



July 26, 2018

NG-18-0090

10 CFR 50.90  
10 CFR 50, Appendix E

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

Response to Request for Additional Information Regarding License Amendment Request (TSCR-166), Adoption of Emergency Action Level Scheme Pursuant to NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors"

References:

1. NextEra Energy Duane Arnold, LLC letter NG-17-0235, License Amendment Request (TSCR-166), Adoption of Emergency Action Level Scheme Pursuant to NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors" (ML17363A069)
2. NRC E-Mail: Draft request for additional information (RAI) - Duane Arnold Energy Center (DAEC) - LAR TSCR-166, Adoption of EAL Scheme Pursuant to NEI 99-01 - EPID L-2017-LLA-0420. From Mahesh Chawla, NRC, June 15, 2018

In Reference 1, NextEra Energy Duane Arnold, LLC (NextEra) submitted a license amendment request (LAR) for Duane Arnold Energy Center (DAEC). The proposed change adopts an Emergency Action Level (EAL) scheme pursuant to NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors."

In Reference 2, the NRC staff requested additional information to support its review of the LAR. The Enclosure to this letter provides NextEra's response to the request for additional information (RAI). The following information is provided as attachments to the Enclosure to aid NRC review and approval and replaces the Attachments in their entirety from Reference 1:

- Attachment 1 - Updated Redline Markup of NEI 99-01 Revision 6
- Attachment 2 - Updated Clean Copy of the Proposed DAEC EAL Scheme
- Attachment 3 - Updated Deviations and Differences Matrix
- Attachment 4 - Updated Supporting Technical Information
- Attachment 5 - Updated DAEC EAL Scheme Wallboards

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This RAI response does not alter the conclusions in Reference 1 that the changes do not involve a significant hazards consideration pursuant to 10 CFR 50.92, and there are no significant environmental impacts associated with the changes.

No new or revised commitments are included in this letter.

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

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

Executed on July 26, 2018



Dean Curtland  
Dean Curtland  
Site Director  
NextEra Energy Duane Arnold, LLC

Enclosure

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**

**DUANE ARNOLD ENERGY CENTER**

**NG-18-0090**

**Response to Adoption of EAL Scheme Pursuant to NEI 99-01  
Request for Additional Information (RAI), June 15, 2018  
EPID L-2017-LLA-0420.**

10 pages follow  
plus Attachments

**RAI-DAEC-1**

*Section 4.4 of NEI 99-01, Revision 6, states that alternative methods for presenting EAL scheme information may be developed for use provided that it contains all the information needed to make a correct emergency classification. This information includes the Initiating Conditions, Operating Mode Applicability criteria, EALs, and Notes. DAEC provides a Hot Classification Matrix and a Cold Classification Matrix as alternative presentation methods.*

- a. The DAEC EAL alternative method for presenting EAL scheme information does not include the notes as provided in the proposed EAL Technical Basis document. This could lead to inaccurate or delayed emergency classifications. Please revise the DAEC Hot and Cold Matrices to include the applicable notes as described in NEI 99-01, Revision 6, or provide justification for omission.*
- b. The DAEC EAL alternative method for presenting EAL scheme information is not consistent with the proposed EAL Technical Basis document. This could lead to inaccurate or delayed emergency classifications. A partial list of examples of inconsistencies are as follows: (NOTE: These items should not be considered a complete list of potential inconsistencies.)*
  - Fuel clad damage assessment corresponding to Containment Barrier Potential Loss 5A provides a value of 5% vice the value of 20% which is provided in the technical basis document.*
  - SA1.1 provides “AC power capability to 1A3 and 1A3” vice “AC power capability to 1A3 and 1A4 buses.”*
  - Table E-1 Cask On Contact Dose Rates implies all readings should be taken On Contact vice three feet from the HSM [horizontal storage module].*
  - The tables used on the alternate method for presenting EAL scheme information have different layouts and titles than the technical basis document tables. In some cases, there is no corresponding technical basis document table. (see attached table of additional comments)*

*Please review the DAEC EAL alternative method for presenting EAL scheme information and ensure the method is technically accurate and addresses human factors issues that could impact timely and accurate EAL assessments.*

**DAEC Response**

DAEC has revised the wallcharts and Technical Basis Document for better consistency and prevention of EAL assessor confusion (consideration of human factors). This revision addressed all the listed examples provided in the RAI, as well as other examples observed during a 100% comparison of the ICs and EALs between the two documents.

The revised documents are provided in the updated versions of Attachments 1, 2, and 5 provided in this letter.

