



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

March 7, 2018

Mr. Dean Curtland
Site Director, Duane Arnold Energy Center
NextEra Energy Duane Arnold, LLC
3277 DAEC Road
Palo, IA 52324-9785

SUBJECT: DUANE ARNOLD ENERGY CENTER – ISSUANCE OF LICENSE
AMENDMENT NO. 303 RE: REVISION TO TECHNICAL SPECIFICATION
TABLE 3.3.2.1-1, CONTROL ROD BLOCK INSTRUMENTATION
(EPID L-2017-LLA-0190)

Dear Mr. Curtland:

The U.S. Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed License Amendment No. 303 to NextEra Energy Duane Arnold, LLC (licensee) for Renewed Facility Operating License No. DPR-49 for the Duane Arnold Energy Center (DAEC). The amendment consists of changes to the technical specifications (TSs) in response to your application dated March 24, 2017.¹

The amendment revises TS Table 3.3.2.1-1, "Control Rod Block Instrumentation." Specifically, the revised TS relocates cycle-specific minimum critical power ratio (MCPR) values specified in footnotes (a) through (e) for Function 1, Rod Block Monitor, from TS Table 3.3.2.1-1 to the DAEC core operating limits report (COLR). It also corrects a typographical error and adds requirement item a.4 to the DAEC TS 5.6.5, COLR, which addresses the relocation of the MCPR values.

Additional information on the amendment changes and the NRC staff's evaluation is documented in Enclosure 2 of this letter.

¹ Agencywide Document Access Management System (ADAMS) Accession No. ML17086A442.

D. Curtland

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The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

A handwritten signature in black ink, appearing to read "Mahesh L. Chawla". To the right of the signature is a large, stylized flourish or mark that resembles the number "1" followed by a cursive flourish.

Mahesh L. Chawla, Project Manager
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-331

Enclosures:

1. Amendment No. 303 to DPR-49
2. Safety Evaluation

cc w/enclosures: ListServ



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

NEXTERA ENERGY DUANE ARNOLD, LLC

DOCKET NO. 50-331

DUANE ARNOLD ENERGY CENTER

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 303
Renewed License No. DPR-49

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by NextEra Energy Duane Arnold, LLC dated March 24, 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.

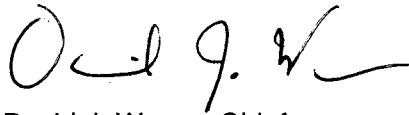
2. Accordingly, the license is amended by changes to the Operating License and Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Renewed Facility Operating License No. DPR-49 is hereby amended to read as follows:

- (2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 303, are hereby incorporated in the license. NextEra Energy Duane Arnold, LLC 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 180 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



David J. Wrona, Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Operating License
and Technical Specifications

Date of Issuance: March 7, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 303

DUANE ARNOLD ENERGY CENTER

RENEWED FACILITY OPERATING LICENSE NO. DPR-49

DOCKET NO. 50-331

Replace page 3 of Renewed Facility Operating License No. DPR-49 with the attached page 3. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

3.3-20

5.0-20

Insert

3.3-20

5.0-20

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 I; 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; 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

NextEra Energy Duane Arnold, LLC is authorized to operate the Duane Arnold Energy Center at steady state reactor core power levels not in excess of 1912 megawatts (thermal).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 303, are hereby incorporated in the license. NextEra Energy Duane Arnold, LLC shall operate the facility in accordance with the Technical Specifications.

(a) For Surveillance Requirements (SRs) whose acceptance criteria are modified, either directly or indirectly, by the increase in authorized maximum power level in 2.C.(1) above, in accordance with Amendment No. 243 to Facility Operating License DPR-49, those SRs are not required to be performed until their next scheduled performance, which is due at the end of the first surveillance interval that begins on the date the Surveillance was last performed prior to implementation of Amendment No. 243.

(b) Deleted.

(3) Fire Protection Program

NextEra Energy Duane Arnold, LLC shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment request dated August 5, 2011 (and supplements dated October 14, 2011, April 23, 2012, May 23, 2012, July 9, 2012, October 15, 2012, January 11, 2013, February 12, 2013, March 6, 2013, May 1, 2013, May 29, 2013, two supplements dated July 2, 2013, and supplements dated August 5, 2013 and August 28, 2013) and as approved in the safety evaluation report dated September 10, 2013. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

