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10 CFR 50.82(a)(7)

June 26, 2019

U.S. Nuclear Regulatory Commission
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Director,
Office of Nuclear Reactor Regulation
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Subject: Notification of Revised Post-Shutdown Decommissioning Activities Report (Revised PSDAR)
Crystal River Unit 3 Nuclear Generating Plant (CR-3)
Docket Nos. 50-302 & 72-1035
License No. DPR-72

References:
(1) Letter, Duke Energy Florida, LLC (DEF) to USNRC, "Application for Order Consenting to Direct Transfer of Control of Licenses and Approving Conforming License Amendment" June 14, 2019 (ADAMS Accession No. ML19170A195).

(2) Letter, Duke Energy Florida, LLC (DEF), to USNRC transmitting "Post Shutdown Decommissioning Activities Report." December 2, 2013 (ADAMS Accession No. ML13340A009).

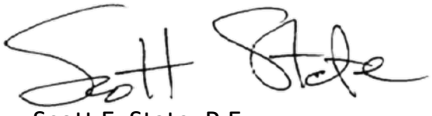
In Reference 1, Duke Energy Florida, LLC ("DEF"), on behalf of itself and ADP CR3, LLC ("ADP CR3"), and Accelerated Decommissioning Partners, LLC ("ADP"), requested that the U.S. Nuclear Regulatory Commission ("NRC") consent to direct and indirect transfers of control of DEF's Facility Operating License No. DPR-72 for the Crystal River Unit 3 Nuclear Generating Plant ("CR-3), as well as the general license for the CR-3 Independent Spent Fuel Storage Installation (the "Licenses"). ADP is submitting this Revised Post Shutdown Decommissioning Activities Report providing the plan for activities to be conducted by ADP CR3 and ADP, if the Application for license transfers is approved.

In Reference 2, DEF submitted a Post Shutdown Decommissioning Activities Report in accordance with 10 CFR 50.82, "Termination of license," paragraph (a)(4)(i) ("2013 PSDAR"). This letter is provided to notify the NRC of a significant schedule change to the 2013 PSDAR in accordance with 10 CFR 50.82, "Termination of license," paragraph (a)(7), by which we intend to accelerate the decommissioning schedule if the Application for license transfers is approved. The Revised PSDAR is provided as an attachment to this letter. The attached Revised PSDAR demonstrates that our elected actions are consistent with NRC requirements for decommissioning activities.

If you have any questions about this letter, please contact me at 212.951.3660 or sstate@northstar.com.

Again, thank you for the opportunity to provide the attached information and we look forward to further discussions.

Sincerely,



Scott E. State, P.E.
Chief Executive Officer

CRYSTAL RIVER UNIT 3

Revised Crystal River Unit 3 Post Shutdown Decommissioning Activities Report

Prepared by Accelerated Decommissioning Partners, LLC

June 26, 2019

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Acronyms

ADP	Accelerated Decommissioning Partners LLC.
AIF	Atomic Industrial Forum
ALARA	As Low As Reasonably Achievable
BMP	Best Management Practices
CFR	Code of Federal Regulations
CR3	Crystal River Unit 3
CREC	Crystal River Energy Complex
DCE	Decommissioning Cost Estimate
D&D	Decontamination and Dismantlement
DEF	Duke Energy Florida, LLC.
DOE	Department of Energy
DSEIS	Draft Supplemental Environmental Impact Statement (NUREG-1437, Supp. 44)
FDEP	Florida Department of Environmental Protection
FPSC	Florida Public Service Commission
GEIS	Generic Environmental Impact Statement (NUREG-0586)
GTCC	Greater than Class C
GW	Groundwater
ISFSI	Independent Spent Fuel Storage Installation
LLRW	Low-Level Radioactive Waste
LTP	License Termination Plan
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MWt	Megawatt-thermal
NEI	Nuclear Energy Institute
NESP	National Environmental Studies Project
NPDES	National Pollutant Discharge Elimination System
PSDAR	Post-Shutdown Decommissioning Activities Report
PWR	Pressurized Water Reactor
SAR	Safety Analysis Report
SFP	Spent Fuel Pool
SNF	Spent Nuclear Fuel
SSCs	Structures, Systems and Components

1.0 INTRODUCTION AND SUMMARY

1.1 Introduction

This revised Post-Shutdown Decommissioning Activities Report (Revised PSDAR) for the Crystal River Unit 3 (CR3) is submitted to notify the U.S. Nuclear Regulatory Commission (NRC) of changes in the actions and schedules previously described in the PSDAR for CR3 submitted in December 2013 (Reference 1) (2013 PSDAR), supplemented by letter dated June 17, 2014 (Reference 2), and accepted by the NRC by letter dated March 11, 2015 (Reference 3). The 2013 PSDAR was submitted in accordance with the requirements of Title 10 of the Code of Federal Regulation (CFR) 50.82, "Termination of license" paragraph (a) (4) (i), and this PSDAR updates the information previously provided as required by 10 CFR 50.82(a)(7).

