



March 1, 2018

NG-18-0024  
10 CFR 50.90

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

Duane Arnold Energy Center  
Docket No. 50-331

Response to Request for Additional Information Regarding License Amendment Request (TSCR-170), Revision to Technical Specification 3.5.1, ECCS-Operating

References:

1. NextEra Energy Duane Arnold, LLC letter NG-17-0127, "License Amendment Request (TSCR-170), Revision to Technical Specification 3.5.1, ECCS-Operating", September 5, 2017 (ML17248A284)
2. NRC E-Mail "Draft Request for Additional Information - Duane Arnold Energy Center (DAEC) - License Amendment Request (TSCR-170), Revision to Technical Specification 3.5.1, ECCS-Operating - EPID L-2017-LLA-0288", from Mahesh Chawla, NRC, February 6, 2018

In Reference 1, NextEra Energy Duane Arnold, LLC (NextEra) submitted a license amendment request for Duane Arnold Energy Center. The proposed change modifies an existing Technical Specification (TS) requirement regarding the Automatic Depressurization System (ADS) nitrogen supply.

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).

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 March 1, 2018

A handwritten signature in black ink, appearing to read "Dean Curtland". The signature is written in a cursive, flowing style.

Dean Curtland  
Site Director, Duane Arnold Energy Center  
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

### Response to Request for Additional Information

#### RAI – 1

Regulatory Basis: 10 CFR Part 50.36 "Technical specifications," establishes the surveillance requirements related to the content of the TS.

10 CFR Part 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," requires an ECCS system that meets the criteria in 10 CFR 50.46(b) for cooling performance following a LOCA.

It was stated in Section 2.3 of the license amendment request (LAR),

Review of the DAEC accident analyses has shown that the worst-case DAEC accident scenario will require the use of ADS for 3 days post-accident. Reducing the duration of time from 100 days to 30 days still provides ample conservatism for the DAEC accident analyses and allows for an increase in accumulator margin.

Please provide the following additional information:

- a) Describe the worst-case event, including the number of times the valves are required to cycle open over the 3 day post-accident period, and whether the ADS valves have adequate capacity available to cycle during that period.
- b) Confirm that the capacity to cycle the ADS valves open at least five times at design pressures will still remain available during the proposed 30 days period, as stated in NUREG-0737, "Clarification of TMI Action Plan Requirements," Item II.K.3.28, "Verify Qualifications of Accumulators on Automatic Depressurization System Valves."

#### NextEra Response

- a) The limiting event in the 3 day post-accident period where the ADS valves would be expected to depressurize the reactor is a small break loss of coolant (LOCA) corresponding to a 0.01 ft<sup>2</sup> steam line break. This event is summarized below:
  - The plant is operating at 102% of the 120% original rated thermal power (1950 MWt) when a steam line break occurs concurrent with a loss of offsite power.

- High Pressure Coolant Injection (HPCI) flow starts injecting into the vessel until it trips on vessel high water level.
- Operators initiate a rapid depressurization at 10 minutes (600 seconds) using 4 available Safety Relief Valves (SRVs).
- Drywell spray is initiated 1800 seconds into the event resulting in a rapid reduction in drywell pressure.

During this event, drywell pressure peaks at approximately 35 psia (~20 psig) at 1800 seconds when the drywell sprays are initiated. The ADS accumulators have adequate capacity to cycle the valves and depressurize the reactor during this event based on the following conservative assumptions:

- In addition to the number of cycles required to depressurize the reactor during the small break LOCA event, additional cycles were considered to bound the main steam line break outside of containment (MSLO) event where the low-low set (LLS) valves are required to operate. For the MSLO event, there are 11 total SRV actuations between the six SRVs (four ADS valves and two LLS valves). The first two actuations are from the SRVs reaching their mechanical set point due to the main steam isolation valve (MSIV) closure which arms the LLS logic such that both LLS valves receive an open signal. The five subsequent actuations are LLS actuations that maintain reactor pressure within the LLS pressure band. The final four actuations are from manual depressurization of the four ADS valves for a total of eleven actuations among the six SRVs (assuming the first actuations from reaching the mechanical set point are considered LLS actuations). Two ADS valves have a dedicated accumulator and the other two ADS valves share an accumulator with an LLS valve. Therefore, the maximum number of cycles for one accumulator is seven (six LLS actuations and one manual depressurization ADS actuation). The calculation conservatively assumes that an ADS accumulator provides 10 valve cycles.
  - Peak drywell pressure is considered at the time the ADS valves cycle although the reactor is depressurized earlier in the event at a much lower drywell pressure.
  - Maximum permissible leakage out the accumulator system is assumed to occur for the entire 3 day period. The ADS valves would cycle much earlier in the event.
- b) The RAI specifies “at design pressures” during the proposed 30 day period. NUREG-0737, Item II.K.3.28, *Verify Qualification of Accumulators on Automatic Depressurization System Valves* states:
- “Safety analysis reports claim that air or nitrogen accumulators for the automatic depressurization system (ADS) valves are provided with sufficient capacity to cycle the valves open five times at design pressures. GE has also stated that the emergency core cooling (ECC) systems are designed to withstand a hostile environment and still perform their function for 100 days

following an accident. Licensee should verify that the accumulators on the ADS valves meet these requirements, even considering normal leakage. If this cannot be demonstrated, the licensee must show that the accumulator design is still acceptable.”

The station cannot open the ADS SRVs at “design pressure” 30 days post-accident. The station analyzed for the expected long-term containment pressure, which would be at a much lower pressure than the design pressure considering all of the energy having already been removed. As additional margin, we have shown that the SRVs can be opened ten times at the expected containment peak pressure. This meets the caveat of the NUREG which specifies that the “licensee must show that the accumulator design is still acceptable.”