



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

May 26, 2022

Mr. Bob Coffey
Executive Vice President, Nuclear
and Chief Nuclear Officer
Florida Power & Light Company
Mail Stop: EX/JB
700 Universe Boulevard
Juno Beach, FL 33408

SUBJECT: DUANE ARNOLD ENERGY CENTER – REVIEW OF THE POST-SHUTDOWN
DECOMMISSIONING ACTIVITIES REPORT (EPID L-2020-LLL-0005)

Dear Mr. Coffey:

The purpose of this letter is to inform you that the U.S. Nuclear Regulatory Commission (NRC, the Commission) staff has completed its review of the post-shutdown decommissioning activities report (PSDAR), including the site-specific decommissioning cost estimate (DCE), for the Duane Arnold Energy Center (DAEC) and finds that it contains the information required by Section 50.82(a)(4)(i) of Title 10 of the *Code of Federal Regulations* (10 CFR). The associated regulations do not require the NRC to approve a licensee's submitted PSDAR; rather, NRC approval is required later in the decommissioning process, with regard to the licensees' license termination plan, in accordance with 10 CFR 50.82(a)(9)-(10).

10 CFR 50.82(a)(4)(i) states:

Prior to or within 2 years following permanent cessation of operations, the licensee shall submit a post-shutdown decommissioning activities report (PSDAR) to the NRC, and a copy to the affected State(s). The PSDAR must contain a description of the planned decommissioning activities along with a schedule for their accomplishment, a discussion that provides the reasons for concluding that the environmental impacts associated with site-specific decommissioning activities will be bounded by appropriate previously issued environmental impact statements, and a site-specific DCE [decommissioning cost estimate], including the projected cost of managing irradiated fuel.

On April 2, 2020, NextEra Energy Duane Arnold, LLC (NEDA, the licensee), submitted a letter containing the DAEC PSDAR, which included the DCE (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20094F603), pursuant to 10 CFR 50.82. The PSDAR was updated by letter dated February 5, 2021 (ADAMS Accession No. ML21036A160).

10 CFR 50.82(a)(5) states:

Licensees shall not perform any major decommissioning activities, as defined in [10 CFR] § 50.2, until 90 days after the NRC has received the licensee's PSDAR submittal and until certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel, as required under [10 CFR] § 50.82(a)(1), have been submitted.

By letter dated January 18, 2019 (ADAMS Accession No. ML19023A196), NEDA certified to the NRC that it planned to permanently cease power operations at DAEC in the fourth quarter of 2020. By letter dated March 2, 2020 (ADAMS Accession No. ML20062E489), NEDA updated its timeline and certified to the NRC that it planned to permanently cease power operations at DAEC on October 30, 2020. Subsequently, by letter dated August 27, 2020 (ADAMS Accession No. ML20240A067), NEDA certified, pursuant to 10 CFR 50.82(a)(1)(i), that DAEC permanently ceased power operations on August 10, 2020, as the result of a derecho event.

By letter dated October 12, 2020 (ADAMS Accession No. ML20286A317), NEDA certified, pursuant to 10 CFR 50.82(a)(1)(ii), that fuel was permanently removed from the DAEC reactor vessel and placed in the spent fuel pool (SFP) as of October 12, 2020. Accordingly, pursuant to 10 CFR 50.82(a)(2), the renewed facility operating license (DPR-49) for DAEC no longer authorizes operation of the reactor or emplacement or retention of fuel in the reactor vessel. The facility is still authorized to possess and store irradiated (i.e., spent) nuclear fuel. Spent fuel is currently stored onsite at the DAEC facility in the SFP and in a dry cask independent spent fuel storage installation (ISFSI). Further, consistent with 10 CFR 50.82(a)(5), 90 days had passed before any major decommissioning activities were performed.

