NEXTera ENERGY
DUANE ARNOLD

Enclosure 6 Contains Proprietary Information

Withhold Enclosure 6 from Public Disclosure in Accordance with 10 CFR 2.390

March 15, 2016

NG-16-0052
10 CFR 50.90

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

Duane Arnold Energy Center
Docket No. 50-331
Renewed Facility Operating License No. DPR-49

License Amendment Request (TSCR-159) to Revise Technical Specifications Fuel Storage Requirements

Reference: Letter, R. Anderson (NextEra) to U. S. NRC, "Duane Arnold Energy Center (DAEC) Commitment Regarding Licensee Event Report (LER) 2013-003-00," NG-14-0071, Dated February 27, 2014 (ML14062A183)

In accordance with the provisions of Section 50.90 of Title 10 of the *Code of Federal Regulations* (10 CFR), NextEra Energy Duane Arnold, LLC (NextEra) is submitting a request for an amendment to the Technical Specifications (TS) for the Duane Arnold Energy Center (DAEC).

The proposed amendment would revise TS 4.3.1, "Fuel Storage, Criticality," and TS 4.3.3, "Fuel Storage, Capacity," in accordance with the enclosed spent fuel pool criticality safety analysis report. The proposed amendment would also add a new requirement to TS 5.5, "Programs and Manuals," for a Spent Fuel Pool Neutron Absorber Monitoring Program.

Enclosure 1 provides NextEra's evaluation of the proposed change. Enclosure 2 provides the existing TS pages marked up to show the proposed change. Enclosure 3 provides revised (clean) TS pages. Enclosure 4 provides the non-proprietary version of the spent fuel pool criticality safety analysis report performed by NextEra.

A001
NRR

Enclosure 6 transmitted herewith contains Proprietary Information.
When separated from Enclosure 6, this document is decontrolled.

Enclosure 6 provides the proprietary version of the spent fuel pool criticality safety analysis report. Enclosure 6 contains information proprietary to Global Nuclear Fuel – Americas, LLC (GNF-A), and is supported by an affidavit in Enclosure 5 signed by GNF-A, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure and addresses with specificity the considerations listed in paragraph (b)(4) of CFR 2.390. Accordingly, NextEra requests that the information that is proprietary to GNF-A (Enclosure 6) be withheld from public disclosure in accordance with 10 CFR 2.390.

This letter contains no new or revised regulatory commitments. Submission of this License Amendment Request satisfies the following Regulatory Commitment made in the referenced letter:

> *NextEra Energy Duane Arnold, LLC will revise the DAEC criticality analysis of record to include additional margin for Boron-10 areal density to bound testing uncertainty. A License Amendment Request with a revised criticality analysis will be submitted by March 15, 2016.*

NextEra requests approval of the proposed license amendment by March 30, 2017, with the amendment being implemented within 60 days.

In accordance with 10 CFR 50.91, a copy of this application, with enclosures, is being provided to the designated State of Iowa official.

As discussed in Enclosure 1, the proposed change does not involve a significant hazards consideration pursuant to 10 CFR 50.92, and there are no significant environmental impacts associated with the change. The Duane Arnold Energy Center Onsite Review Group has reviewed the proposed license amendment request.

If you have any questions or require additional information, please contact J. Michael Davis at 319-851-7032.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on March 15, 2016.

T. A. Vehec
Vice President, Duane Arnold Energy Center
NextEra Energy Duane Arnold, LLC

Enclosures

cc: Regional Administrator, USNRC, Region III,
Project Manager, USNRC, Duane Arnold Energy Center
Resident Inspector, USNRC, Duane Arnold Energy Center
A. Leek (State of Iowa)

ENCLOSURE 1 to NG-16-0052

NEXTERA ENERGY DUANE ARNOLD, LLC
DUANE ARNOLD ENERGY CENTER

License Amendment Request (TSCR-159) to Revise Technical Specification Fuel Storage Requirements

EVALUATION OF PROPOSED CHANGES

9 pages follow

1.0 SUMMARY DESCRIPTION

NextEra Energy Duane Arnold, LLC (NextEra) hereby requests an amendment to the Duane Arnold Energy Center (DAEC) Technical Specifications (TS). The requested amendment would revise the fuel storage requirements in TS Section 4.3, as well as add a new program titled "Spent Fuel Pool Neutron Absorber Monitoring Program" to TS Section 5.5. The amendment is supported by a new spent fuel pool criticality safety analysis for the Programmed and Remote Systems Corporation (PaR) racks in the DAEC spent fuel pool.

