



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

March 1, 2018

Mr. Richard D. Bologna  
Site Vice President  
FirstEnergy Nuclear Operating Company  
Beaver Valley Power Station  
Mail Stop A-BV-SEB1  
P.O. Box 4, Route 168  
Shippingport, PA 15077

**SUBJECT:** BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 – ISSUANCE OF AMENDMENT NOS. 302 AND 191 REGARDING THE USE OF OPTIMIZED ZIRLO™ FUEL ROD CLADDING (CAC NOS. MF9580 AND MF9581; EPID L-2017-LLA-0201)

Dear Mr. Bologna:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 302 to Renewed Facility Operating License No. DPR-66 for Beaver Valley Power Station, Unit No. 1, and Amendment No. 191 to Renewed Facility Operating License No. NPF-73 for Beaver Valley Power Station, Unit No. 2. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated April 9, 2017.<sup>1</sup>

The amendments revise TS Section 4.2.1, "Fuel Assemblies," and TS Section 5.6.3, "Core Operating Limits Report (COLR)," to allow the use of Optimized ZIRLO™ as an approved fuel rod cladding material. In the letter dated April 9, 2017, the licensee also requested an exemption from certain requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.46 and 10 CFR Part 50, Appendix K, in accordance with 10 CFR 50.12, to support the license amendments. The requested exemption is addressed in separate correspondence.<sup>2</sup>

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<sup>1</sup> Agencywide Documents Access and Management System (ADAMS) Accession No. ML17100A269

<sup>2</sup> ADAMS Accession No. ML17313A554

R. Bologna

- 2 -

A copy of our related safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

A handwritten signature in black ink, appearing to read "V. Booma", written over a horizontal line.

Booma Venkataraman, Project Manager  
Plant Licensing Branch I  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosures:

1. Amendment No. 302 to DPR-66
2. Amendment No. 191 to NPF-73
3. Safety Evaluation

cc: Listserv



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

FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION, LLC

DOCKET NO. 50-334

BEAVER VALLEY POWER STATION, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 302  
Renewed License No. DPR-66

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by FirstEnergy Nuclear Operating Company, (FENOC)\* acting on its own behalf and as agent for FirstEnergy Nuclear Generation, LLC (the licensees), dated April 9, 2017, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I.
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. DPR-66 is hereby amended to read as follows:

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\*FENOC is authorized to act as agent for FirstEnergy Nuclear Generation, LLC, and has exclusive responsibility and control over the physical construction, operation, and maintenance of the facility.

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 302, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days.

FOR THE NUCLEAR REGULATORY COMMISSION



James G. Danna, Chief  
Plant Licensing Branch I  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Renewed Facility Operating  
License and Technical Specifications

Date of Issuance: March 1, 2018



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

FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION, LLC

DOCKET NO. 50-412

BEAVER VALLEY POWER STATION, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 191  
Renewed License No. NPF-73

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by FirstEnergy Nuclear Operating Company, (FENOC)\* acting on its own behalf and as agent for FirstEnergy Nuclear Generation, LLC (the licensees), dated April 9, 2017, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I.
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. DPR-66 is hereby amended to read as follows:

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\*FENOC is authorized to act as agent for FirstEnergy Nuclear Generation, LLC, and has exclusive responsibility and control over the physical construction, operation, and maintenance of the facility.

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 191, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto and hereby incorporated in the license. FENOC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days.

FOR THE NUCLEAR REGULATORY COMMISSION



James G. Danna, Chief  
Plant Licensing Branch I  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Renewed Facility Operating  
License and Technical Specifications

Date of Issuance: March 1, 2018

ATTACHMENT TO LICENSE AMENDMENTS

BEAVER VALLEY POWER STATION, UNIT NO. 1

BEAVER VALLEY POWER STATION, UNIT NO. 2

RENEWED FACILITY OPERATING LICENSE NOS. DPR-66 AND NPF-73

DOCKET NOS. 50-334 AND 50-412

Replace the following page of the Unit No. 1 Renewed Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove  
Page 3

Insert  
Page 3

Replace the following page of the Unit No. 2 Renewed Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove  
Page 4

