabrook Station, Unit No. 1 - Issuance of Amendment Regarding the Use of Optimized ZIRLO™ Fuel Rod Cladding Material (TAC No. MF2410)," March 5, 2014 (ADAMS Accession No. ML13213A143).

- Letter from J. Kim (U. S. Nuclear Regulatory Commission) to D. A. Heacock (Dominion), "Millstone Power Station Unit No. 3 - Issuance of Amendment Re: the Use of Optimized ZIRLO™ Fuel Rod Cladding (TAC No. ME7663)," September 24, 2012 (ADAMS Accession No. ML12236A396).

- Letter from J. S. Wiebe (U. S. Nuclear Regulatory Commission) to D. A. Heacock (Dominion), "North Anna Power Station, Unit Nos. 1 and 2, Issuance of Amendments Regarding the Use of Optimized ZIRLO™ Fuel Rod Cladding (TAC Nos. ME3885 and ME3886)," April 14, 2011 (ADAMS Accession No. ML110601196).

4.3 No Significant Hazards Consideration

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (EGC) requests an amendment to Renewed Facility Operating License No. DPR-18 for R.E. Ginna Nuclear Power Plant (Ginna).

This amendment request proposes to allow the use of Optimized ZIRLO™ fuel cladding material consistent with the U. S. Nuclear Regulatory Commission (NRC) allowed use of Optimized ZIRLO™ fuel cladding material as documented in the Safety Evaluation included in Addendum 1-A to Westinghouse topical report WCAP-12610-P-A & CENPD-404-P-A, "Optimized ZIRLO™." In support of this change, EGC proposes to revise the Ginna Technical Specifications (TS) 4.2.1, "Reactor Core, Fuel Assemblies," to add Optimized ZIRLO™ as an approved fuel rod cladding, and EGC proposes to revise Ginna TS 5.6.5.b, "Core Operating Limits Report (COLR)," to add the Westinghouse topical report for Optimized ZIRLO™ (i.e., WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A) to the current list of NRC approved analytical methods used to determine the core operating limits, and to revise an approved analytical methodology to reflect the most up to date revision.

According to 10 CFR 50.92, "Issuance of amendment," paragraph (c), a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

EGC has evaluated the proposed changes for Ginna, using the criteria in 10 CFR 50.92, and has determined that the proposed changes do not involve a significant hazards consideration. The following information is provided to support a finding of no significant hazards consideration.

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

   Response: No.

   The proposed change would allow the use of Optimized ZIRLO™ clad nuclear fuel in the reactors. The NRC approved topical report WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™," prepared by Westinghouse Electric Company LLC (Westinghouse), addresses Optimized ZIRLO™ and demonstrates that Optimized ZIRLO™ has essentially the same properties as currently licensed ZIRLO®. The fuel cladding itself is not an accident initiator and does not affect accident probability.

With the approved exemption, use of Optimized ZIRLO™ fuel cladding will continue to meet all 10 CFR 50.46 acceptance criteria and, therefore, will not increase the consequences of an accident.
Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   Response: No.

   Use of Optimized ZIRLO™ clad fuel will not result in changes in the operation or configuration of the facility. Topical Report WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, demonstrated that the material properties of Optimized ZIRLO™ are similar to those of standard ZIRLO®. Therefore, Optimized ZIRLO™ fuel rod cladding will perform similarly to those fabricated from standard ZIRLO®, thus precluding the possibility of the fuel cladding becoming an accident initiator and causing a new or different type of accident. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

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

   Response: No.

   The proposed change will not involve a significant reduction in the margin of safety. Topical Report WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, demonstrated that the material properties of the Optimized ZIRLO™ are not significantly different from those of standard ZIRLO®. Optimized ZIRLO™ is expected to perform similarly to standard ZIRLO® for all normal operating and accident scenarios, including both loss of coolant accident (LOCA) and non-LOCA scenarios. For LOCA scenarios, where the slight difference is Optimized ZIRLO™ material properties relative to standard ZIRLO® could have some impact on the overall accident scenario, plant-specific LOCA analyses using Optimized ZIRLO™ properties will demonstrate that the acceptance criteria of 10 CFR 50.46 have been satisfied. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, EGC concludes that the proposed amendment to allow the use of Optimized ZIRLO™ fuel cladding material does not involve a 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 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 to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

EGC has evaluated the proposed amendment for environmental considerations. The review has resulted in the determination 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, and 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 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(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

1) WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™," July 2006.