**RAI-DAEC-2**

On Page 17, the proposed DAEC Section 5.1, "General Considerations," state:

*As used here, "promptly" means at the first available opportunity (e.g., if the Shift Manager is receiving an update from the fire brigade at the 15 minute mark, it is expected that the declaration will occur as the next action after the call ends).*

*The above statement could infer that it is acceptable for the Shift Manager to make the EAL declaration after the 15 minute mark, if the Shift Manager was on the phone or otherwise busy. Guidance in Section IV.H.8 to NSIR/DPR-ISG-01, "Emergency Staff Guidance for Nuclear Power Plants," provides that delays beyond 15 minutes could be found compliant under the following conditions:*

- *The delay was caused by a licensee actively performing another action immediately needed to protect the public health and safety such that a delay in declaration qualitatively represents the lesser risk.*
- *The cause of the delay was not reasonably within the licensee's ability to foresee and prevent.*

*Based on the NRC guidance cited above, unless the Shift Manager was performing actions immediately needed to protect public health and safety, it would be reasonable to expect him to obtain the required information needed to make a declaration within 15 minutes of the initiation of the event. Please explain how the Shift Manager/Emergency Director would not potentially infer that it is acceptable to make a declaration greater than 15 minutes from the initial detection of a fire, or revise accordingly to align with NRC guidance.*

**DAEC Response**

After further clarifying discussion with the NRC staff during a June 26, 2018 telephone call, DAEC now believes the guidance in Section IV.H.8 to NSIR/DPR-ISG-01 is best suited for use in EAL assessor training where the full context of the guidance can be considered. Therefore, DAEC has removed the partial clarifying guidance supplied by Section IV.H.8 to NSIR/DPR-ISG-01 and returns proposed Section 5.1 to the wording provided in NEI 99-01 alone.

The revised documents are provided in the updated versions of Attachments 1 and 2 provided in this letter.

**RAI-DAEC-3**

*The proposed DAEC EAL RA1.1, RS1.1, and RG1.1 have values for the Offgas Stack radiation monitor that were rounded from 4.45Exx to 4.5Exx and the Turbine Building ventilation radiation monitor setpoint was rounded from 1.44Exx to 1.0Exx. This could result in a difference of approximately 50% for the Turbine building ventilation radiation monitors. The staff could not determine why apparently different rounding methodologies were used for the Offgas Stack and Turbine Building ventilation radiation monitors. Please explain the basis used for the apparently different rounding methodologies or revise accordingly.*

**DAEC Response**

DAEC has reevaluated the averaging and rounding methodologies used in selection of these thresholds and agrees that too much emphasis was placed on creation of a stepped escalation progression from UE to GE. A more standard method of averaging and rounding has now been employed to determine these threshold values as shown in the revised Table R-1 below:

Table R-1 - Effluent Monitor Classification Thresholds					
	Monitor	GE	SAE	Alert	NOUE
Gaseous	Reactor Building ventilation rad monitor (Kaman 3/4, 5/6, 7/8)	1.1E+00 uci/cc	1.1E-01 uci/cc	1.1E-02 uci/cc	8.0E-04 uci/cc
	Turbine Building ventilation rad monitor (Kaman 1/2)	1.4E+00 uci/cc	1.4E-01 uci/cc	1.4E-02 uci/cc	8.0E-04 uci/cc
	Offgas Stack rad monitor (Kaman 9/10)	4.5E+03 uci/cc	4.5E+02 uci/cc	4.5E+01 uci/cc	2.0E-01 uci/cc
	LLRPSF rad monitor (Kaman 12)	---	1.4E-01 uci/cc	1.4E-02 uci/cc	1.2E-03 uci/cc
Liquid	GSW rad monitor (RIS-4767)	---	---	1.7E+04 cps	1.5E+03 cps
	RHRSW & ESW rad monitor (RM-1997)	---	---	1.2E+04 cps	8.4E+02 cps
	RHRSW & ESW Rupture Disc rad monitor (RM-4268)	---	---	1.8E+04 cps	1.0E+03 cps

The revised threshold values are provided in the updated versions of Attachments 1, 2, 3, 4, and 5 provided in this letter.

**RAI-DAEC-4**

*NEI 99-01, Revision 6, EAL CU1 is intended to result in the declaration of a Notification of Unusual Event (Unusual Event) if there is an unplanned loss of reactor pressure vessel (RPV) inventory that results in a RPV level below a minimum operating level required by the governing procedure for greater than 15 minutes. DAEC proposes to use this threshold value only when RPV level is below the RPV flange. Please explain what unique DAEC conditions require this deviation from proposed guidance for CU1.1 or revise accordingly.*

**DAEC Response**

After further clarifying discussion with the NRC staff during a June 26, 2018 telephone call, DAEC has reevaluated the proposed site-specific implementation of CU1.1 and proposes to return to the standard language provided in NEI 99-01 of: *"UNPLANNED loss of reactor coolant results in RPV level less than a required lower limit for 15 minutes or longer."*

The revised documents are provided in the updated versions of Attachments 1, 2, 3, and 5 provided in this letter.