Insert  
Page 4

Replace the following pages of the Unit Nos. 1 and 2, Appendix A, Technical Specifications (located in Renewed Facility Operating License, Unit No. 1, for both units) with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove  
4.0 - 1  
5.6 - 3  
5.6 - 4  
5.6 - 5  
5.6 - 6

Insert  
4.0 - 1  
5.6 - 3  
5.6 - 4  
5.6 - 5  
5.6 - 6

- (3) FENOC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (4) FENOC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use in amounts as required any byproduct, source, or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components;
- (5) FENOC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter 1: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

FENOC is authorized to operate the facility at a steady state reactor core power level of 2900 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 302, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

(3) Auxiliary River Water System

(Deleted by Amendment No. 8)



C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations set forth in 10 CFR Chapter 1 and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

FENOC is authorized to operate the facility at a steady state reactor core power level of 2900 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 191, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto are hereby incorporated in the license. FENOC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

## 4.0 DESIGN FEATURES

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### 4.1 Site Location

The Beaver Valley Power Station is located in Shippingport Borough, Beaver County, Pennsylvania, on the south bank of the Ohio River. The site is approximately 1 mile southeast of Midland, Pennsylvania, 5 miles east of East Liverpool, Ohio, and approximately 25 miles northwest of Pittsburgh, Pennsylvania. The Unit 1 exclusion area boundary has a minimum radius of 2000 feet from the center of containment. The Unit 2 exclusion area boundary has a minimum radius of 2000 feet around the Unit No. 1 containment building.

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### 4.2 Reactor Core

#### 4.2.1 Fuel Assemblies

The reactor shall contain 157 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<sub>2</sub>) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with 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 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 48 control rod assemblies. The control material shall be silver indium cadmium as approved by the NRC.

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### 4.3 Fuel Storage

#### 4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

- a. Fuel assemblies having a maximum U-235 enrichment as specified in LCO 3.7.14, "Spent Fuel Pool Storage,"
- b. Unit 1  
 $K_{\text{eff}} \leq 0.95$  if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.12 of the UFSAR,

5.6 Reporting Requirements

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5.6.3 CORE OPERATING LIMITS REPORT (COLR) (continued)

WCAP-16045-P-A, "Qualification of the Two-Dimensional Transport Code PARAGON,"

WCAP-16045-P-A, Addendum 1-A, "Qualification of the NEXUS Nuclear Data Methodology,"

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

As described in reference documents listed above, when an initial assumed power level of 102% of RATED THERMAL POWER is specified in a previously approved method, 100.6% of RATED THERMAL POWER may be used when input for reactor thermal power measurement of feedwater flow is by the leading edge flow meter (LEFM).

Caldon, Inc. Engineering Report-80P, "Improving Thermal Power Accuracy and Plant Safety While Increasing Operating Power Level Using the LEFM  $\sqrt{\text{TM}}$  System"

Caldon, Inc. Engineering Report-160P, "Supplement to Topical Report ER-80P: Basis for a Power Uprate with the LEFM  $\sqrt{\text{TM}}$  System"

- 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.

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

- a. RCS pressure and temperature limits for heat up, cooldown, low temperature operation, criticality, and hydrostatic testing, Overpressure Protection System (OPPS) enable temperature, and PORV lift settings 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," and

LCO 3.4.12, "Overpressure Protection System (OPPS)"

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

5.6 Reporting Requirements

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

NRC Letter, "Beaver Valley Power Station, Units 1 and 2 – Acceptance of Methodology for Referencing Pressure and Temperature Limits Report (TAC Nos. MB3319 and MB3320)," dated October 8, 2002.

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

The methodology listed in WCAP-14040-NP-A was used with two exceptions:

- ASME Code Case N-640, "Alternative Reference Fracture Toughness for Development of P-T Limits for Section XI, Division 1."
- ASME, Section XI, Appendix G, "Fracture Toughness Criteria for Protection Against Failure," 1996 version.

- c. The PTLR shall be provided to the NRC upon issuance for each reactor vessel fluence period and for any revision or supplement thereto.

5.6.5 Post Accident Monitoring Report

When a report is required by Condition B or F of LCO 3.3.3, "Post Accident Monitoring (PAM) Instrumentation," a report shall be submitted within the following 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.