Control Rod Block Instrumentation 3.3.2.1

Table 3.3.2.1-1 (page 1 of 1)
Control Rod Block Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Rod Block Monitor				
a. Low Power Range - Upscale	(a)	2	SR 3.3.2.1.1 SR 3.3.2.1.4 SR 3.3.2.1.5	≤ 115.5/125 divisions of full scale
b. Intermediate Power Range - Upscale	(b)	2	SR 3.3.2.1.1 SR 3.3.2.1.4 SR 3.3.2.1.5	≤ 109.7/125 divisions of full scale
c. High Power Range - Upscale	(c),(d)	2	SR 3.3.2.1.1 SR 3.3.2.1.4 SR 3.3.2.1.5	≤ 105.9/125 divisions of full scale
d. Inop	(d),(e)	2	SR 3.3.2.1.1	NA
e. Downscale	(d),(e)	2	SR 3.3.2.1.1 SR 3.3.2.1.5	NA
f. Bypass Time Delay	(d),(e)	2	SR 3.3.2.1.1 SR 3.3.2.1.5	≤ 2.0 seconds
2. Rod Worth Minimizer	1 ^(f) , 2 ^(f)	1	SR 3.3.2.1.2 SR 3.3.2.1.3 SR 3.3.2.1.7	NA
3. Reactor Mode Switch – Shutdown Position	(g)	2	SR 3.3.2.1.6	NA

(a) THERMAL POWER ≥ 30% and < 65% RTP and MCPR less than the limit specified in the COLR.

(b) THERMAL POWER ≥ 65% and < 85% RTP and MCPR less than the limit specified in the COLR.

(c) THERMAL POWER ≥ 85% and < 90% RTP and MCPR less than the limit specified in the COLR.

(d) THERMAL POWER ≥ 90% RTP and MCPR less than the limit specified in the COLR.

(e) THERMAL POWER ≥ 30% and < 90% RTP and MCPR less than the limit specified in the COLR.

(f) With THERMAL POWER ≤ 10% RTP, except during the reactor shutdown process if the coupling of each withdrawn control rod has been confirmed.

(g) Reactor mode switch in the shutdown position.

5.6 Reporting Requirements (continued)

5.6.3 Radioactive Material Release Report

The Radioactive Material Release Report covering the operation of the unit during the previous calendar year shall be submitted prior to May 1 of each year in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODAM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR Part 50, Appendix I, Section IV.B.1.

5.6.4 DELETED

5.6.5 CORE OPERATING LIMITS REPORT (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:
 1. The Average Planar Linear Heat Generation Rate (APLHGR) for Specification 3.2.1;
 2. The Minimum Critical Power Ratio (MCPR) for Specification 3.2.2;
 3. Exclusion Region in the Power/Flow Map for Specification 3.4.1; and
 4. The Minimum Critical Power Ratios (MCPR) in Table 3.3.2.1-1 for Specification 3.3.2.1.
- b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC in General Electric Standard Application for Reactor Fuel, NEDE-24011-P-A, (GESTAR II). The revision number is the one approved at the time the reload fuel analyses are performed.

(continued)



UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING LICENSE AMENDMENT REQUEST TO REVISE

TECHNICAL SPECIFICATION TABLE 3.3.2.1-1,

CONTROL ROD BLOCK INSTRUMENTATION

NEXTERA ENERGY DUANE ARNOLD, LLC

DUANE ARNOLD ENERGY CENTER

DOCKET NO. 50-331

1.0 INTRODUCTION

By application dated March 24, 2017, NextEra Energy Duane Arnold, LLC (NextEra) submitted a license amendment request (LAR) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17086A442) to the U.S. Nuclear Regulatory Commission (NRC or Commission) for Duane Arnold Energy Center (DAEC). The proposed LAR would revise technical specification (TS) Table 3.3.2.1-1, "Control Rod Block Instrumentation." Specifically, the revised TS would relocate cycle-specific minimum critical power ratio (MCPR) values specified in footnotes (a) through (e) for FUNCTION 1, "Rod Block Monitor [RBM]," from TS Table 3.3.2.1-1 to the DAEC core operating limits report (COLR). The proposed relocation of the control rod block instrumentation MCPR values to the DAEC COLR would allow DAEC the flexibility to revise cycle-specific MCPR operating limits without the need for a license amendment. It would also correct a typographical error and add a requirement, designated as item a.4, to TS 5.6.5, "Core Operating Limits Report," which addresses the relocation of the DAEC MCPR values.

2.0 REGULATORY EVALUATION

2.1 System Description

DAEC updated final safety analysis report (UFSAR), Section 3.1.2.2.4, Criterion 13 – "Instrumentation and Control," discusses the function of the control rod block monitoring system (RBMS). The RBMS is designed to prevent local fuel damage as a result of a single rod withdrawal error under the worst permitted condition of RBMS bypass.