The existing TS pages, marked up to show the proposed changes, and revised (clean) TS pages are included as enclosures to this License Amendment Request, NG-16-0052 (LAR). The non-proprietary version of our spent fuel pool criticality safety analysis report, vendor affidavit in support of the proprietary version of our spent fuel pool criticality safety analysis report and the proprietary version of our spent fuel pool criticality safety analysis report are also included as enclosures to this LAR.

2.0 DETAILED DESCRIPTION

Background

The DAEC spent fuel pool contains two types of spent fuel storage racks: twelve PaR racks, and nine Holtec racks. The PaR racks were approved for installation via license amendment number 45 in 1978, and the Holtec racks were approved for installation via license amendment number 195 in February of 1994. Both rack types have Boral panels, used as the neutron absorber for criticality safety. The criticality requirements for storage of fuel assemblies in the spent fuel pool racks were approved via license amendment number 226 in June 1999, for both rack types. The spent fuel pool criticality safety analysis supporting this amendment credited Boral as the neutron absorber for both rack types.

NextEra (known as FPL Energy at the time) submitted a license renewal application for DAEC in September 2008, which was approved in December 2010. As part of that license renewal, an NRC commitment was made (#48 in the NRC SER, NUREG-1955) to implement a Boral Surveillance Program and complete the first in-situ neutron attenuation test of the PaR spent fuel racks prior to the period of extended operation, which began on February 21, 2014. The purpose of the testing was to validate that there had been no degradation in the PaR Boral panels that could affect the PaR racks intended function. As noted above, this commitment was only for the PaR racks, as the Holtec spent fuel pool racks have a coupon surveillance program.

On June 10 through 19, 2013, Boron-10 Areal Density Gage to Evaluate Racks (BADGER) testing was performed at DAEC. Sixty panels among the PaR spent fuel pool racks were chosen by NextEra Energy to be tested by NETCO (Northeast Technology Corporation) using the BADGER testing system.

On September 11, 2013, DAEC received the BADGER Test Report from NETCO. The report indicated that the Boral areal density assumed in the criticality safety analysis of record as discussed in UFSAR Section 9.1.2.2.1 may not be supported. This conclusion was based on measurements that showed some of the panels had an average Boral areal density below the minimum areal density used in the criticality safety analysis. Since the minimum Boral areal density in the criticality safety analysis could not be supported based on the testing results, the PaR spent fuel pool racks do not conform to k-infinity and enrichment limits of DAEC TS Design Specifications 4.3.1.1 (i) and 4.3.1.1(iii). NextEra submitted a Licensee Event Report (LER) to

document the event (Reference 1). As discussed in the LER, NextEra declared the PaR racks to be in an operable but non-conforming condition until corrective actions are completed. NextEra established administrative controls to ensure the effective neutron multiplication factor (k_{eff}) in the PaR racks fully loaded with fuel of the highest anticipated reactivity and accounting for uncertainties, remains below the regulatory limit of 0.95 with a 95% probability at a 95% confidence level. Subsequently, NextEra made a commitment (Reference 2) to revise the criticality safety analysis of record to include additional margin for the Boral areal density.

Spent Fuel Pool Criticality Safety Analysis

NextEra has performed a new spent fuel pool criticality safety analysis for the DAEC PaR racks with a reduction in the Boral areal density credited in the analysis. This amendment requests NRC approval of this new spent fuel pool criticality safety analysis for DAEC. The new analysis addresses legacy 7x7 and 8x8 fuel designs currently stored in the spent fuel pool, as well as the various 10x10 fuel designs used at DAEC. The new analysis shows that the effective neutron multiplication factor (k_{eff}) in the spent fuel pool PaR racks fully loaded with fuel of the highest anticipated reactivity and accounting for uncertainties, is less than the regulatory limit of 0.95 with a 95% probability at a 95% confidence level. Reactivity effects of normal and accident conditions are evaluated to assure that under all credible conditions, the reactivity will not exceed the regulatory limit.

The analysis is performed consistent with existing applicable regulatory requirements and guidance. The new criticality safety analysis has been performed using methodologies that have been reviewed and approved by the NRC in previous applications. Details of the new spent fuel pool criticality safety analysis for the DAEC PaR racks are provided in Enclosures 4 and 6.