5.6.6 Steam Generator (SG) Tube Inspection Report

5.6.6.1 Unit 1 SG Tube Inspection Report

A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 5.5.5.1, "Unit 1 SG Program." The report shall include:

- a. The scope of inspections performed on each SG,
- b. Degradation mechanisms found,
- c. Nondestructive examination techniques utilized for each degradation mechanism,
- d. Location, orientation (if linear), and measured sizes (if available) of service-induced indications,
- e. Number of tubes plugged during the inspection outage for each degradation mechanism,
- f. The number and percentage of tubes plugged to date, and the effective plugging percentage in each steam generator, and

5.6 Reporting Requirements

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5.6.6 Steam Generator (SG) Tube Inspection Report (continued)

5.6.6.1 Unit 1 SG Tube Inspection Report (continued)

- g. The results of condition monitoring, including the results of tube pulls and in-situ testing.

5.6.6.2 Unit 2 SG Tube Inspection Report

1. A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 5.5.5.2, "Unit 2 SG Program." The report shall include:
  - a. The scope of inspections performed on each SG,
  - b. Degradation mechanisms found,
  - c. Nondestructive examination techniques utilized for each degradation mechanism,
  - d. Location, orientation (if linear), and measured sizes (if available) of service-induced indications,
  - e. Number of tubes plugged or repaired during the inspection outage for each degradation mechanism,
  - f. The number and percentage of tubes plugged or repaired to date, and the effective plugging percentage in each steam generator,
  - g. The results of condition monitoring, including the results of tube pulls and in-situ testing, and
  - h. Repair method utilized and the number of tubes repaired by each repair method.
2. A report shall be submitted within 90 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 5.5.5.2, "Unit 2 SG Program," when voltage-based alternate repair criteria have been applied. The report shall include information described in Section 6.b of Attachment 1 to Generic Letter 95-05, "Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking."
3. For implementation of the voltage-based plugging or repair criteria to tube support plate intersections, notify the Commission prior to returning the steam generators to service (MODE 4) should any of the following conditions arise:

5.6 Reporting Requirements

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5.6.6 Steam Generator (SG) Tube Inspection Report (continued)

5.6.6.2 Unit 2 SG Tube Inspection Report (continued)

- a. If circumferential crack-like indications are detected at the tube support plate intersections.
  - b. If indications are identified that extend beyond the confines of the tube support plate.
  - c. If indications are identified at the tube support plate elevations that are attributable to primary water stress corrosion cracking.
4. A report shall be submitted within 90 days after the initial entry into MODE 4 following an outage in which the F\* methodology was applied. As applicable, the report shall include the following hot-leg and cold-leg tubesheet region inspection results associated with the application of F\*:
- a. Total number of indications, location of each indication, orientation of each indication, severity of each indication, and whether the indications initiated from the inside or outside surface.
  - b. The cumulative number of indications detected in the tubesheet region as a function of elevation within the tubesheet.
  - c. The projected end-of-cycle accident-induced leakage from tubesheet indications.
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NOS. 302 AND 191 TO  
RENEWED FACILITY OPERATING LICENSES NOS. DPR-66 AND NPF-73  
FIRSTENERGY NUCLEAR OPERATING COMPANY  
FIRSTENERGY NUCLEAR GENERATION, LLC  
BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2  
DOCKET NOS. 50-334 AND 50-412

1.0 INTRODUCTION

By application dated April 9, 2017,<sup>1</sup> FirstEnergy Nuclear Operating Company (the licensee), requested changes to the Technical Specifications (TSs) for Beaver Valley Power Station (Beaver Valley), Unit Nos. 1 and 2. The proposed changes would revise TS Section 4.2.1, "Fuel Assemblies," and TS Section 5.6.3, "Core Operating Limits Report (COLR)," to allow the use of Optimized ZIRLO™ as an approved fuel rod cladding material. In the letter dated April 9, 2017, the licensee also requested an exemption from certain requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and Appendix K to 10 CFR Part 50, "ECCS [Emergency Core Cooling System] Evaluation Models," in accordance with 10 CFR 50.12, to support the license amendments. The requested exemption is addressed in separate correspondence.<sup>2</sup>