Consistent with 10 CFR 50.82(a)(4)(ii), the public was offered an opportunity to comment on the DAEC PSDAR and DCE. An initial notice of receipt of the DAEC PSDAR and DCE was published in the *Federal Register* (FR) on June 19, 2020 (85 FR 37116). The NRC staff requested that all comments be submitted by December 20, 2021. Comments that were submitted electronically can be viewed at www.regulations.gov by searching for Docket ID NRC-2020-0148 and selecting "Open Docket Folder." However, the NRC staff notes that no public comments were received on the docket related to the DAEC PSDAR and DCE.

Additionally, pursuant to 10 CFR 50.82(a)(4)(ii), the NRC staff held a public meeting at the Palo Community Center in Palo, Iowa, on September 28, 2021, to describe the decommissioning process, receive comments, and answer questions regarding both the DAEC PSDAR and the DAEC DCE. A webinar on the same topic was held on October 6, 2021. A summary of the meetings, dated April 13, 2022, can be found at ADAMS Accession No. ML22103A059. The transcript of the meeting is available to review at ADAMS Accession No. ML222103A060.

10 CFR 50.82(a)(7) states:

In taking actions permitted under [10 CFR] § 50.59 following submittal of the PSDAR, the licensee shall notify the NRC, in writing and send a copy to the affected State(s), before performing any decommissioning activity inconsistent with, or making any significant schedule change from, those actions and schedules described in the PSDAR, including changes that significantly increase the decommissioning cost.

The purposes of a PSDAR and DCE are to: (1) inform the public of the licensees' planned decommissioning activities, (2) assist in the scheduling of NRC resources necessary for the appropriate oversight activities, (3) ensure that the licensee has considered all of the costs of the planned decommissioning activities and has considered the funding for the dismantlement process, and (4) ensure that the environmental impacts of the planned decommissioning activities are bounded by those considered in existing environmental impact statements.

The NRC staff reviewed the DAEC PSDAR and in accompanying DCE against the requirements in 10 CFR 50.82(a). In addition, the NRC staff used the guidance in Regulatory Guide (RG) 1.185, Revision 1, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report," dated June 2013 (ADAMS Accession No. ML13140A038), in conducting its review. Based on its review, the NRC staff concludes as follows.

1. Section 2 of the DAEC PSDAR, "Description of Planned Decommissioning Activities," and the DCE provide the applicable information identified in Section C.1 of RG 1.185, Revision 1. The NRC staff's review found that the licensee adequately described the activities associated with the major periods or milestones related to the decommissioning, as required by 10 CFR 50.82(a)(4)(i) and consistent with RG 1.185, Revision 1. As described in NUREG/CR-6174, "Revised Analyses of Decommissioning for the Reference Boiling Water Reactor Power Station," dated July 1996 (ADAMS Accession No. ML14008A186), these periods include Pre-Decommissioning Planning and Preparation, Plant Deactivation, Safe Storage Operations, and Dismantlement.
2. Section 3 of the DAEC PSDAR, "Schedule of Planned Decommissioning Activities," and the DCE provide the estimated dates for initiation and completion of major decommissioning activities, as required by 10 CFR 50.82(a)(4)(i) and consistent with Section C.2 of RG 1.185, Revision 1. The NRC staff finds that the schedule for decommissioning activities is adequate to achieve DAEC license termination within 60 years of permanent cessation of operations, as required by 10 CFR 50.82(a)(3).
3. Section 4 of the DAEC PSDAR, "Estimate of Expected Decommissioning and Spent Fuel Management Costs," and the DCE provide an estimate of the expected decommissioning costs for DAEC. In the March 31, 2021, decommissioning and spent fuel management funding status report for DAEC (ADAMS Accession No. ML21090A232), NEDA reported an updated DTF balance of approximately \$632 million as of December 31, 2020.