This Revised PSDAR is intended to apply based upon and contingent upon Duke Energy Florida, LLC. (DEF) completing a transfer of the NRC License for CR3 pursuant to the terms of the Decommissioning Services Agreement between DEF and ADP CR3, LLC. (ADP) dated as of May 29, 2019. Contemporaneously with the submittal of this Revised PSDAR, DEF and ADP will submit a joint petition to the Florida Public Service Commission seeking approval of the proposed decommissioning services arrangement. DEF and ADP submitted an application to the NRC requesting approval of the transfer of control of CR3 to ADP and of the transfer of the authority to possess, maintain and decommission CR3 from DEF to ADP (Reference 4). Upon completion of the proposed transfer, ADP will assume control of the CR3 facilities. In the event that ADP does not complete the proposed transaction, this revised PSDAR will be ineffective, and the 2013 PSDAR will remain in effect.

This revised PSDAR, which will apply upon ADP becoming the licensee for CR3, contains the following:

1. A description of the planned decommissioning activities along with a schedule for their accomplishment.
2. 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.
3. A site-specific decommissioning cost estimate (DCE), including the projected cost of managing irradiated fuel.

This Revised PSDAR is also consistent with expectations of the Florida Department of Environmental Protection (FDEP) regarding the decommissioning of CR3, as set forth FDEP letter to DEF dated February 15, 2019 ("Decommissioning End State Conditions").

The PSDAR has been developed consistent with Regulatory Guide 1.185, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report," (Reference 5). This report is based on currently available information and the plans discussed herein may be modified as additional information becomes available or conditions change. As required by 10 CFR 50.82(a)(7), ADP will notify the NRC in writing 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.

1.2 Background

CR3 is part of the larger Crystal River Energy Complex (CREC), which is located on the Gulf of Mexico in Citrus County, Florida. DEF is the owner of the complex with ADP assuming control of CR3. This site location is approximately 7.5 miles northwest of the City of Crystal River, and 80 miles north of Tampa. In addition to CR3, other structures on the CREC include four fossil-fueled units (two operational and two permanently shut down), two large cooling towers, coal delivery and storage areas, ash storage area, office buildings, warehouses, barge handling docks, and a railroad. CR3 uses approximately 27 acres of previously disturbed land within the 1,062-acre developed portion of the 4,738-acre CREC site. A request for partial site release of 3,854 acres of non-impacted land from the 4,738-acre CREC site was submitted to the NRC on January 22, 2019 and is currently under review. CR3 is located at latitude 28° 57' 25.87" north and longitude 82° 41'" west.

CR3 is a single unit pressurized light-water reactor (PWR) supplied by Babcock & Wilcox. CR3 was initially licensed to operate at a maximum of 2,452 megawatt-thermal (MWt). In 1981, 2002, and 2007, the NRC approved three DEF requests to increase the licensed core power level to a maximum power level of 2,609 MWt. The reactor containment structure is a steel-lined, reinforced-concrete structure in the shape of a cylinder and capped with a shallow dome. The walls of the containment structure are approximately 3.5 feet thick. During operation, cooling water for CR3 was drawn from and returned to the Gulf of Mexico.

A brief history of the major milestones related to CR3 construction and operational history is as follows:

- Construction Permit Issued: September 25, 1968
- Operating License Issued: January 28, 1977
- Commercial Operation: March 13, 1977
- Initial Operating License Expiration: December 3, 2016
- Final Reactor Shutdown: September 26, 2009
- Final Removal of Fuel from Reactor Vessel: May 28, 2011
- Final Transfer of Fuel from Pool to ISFSI Pad January 12, 2018

By letter dated February 20, 2013, (Reference 6), DEF provided the NRC with the certification required by 10 CFR 50.82(a)(1)(i) and (ii), that operation had permanently ceased and that all fuel had been permanently removed from the reactor vessel at CR3. Upon docketing of these certifications pursuant to 10 CFR 50.82(a)(2), the 10 CFR Part 50 license for CR3 no longer authorized operation of the reactor or emplacement or retention of fuel in the reactor vessel.

On March 13, 2013, the NRC acknowledged the DEF certification of permanent cessation of power operation and permanent removal of fuel from the vessel, and that pursuant to 10 CFR 50.82(a)(2), the 10 CFR Part 50 license for CR3 no longer authorized operation of the reactor or emplacement or retention of fuel in the reactor vessel (Reference 7).

Pursuant to 10 CFR 50.51(b), “Continuation of license,” the license for a facility that has permanently ceased operations, continues in effect beyond the expiration date to authorize

ownership and possession of the utilization facility until the Commission notifies the licensee in writing that the license has been terminated.

During the period that the modified license remains in effect, 10 CFR 50.51(b) requires that ADP:

1. Take actions necessary to decommission and decontaminate the facility and continue to maintain the facility including storage, control, and maintenance of the spent fuel in a safe condition.
2. Conduct activities in accordance with all other restrictions applicable to the facility in accordance with NRC regulations and the 10 CFR 50 facility license.

10 CFR 50.82(a)(9) states that power reactor licensees must submit an application for termination of the license at least two years prior to the license termination date and that the application must be accompanied or preceded by a license termination plan to be submitted for NRC approval.

1.3 Summary of Decommissioning Alternatives

The NRC has evaluated the environmental impacts of three general methods for decommissioning power reactor facilities in NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities: Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors," (GEIS) (Reference 8). The three general methods evaluated are summarized as follows:

- DECON: The equipment, structures and portions of the facility and site that contain radioactive contaminants are promptly removed or decontaminated to a level that permits termination of the license shortly after cessation of operations.