The Optimized ZIRLO™ cladding manufactured by Westinghouse Electric Company (Westinghouse) is a new version of the ZIRLO® material and was approved in topical report (TR) Addendum 1-A to WCAP-12610-P-A and CENPD-404-P-A, entitled "Optimized ZIRLO™," for Westinghouse and Combustion Engineering fuel designs.<sup>3</sup> However, the U.S. Nuclear Regulatory Commission (NRC or the Commission) staff requires that licensees using Optimized ZIRLO™ comply with the conditions and limitations listed in the NRC staff safety evaluation (SE) regarding the topical report dated June 10, 2005.<sup>4</sup>

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<sup>1</sup> Agencywide Documents Access and Management System (ADAMS) Accession No. ML17100A269

<sup>2</sup> ADAMS Accession No. ML17313A554

<sup>3</sup> ADAMS Accession No. ML062080563

<sup>4</sup> ADAMS Package Accession No. ML051670395

The licensee plans to use Optimized ZIRLO™ fuel cladding for the core reload scheduled for Beaver Valley in spring 2018.

## 2.0 REGULATORY EVALUATION

The NRC staff considered the following regulatory requirements, guidance, and licensing and design-basis information during its review of the proposed changes.

### 2.1 Regulatory Requirements

Section 50.36, "Technical specifications," to 10 CFR Part 50, establishes the regulatory requirements related to the content of TSs. This regulation requires, in part, that TSs include: (1) safety limits, limiting safety system settings and limiting control settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls.

Section 50.46 of 10 CFR Part 50 requires, in part, that each boiling or pressurized light-water nuclear power reactor fueled with uranium oxide pellets within cylindrical Zircaloy or ZIRLO® cladding must be provided with an ECCS that must be designed so that its calculated cooling performance following postulated loss-of-coolant accidents conforms to the criteria set forth in Section 50.46(b).

Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants" (hereinafter referred to as GDC), establishes the minimum requirements for the principal design criteria for water-cooled nuclear power plants. The principal design criteria establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety.

GDC 10, "Reactor design," requires that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.

GDC 27, "Combined reactivity control system capability," requires that the reactivity control systems shall be designed to have a combined capability in conjunction with poison addition by the ECCS of reliably controlling reactivity changes to assure that under postulated accident conditions and with appropriate margin for stuck rods, the capability to cool the core is maintained.

GDC 35, "Emergency core cooling," requires, in part, that the ECCS transfer heat from the reactor core following any loss of reactor coolant at a rate such that: (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

Appendix K to 10 CFR Part 50 establishes the regulations for conservative ECCS evaluation models.

### 2.2 Applicable Guidance

The guidance that the NRC staff considered in its review of this license amendment request includes the following.



Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (NUREG-0800) (SRP), Section 4.2, "Fuel System Design," provides regulatory guidance for the review of fuel rod cladding materials and fuel systems. In addition, the SRP provides guidance for compliance with the applicable GDC. According to SRP Section 4.2, the fuel system safety review provides assurance that:

- The fuel system is not damaged as a result of normal operation and anticipated operational occurrences.
- Fuel system damage is never so severe as to prevent control rod insertion when it is required.
- The number of fuel rod failures is not underestimated for postulated accidents and coolability is always maintained.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Description of the Proposed TS Changes

The proposed change to TS 4.2.1 will add "Optimized ZIRLO™" to the list of approved fuel rod cladding materials and will revise TS 5.6.3 to add NRC-approved topical report WCAP-12610-P-A and CENPD-04-P-A Addendum 1-A, "Optimized ZIRLO™," to the list of analytical methods. In addition, the proposed changes to TS 4.2.1 include editorial changes, correction of the spelling of the word Zircaloy, and addition of the word "clad" after the phrase "Optimized ZIRLO™," and addition of a registered trademark designator to the word ZIRLO. These changes are editorial in nature and do not change or impact the methodology.

#### 3.1 Exemption from the Regulations

The Optimized ZIRLO™ fuel cladding is different from standard ZIRLO® in two respects: (1) the tin content is lower and (2) the microstructure is different. This difference in tin content and microstructure can lead to differences in some material properties. Westinghouse has committed to provide irradiated data and validate fuel performance models ahead of burnups achieved in batch application (i.e., a group of fuel assemblies). The NRC staff's SE for the topical report contains ten conditions and limitations. The staff indicated in the SE that licensees referencing Addendum 1-A of WCAP-12610-P-A and CENPD 404-P-A to implement Optimized ZIRLO™ must ensure compliance with the ten conditions and limitations. The licensee provided documentation of its compliance with these ten conditions and limitations and, by including reference to the topical report in the TSSs, will continue to ensure compliance for future reloads.