In the March 31, 2021, report, NEDA also reported that the 10 CFR 50.75(c) minimum formula amount required to demonstrate reasonable assurance of funds to radiologically decommission DAEC, as of December 31, 2020, was \$606,136,966. Using the formula in 10 CFR 50.75(c) and the methodology provided in NUREG-1713, "Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors," dated December 2004 (ADAMS Accession No. ML043510113), and NUREG-1307, Revision 17, "Report on Waste Burial Charges: Changes in Decommissioning Waste Disposal Costs at Low-Level Waste Burial Facilities," dated February 2019 (ADAMS Accession No. ML19037A405), the NRC staff independently confirmed that the minimum formula amount required to demonstrate reasonable assurance of funds to radiologically decommission DAEC to be \$606,136,966.

In its evaluation of the site-specific DCE, the NRC staff noted that according to NEDA, using the SAFSTOR decommissioning approach the estimated remaining radiological

decommissioning cost of DAEC is approximately \$1 billion (in 2020 dollars), with the estimated license termination cost at approximately \$705 million, the spent fuel management cost at approximately \$263 million, and the estimated site restoration cost of DAEC at approximately \$37 million.

The NRC staff compared the DAEC site-specific radiological decommissioning costs with the estimated activities of the four periods associated with the SAFSTOR decommissioning method as outlined in NUREG/CR-6174. The NRC staff concluded that NEDA's method for developing the DAEC site-specific radiological decommissioning cost estimate, as compared to NUREG/CR-6174, was reasonable.

As part of its review of the DAEC PSDAR, the NRC staff reviewed the cost estimates against the guidance in RG 1.185, Revision 1, Section C.3 and found that NEDA's site-specific DCE and spent fuel management estimate for DAEC are reasonable, are described consistent with the guidance in RG 1.185, Revision 1, provide sufficient details associated with the funding mechanisms, and meet the requirements of 10 CFR 50.82(a)(4)(i).

As required by 10 CFR 50.82(a)(7), NEDA must notify the NRC in writing and send a copy to the State of Iowa before performing any decommissioning activity inconsistent with, or making any significant schedule change from, the planned decommissioning activities and schedules described in the DAEC PSDAR, including changes that significantly increase the decommissioning costs. As required, NEDA will have to verify that the decommissioning activities meet the requirements of 10 CFR 50.82(a)(6)(i) through 10 CFR 50.82(a)(6)(iii) or seek appropriate regulatory approval if needed. Finally, consistent with 10 CFR 50.82(a)(8), NEDA will be required to annually submit to the NRC financial assurance status reports, which, among other things, must include additional financial assurance to cover any shortfalls.

4. Section 5 of the DAEC PSDAR, "Environmental Impacts," provides a discussion of the potential environmental impacts associated with the planned DAEC decommissioning activities, as required by 10 CFR 50.82(a)(4)(i) and consistent with Section C.4 of RG 1.185, Revision 1. The PSDAR includes a comparison of the potential environmental impacts from the planned DAEC decommissioning activities with impacts from similar activities provided in NUREG-0586, Supplement 1, "Generic Environmental Impact Statement [GEIS] on Decommissioning of Nuclear Facilities," dated November 2002, Volumes 1 and 2 (ADAMS Accession Nos. ML023470327 and ML023500228, respectively) (also called the Decommissioning GEIS). A licensee in decommissioning is required to address the environmental impacts associated with site-specific decommissioning activities in both its PSDAR per 10 CFR 50.82(a)(4)(i) and before performing decommissioning activities that may (1) foreclose release of the site for possible unrestricted use, (2) result in significant environmental impacts not previously reviewed, or (3) result in there no longer being reasonable assurance that adequate funds will be available for decommissioning, per 10 CFR 50.82(a)(6)(i – iii).