- SAFSTOR: After the plant is shut down and defueled, the facility is placed in a safe, stable condition and maintained in that state (safe storage). The facility is decontaminated and dismantled at the end of the storage period to levels that permit license termination. During SAFSTOR, a facility is left intact or may be partially dismantled, but the fuel is removed from the reactor vessel and radioactive liquids are drained from systems and components and then processed. Radioactive decay occurs during the SAFSTOR period, thereby reducing the quantity of contamination and radioactivity that must be disposed of during decontamination and dismantlement.

- ENTOMB: Radioactive structures, systems and components (SSCs) are encased in a structurally long-lived substance, such as concrete. The entombed structure is appropriately maintained, and continued surveillance is carried out until the radioactivity decays to a level that permits termination of the license.

The decommissioning approach selected by DEF for CR3 as stated in the 2013 PSDAR was the SAFSTOR method. In this Revised PSDAR, ADP has selected the DECON method, with decontamination and dismantlement activities commencing promptly. The primary objectives of the CR3 decommissioning project remain to remove the facility from service, reduce residual radioactivity to levels permitting unrestricted release, restore the site, perform this work safely, and complete the work in a cost-effective manner.
ADP intends to complete radiological decommissioning, site restoration, and release for

unrestricted use of all portions of the site other than the Independent Spent Fuel Storage Installation ("partial license termination") potentially as soon as 2026, but no later than the end of 2030. In accordance with 10CFR50.82(a)(9), a license termination plan will be developed and submitted for NRC approval at least 2 years prior to the expected date for partial site termination. Full NRC license termination will not occur until spent fuel and greater than class C (GTCC) has been removed from the site and the ISFSI is decommissioned.

With approval of the pending partial site release request and planned partial license termination, ADP plans to release the large majority of the CR3 site property for redevelopment decades sooner than planned under the 2013 PSDAR, thereby reducing the overall risk to the workers, public, and environment associated with the long-term storage of aged, excess nuclear facilities.

The decommissioning approach for CR3 is described in the following sections.

- Section 2.0 describes the planned decommissioning activities and the general timing of their implementation.
- Section 3.0 describes the overall decommissioning schedule, including the spent fuel management activities.
- Section 4.0 provides an analysis of expected decommissioning costs, including the costs associated with spent fuel management and site restoration.
- Section 5.0 describes the basis for concluding that the environmental impacts associated with decommissioning CR3 are bounded by the NRC generic environmental impact statement related to decommissioning.
- Section 6.0 is a list of references.

2.0 DESCRIPTION OF PLANNED DECOMMISSIONING ACTIVITIES

ADP plans to use the DECON method following contract execution. DECON is broadly defined in Section 1.3 of this report. Use of the DECON method will require the management of Spent Nuclear Fuel (SNF) because of the failure of the Department of Energy to perform its spent fuel removal obligations under the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract) for the CR3 SNF. An affiliate of ADP, ADP SF1, LLC (ADP SF1), has assumed title to the SNF and all rights under the Standard Contract. ADP SF1 will be responsible for funding the SNF costs incurred by ADP, and it will secure funds for this activity from its parent companies and through damages recoveries from DOE. To explain the basis for projecting the cost of managing SNF, a discussion of SNF management activities for the site is included herein. ADP has accelerated the timeline for the decontamination and dismantlement phase of the project and intends to begin DECON promptly after ADP becomes the NRC-licensed operator of the single-reactor facility and after transition of CR3 from Duke to ADP.

During the initial phase of decommissioning, the plant was configured to ensure continued safe storage of spent fuel while it remained in the spent fuel pool (SFP). Other activities being performed under the 2013 PSDAR have involved preparing the plant for a period of dormancy. This entailed draining fluids and de-energizing systems, and reconfiguring the electrical distribution, ventilation, heating, and fire protection systems. The spent fuel has been transferred to the ISFSI for dry storage until possession is transferred to the DOE. Spent fuel racks have been removed and shipped for disposal, and the spent fuel pool has been cleaned out and dewatered. The spent fuel will be stored in on-site dry storage at the ISFSI until transfer to the DOE, or an approved interim storage facility, which is assumed to be completed by 2037.

Under this revised PSDAR, ADP will commence decontamination and dismantlement (D&D) activities soon after the closing of the proposed transaction.

For the purposes of ADP's DECON decommissioning cost estimate ("DECON DCE"), it is assumed that remaining structures within the power block are to be demolished to depths of three feet below grade and backfilled with clean fill material. The Florida Department of Environmental Protection has concurred with the removal depth.

Decommissioning activities will be performed in accordance with written, reviewed and approved site procedures, as amended for ADP to begin decommissioning. There are no identified or anticipated decommissioning activities that are unique to the CR3 site and outside the bounds considered in the GEIS.

Radiological and environmental programs will be maintained throughout the decommissioning process to ensure occupational, public health and safety, and environmental compliance with all applicable laws and regulations. Radiological programs will be conducted in accordance with the facility's revised Technical Specifications, Operating License, Defueled Safety Analysis Report (DSAR), Radiological Environmental Monitoring Program, and the Offsite Dose Calculation Manual, as amended for ADP to begin decommissioning. Non-radiological Environmental Programs will be conducted in accordance with applicable requirements and permits.