Technical specification bases 3.3.2, "Control Rod Block Instrumentation," discusses that each RBMS channel uses input signals from either six average power range monitors (APRMs), six intermediate range monitors (IRMs), or four source range monitors (SRMs). The trip logic for the RBM Function is one out of any these APRM, IRM, or SRM channels which initiates a rod

block signal to the RBMS to inhibit control rod withdrawal. The trip is initiated when RBM output exceeds the rod block setpoint. The RBMS is used to limit control rod withdrawal if localized neutron flux exceeds a predetermined setpoint during control rod manipulations. It would block control rod withdrawal during control rod withdrawal error events to prevent MCPR limits from being exceeded.

2.2 Current TS and Proposed TS Changes

2.2.1 Relocation of TS Table 3.3.2.1-1 MCPR Values to COLR

DAEC TS Table 3.3.2.1-1, footnotes (a) through (e), specify for the RBM setpoints the thermal levels and MCPR limits applicable to conditions of low power range (upscale), intermediate power range (upscale), high power range (upscale), inoperative, and downscale, respectively. The current footnotes (a) through (e) for the RBM setpoints require that:

- (a) THERMAL POWER ≥ 30 % and < 65 % RTP and MCPR < 1.70 .
- (b) THERMAL POWER ≥ 65 % and < 85 % RTP and MCPR < 1.70 .
- (c) THERMAL POWER ≥ 85 % and < 90 % RTP and MCPR < 1.70 .
- (d) THERMAL POWER ≥ 90 % RTP and MCPR < 1.40 .
- (e) THERMAL POWER ≥ 30 % and < 90 % RTP and MCPR < 1.70 .

The proposed TS would remove the above control rod block instrumentation MCPR values from footnotes (a) through (e) and reference them in a DAEC COLR as follows:

- (a) THERMAL POWER ≥ 30 % and < 65 % RTP and MCPR less than the limit specified in the COLR.
- (b) THERMAL POWER ≥ 65 % and < 85 % RTP and MCPR less than the limit specified in the COLR.
- (c) THERMAL POWER ≥ 85 % and < 90 % RTP and MCPR less than the limit specified in the COLR.
- (c) THERMAL POWER ≥ 90 % RTP and MCPR less than the limit specified in the COLR.
- (d) THERMAL POWER ≥ 30 % and < 90 % RTP and MCPR less than the limit specified in the COLR.

In Section 4.2, "Precedent," of the LAR, the licensee states that several other sites have TSs that contain MCPR notes comparable to those in the DAEC TS which were previously approved by the NRC. These sites include: Columbia Generating Station; Brunswick Steam and Electric Plant, Units 1 and 2; Browns Ferry Nuclear, Unit 2; Peach Bottom Unit 2; and Susquehanna, Units 1 and 2.

2.2.2 Additional Requirement to TS 5.6.5

TS 5.6.5, "Core Operating Limits Report," controls relocation of cycle-specific parameter limits to COLRs.

Currently, TS 5.6.5 a. states:

- 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:
 1. The Average Planar Linear Heat Generation Rate (APLHGR) for Specification 3.2.1;
 2. The Minimum Critical Power Ratio (MCPR) for Specification 3.2.2; and
 3. Exclusion Region in the Power/Flow Map for Specification 3.4.1.

The proposed TS 5.6.5 would correct a typographical error in item a.2, add new item a.4, and read as follows:

- 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:
 1. The Average Planar Linear Heat Generation Rate (APLHGR) for Specification 3.2.1;
 2. The Minimum Critical Power Ratio (MCPR) for Specification 3.2.2;
 3. Exclusion Region in the Power/Flow Map for Specification 3.4.1; and
 4. The Minimum Critical Power Ratios (MCPR) in Table 3.3.2.1-1 for Specification 3.3.2.1.

2.3 Applicable Regulatory Requirements and Guidance

The Commission's regulatory requirements related to the content of the TSs are contained in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.36. The regulation at 10 CFR 50.36 requires applicants for nuclear power plant operating licenses to include proposed TSs as part of the application. The regulation requires, in part, that the TSs include items in the following categories: (1) safety limits, limiting safety systems settings, and limiting control settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls. However, the regulation does not specify the particular requirements to be included in TSs.

Paragraph 10 CFR 50.36(c)(1)(i)(A) states, in part, that:

Safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity.

Paragraph 10 CFR 50.36(c)(5), states in part, that:

Administrative controls are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure the operation of the facility in a safe manner.