2) Letter from H. N. Berkow (USNRC) to J. A. Gresham (Westinghouse), "Final Safety Evaluation for Addendum 1 to Topical Report WCAP-12610-P-A & CENPD-404-P-A, 'Optimized ZIRLO™'," June 10, 2005.

3) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-1, January 4, 2007.

4) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-58, November 6, 2007.

5) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-58, Rev. 1, February 5, 2008.

6) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-08-60, December 30, 2008.

7) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-Proprietary)," LTR-NRC-10-43, July 26, 2010.

8) Letter from James A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-Proprietary)," LTR-NRC-13-6, February 25, 2013.

9) Letter from James A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "Submittal of Responses to Draft RAIs and Revisions to Select Figures in LTR-NRC-13-6 to Fulfill Conditions 6 and 7 of the Safety Evaluation for WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A (Proprietary/ Non-Proprietary)," LTR-NRC-15-7, February 9, 2015.

10) Letter from James. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "Submittal of Response to Condition 8.a of the Safety Evaluation Report (SER) on WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A, 'Optimized ZIRLO™,' (Proprietary/Non-Proprietary)," LTR-NRC-15-84, September 29, 2015.

ATTACHMENT 2

Exemption Request

R.E. Ginna Nuclear Power Plant

5 pages follow

ATTACHMENT 2
Exemption Request

1.0 SUMMARY DESCRIPTION

Exelon Generation Company, LLC (EGC) requests an exemption from the provisions of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and Appendix K to 10 CFR Part 50, "ECCS Evaluation Models," to allow the use of Optimized ZIRLO™ High Performance Fuel Cladding Material in future core reload applications for R.E. Ginna Nuclear Power Plant (Ginna). The regulation in 10 CFR 50.46 contains acceptance criteria for the emergency core cooling system (ECCS) for reactors that have fuel rods fabricated either with Zircaloy or ZIRLO® High Performance Cladding Material. Appendix K to 10 CFR Part 50, paragraph I.A.5, requires the Baker-Just equation to be used to predict the rates of energy release, hydrogen generation, and cladding oxidation from the metal-water reaction. The Baker-Just equation assumed the use of a zirconium alloy different than Optimized ZIRLO™ material. Therefore, an exemption to 10 CFR 50.46 and 10 CFR Part 50, Appendix K is required to support the use of Optimized ZIRLO™ fuel rod cladding. The exemption request relates solely to the specific cladding material specified in these regulations (i.e., fuel rods with Zircaloy or ZIRLO® cladding). This request will provide for the application of the acceptance criteria of 10 CFR 50.46 and Appendix K to 10 CFR Part 50 to fuel assembly designs utilizing Optimized ZIRLO™ fuel rod cladding.

2.0 BACKGROUND

As the nuclear industry pursues longer operating cycles with increased fuel discharge burnup and fuel duty, the corrosion performance requirements for the nuclear fuel cladding become more demanding. Optimized ZIRLO™ material was developed to meet these needs and provides a reduced corrosion rate while maintaining the benefits of mechanical strength and resistance to accelerated corrosion from abnormal chemistry conditions. In addition, fuel rod internal pressures (resulting from the increased fuel duty, use of integral fuel burnable absorbers, and corrosion/temperature feedback effects) have become more limiting with respect to fuel rod design criteria. Reducing the associated corrosion buildup, and thus minimizing temperature feedback effects, provides additional margin to the fuel rod internal pressure design criterion.

EGC currently plans to use Optimized ZIRLO™ as the fuel rod cladding material for Ginna reloads starting with the new fuel introduced for Cycle 41, which is scheduled to begin in the fall of 2018.

Technical Specification (TS) changes for Ginna are required to allow the use of Optimized ZIRLO™ fuel rod cladding for core reload applications. The request for the TS changes is provided in Attachment 1 to this submittal.