Proposed Changes to Technical Specifications

The DAEC requirements related to fuel storage are contained in TS Section 4.3, "Fuel Storage." TS 4.3.1, "Criticality," identifies requirements pertaining to the design of the spent fuel pool storage racks. Specifically, TS 4.3.1.1.a has limits for fuel assembly k-infinity and lattice-averaged U-235 enrichment, with different values depending on pin array and rack type. This license amendment request proposes changes to 4.3.1.1.a, as follows: (1) reduce the k-infinity limit for 7x7 and 8x8 pin arrays, (2) specify that the 7x7 and 8x8 pin arrays limits are for legacy fuel assemblies only, (3) remove the 9x9 pin arrays, as those have not been used at DAEC; and (4) make the same k-infinity limit for 10x10 pin arrays applicable to both Holtec and PaR racks.

TS 4.3.1.1.b currently requires keff ≤ 0.95 if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR. TS 4.3.1.1.c currently requires a nominal 6.060 inches for HOLTEC designed and 6.625 inches for PaR designed center to center distance between fuel assemblies placed in the storage racks. No changes to the existing 4.3.1.1.b and 4.3.1.1.c are proposed in this license amendment request.

This license amendment also requests Section 4.3.1.1 be revised to include the addition of a new TS requirement, 4.3.1.1.d. This proposed change is as follows:

d. The Boral neutron absorber shall have a ^{10}B areal density greater than or equal to 0.0162 grams $^{10}B/cm^2$ with an uncertainty of 0.0012 grams $^{10}B/cm^2$.

The license amendment request also proposes to modify TS 4.3.3, "Capacity," to reduce the spent fuel pool storage capacity limits (total and cask pit) to the values for the current spent fuel pool configuration. NextEra had expansion plans that had been NRC approved, yet those plans were not implemented and are no longer planned to be implemented. NextEra is using spent fuel pool dry storage instead of increasing the spent fuel pool capacity.

Finally, the license amendment request proposes to add a new TS in Section 5.5, "Programs and Manuals," for the Spent Fuel Pool Neutron Absorber Monitoring Program.

A markup of the proposed TS changes is provided in Enclosure 2. The UFSAR will also be revised, upon implementation of the approved amendment, as part of NextEra's configuration control process.

3.0 TECHNICAL EVALUATION

As described in the DAEC UFSAR Section 9.1.2, "Spent Fuel Storage," the power generation objective of the spent fuel storage racks is to provide specially designed underwater storage space for the spent fuel assemblies or bundles that require shielding, cooling, and criticality control during storage and handling. To achieve that objective, the racks are designed using the following power generation and safety design bases:

- Spent fuel storage racks are designed and arranged such that the fuel assemblies can be efficiently handled during refueling operations.
- High density spent fuel storage racks are designed to provide maximum storage space in the spent fuel pool.
- The fuel array in the fully loaded spent fuel racks will be substantially subcritical and prevent fuel barrier damage caused by overheating. For any operating or accident condition which is a design basis for DAEC, the subcritical multiplication factor (k_{eff}) is maintained below 0.95. This includes the worst-case postulation of a dropped fuel assembly.
- Each spent fuel storage rack, empty or loaded with fuel, is designed to withstand earthquake loading to minimize distortion of the spent fuel storage arrangement.

The PaR spent fuel racks are a bolted anodized aluminum construction having a neutron absorber medium of natural B_4C in an aluminum matrix core clad with 1100 series aluminum. The neutron absorber, marketed under the trade name of Boral, is sealed within two concentric square aluminum tubes forming the "poison can." The nominal Boral areal density is 0.0250 grams $^{10}B/cm^2$, with a minimum of 0.0232 grams $^{10}B/cm^2$.

This amendment request provides a new spent fuel pool criticality safety analysis for DAEC for the PaR spent fuel racks. A summary of the new analysis is provided in Enclosures 4 and 6. The Holtec spent fuel racks will continue to rely on their current licensing basis analysis (approved via Amendment 226).

The new spent fuel pool criticality safety analysis demonstrates that all fuel assemblies stored in the PaR spent fuel racks are in compliance with the spent fuel criticality control requirements in 10 CFR 50.68(b) and NRC Interim Staff Guidance (ISG) DSS-ISG-2010-01 (Reference 3). The new analysis uses a reduced Boral areal density of 0.0150 grams $^{10}B/cm^2$ in the PaR rack spent fuel racks at DAEC.