Appendix 1 includes the following information:

- Table 1 – Decommissioning Cost Summary
- Table 2 – Decommissioning Annual Spend

2.1 Discussion of Decommissioning Periods

The following narrative describes the basic activities associated with decommissioning CR3. The DECON DCE is divided into phases or periods based upon major milestones within the project or significant changes in the projected expenditures. The following sub-sections correspond to the major decommissioning periods within the estimate. Further details regarding the DECON DCE are provided in Tables 1 and 2 in Attachment 1.

2.1.1 Period 2: ISFSI Operations

ISFSI construction was completed and the spent fuel was transferred from the spent fuel pool to horizontal storage modules located on the ISFSI pad adjacent to the former power block ahead of schedule and was completed in January 2018. DEF will continue final preparations for Dormancy until ADP assumes control of CR3, upon which time ADP will initiate decommissioning as described in 2.1.3 and 2.1.4. For the ADP DECON DCE, the ISFSI Operations Period commences after CR3 transfer to ADP.

ISFSI Operations activities include a 24-hour security force, preventive and corrective maintenance on security systems, area lighting, general building maintenance, routine radiological inspections and a site environmental and radiation monitoring program. Maintenance or vendor personnel, as appropriate, perform equipment maintenance, inspection activities, routine services to maintain safe conditions, adequate lighting, heating, and ventilation, and periodic preventive maintenance on essential site services. Following removal of SNF and GTCC from the ISFSI, the ISFSI pad will be decommissioned.

An environmental surveillance program will be carried out during the ISFSI Operations period to monitor any radiological impacts to the environment. The environmental surveillance program constitutes an abbreviated version of the program in effect during normal plant operations. Emergency planning exemptions are in effect based on analyses that indicate any releases beyond the exclusion area boundary are below the EPA Protective Action Guides exposure levels.

Security during the ISFSI Operations period will be conducted primarily to safeguard the spent fuel while on site and prevent unauthorized entry. The security fence, sensors, alarms, and other surveillance equipment provide security.

For planning purposes, ADP's current CR3 spent fuel management plan is based, in general, upon the following projections: 1) Assuming priority pickup for the spent fuel from shutdown reactors, a 2034 start date for the DOE initiating transfer of commercial spent fuel to a federal facility, 2) a corresponding 2036 date for beginning to remove spent fuel from CR3, and 3) a 2037 completion date for removal of all CR3 spent fuel, although transfer could occur earlier if the DOE is successful in implementing its current strategy for the management and disposal of spent fuel. The ISFSI will then be decommissioned.

2.1.2 Period 3: Preparations for Decommissioning

ADP will commence preparations for decommissioning after CR3 is transferred. Preparations are undertaken to reactivate site services and prepare for decommissioning. Preparations include engineering and planning, a detailed site characterization, and the assembly of a decommissioning management organization. Final planning for activities and the writing of activity specifications and detailed procedures are also initiated at this time.
At least two years prior to the anticipated date of license termination, a License Termination Plan (LTP) is required. Submitted as a supplement to the SAR or its equivalent, the plan must include: a site characterization, description of the remaining dismantling activities, plans for site remediation, procedures for the final radiation survey, designation of the end use of the site, an updated cost estimate to complete the decommissioning, and any associated environmental concerns. The NRC will notice the receipt of the plan, make the plan available for public comment, and schedule a local hearing. LTP approval will be subject to any conditions and limitations as deemed appropriate by the Commission.

2.1.3 Period 4: Decommissioning

This period includes the physical decommissioning activities associated with the removal and disposal of contaminated and activated components and structures, including the successful termination of the 10 CFR 50 operating license. Although the initial radiation levels due to ^{60}Co-decreased during the dormancy period, the internal components of the reactor vessel will still exhibit sufficiently high radiation dose rates to require remote sectioning under water since the ^{60}Co levels are still significant. Portions of the biological shield will also be radioactive due to the presence of activated trace elements with long half- lives (^{152}Eu and ^{154}Eu). Decontamination will require controlled removal and disposal. It is assumed that radioactive corrosion products on inner surfaces of piping and components will not have decayed to levels that will permit unrestricted use or allow conventional removal.

These systems and components will be surveyed as they are removed and disposed of in accordance with the existing radioactive release criteria.

Significant decommissioning activities in this phase include:

- Reconfiguration, revitalization, and modification of site structures and facilities, as needed, to support decommissioning operations. This may include establishing a centralized processing area to facilitate equipment removal and component preparation for offsite disposal. Modifications may also be required to the reactor building to facilitate equipment access, support the segmentation of the reactor vessel internals, and for large component extraction.
- Design and fabrication of temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling, as needed.
- Procurement (lease or purchase) of shipping canisters, cask liners, and industrial packages for the disposition of low-level radioactive waste (LLRW).
- Decontamination of components and piping systems, as required, to control (minimize) worker exposure.