3.0 TECHNICAL JUSTIFICATION OF ACCEPTABILITY

Westinghouse Electric Company LLC (Westinghouse) topical report WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™," (Reference 1) provides the details and results of testing of Optimized ZIRLO™ material compared to standard ZIRLO® material as well as the material properties to be used in various models and methodologies when analyzing Optimized ZIRLO™ fuel rod cladding. The Nuclear Regulatory Commission (NRC) Safety

Evaluation for WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, (Reference 2) contains ten conditions and limitations. The first condition requires an exemption from 10 CFR 50.46 and 10 CFR Part 50, Appendix K, which is being requested via this letter. Westinghouse has provided the NRC with information related to test data and models (References 3 through 9) to address conditions and limitations 6 and 7. Conditions and limitations 8.b and 9 do not apply because Ginna does not have a Combustion Engineering (CE) fuel design and is not licensed with LOCBART or STRIKIN-II. The remaining conditions and limitations will be addressed in the Ginna TS changes and evaluations required to support core reload activities. Since plant-specific TS changes are required prior to utilizing Optimized ZIRLO™ fuel rod cladding, no new commitments are necessary to support NRC approval of this exemption request.

The reload evaluations will ensure that acceptance criteria are met for insertion of assemblies with fuel rods clad with Optimized ZIRLO™ material. These assemblies will be evaluated using NRC approved methods and models to address the use of Optimized ZIRLO™ fuel rod cladding.

4.0 JUSTIFICATION OF EXEMPTION

10 CFR 50.12, "Specific exemptions," states that the NRC may grant exemptions from the requirements of the regulations of this part provided two conditions are met. They are: (1) the exemption is authorized by law; the exemption will not present an undue risk to the health and safety of the public; and the exemption is consistent with the common defense and security; and (2) the Commission will not consider granting an exemption unless special circumstances are present. The requested exemption to allow the use of Optimized ZIRLO™ fuel rod cladding material in addition to Zircaloy or ZIRLO® material for core reload applications at Ginna satisfies these criteria as described below.

<u>Condition 1:</u>

1. <u>This exemption is authorized by law</u>

   As required by 10 CFR 50.12 (a)(1), this requested exemption is "authorized by law." The selection of a specified cladding material in 10 CFR 50.46 and implied in 10 CFR Part 50, Appendix K, was adopted at the discretion of the Commission consistent with its statutory authority. No statute required the NRC to adopt this specification. Additionally, the NRC has the authority under Section 50.12 to grant exemptions from the requirements of Part 50 upon showing proper justification. Further, it should be noted that, by submitting this exemption request, Ginna does not seek an exemption from the acceptance and analytical criteria of 10 CFR 50.46 and 10 CFR Part 50, Appendix K. The intent of the request is solely to allow the use of criteria set forth in these regulations for application to the Optimized ZIRLO™ fuel rod cladding material.

2. <u>This exemption will not present an undue risk to public health and safety.</u>

   The reload evaluations will ensure that acceptance criteria are met for the insertion of assemblies with fuel rods clad with Optimized ZIRLO™ material. Fuel assemblies using Optimized ZIRLO™ fuel rod cladding will be evaluated using NRC approved analytical methods and plant-specific models to address the changes in the cladding material properties. The safety analyses for Ginna is supported by the applicable site specific TS. Reload cores are required to be operated in accordance with the operating limits specified in the TS. Thus, the granting of this exemption request will not pose an undue risk to public health and safety.

3. <u>This exemption is consistent with common defense and security.</u>

   As noted above, the exemption request is only to allow the application of the aforementioned regulations to an improved fuel rod cladding material. All the requirements and acceptance criteria will be maintained. The special nuclear material in these assemblies is required to be handled and controlled in accordance with approved procedures. Use of full regions of Optimized ZIRLO™ fuel rod cladding in the Ginna core will not affect plant operations and is consistent with common defense and security.

<u>Condition 2</u>

<u>Special circumstances support the issuance of an exemption</u>

10 CFR 50.12(a)(2) states that the NRC will not consider granting an exemption to the regulations unless special circumstances are present. The requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii) which states that, "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule." In this particular circumstance, application of the subject regulations is not necessary to achieve the underlying purpose of the rule.