The methodology for the new spent fuel pool criticality safety analysis is as follows:

- Evaluate lattices from fuel assemblies used at DAEC at multiple conditions to establish relationship between standard core cold geometry (SCCG) k-infinity and in-rack k_{eff}
- Determine SCCG lattice k-infinity that bounds all fuel assemblies used at DAEC
- Calculate in-rack k_{eff} for bounding SCCG lattice
- Calculate uncertainties (e.g., fuel tolerances, rack tolerances, depletion)
- Calculate biases (e.g., eccentricity, orientation, interfaces)
- Evaluate normal operating conditions
- Evaluate accidents (e.g., misplaced fuel assembly, dropped fuel assembly)
- Validate computer codes and cross section libraries using critical experiments, following the guidance in NUREG/CR-6698 (Reference 4).
- Determine maximum in-rack k_{eff} by adding biases and uncertainties to calculated in-rack k_{eff} for bounding SCCG lattice, ensuring that it is below the regulatory limit of 0.95 with sufficient margin

The NRC ISG (Reference 3) was reviewed and addressed, as applicable, for the new criticality safety analysis. The report included in Enclosures 4 and 6 includes a table that provides a cross-reference between the ISG technical guidance topic and the location where the topic is addressed in the criticality safety analysis.

The PaR spent fuel pool racks SCCG lattice k-infinity limit for the 10x10 fuel designs was selected to match the value used for the Holtec spent fuel pool racks. Although a higher value could have been supported, the value selected is considerably higher than the SCCG k-infinity for all fuel assemblies used at DAEC, and should remain bounding for future fuel assemblies. All future fuel assemblies will be verified to have an SCCG k-infinity lower than the SCCG lattice k-infinity limit prior to storing in the spent fuel pool racks.

For the 7x7 and 8x8 legacy fuel designs used in early cycles at DAEC, the SCCG lattice k-infinity limit is lowered to the same value as for the 10x10 fuel designs since that value is sufficiently bounding of all fuel assemblies. Additionally, the TS applicable to 7x7 and 8x8 fuel designs is modified to specify that it only applies to legacy fuel assemblies. This change was made to limit the calculations needed for those fuel designs since they are no longer used at DAEC and will not be used in the future.

The current DAEC TS were based on the Standard TS for General Electric BWR/4s in NUREG-1433, "Standard Technical Specifications General Electric Plants, BWR/4," Revision 1, April 1995, with exceptions as approved during the DAEC conversion. NUREG-1433 Revision 1 (and the most recent revision, i.e., Revision 4) provide an option to either include the maximum k-infinity in the normal reactor core configuration at cold conditions, or the maximum average U-235 enrichment as part of TS 4.3.1.1. Both of those parameters are currently included in the DAEC TS, and the proposed changes in this amendment request modify but do not remove either of the parameters.

Boral Surveillance Program

As previously discussed, the new spent fuel pool criticality safety analysis partially credits the Boral in the PaR spent fuel pool racks. NextEra has a Boral Surveillance Program for the PaR racks, to monitor the integrity and performance of the Boral on a continuing basis to assure that slow, long-term synergistic effects, if any, do not become significant. The purpose of the

surveillance program is to characterize certain properties of the Boral with the objective of providing data necessary to assure the capability of the Boral panels in the racks to continue to perform their intended function.

Since the PaR racks do not have test coupons, in-situ neutron attenuation testing is performed to confirm no Boral degradation is occurring which would cause the racks to not meet the assumptions in the spent fuel pool criticality analysis. NextEra performed the first in-situ (BADGER) test for the DAEC PaR spent fuel pool racks in 2013, and will perform additional tests on a 10 year frequency. The next test will be performed prior to May 31, 2023. The testing frequency is appropriate given the significant reduction in the credited Boral areal density in the new spent fuel pool criticality safety analysis (0.0232 to 0.0150 grams $^{10}B/cm^2$). The reduced Boral areal density is considerably lower than the lowest panel measured in the first BADGER test (0.0208 grams $^{10}B/cm^2$).