License amendments are generally required for each fuel cycle to update the values of cycle-specific core operating limits in TSs. In 1988, the NRC issued industry guidance in Generic Letter (GL) 88-16² allowing licensees to relocate cycle-specific core operating limits from TSs, provided that the values of these limits are included in the COLR and are determined using NRC-approved methodologies which are referenced in the TSs.

3.0 TECHNICAL EVALUATION

The NRC staff reviewed the licensee's proposed TS revisions to determine if they satisfy NRC-approved guidance and requirements.

3.1 NRC Staff Evaluation of Relocation of TS, Table 3.3.2.1-1, MCPR Values to COLR

As discussed in Section 2.2.1 above, the proposed TS would reference the control rod block instrumentation MCPR values in the DAEC COLR (vs Table 3.3.2.1-1). The NRC staff finds that the proposed TS is similar to current DAEC TS LCO 3.2.2, "Minimum Critical Power Ratio (MCPR)," that references acceptable MCPR limits in the COLR. The staff also determined the licensee's proposed relocation of these MCPR values to the COLR is consistent with NRC-approved industry guidance, as established by GL 88-16, and is therefore acceptable.

3.2 NRC Staff Evaluation of Additional Requirement to TS 5.6.5

As discussed in Section 2.2.2 above, the proposed addition of item a.4 to TS 5.6.5 is for controlling the proposed relocation of the control rod block instrumentation MCPR values to a COLR. The NRC staff finds this to be an acceptable change to the TS since it is consistent with NRC-approved industry guidance as established by GL 88-16 and is similar to the requirements of current TS 5.6.5 items a.1 through a.3 in place for controlling the relocation of APLHGR and MCPR values, and Exclusion Region in the Power/Flow Map to a COLR, respectively.

Additionally, the licensee identified a typographical error in TS 5.6.5 item a.2. The error was corrected by changing the word "Ration" to "Ratio." Since this correction fixes a typographical error and correctly identifies the Minimum Critical Power Ratio, the NRC staff has determined it is acceptable.

² Removal of Cycle-Specific Parameter Limits from Technical Specifications (ADAMS Accession No. ML031130447), dated October 4, 1988.

3.3 NRC Staff Evaluation of Licensee Methodologies for Determining MCPR Limits

DAEC UFSAR, Section 4.4.1.4, indicates that the MCPR limits are established such that no MCPR safety limit is expected to be exceeded during the most severe anticipated operational occurrences MCPR event. Control rod block instrumentation MCPR values to be relocated from TSs are calculated (page 3 of Enclosure to the LAR) as part of the reload core design licensing analyses in accordance with NRC-approved methods in topical report (TR), NEDE-24011-P-A.³

The NRC staff determined the licensee has incorporated NRC-approved NEDE-24011-P-A in the current DAEC TS 5.6.5 b, which requires that:

The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC in General Electric Standard Application for Reactor Fuel, NEDE-24011-P-A, (GESTAR II). The revision number is the one approved at the time the reload fuel analyses are performed.

3.4 Technical Conclusion

The NRC staff reviewed the proposed changes to TS Table 3.3.2.1-1 and TS 5.6.5 regarding relocation of the control rod block instrumentation MCPR values to the DAEC COLR, and finds that the MCPR values to be relocated would be determined by the NRC-approved methods documented in a TR, NEDE-24011-P-A, in support of DAEC cycle-specific reload core design licensing applications, and the TR is referenced in current TS 5.6.5 b. Furthermore, based on the above findings, the NRC staff has determined the proposed changes are in compliance with the GL 88-16 guidance, which allows licensees to remove cycle-specific core operating limits from TSs to a COLR provided that the limits are determined using NRC-approved methodology which is referenced in the TS. Therefore, the NRC staff concludes that the licensee's proposed changes, including the identified typographical error discussed above in Section 3.2, are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the appropriate official for the State of Iowa was notified of the NRC's proposed issuance of the amendment on January 24, 2018. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the 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 amendment involves 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 amendment involves no significant hazards consideration (*Federal Register* 82 FR 23627, dated May 23, 2017), and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR

³ General Electric Standard Application for Reactor Fuel (GESTAR II) (ADAMS Accession No. ML16250A047), dated September 2016.

51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principle Contributor: Summer Sun, NRR

Date of Issuance: March 7, 2018

SUBJECT: DUANE ARNOLD ENERGY CENTER – ISSUANCE OF LICENSE
 AMENDMENT NO. 303 RE: REVISION TO TECHNICAL SPECIFICATION
 TABLE 3.3.2.1-1, CONTROL ROD BLOCK INSTRUMENTATION
 (EPID L-2017-LLA-0190) DATED MARCH 7, 2018

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