10 CFR 50.46 identifies acceptance criteria for ECCS performance at nuclear power plants. Due to the similarities in the properties of Optimized ZIRLO™ material and standard ZIRLO® material, the current ECCS analysis approach remains applicable. Westinghouse will perform an evaluation of the Ginna core using Loss of Coolant Accident (LOCA) methods approved for the site to ensure that assemblies with Optimized ZIRLO™ fuel rod cladding material meet all LOCA safety criteria.

The intent of 10 CFR Part 50, Appendix K, paragraph I.A.5 is to apply an equation for rates of energy release, hydrogen generation, and cladding oxidation from a metal-water reaction that conservatively bounds all post-LOCA scenarios (i.e., the Baker-Just equation). Application of the Baker-Just equation has been demonstrated to be appropriate for the Optimized ZIRLO™ alloy. Due to the similarities in the composition of the Optimized ZIRLO™ and standard ZIRLO® fuel rod cladding materials, the application of the Baker-Just equation will continue to conservatively bound all post-LOCA scenarios.

5.0 CONCLUSION

The acceptance criteria and requirements of 10 CFR 50.46 and 10 CFR Part 50, Appendix K are currently limited in applicability to the use of fuel rods with Zircaloy or ZIRLO cladding. 10 CFR 50.46 and 10 CFR Part 50, Appendix K do not apply to the proposed use of Optimized ZIRLO™ fuel rod cladding material since Optimized ZIRLO™ material has a slightly different composition than Zircaloy or ZIRLO material. With the approval of this exemption request, these regulations will be applied to Optimized ZIRLO™ fuel rod cladding.

In order to support the use of Optimized ZIRLO™ fuel rod cladding material, an exemption from the requirements of 10 CFR 50.46 and 10 CFR Part 50, Appendix K is requested. As required by 10 CFR 50.12, the requested exemption is authorized by law, does not present undue risk to public health and safety, and is consistent with common defense and security. Approval of this exemption request does not violate the underlying purpose of the rule. In addition, special circumstances do exist to justify the approval of an exemption from the subject requirements.

6.0 REFERENCES

1) WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™," July 2006.

2) Letter from H. N. Berkow (USNRC) to J. A. Gresham (Westinghouse), "Final Safety Evaluation for Addendum 1 to Topical Report WCAP-12610-P-A & CENPD-404-P-A, 'Optimized ZIRLO™'," June 10, 2005.

3) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-1, January 4, 2007.

4) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-58, November 6, 2007.

5) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-07-58, Rev. 1, February 5, 2008.

6) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-proprietary)," LTR-NRC-08-60, December 30, 2008.

7) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-Proprietary)," LTR-NRC-10-43, July 26, 2010.

8) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "SER Compliance of WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™' (Proprietary/Non-Proprietary)," LTR-NRC-13-6, February 25, 2013.

9) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "Submittal of Responses to Draft RAIs and Revisions to Select Figures in LTR-NRC-13-6 to Fulfill Conditions 6 and 7 of the Safety Evaluation for WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A (Proprietary/Non-Proprietary)," LTR-NRC-15-7, February 9, 2015.

10) Letter from J. A. Gresham (Westinghouse) to U. S. Nuclear Regulatory Commission, "Submittal of Response to Condition 8.a of the Safety Evaluation Report (SER) on WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A, 'Optimized ZIRLO™,' (Proprietary/Non-Proprietary)," LTR-NRC-15-84, September 29, 2015.

ATTACHMENT 3

Markup of Technical Specifications Pages

R.E. Ginna Nuclear Power Plant

Docket No. 50-244

Renewed Facility Operating License No. DPR-18

REVISED TS PAGES

4.2-1
5.6-3
5.6-4

4.0 DESIGN FEATURES

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor shall contain 121 fuel assemblies. Each assembly shall consist of a matrix of zircaloy, ZIRLO®, or Optimized ZIRLO™ ~~or ZIRLO~~ clad fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zircaloy, ZIRLO, or stainless steel filler rods for fuel rods, in accordance with NRC approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or cycle specific analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

4.2.2 Control Rod Assemblies

The reactor core shall contain 29 control rod assemblies. The control material shall be silver indium cadmium.