The environmental impacts associated with decommissioning activities are generically evaluated in the Decommissioning GEIS. In the Decommissioning GEIS, the NRC staff explained the significance of the impacts and whether the environmental impacts of decommissioning activities are considered generic to all nuclear power plants or site-specific to the decommissioning facility. The Decommissioning GEIS also identifies activities that can be bounded by the generic evaluations presented in the

Decommissioning GEIS. The licensee can therefore rely on information in the Decommissioning GEIS and in the site-specific Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437), Supplement 42, Regarding Duane Arnold Energy Center (also called the Supplemental EIS (SEIS)) (ADAMS Accession No. ML102790308) as a basis for meeting the bounding impacts requirement in 10 CFR 50.82(a)(4)(i). For environmental impacts that the Decommissioning GEIS classifies as site-specific, or for decommissioning activities that could exceed the generic environmental impacts analyzed by the Decommissioning GEIS, the licensee cannot rely on the Decommissioning GEIS. The Decommissioning GEIS identifies threatened and endangered species, environmental justice, and cultural, historical, and archaeological resources as environmental impacts that must be evaluated on a site-specific basis.

In the DAEC PSDAR, NEDA provided a summary of the reasons for reaching the conclusion that the environmental impacts associated with the planned DAEC decommissioning activities are bounded by the Decommissioning GEIS or by NUREG-1437, Supplement 42. By letter dated January 6, 2021 (ADAMS Accession No. ML21006A405), the NRC transmitted to NEDA a request for additional information (RAI) in order to determine whether the site-specific environmental impacts of decommissioning are adequately addressed in the DAEC PSDAR.

Threatened and Endangered Species

As discussed in the DAEC PSDAR, Section 5.1.7, NEDA conducted a site-specific assessment of decommissioning impacts on threatened and endangered species. Based on this evaluation, NEDA does not anticipate that the planned decommissioning activities during the dormancy (SAFSTOR) phase will affect threatened or endangered species. Following dormancy and prior to conducting any significant dismantling or disassembly activities, NEDA will assess potential impacts of such activities on threatened and endangered species to ensure that any impacts are appropriately considered. If adverse impacts are determined to be possible, NEDA will take appropriate actions at that time to ensure compliance with the Endangered Species Act. NEDA would also obtain all other necessary permits, such as those issued by Linn County, the Iowa Department of Sovereign Lands, and the U.S. Army Corps of Engineers, and follow best management practices outlined in those permits, which would also ensure that potential impacts to threatened and endangered species are minimized or avoided.

Environmental Justice

Section 5.1.13 of the DAEC PSDAR addresses environmental justice. In the January 6, 2021, RAI letter the NRC staff requested that NEDA provide a more up-to-date environmental justice demographic analysis (i.e., 2010 census data) and its basis for concluding that environmental justice impacts associated with site-specific decommissioning activities will (or will not) be bounded by appropriate previously issued environmental impact statements. In response to the NRC staff's RAI, NEDA revised Section 5.1.13 of the DAEC PSDAR to discuss how the 2010 census data compared with the 2000 census data and provided an explanation to support the conclusion that the existing SEIS would bound the proposed DAEC decommissioning activities (see ADAMS Accession No. ML21036A160). The 2010 census showed an increase in

minority populations during the ten-year period, with the closest minority or high-density low-income population approximately 10 miles away in Cedar Rapids, Iowa.

NEDA does not anticipate offsite land disturbances and stated that the potential impacts to minority and low-income populations would mostly consist of radiological effects (if any). Given: (1) that the SEIS for DAEC license renewal determined that the radiation and radioactivity around the plant has no significant or measurable radiological impact on the environment; (2) that decommissioning activities will be confined to the DAEC site; and (3) the relatively distant location of minority and low-income populations from the DAEC site, NEDA reasoned that there can be no disproportionately high and adverse impacts on minority and low-income populations resulting from the decommissioning of DAEC.