The regulations in 10 CFR 50.46 and 10 CFR Part 50, Appendix K, make no provisions for use of fuel rod cladding material other than Zircaloy or ZIRLO®. Since the material specifications of Optimized ZIRLO™ differ from the specification for Zircaloy or ZIRLO®, a plant-specific exemption is needed to permit an amendment, which this SE supports, to be effective. The exemption is issued separately from but with support from this SE and amendments.

#### 3.2 Conditions and Limitations

The NRC staff's SE for the topical report referenced above includes ten conditions and limitations. The licensee documented conformance with these ten conditions and limitations in

Section 3.0 (technical evaluation) of the license amendment request where it has committed to ensuring conformance for future reloads. These conditions and limitations were evaluated by the NRC staff in the requested exemption and accepted.

In addition, the NRC staff's SE regarding the Optimized ZIRLO™ topical report reviewed the effects of Optimized ZIRLO™ using the appropriate fuel design requirements of SRP 4.2 and 10 CFR Part 50, Appendix A, GDC, and found that the topical report provided reasonable assurance that under both normal and accident conditions, Westinghouse and Combustion Engineering fuel assembly designs utilizing Optimized ZIRLO™ fuel cladding would be able to safely operate and comply with NRC regulations.

### 3.3 Editorial Changes

The NRC staff reviewed the requested editorial changes. The licensee proposed a revision to TS 4.2.1 to correct the spelling of the word Zircaloy, to add the word "clad" after the phrase "Optimized ZIRLO™," and addition of registered trademark designator to the word ZIRLO. These changes are editorial in nature and do not change or impact the methodology.

The NRC staff finds the proposed changes to TS 4.2.1 to be acceptable and determined that the proposed changes meet the regulatory requirements of 10 CFR 50.36. Therefore, the proposed amendments to revise TS 4.2.1 are acceptable.

### 3.4 Technical Conclusion

Based upon the NRC staff's prior approval of Optimized ZIRLO™, the licensee's compliance with the SE conditions and limitations through inclusion of the topical reports in the TSs, and the licensee's use of NRC-approved methodologies in TS 5.6.3 to add NRC-approved topical report WCAP-12610-P-A & CENPD-04-P-A Addendum 1-A, "Optimized ZIRLO™" to the list of analytical methods, the NRC staff finds the proposed changes to TS 4.2.1 and TS 5.6.3 to allow the use of Optimized ZIRLO™ to be acceptable.

## 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendments on January 30, 2018. The State official had no comments.

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (July 18, 2017; 82 FR 32881). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

## 6.0 CONCLUSION

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

Principal Contributors: F. Forsaty  
T. Hood

Date: March 1, 2018

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 – ISSUANCE OF AMENDMENT NOS. 302 AND 191 REGARDING THE USE OF OPTIMIZED ZIRLO™ FUEL ROD CLADDING (CAC NOS. MF9580 AND MF9581; EPID L-2017-LLA-0201) DATED MARCH 1, 2018

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- RidsNrrPMBeaverValley Resource
- RidsNrrDssSnpb Resource
- RidsNrrDssSrxs Resource
- RidsNrrDmlrMvib Resource
- FForsaty, NRR
- MHamm, NRR
- JMedoff, NRR

**ADAMS Accession No: ML18022B116**

\*by memo

\*\*by e-mail

OFFICE	DORL/LPL1/PM	DORL/LPL1/LA	DSS/SRXB/BC(A)*	DSS/STSB/BC	DMLR/MVIB/BC(A)**
NAME	THood	LRonewicz	JWhitman	VCusumano	SRuffin
DATE	01/19/2018	02/14/2018	01/16/2018	01/31/2018	01/19/2018
OFFICE	DSS/SNPB/BC**	OGC – NLO w/noted change	DORL/LPL1/BC	DORL/LPL1/PM	
NAME	RLukes	STurk	JDanna	BVenkataraman	
DATE	02/01/2018	02/13/2018	02/23/2018	03/01/2018	

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