In-situ testing of the PaR spent fuel pool racks at DAEC is performed via a special test procedure. The test is performed following this general outline:

- The test equipment is assembled poolside and suspended from the refueling bridge frame mounted hoist or monorail hoist.
- The Cf-252 source is transferred into the source tube, a seal plug installed, and the source and detector heads are immediately lowered into the pool.
- A 3x3 calibration cell mockup, similar in construction to the installed fuel storage cells is available for this test and has Boral panels installed of known areal densities. It is lowered into the pool and rests on top of the existing spent fuel racks.
- A probe is lowered into the calibration cell and detector count rate between source and the detectors is measured and recorded by the data logging computer. During calibration, the reference elevation datum is established at the bottom of the calibration cell.
- To test a given cell, a 7x7 array (with the test cell in the center) must be void of fuel to obtain representative readings.
- The probe is lowered to the bottom of two specific cells on either side of the Boral panel of interest. A high speed manual override controller allows the test equipment operator to override the slower (lowering) speed of the computer.
- When the probe reaches the bottom of the cell (as indicated by the load sensor) a zero elevation reference datum is recorded by the computer.
- After the reference datum is established, the entire Boral panel is scanned with the heads being moved in increments equal to the active length of the detectors.
- At each elevation, the counts from the detector are measured for a predetermined period of time and recorded by the computer.
- The counting interval depends on the areal density of the Boral with a longer interval required for Boral with higher areal densities.
- A count is taken in the cell above the Boral panel to provide an effective "un-attenuated" count rate. This un-attenuated count applies to the condition where the source and detector are separated by the aluminum rack structure only with no Boral.
- Scan from the bottom of the cell up to allow a more precise alignment of the probes with respect to plumbness relative to the rack cells.
- Obtain Boral areal densities throughout the entire length of the panel.
- Repeat the process on subsequent panels scheduled to be tested.

Upon receipt of the BADGER Test Final Report, areal density criteria is used to determine performance acceptance of the PaR rack Boral panels. If the measured Boral areal density for all measured panels is greater than or equal to the minimum Boral areal density used in the spent fuel pool criticality analysis, then no further action is required, as panels are in compliance. If one or more panels are below the minimum Boral areal density used in the spent fuel pool criticality analysis, then several actions must be taken, including entering a condition report, performing a prompt operability determination, implementing administrative controls, evaluating reportability, re-performing the spent fuel pool criticality analysis, and potentially performing fuel moves, depending on how low the measured Boral areal densities were. The acceptance criteria are also documented in the special test procedure for performance of the in-situ testing of the PaR spent fuel pool racks.

Additional information on the DAEC Boral Surveillance Program can be found in Reference 5.

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. NextEra has determined that the proposed changes do not require any exemptions or relief from regulatory requirements and do not affect conformance with any General Design Criterion differently than described in the DAEC UFSAR.

10 CFR 50.68, "Criticality Accident Requirements," paragraph (b)(4) states that the k_{eff} of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity and flooded with unborated water must not exceed 0.95, at a 95 percent probability, 95 percent confidence level. The new spent fuel pool criticality safety analysis provided in Enclosures 4 and 6 to this submittal demonstrates that this requirement is met.

10 CFR 50.68, "Criticality Accident Requirements," paragraph (b)(7) states that the maximum nominal U-235 enrichment of the fresh fuel assemblies is limited to 5.0 percent by weight. All DAEC fuel meets this requirement.

Duane Arnold UFSAR Section 3.1, "Conformance to AEC General Design Criteria for Nuclear Power Plants," provides an evaluation of the design basis of Duane Arnold against Appendix A of 10 CFR 50 effective May 21, 1971 and subsequently amended on July 7, 1971. The applicable AEC General Design Criteria (GDC) is Criterion 62, "Prevention of Criticality in Fuel Storage and Handling," which states, "Criticality in the fuel storage and handling system shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations." The evaluation of DAEC's conformance with GDC 62 is discussed in UFSAR Section 9.1, "Fuel Storage and Handling." The racks in which fuel assemblies are placed, are designed and arranged to ensure subcriticality in the spent fuel pool. The new criticality safety analysis has been performed to demonstrate that, given the current spent fuel pool storage system design, k_{eff} will remain less than or equal to the regulatory limit.

4.2 Significant Hazards Consideration

NextEra Energy Duane Arnold has evaluated the proposed changes to the TS using the criteria in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration.