**RAI-DAEC-5**

*The proposed DAEC EALs CU4, SS2.1, and SG2.1.b use 105 VDC for the threshold value. However, the Developer's Notes for these threshold values provides at least a 15 minute margin for a minimum DC voltage. The DAEC basis for the threshold value states that the inverter has an auto trip at 105 VDC decreasing. As such, this threshold value would provide no margin. Please explain why the DAEC threshold values for CU4 and SS2.1 and SG2.1.b were not developed above the inverter auto trip setpoint to allow for with a 15 minute margin, or revise accordingly.*

**DAEC Response**

Duane Arnold has two Class 1E 125 VDC station batteries (1D1 and 1D2). The Class 1E station batteries have a capacity of 1200 ampere-hours at an 8-hour discharge rate to 1.75 V per cell. Bus voltage of 105 VDC decreasing was chosen as the SS2 and SG2 loss of Vital DC power threshold due to this value being operationally significant and easy for operators to recognize since the 125V DC SYSTEM 1 TROUBLE, 125V DC CHARGER 1D12 TROUBLE, and 125V DC CHARGER 1D120 TROUBLE annunciators (Div 1) or 125V DC SYSTEM 2 TROUBLE and 125V DC CHARGER 1D22 TROUBLE annunciators (Div 2) will activate at this minimum system design voltage.

Due to differences in bus loading, these Division 1 and Division 2 subsystems are not expected to reach the minimum bus voltage necessary for adequate operation of SAFETY SYSTEM equipment simultaneously. Therefore, operator response to the loss of one 125 VDC bus would provide adequate (>15 minute) margin as provided by the EAL Developer Note to focus operator attention on the potential EAL threshold. Additionally, operator follow-up actions are provided in Abnormal Operating Procedure AOP-302.1, *LOSS OF 125 VDC POWER*, to reference EPIP 1.1 for EAL assessment for conditions that would only occur once battery voltage reaches 105 VDC (see annunciators listed above).

The revised source reference is provided in the updated version of Attachment 4 provided in this letter.



**RAI-DAEC-6**

*The proposed EALs CA6 and SA8 are intended to result in the declaration of an Alert classification if a hazardous event resulted in degraded performance to one train of a safety system, with either visible damage to or degraded performance of a second train of safety equipment. The proposed DAEC EALs CA6 and SA8 include the following threshold value that does not appear to be consistent with the overall intent for these EALs: "Loss of the safety function of a single train SAFETY SYSTEM." It was not apparent where such that a single support system issue would compromise public health and safety during a radiological event. As such, please explain which single safety systems would result in compromising public health and safety during a radiological event if they were compromised, or revise accordingly. As provided, DAEC EALs CA6 and SA8 are neither consistent with NEI 99-01, Revision 6, nor with the guidance provided by EPFAQ 2016-02, "Clarification of Equipment Damage as a Result of a Hazardous Event" (ADAMS Accession No. ML17195A299). Please explain what specific design DAEC features preclude using the guidance provided by EPFAQ 2016-02, or revise accordingly to preclude a possible unwarranted event classification.*

**DAEC Response**

Using the clarifying guidance provided in draft EALFAQ 2018-04, DAEC has removed the proposed threshold value for single train safety systems that is not consistent with the overall intent for these EALs. DAEC has added the clarifying language provided in this draft EALFAQ to the Basis for proposed EALs CA6 and SA8 as an aid to the plant operators to promote a consistent conclusion in evaluation of these EALs.

With the exception of one additional clarifying Basis paragraph as provided by EALFAQ 2018-04, these EALs are now consistent with the guidance provided by EPFAQ 2016-02.

The revised documents are provided in the updated versions of Attachments 1, 2, 3, 4, and 5 provided in this letter.

Enclosure to NG-18-0090

Response to Adoption of EAL Scheme Pursuant to NEI 99-01 RAIs

**RAI-DAEC-7**

*The proposed DAEC EAL threshold values for CS1.3.b and CG1.2.b include “Erratic source range indication” as a core uncover[y] indication. This indication is typically applicable to pressurized water (PWR) reactors and not boiling water reactors (BWR). Please justify using a threshold value that is typically applicable to a PWR for DAEC, which is a BWR, or revise accordingly.*

**DAEC Response**

DAEC agrees that use of this indication of potential core uncover[y] is unreliable for BWR designs and has removed it from the listing of potential indications in DAEC proposed EALs CS1 and CG1.