- Removal of piping and components no longer essential to support decommissioning operations.
- Removal of control rod drive housings and the head service structure from the reactor vessel head, if required. Off-site shipping of the reactor vessel head with the control rod drive housings and head service structure in one-piece package might be envisioned.
- Removal, disassembly, and segmentation of the reactor internals, if necessary. The reactor internals include the plenum assembly and the core support assembly. Depending on packaging, some material may exceed Class C disposal requirements. Any such material will be packaged in modified fuel storage canisters and safely stored on the ISFSI. Segmentation will maximize the loading of the shielded transport casks (i.e., by weight and activity). The operations will primarily be conducted under water using remotely operated tooling and contamination controls.
- Removal of the reactor vessel. Appropriate ALARA considerations will be factored in during design phase and engineering controls will be implemented during segmentation and packaging activities to minimize the working area dose rates. For example, a shielded platform will be installed for reactor vessel segmentation as cutting operations will be performed in-air using remotely operated equipment within a contamination control envelope.
- Removal of the activated and contaminated portions of the concrete biological shield and accessible contaminated concrete surfaces. If dictated by the steam generator and pressurizer removal scenarios, those portions of the associated D-rings necessary for access and component extraction will be removed.
- Removal of remaining plant systems and associated components as they become non- essential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).
- Removal of the steel liners from the refueling canal, disposing of the activated and contaminated sections as radioactive waste. Removal of any activated/contaminated concrete.
- Surveys of the decontaminated areas of the reactor building.
- Remediation and removal of the contaminated equipment and material from the auxiliary building and any other contaminated area. Radiation and contamination controls will be utilized until residual levels indicate that the structures and equipment can be released for unrestricted access and conventional demolition. This activity may necessitate the dismantling and disposition of most of the systems and components (both clean and contaminated) located within these buildings. This activity facilitates surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.
- Routing of material removed in the decontamination and dismantling to a central processing area. Material certified to be free of contamination will be released for unrestricted disposition, e.g., as scrap, recycle, or general disposal. Contaminated material will be characterized and segregated for volume reduction, and waste treatment, and/or packaged for controlled disposal at a low-level radioactive waste disposal facility.

- Remediation of the West Settling Pond to meet the unrestricted release criteria in 10 CFR 20.1402. The DCE assumes that 500 cubic yards of contaminated soil will be shipped offsite as LLRW for disposal.
- Removal of contaminated underground piping. The DCE assumes that the Station Drain Tank line and the approximately 1,000-foot-long nitrogen line will be removed in order to meet license termination criteria.

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)." This document incorporates the statistical approaches to survey design and data interpretation used by the Environmental Protection Agency (EPA). It also identifies state-of- the-art, commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the surveys are complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on the requested change to the operating license.

The NRC will terminate the operating license if it determines that site remediation has been performed in accordance with the LTP, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release.

2.1.4 Period 5: Site Restoration

Site restoration activities will begin with demolition of non-radiological buildings and structures outside the radiological controlled area. Structures within the power block will be removed to a nominal depth of three feet below the top grade of the embankment, wherever possible. This assumption was applied to the disposition of all CR3 facilities on the berm and, as a result, the general topography of the berm will be retained at the conclusion of site restoration.

The three-foot depth allows for the placement of gravel for drainage, as well as topsoil, so that vegetation can be established for erosion control. Site areas affected by the dismantling activities are restored and the plant area graded as required to prevent ponding and inhibit the refloating of subsurface materials.

Non-contaminated concrete rubble produced by demolition activities is processed to remove reinforcing steel and miscellaneous embedments. The processed material will then be used on site to backfill foundation voids. Excess non-contaminated materials will be trucked to an offsite area for disposal as construction debris.

Remediation of hazardous constituents will also be conducted during the site restoration phase. Soil containing lead residue will be excavated from the Firing Range and disposed of offsite.

2.2 General Decommissioning Considerations

2.2.1 Major Decommissioning Activities

As defined in 10 CFR 50.2, "Definitions," a "major decommissioning activity" is "any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components for shipment containing greater than class C waste in accordance with § 61.55." The following discussion provides a summary of the major decommissioning activities currently planned for CR3. These activities are envisioned to occur in Period 4 however, the schedule may be modified as conditions dictate.

Prior to starting a major decommissioning activity, the affected components will be surveyed and decontaminated, as required, in order to minimize worker exposure, and a plan will be developed for the activity. Shipping casks and other equipment necessary to conduct major decommissioning activities will be designed and procured.

The initial major decommissioning activities will focus on the removal, packaging and disposal of piping and components that are no longer essential to support decommissioning operations. Additional systems and associated components will be removed as they become non-essential to the reactor vessel removal operations, related decommissioning activities, or worker health and safety.

Following reactor vessel and cavity re-flood, the reactor vessel internals will be removed from the reactor vessel and segmented, if necessary, for packaging or to separate Greater Than Class C (GTCC) waste. The internals comprising the Core Barrel, Baffle Plates, Thermal Shield, Lower Grid and Upper Grid may need to be treated as GTCC waste, in which case the components will be segmented and packaged into dry shielded containers. ADP intends to pursue storage of GTCC containers on the ISFSI pad in Horizontal Storage Modules. Using this approach, the internals will be packaged and disposed of independent of the reactor vessel. When the internals segmentation effort is completed, the reactor vessel and cavity will be drained, and emptied.

Removal of the reactor vessel follows the removal of the reactor internals. Without the internals present, several options are available for the removal and disposal of the reactor vessel: segmentation, sectioning into larger pieces, or disposal as an intact package. It is likely that the components would be removed by sectioning or segmenting performed remotely in-air using cutting technology

Additional major decommissioning activities that would be conducted include the removal and disposal of the steam generators, pressurizer, and reactor coolant system. The dismantling of the containment structure would be undertaken as part of the reactor building demolition.