NO CHANGE TO THIS PAGE -- PROVIDED FOR INFORMATION ONLY

5.6.5 CORE OPERATING LIMITS REPORT (COLR)

The following administrative requirements apply to the COLR:

a. Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

2.1,	"Safety Limits (SLs)";
LCO 3.1.1,	"SHUTDOWN MARGIN (SDM)";
LCO 3.1.3,	"MODERATOR TEMPERATURE COEFFICIENT (MTC)";
LCO 3.1.5,	"Shutdown Bank Insertion Limit";
LCO 3.1.6,	"Control Bank Insertion Limits";
LCO 3.2.1,	"Heat Flux Hot Channel Factor ($F_Q(Z)$)";
LCO 3.2.2,	"Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$)";
LCO 3.2.3,	"AXIAL FLUX DIFFERENCE (AFD)";
LCO 3.3.1,	"Reactor Protection System (RPS) Instrumentation";
LCO 3.4.1,	"RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits"; and
LCO 3.9.1,	"Boron Concentration."

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. WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985.
(Methodology for 2.1, LCO 3.1.1, LCO 3.1.3, LCO 3.1.5, LCO 3.1.6, LCO 3.2.1, LCO 3.2.2, LCO 3.2.3, and LCO 3.9.1.)

2. WCAP-16009-P-A, "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty (ASTRUM)," January 2005.

3. WCAP-10216-P-A, Rev. 1A, "Relaxation of Constant Axial Offset Control / FQ Surveillance Technical Specification," February 1994.
(Methodology for LCO 3.2.1 and LCO 3.2.3.)

4. WCAP-12610-P-A, "VANTAGE + Fuel Assembly Reference Core Report," April 1995.
(Methodology for LCO 3.2.1.)

5. WCAP 11397-P-A, "Revised Thermal Design Procedure," April 1989.
(Methodology for LCO 3.4.1 when using RTDP.)

6. WCAP-10054-P-A and WCAP-10081-A, "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," August 1985.
(Methodology for LCO 3.2.1.)

7. WCAP-10054-P-A, Addendum 2, Revision 1, "Addendum to the Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code: Safety Injection Into the Broken Loop and COSI Condensation Model," July 1997.
(Methodology for LCO 3.2.1)

8. WCAP-11145-P-A, "Westinghouse Small Break LOCA ECCS Evaluation Model Generic Study With the NOTRUMP Code," October 1986.
(Methodology for LCO 3.2.1)

9. WCAP-10079-P-A, "NOTRUMP - A Nodal Transient Small Break and General Network Code," August 1985.
(Methodology for LCO 3.2.1)

WCAP-8745-P-A

September 1986

10. ~~WCAP-8745~~, "Design Basis for the Thermal Overpower Delta T and Thermal Overtemperature Delta T Trip Functions," ~~March 1977~~.
(Methodology for LCO 3.3.1.)

12. WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™," July 2006. (Methodology for LCO 3.2.1)

11. WCAP-14710-P-A, "1-D Heat Conduction Model for Annular Fuel Pellets," May, 1998. (Methodology for LCO 3.2.1)

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.6.6 Reactor Coolant System (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)

The following administrative requirements apply to the PTLR:

a. RCS pressure and temperature limits for heatup, cooldown, criticality, and hydrostatic testing as well as heatup and cooldown rates shall be established and documented in the PTLR for the following:

LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits"

b. The power operated relief valve lift settings required to support the Low Temperature Overpressure Protection (LTOP) System, and the LTOP enable temperature shall be established and documented in the PTLR for the following:

LCO 3.4.6, "RCS Loops - MODE 4";

LCO 3.4.7, "RCS Loops - MODE 5, Loops Filled";

LCO 3.4.10, "Pressurizer Safety Valves"; and

LCO 3.4.12, "LTOP System."

c. The analytical methods used to determine the RCS pressure and temperature and LTOP limits shall be those previously reviewed and approved by the NRC. Specifically, the methodology is described in the following documents:

1. WCAP-14040-A, "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves," Revision 4.