The revised documents are provided in the updated versions of Attachments 1, 2, 3, and 5 provided in this letter.

**RAI-DAEC-8**

*The proposed DAEC EAL threshold values for fission product barrier degradation, based on containment radiation monitors, do not appear appropriate. Considering that the Fuel Clad Loss threshold value should correspond to 2% to 5% clad damage, and the Containment Barrier Potential Loss threshold value should be 20% (as provided by NEI 99-01, Revision 6), it would be reasonable for the radiation values to be different by a factor of 4 to 10. However, the value for the Containment Barrier Loss drywell radiation monitor reading is 25 times higher than the Primary Containment Loss radiation monitor reading, while the corresponding Torus Radiation Monitor reading for a Containment Barrier Potential Loss is 2.5 times the Fuel Clad Barrier Loss threshold value. Additionally, it appears the Fuel Clad Barrier Loss was developed based on an intact RCS, which is not consistent with the guidance provided by NEI 99-01, Revision 6, or the DAEC Technical Basis for the Torus Radiation Monitor Containment Loss threshold value, which is based on a loss of RCS inventory. Please verify that the Fuel Clad Barrier threshold values for the Drywell and Torus radiation monitors are based on a loss of the RCS with between approximately 2% and 5% clad damage and that the Containment Barrier Potential Loss radiation monitors are based on approximately 20% clad damage, or revise accordingly.*

**DAEC Response**

After further clarifying discussion with the NRC staff during a June 26, 2018 telephone call, DAEC has updated the proposed Fuel Clad Loss radiation monitor threshold value to reflect a value based on a loss of the RCS with between approximately 2% and 5% clad damage (Loss 4.A). The proposed radiation monitor threshold values for Drywell and Torus Containment Barrier Potential Loss are now both 2.5 times the Fuel Clad Barrier Loss threshold value.

Additionally, the standardized threshold for RCS Activity due to Fuel Clad Loss (Loss 1.A) has been added to the Fission Product Barrier Matrix to provide an alternate method of assessing this barrier if coolant samples results are available.

Both changes are consistent with the guidance provided by NEI 99-01, Revision 6.

The revised documents are provided in the updated versions of Attachments 1, 2, 3, 4, and 5 provided in this letter.

**RAI-DAEC-9**

*The proposed DAEC EAL HU3 includes threshold values that do not appear to be consistent with the overall intent of EAL HU3 to address hazardous events, including a threshold value for high river level and a River Water Supply (RWS) pit low level alarm. Considering that internal room or area flooding is specifically addressed by HU3.2, the threshold value for river level appears redundant. Additionally, a high river level alone may, or may not, involve internal room or area flooding. Although a RWS pit low level alarm may be the result of a hazardous event, the RWS pit low level condition does not appear to represent an actual hazardous event. Please verify whether a high river level or a river water supply pit low level alarm should be considered as hazardous events, or revise accordingly.*

**DAEC Response**

DAEC agrees that the proposed thresholds for high river level and a River Water Supply (RWS) pit low level alarm are not consistent with the overall intent of EAL HU3 and these examples have been removed.

Additionally, the same conditions were listed as example hazardous events in EAL SA8. DAEC has determined that these conditions are adequately covered by the existing standardized examples provided in NEI 99-01, Revision 6, and has removed the high river level and a River Water Supply (RWS) pit low level alarm conditions from EAL SU8 as redundant to the other examples provided.

The revised documents are provided in the updated versions of Attachments 1, 2, 3, 4, and 5 provided in this letter.

**RAI-DAEC-10**

*The proposed DAEC EAL HU4.2 is intended to provide licensees thirty (30) minutes to validate whether or not a single fire alarm is valid. BWRs typically inert the Drywell and Torus when at power. DAEC EAL HU4.2 does not appear to have a note or other statement that indicates that an Unusual Event should not be declared if the Drywell and Torus are inerted. Please verify that there is a need to declare DAEC EAL HU4 for containment if the DAEC Drywell and Torus are inerted, or revise accordingly.*

**DAEC Response**

Due to the absence of fire alarms within the Drywell and Torus, DAEC is not susceptible to false fire alarms in those areas and the accompanying potential for an erroneous NOUE declaration using EAL HU4.2. These areas do remain listed on the Table H-1 fire areas for use in the evaluation of EAL HU4.1 in the event of a fire report from the field during those times that the Drywell and Torus are not inerted and can be accessed by plant personnel.

No changes were made the proposed EAL HU4.