2.2.2 Other Decommissioning Activities

Secondary side piping and components in the intermediate building and turbine building may require disposal as LLRW due to steam generator tube leaks during operation. Numerous support systems in the Auxiliary Building will require disposal as LLRW.

2.2.3 Decontamination and Dismantlement Activities

The objectives of the decontamination effort are two-fold. The first objective is to reduce radiation levels throughout the facility in order to minimize personnel exposure during dismantlement.

The second objective is to clean as much material as possible thereby permitting demolition and disposal and minimizing the quantities of material that must be disposed of by burial as radioactive waste. The second objective will be achieved by decontaminating structural components including steel framing and concrete surfaces. The methods to accomplish this are typically mechanical, requiring the removal of the surface or surface coating, and are used regularly in industrial and contaminated sites. The need to decontaminate SSCs will be determined by the schedule to dismantle them and by plant conditions.
The decontamination and/or dismantlement of contaminated SSCs may be accomplished by decontamination in place, decontamination and dismantlement, or dismantlement and disposal. A combination of these methods may be utilized to reduce contamination levels, worker radiation exposures, and project costs. The methods chosen will be those deemed most appropriate for the particular circumstances. Material below the applicable radiological limits will be released for unrestricted disposition (e.g., scrap, recycle, or general disposal). Radioactively contaminated or activated materials will be removed from the site as necessary to allow the site to be released for unrestricted use.

LLRW will be processed in accordance with plant procedures and existing commercial options. Contaminated material will be characterized and segregated for controlled disposal at a LLRW disposal facility.

Contaminated concrete and structural steel components will be decontaminated and removed, as required, in order to gain access to contaminated and uncontaminated systems and components. After the systems and components are removed and processed as described above, the remaining contaminated concrete and structural steel components will be decontaminated and/or removed. Contaminated concrete will be packaged and shipped to a LLRW disposal facility. Contaminated structural steel components may be removed to a processing area for decontamination, volume reduction, and packaging for shipment to a processing facility or to a LLRW disposal facility, as necessary.

Buried and imbedded contaminated components (e.g., piping, drains, etc.) will be decontaminated in place or excavated and decontaminated. Appropriate contamination controls will be employed to minimize the spread of contamination and to protect personnel.

2.2.4 Radioactive Waste Management

A major component of the total cost of decommissioning CR3 is the cost of packaging and disposing of SSCs, contaminated soil, resins, water, and other plant process liquids. A waste management plan will be developed to incorporate the most cost-effective disposal strategy, consistent with regulatory requirements for each waste type. Currently, Class A, B, and C LLRW may be disposed of at the Waste Control Specialists site in Andrews County, Texas. If other licensed LLRW facilities become available, ADP may choose to use them as well. The waste management plan will be based on the evaluation of available methods and strategies for processing, packaging, and transporting radioactive waste in conjunction with the available disposal facility options and associated waste acceptance criteria.

2.2.5 Removal of Mixed Wastes

Mixed wastes and mixed wastes generated during decommissioning, if any, will be managed in accordance with applicable Federal and State regulations.

Mixed wastes from CR3 will be transported by authorized and licensed transporters and shipped to authorized and licensed facilities. If technology, resources, and approved processes are available, the processes will be evaluated to render the mixed waste non-hazardous.

2.2.6 Site Characterization

There are no changes to the information previously provided in this section.

2.2.7 Groundwater Protection and Radiological Decommissioning Records Program

There are no changes to the information previously provided in this section.

2.2.8 Changes to Management and Staffing

The ADP management team will be comprised of NorthStar, Orano, and incumbent site personnel, including DEF personnel who transfer to ADP team members after CR3 closure.

Throughout the decommissioning process, plant management and staffing levels will be adjusted to reflect the ongoing transition of the site organization.

3.0 SCHEDULE OF PLANNED DECOMMISSIONING ACTIVITIES

ADP intends to pursue the decommissioning of CR3 utilizing a DECON methodology. Work activities associated with the planning and preparation period began after the plant was permanently shut down. The schedule of spent fuel management and decommissioning activities is provided in Attachment 1, Table 1. ADP has made a reasonable determination that the funds in the nuclear decommissioning trust (NDT) for CR3 are adequate to complete decommissioning. ADP SF1 will provide all required funding for SNF management activities. ADP is submitting this Revised PSDAR to provide notification required by 10 CFR 50.82(a)(7) of the changes in activities and schedule to allow decontamination and dismantlement activities to proceed. Work activities associated with the planning and preparation period began before the plant was permanently shut down. The schedule duration (start and end dates) of spent fuel management and major decommissioning activities is provided in Attachment 1, Table 2.

The schedule recognizes that spent fuel will be retained in the ISFSI until it can be ultimately transferred to the DOE or safely moved to a Consolidated Interim Storage (CIS) Facility.

4.0 ESTIMATE OF DECOMMISSIONING AND SPENT FUEL MANAGEMENT COSTS

10 CFR 50.82(a)(8)(iii) requires that a site-specific DCE be prepared and submitted within two years following permanent cessation of operations. 10 CFR 50.82(a)(4)(i) requires that the PSDAR contain a site-specific DCE, including the projected cost of managing irradiated fuel. The 2013 PSDAR and site-specific DCE fulfilled the requirements of 10 CFR 50.82(a)(4)(i) and 10 CFR 50.82(a)(8)(iii). Duke submitted an updated CR3 DCE, in June 2018, to the NRC.