Description of Amendment Request: The proposed amendment would revise TS 4.3.1, "Fuel Storage, Criticality," and TS 4.3.3, "Fuel Storage, Capacity," in accordance with the enclosed spent fuel pool criticality safety analysis report. The proposed amendment would also add a new requirement to TS 5.5, "Programs and Manuals," for a Spent Fuel Pool Neutron Absorber Monitoring Program.

Basis for proposed no significant hazards determination: As required by 10 CFR 50.91(a), the NextEra Energy Duane Arnold analysis of the issue of no significant hazards consideration is presented below:

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

   Response: No

   The proposed amendment involves a new spent fuel pool criticality safety analysis and proposes modified or new TS requirements. The new spent fuel pool criticality safety analysis does not involve a physical change to any plant system nor does it involve a change to any of the accident mitigation features previously evaluated.

   The proposed amendment does not change or modify the fuel, fuel handling processes, spent fuel storage racks, decay heat generation rate, or the spent fuel pool cooling and cleanup system.

   Operation in accordance with the proposed amendment will not significantly increase the probability of a fuel mis-positioning event because the new spent fuel pool criticality safety analysis demonstrates that fuel assemblies that meet the new TS requirements can be stored in any spent fuel pool location without restriction.

   There is no dose consequence associated with an abnormal condition since the criticality safety analysis acceptance criteria preclude criticality and does not involve a radiological release.

   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

   The proposed amendment involves a new spent fuel pool criticality safety analysis and proposes modified or new TS requirements. The new spent fuel pool criticality safety analysis does not involve a physical change to any plant system.

   The proposed amendment does not change or modify the fuel, fuel handling processes, spent fuel storage racks, decay heat generation rate, or the spent fuel pool cooling and cleanup system. The proposed amendment does not change the method of fuel movement or fuel storage and does not create the potential for a new accident.

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

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

   Response: No

   10 CFR 50.68, Criticality Accident Requirements, requires the spent and fresh fuel storage racks to maintain the effective neutron multiplication factor, k_{eff}, less than or equal to 0.95 when fully flooded with unborated water, which includes an allowance for uncertainties. Therefore, for criticality, the required safety margin is 5%, including a conservative margin to account for engineering and manufacturing uncertainties. The new spent fuel pool criticality safety analysis and proposed TS changes continue to satisfy this requirement.

   The new spent fuel pool criticality safety analysis does not affect spent fuel heat generation or the spent fuel pool cooling systems. In addition, the radiological consequences of a dropped fuel assembly remain unchanged as the anticipated fuel damage due to a fuel handling accident is unaffected by the implementation of the new spent fuel pool criticality safety analysis. The proposed change reduces the capacity of the spent fuel pool which either does not impact or increases the margin of safety.

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

Based on the above, NextEra concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92, and, accordingly, a finding of "no significant hazards consideration" is justified.

4.3 Conclusions

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 CONSIDERATIONS

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 REFERENCES

1. Letter from Richard Anderson (NextEra Energy Duane Arnold) to U.S. Nuclear Regulatory Commission, "Licensee Event Report #2013-003," NG-13-0411, November 11, 2013.
2. Letter from Richard Anderson (NextEra Energy Duane Arnold) to U.S. Nuclear Regulatory Commission, "Duane Arnold Energy Center (DAEC) Commitment regarding Licensee Event Report (LER) 2013-003-00," NG-14-071, February 27, 2014.
3. Final Division of Safety Systems Interim Staff Guidance, "Staff Guidance Regarding the Nuclear Criticality Safety Analysis for Spent Fuel Pools," DSS-ISG-2010-01 Revision 0, October 2011. (ADAMS Accession Number ML110620086.)
4. J.C. Dean and R.W. Tayloe, Jr., "Guide for Validation of Nuclear Criticality Safety Calculational Methodology," NUREG/CR-6698, January 2001.
5. Letter from Christopher Costanzo (NextEra Energy Duane Arnold) to U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information Regarding Boral and Protective Coatings in the Duane Arnold Energy Center License Renewal Application," NG-09-0765, October 23, 2009.