Cultural, Historic, and Archaeological Resources

Section 5.1.14 of the DAEC PSDAR provides an analysis of potential impacts to cultural, historic, and archaeological resources. In the PSDAR, NEDA indicates that decommissioning activities at DAEC would be confined to the operational area, and because this area was degraded during site construction, no impact to cultural, historical, or archaeological resources would be anticipated. NEDA further acknowledges that the SEIS for DAEC license renewal determined that potential impacts to historic and archaeological resources were possible due to the potential richness of archaeological resources on the DAEC property. The DAEC PSDAR states that NEDA has, accordingly, coordinated with the Iowa State Historic Preservation Officer (SHPO) to develop and maintain excavation and trenching procedures for DAEC which address potential impacts to both known and undiscovered resources.

In the January 6, 2021, RAI letter the NRC staff requested that NEDA clarify whether it plans to determine, in consultation with the Iowa SHPO, prior to dismantlement and demolition activities during decommissioning, the current eligibility status of the DAEC facility itself for inclusion in the National Register of Historic Places or Historic American Engineering Record, and, if required, identify appropriate mitigation measures (e.g., preservation of historic information and data) potentially resulting from this consultation. In response to the NRC staff's RAI, NEDA stated that it will determine, in consultation with the Iowa SHPO, the eligibility status of the DAEC facility for inclusion in the National Register of Historic Places or Historic American Engineering Record and will identify appropriate mitigation measures, if required.

Water Resources

Section 2.3.6 of the DAEC PSDAR discusses a site hydrology study that was completed as part of NEDA's groundwater protection program. In the PSDAR, NEDA also states that tritium was detected in the site's existing groundwater monitoring wells in 2012. In the January 6, 2021, RAI letter the NRC staff requested that NEDA provide information pertaining to the environmental impacts of inadvertent releases of radionuclides to groundwater since the Decommissioning GEIS did not generically consider the environmental impacts of inadvertent releases of radionuclides to groundwater during the decommissioning of a nuclear reactor site. In response to the NRC staff's RAI, NEDA revised Section 2.3.6 of the DAEC PSDAR to identify sources of tritium detected in groundwater and corrective actions taken by the licensee to stop inadvertent releases. NEDA asserts in its response that groundwater monitoring results confirm termination of

the tritium leakage, continuous pumping of mitigation wells has confined the tritium to the onsite shallow aquifer, and tritium mitigation is expected to be completed in approximately 4 to 5 years.

Other Environmental Resources

For all generic issues, NEDA provided adequate reasons in the DAEC PSDAR for reaching the conclusion that the environmental impacts of decommissioning DAEC are bounded by the Decommissioning GEIS and by the DAEC SEIS.

Based on its review, the NRC staff finds that the DAEC PSDAR, as updated in the letter dated February 5, 2021, contains the information required by 10 CFR 50.82(a)(4)(i). As required by 10 CFR 50.82(a)(7), NEDA will notify the NRC in writing and send a copy to the State of Iowa before performing any decommissioning activity inconsistent with, or making any significant schedule change from, the planned decommissioning activities and schedules described in the DAEC PSDAR, including changes that significantly increase the decommissioning costs. In accordance with NRC regulations, NEDA will be required to verify that the decommissioning activities meet the requirements of 10 CFR 50.82(a)(6)(i) through 10 CFR 50.82(a)(6)(iii) or seek regulatory approval if needed. The NRC will continue to conduct inspections at DAEC throughout the decommissioning process using IMC 2561, in order to ensure that decommissioning activities are performed safely and in compliance with the Commission's rules and regulations, and the conditions of the DAEC license.

In accordance with 10 CFR 2.390, a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's ADAMS. ADAMS is accessible from the NRC Web site at <https://www.nrc.gov/reading-rm/adams.html>.

If you or your staff have any questions regarding the above, please contact me at 301-415-3178 or via e-mail at marlayna.doell@nrc.gov.

Sincerely,



Signed by Doell, Marlayna
on 05/26/22

Marlayna V. Doell, Project Manager
Reactor Decommissioning Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

Docket Nos. 50-331 and 72-032

cc: Duane Arnold Listserv

Duane Arnold PSDAR Review Letter DATE May 26, 2022

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