4.1 Cost Estimate

ADP has prepared a site-specific decommissioning cost estimate for CR3, which also provides projected costs of managing spent fuel, as well as non-radiological demolition and site restoration costs, accounted for separately. The ADP site-specific DCE summary is provided in Attachment 1, Table 1. An annual spending summary of the site-specific DCE and projected cost of managing spent fuel is provided in Attachment 1, Table 2.

The methodology used by ADP to develop its CR3 site-specific DECON DCE follows the basic approach originally advanced by the Atomic Industrial Forum (AIF) in its program to develop a standardized model for decommissioning cost estimates. The results of this program were published as AIF/NESP-036, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," (Reference 9). The AIF report presents a unit cost factor method for estimating direct activity costs, simplifying the estimating process. ADP utilizes the inventory based, bottoms-up, unit cost factor methodology with company specific labor and equipment productivity based on experience decommissioning commercial power reactors, university test reactors, and DOE Facilities and Sites. ADP also used quotes for unit-rates, subcontractors, and defined scopes of work. Analogous estimates were used for unique scopes of work where historical data exists. ADP applied contingency to all decommissioning costs to account for the inherent uncertainty in quantities, productivity, pricing, and schedules, and to ensure that funding is available for unforeseeable costs.

The ADP method for spent fuel management cost is primarily based on staffing levels and cost data from three (3) Northeast region ISFSI's, adjusted for site specific cost factors.

ADP has developed a team of industry leaders and initiated a series of Firm Fixed Price (FFP) and Fixed Unit Price (FUP) subcontracts to minimize the overall cost and schedule risk to the project. By accelerating the CR3 decommissioning and obtaining these FFP and FUP subcontracts, ADP has minimized the overall project risks.

4.2 Decommissioning Funds

Decommissioning costs will be paid for with funds from the site's Nuclear Decommissioning Trust (NDT) fund.

Under NRC regulations (10 CFR 50.82(a)(8)), a licensee must provide reasonable assurance that funds will be available (or "financial assurance") for decommissioning (i.e., license termination) costs. The regulations also describe the acceptable methods a licensee can use to demonstrate financial assurance. Funding for decommissioning CR3 currently is provided by an external trust held by DEF. ADP will continue this practice. The trust had a market value of approximately $731

million as of April 30, 2019. Further details regarding the financial assurance to be provided by ADP and financial qualifications of ADP are provided in the License Transfer Application submitted by DEF on June 14, 2019 (reference 4).

Adequate funding exists for decommissioning CR3. ADP intends to fund the expenditures for license termination and site restoration from the decommissioning trust fund currently held by DEF, pursuant to ADP's fixed price contract with DEF. Based on a timed cash flow analysis of the radiological decommissioning and site restoration costs, and assuming NDT returns at an annual 2% real, after tax rate of return, the minimum NDT fund balance is assured to fund the $540M period of performance decommissioning cost. Funding for SNF management is being provided by ADP SF1. ADP SF1 will fund ADP's SNF management activities and recover most of its costs from DOE. Its parent companies plan to provide the funding needed by ADP SF1, and over time ADP SF1 will accumulate funds from its parent companies that will be set aside for completing all the required SNF management activities. This commitment to ADP SF1 is backed by formal parental financial Support Agreements totaling $140 million.

10 CFR 50.82(a)(6)(iii) states that, "Licensees shall not perform any decommissioning activities," as defined in 10 CFR 50.2 that, "Result in there no longer being reasonable assurance that adequate funds will be available for decommissioning." ADP does not intend to perform any decommissioning activities that would jeopardize the availability of funds to complete decommissioning.

This PSDAR will not be updated for minor changes in anticipated decommissioning costs. However, the status of the decommissioning funding will continue to be reported to the NRC in accordance with 10 CFR 50.75(f)(1), "Reporting and recordkeeping for decommissioning planning." Additionally, ADP will inform the NRC in writing of any significant schedule and decommissioning cost changes per 10 CFR 50.82(a)(7) and provide an updated site-specific estimate of remaining decommissioning costs with the license termination plan per 10 CFR 50.82(a)(9)(ii)(F). If the funding assurance demonstration shows the NDT is not sufficient, then an alternate funding mechanism allowed by 10 CFR 50.75(e) and the guidance provided in Regulatory Guide 1.159 (Reference 10) will be put in place.

5.0 ENVIRONMENTAL IMPACTS

There are no changes to the information previously provided in this section.

5.1 Conclusions

Based on the information previously provided in this section, ADP concludes that the environmental impacts associated with planned CR3 site-specific decommissioning activities will be bounded by appropriate, previously issued environmental impact statements. Specifically, the environmental impacts are bounded by the GEIS (Reference 8).

1. The postulated impacts associated with the decommissioning method chosen, DECON, have already been considered in the most recent DSEIS and GEIS.
2. There are no unique aspects of CR3 or of the decommissioning techniques to be utilized that would invalidate the conclusions reached in the most recent DSEIS and GEIS.
3. The methods assumed to be employed to dismantle and decontaminate CR3 are standard construction-based techniques fully considered in the most recent DSEIS and GEIS.

Therefore, it can be concluded that the environmental impacts associated with the site-specific decommissioning activities for CR3 will be bounded by appropriate previously issued environmental impact statements.