ENCLOSURE 2 to NG-16-0052

NEXTERA ENERGY DUANE ARNOLD, LLC
DUANE ARNOLD ENERGY CENTER

License Amendment Request (TSCR-159) to Revise Technical Specification Fuel Storage Requirements

PROPOSED TECHNICAL SPECIFICATION CHANGES (MARKUP COPY)

4 pages follow

4.0 DESIGN FEATURES (continued)

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 the following limits for maximum k-infinity in the normal reactor core configuration at cold conditions and maximum lattice-average U-235 enrichment weight percent:

	k-∞	wt %
i) 7x7 and 8x8 pin arrays (Holtec and PaR racks)	≤ ~~1.31~~ 1.29	≤ 4.6
ii) ~~9x9 and~~ 10x10 pin arrays (Holtec racks)	≤ 1.29	≤ 4.95
~~iii) 9x9 and 10x10 pin arrays (PaR racks)~~	~~≤ 1.39~~	~~≤ 4.95~~

Legacy Fuel Assemblies only;

and PaR

b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in 9.1 of the UFSAR; and

c. A nominal 6.060 inches for HOLTEC designed and 6.625 inches for PaR designed center to center distance between fuel assemblies placed in the storage racks.

Insert 1

4.3.1.2 The new fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum k-infinity of 1.31 in the normal reactor core configuration at cold conditions;

b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. $k_{eff} \leq 0.90$ if dry, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR; and

d. A nominal 6.625 inch center to center distance between fuel assemblies placed in storage racks.

(continued)

4.0 DESIGN FEATURES (continued)

4.3.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 831 ft. – 2 3/4 in.

4.3.3 Capacity

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than ~~3152~~ 2563 fuel assemblies in a vertical orientation, including no more than ~~323~~ 152 fuel assemblies stored in the cask pit in accordance with UFSAR Section 9.1.

The new fuel storage vault is equipped with racks for storage of up to 110 fuel assemblies in a vertical orientation.

5.5 Programs and Manuals

5.5.14 Surveillance Frequency Control Program

This program provides controls for Surveillance Frequencies. The program shall ensure that Surveillance Requirements specified in the Technical Specifications are performed at intervals sufficient to assure the associated Limiting Conditions for Operation are met.

a. The Surveillance Frequency Control Program shall contain a list of Frequencies of those Surveillance Requirements for which the Frequency is controlled by the program.

b. Changes to the Frequencies listed in the Surveillance Frequency Control Program shall be made in accordance with NEI 04-10, "Risk-Informed Method for Control of Surveillance Frequencies," Revision 1.

c. The provisions of Surveillance Requirements 3.0.2 and 3.0.3 are applicable to the Frequencies established in the Surveillance Frequency Control Program.

Insert 2

INSERT 1

d. The Boral neutron absorber shall have a ^{10}B areal density greater than or equal to 0.0162 grams $^{10}B/cm^2$ with an uncertainty of 0.0012 grams $^{10}B/cm^2$.

INSERT 2

5.5.15 Spent Fuel Pool Neutron Absorber Monitoring Program

This program provides routine monitoring and actions to ensure that the condition of Boral in the spent fuel pool racks is appropriately monitored to ensure that the Boral neutron attenuation capability described in the criticality safety analysis of UFSAR Section 9.1 is maintained. The program shall include the following:

a. Neutron attenuation in situ testing for the PaR racks shall be performed at a frequency of not more than 10 years, or more frequently based on observed trends or calculated projections of Boral degradation. The acceptance criterion for minimum Boral areal density will be that value assumed in the criticality safety analysis.

b. Neutron attenuation testing of a representative Boral coupon for the Holtec racks shall be performed at a frequency of not more than 6 years, or more frequently based on observed trends or calculated projections of Boral degradation. The acceptance criterion for minimum Boral areal density will be that value assumed in the criticality safety analysis.

c. Description of appropriate corrective actions for discovery of nonconforming Boral.

ENCLOSURE 3 to NG-16-0052

NEXTERA ENERGY DUANE ARNOLD, LLC
DUANE ARNOLD ENERGY CENTER

License Amendment Request (TSCR-159) to Revise Technical Specification Fuel Storage Requirements

REVISED TECHNICAL SPECIFICATION PAGES

3 pages follow

4.0 DESIGN FEATURES (continued)

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 the following limits for maximum k-infinity in the normal reactor core configuration at cold conditions and maximum lattice-average U-235 enrichment weight percent:

	k-∞	wt %
i) 7x7 and 8x8 pin arrays (Legacy Fuel Assemblies only; Holtec and PaR racks)	≤ 1.29	≤ 4.6
ii) 10x10 pin arrays (Holtec and PaR racks)	≤ 1.29	≤ 4.95

b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in 9.1 of the UFSAR; and

c. A nominal 6.060 inches for HOLTEC designed and 6.625 inches for PaR designed center to center distance between fuel assemblies placed in the storage racks.

d. The Boral neutron absorber shall have a ^{10}B areal density greater than or equal to 0.0162 grams $^{10}B/cm^2$ with an uncertainty of 0.0012 grams $^{10}B/cm^2$.

4.3.1.2 The new fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum k-infinity of 1.31 in the normal reactor core configuration at cold conditions;

b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. $k_{eff} \leq 0.90$ if dry, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR; and

d. A nominal 6.625 inch center to center distance between fuel assemblies placed in storage racks.

(continued)

4.0 DESIGN FEATURES (continued)

4.3.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 831 ft. – 2 3/4 in.

4.3.3 Capacity

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 2563 fuel assemblies in a vertical orientation, including no more than 152 fuel assemblies stored in the cask pit in accordance with UFSAR Section 9.1.

The new fuel storage vault is equipped with racks for storage of up to 110 fuel assemblies in a vertical orientation.

5.5 Programs and Manuals

5.5.14 Surveillance Frequency Control Program

This program provides controls for Surveillance Frequencies. The program shall ensure that Surveillance Requirements specified in the Technical Specifications are performed at intervals sufficient to assure the associated Limiting Conditions for Operation are met.

a. The Surveillance Frequency Control Program shall contain a list of Frequencies of those Surveillance Requirements for which the Frequency is controlled by the program.

b. Changes to the Frequencies listed in the Surveillance Frequency Control Program shall be made in accordance with NEI 04-10, "Risk-Informed Method for Control of Surveillance Frequencies," Revision 1.

c. The provisions of Surveillance Requirements 3.0.2 and 3.0.3 are applicable to the Frequencies established in the Surveillance Frequency Control Program.

5.5.15 Spent Fuel Pool Neutron Absorber Monitoring Program

This program provides routine monitoring and actions to ensure that the condition of Boral in the spent fuel pool racks is appropriately monitored to ensure that the Boral neutron attenuation capability described in the criticality safety analysis of UFSAR Section 9.1 is maintained. The program shall include the following:

a. Neutron attenuation in situ testing for the PaR racks shall be performed at a frequency of not more than 10 years, or more frequently based on observed trends or calculated projections of Boral degradation. The acceptance criterion for minimum Boral areal density will be that value assumed in the criticality safety analysis.

b. Neutron attenuation testing of a representative Boral coupon for the Holtec racks shall be performed at a frequency of not more than 6 years, or more frequently based on observed trends or calculated projections of Boral degradation. The acceptance criterion for minimum Boral density will be that value assumed in the criticality safety analysis.

c. Description of appropriate corrective actions for discovery on nonconforming Boral.

ENCLOSURE 5 to NG-16-0052

NEXTERA ENERGY DUANE ARNOLD, LLC
DUANE ARNOLD ENERGY CENTER

License Amendment Request (TSCR-159) to Revise Technical Specification Fuel Storage Requirements

AFFIDAVIT

3 pages follow

Global Nuclear Fuel – Americas

AFFIDAVIT

I, **Lukas Trosman,** state as follows:

(1) I am Engineering Manager, Reload Design and Analysis, Global Nuclear Fuel – Americas, LLC ("GNF-A"), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Attachment 6 of NextEra Energy's letter entitled "License Amendment Request (TSCR-159) to Revise Technical Specification Fuel Storage Requirements," March 15, 2016. GNF proprietary information in Attachment 6 is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]] A "[[" marking at the beginning of a table, figure, or paragraph closed with a "]]" marking at the end of the table, figure or paragraph is used to indicate that the entire content between the double brackets is proprietary. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GNF-A's competitors without license from GNF-A constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future GNF-A customer-funded development plans and programs, resulting in potential products to GNF-A;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

(5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GNF-A, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GNF-A, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GNF-A.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GNF-A are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) is classified as proprietary because it contains details of GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost to GNF-A or its licensor.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GNF-A's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GNF-A.

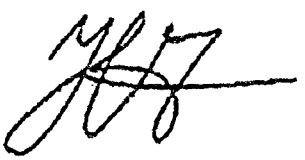
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GNF-A would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 29th day of February 2016.



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