10 CFR 50.82(a)(6)(ii) states that licensees shall not perform any decommissioning activities, as defined in 10 CFR 50.2, that result in significant environmental impacts not previously reviewed. No such impacts have been identified.

6.0 REFERENCES

1. Letter from J. Elnitsky, Vice President Crystal River Nuclear Plant, "Crystal River Unit 3 – Post-Shutdown Decommissioning Activities Report," dated December 2, 2013.

2. Letter from J. Elnitsky, Vice President Crystal River Nuclear Plant, "Crystal River Unit 3 – Post-Shutdown Decommissioning Activities Report – Response to Request for Additional Information," dated June 17, 2014.

3. Letter from M.D. Orenak, Project Manager, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, to T.D. Hobbs, General Manager, Crystal River Nuclear Plant, "Crystal River Unit 3 Nuclear Generating Plant Post-Shutdown Decommissioning Activities Report," dated March 11, 2015.

4. Letter from R. Reising, Senior Vice President, Duke Energy Corporation, "Application for Order Consenting to Direct Transfer of Control of Licenses and Approving Conforming License Amendment, dated June 14, 2019.

5. Regulatory Guide 1.185, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report," Revision 1, dated June 2013.

6. Letter from J.A. Franke, Vice President, Crystal River Nuclear Plant, "Crystal River Unit 3 - Certification of Permanent Cessation of Power Operations and that Fuel Has Been Permanently Removed from the Reactor," dated February 20, 2013. (ADAMS Accession No. ML13056A005)

7. Letter from C. Gratton, Senior Project Manager, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, to J.A. Franke, Vice President, Crystal River Nuclear Plant, "Crystal River Unit 3 Nuclear Generating Plant Certification of Permanent Cessation of Operation and Permanent Removal of Fuel from the Reactor," dated March 13, 2013. (ADAMS Accession No. ML13058A380)

8. NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities: Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors," Final Report dated November 2002.

9. AIF/NESP-036, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," dated May 1986.

10. Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," Revision 2, dated October 2011.

7.0 ATTACHMENT 1

Table 1 – Decommissioning Cost Summary

Thousands of Period of Performance Dollars

	TOTAL ADP COSTS - POST-CLOSING (2020-2037) (Includes ADP CR3 and SF1)				
	2020-2026	2020-2026	2020-2026	2020-2037	
	License Termination (10 CFR 50.75)	**Site Restoration** (Non 10 CFR 50.75 Costs)	**SubTotal**	**Spent Fuel Management** (10 CFR 50.54(bb))	**Total**
Facility Management	$76,056	$8,149	$84,204		$84,204
Decontamination and Decommissioning	$230,588	$25,090	$255,678	$0	$255,678
Large Component Removal	$97,423		$97,423	$12,953	$110,376
GTCC T&D			$0	$37,396	$37,396
Project Management	$95,844	$6,852	$102,696		$102,696
ISFSI Decommissioning			$0	$5,407	$5,407
Non-ISFSI O&M SubTotal	**$499,910**	**$40,090**	**$540,000**	**$55,755**	**$595,755**
ISFSI Operations & Fuel Mgt. (2020 - 2037)				**2020-2037**	
Facility Management				$207,846	$207,846
ISFSI to DOE Fuel Loading				$21,415	$21,415
ISFSI O&M SubTotal	**$0**	**$0**	**$0**	**$229,261**	**$229,261**
Total Decommissioning Costs	**$499,910**	**$40,090**	**$540,000**	**$285,016**	**$825,016**

Table 2 – Decommissioning Annual Spend Plan

Thousands of Period of Performance Dollars

	ANNUAL COST PROFILE (2020-2037) (Includes ADP CR3 and SF1)								
	Total ADP Costs								
	2020	2021	2022	2023	2024	2025	2026	(11 years) 2027-2037	TOTAL
Facility Management	$7,900	$14,855	$14,404	$13,812	$13,909	$9,069	$10,255		$84,204
Decontamination and Decommissioning	$23,606	$69,299	$27,852	$24,579	$69,448	$22,529	$18,365		$255,678
Large Component Removal	$0	$6,789	$66,136	$11,946	$12,551	$0	$0		$97,423
Project Management	$7,748	$17,413	$20,228	$20,573	$20,972	$9,876	$5,886		$102,696
Non-ISFSI O&M SubTotal	**$39,254**	**$108,356**	**$128,620**	**$70,909**	**$116,880**	**$41,474**	**$34,506**	**$0**	**$540,000**
ISFSI Operations & Spent Fuel Mgt. (2020 - 2037)									
Facility Management	$7,820	$7,976	$8,136	$8,298	$8,464	$8,634	$8,806	$149,712	$207,846
GTCC Packaging, Transportation, Disposal			$11,635	$1,319				$37,396	$50,349
ISFSI to DOE Fuel Loading								$21,415	$21,415
ISFSI Decommissioning								$5,407	$5,407
ISFSI O&M SubTotal	**$7,820**	**$7,976**	**$19,770**	**$9,617**	**$8,464**	**$8,634**	**$8,806**	**$213,929**	**$285,016**
Total Decommissioning Costs	**$47,074**	**$116,332**	**$148,390**	**$80,526**	**$125,345**	**$50,108**	**$43,313**	**$213,929**	**$825,016**