



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

March 30, 2018

Ms. Mary J. Fisher
Vice President, Energy Production and
Nuclear Decommissioning
Omaha Public Power District
Fort Calhoun Station
9610 Power Lane, Mail Stop FC-2-4
Blair, NE 68008

SUBJECT: FORT CALHOON STATION, UNIT 1 - REVIEW OF THE IRRADIATED FUEL
MANAGEMENT PLAN (CAC NO. MF9553; EPID L-2017-LLL-0009)

Dear Ms. Fisher:

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(bb), licensees of nuclear power plants must, within 2 years following permanent cessation of operation, submit to the U.S. Nuclear Regulatory Commission (NRC) for review and preliminary approval, the program by which the licensee intends to manage and provide funding for the management of all irradiated fuel at the reactor, until title and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository. In addition, pursuant to Section 50.82(a)(4)(i), the licensee must submit a post-shutdown decommissioning activities report (PSDAR). A site-specific decommissioning cost estimate (DCE), containing the projected cost of managing irradiated fuel, is part of the PSDAR. On November 13, 2016, Omaha Public Power District (OPPD, the licensee) submitted a certification pursuant to 10 CFR 50.82(a)(1)(ii) to the NRC that it had permanently ceased operations of the Fort Calhoun Station, Unit 1 (FCS), and removed fuel from the reactor vessel (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16319A254).

By letter dated March 31, 2017 (ADAMS Accession No. ML17093A594), OPPD submitted the FCS Irradiated Fuel Management Plan (IFMP) to the NRC. By letter dated March 30, 2017 (ADAMS Accession No. ML17089A759), OPPD submitted the PSDAR and the site-specific DCE. The enclosed review focuses on irradiated fuel management. The NRC staff is conducting a separate review of the PSDAR and site-specific DCE.

Based on its review of OPPD's submittal, the NRC staff finds that the licensee's program to manage and provide funding for the management of all irradiated fuel is adequate and provides sufficient detail regarding the associated funding mechanisms. Further, the staff has determined that the elected actions within the program are consistent with NRC requirements for licensed possession of irradiated nuclear fuel and that these actions will be implemented in a timely basis. Therefore, the staff concludes that the FCS IFMP complies with 10 CFR 50.54(bb) and approves the plan on a preliminary basis. The NRC staff's review of the FCS IFMP is enclosed.

In accordance with 10 CFR 50.82(a)(8)(vii), the licensee must annually submit to the NRC, by March 31, a report on the status of its funding for managing irradiated fuel. Further, in accordance with 10 CFR 50.54(bb), the licensee shall notify the NRC of any significant changes to the IFMP. Accordingly, the regulations provide a means of informing the NRC staff of fluctuations in the reported fund balances and funding requirements for spent fuel, and significant changes to the IFMP.

If you have any questions, please contact me at 301-415-4125 or James.Kim@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "James Kim". The signature is written in a cursive style with a long horizontal stroke at the end.

James Kim, Project Manager
Special Projects and Process Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosure:
Safety Evaluation

cc: Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

IRRADIATED FUEL MANAGEMENT PLAN

OMAHA PUBLIC POWER DISTRICT

FORT CALHOUN STATION, UNIT 1

DOCKET NO. 50-285

1.0 INTRODUCTION

Pursuant to Title 10 of the Code of Federal Regulations (10 CFR), Section 50.54(bb), licensees of nuclear power plants must, within 2 years following permanent cessation of operation, submit to the U.S. Nuclear Regulatory Commission (NRC) for review and preliminary approval, the program by which the licensee intends to manage and provide funding for the management of all irradiated fuel at the reactor, until title and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository. In addition, pursuant to Section 50.82(a)(4)(i), the licensee must submit a post-shutdown decommissioning activities report (PSDAR). A site-specific decommissioning cost estimate (DCE), containing the projected cost of managing irradiated fuel, is part of the PSDAR.

By letter dated August 25, 2016 (ADAMS Accession No. ML16242A127), Omaha Public Power District (OPPD, the licensee), notified the NRC of its intent to prematurely and permanently cease power operations at FCS on October 24, 2016. On November 13, 2016, Omaha Public Power District (OPPD, the licensee) submitted a certification pursuant to 10 CFR 50.82(a)(1)(ii) to the NRC that it had permanently ceased operations of the Fort Calhoun Station, Unit 1 (FCS), and removed fuel from the reactor vessel (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16319A254). By letter dated March 31, 2017 (ADAMS Accession No. ML17093A594), OPPD submitted the FCS Irradiated Fuel Management Plan (IFMP) to the NRC. Also, by letter dated March 30, 2017 (ADAMS Accession No. ML17089A759), OPPD submitted the PSDAR and the site-specific DCE.

A summary of the NRC staff's financial review of the IFMP is provided in the following analysis.

2.0 BACKGROUND

Fort Calhoun Station, Unit 1 (FCS) is located about 19 miles north of Omaha, Nebraska. The reactor site is comprised of a single reactor and was authorized to operate at a maximum thermal power level of about 1500 megawatts thermal. The FCS received its operating license on August 9, 1973, and was designed and constructed by Combustion Engineering. The reactor is a pressurized-water reactor. The FCS reactor site also houses an independent spent fuel storage installation (ISFSI)

The licensee also requested a 20-year license extension to August 9, 2033, and the NRC approved the license extension on November 4, 2003. However, by letter dated August 25, 2016 (ADAMS Accession No. ML16242A127), OPPD notified the NRC of its intent to prematurely and permanently cease power operations at FCS on October 24, 2016. On November 13, 2016, OPPD informed the NRC that it had permanently ceased operations of FCS and removed fuel from the reactor vessel (ADAMS Accession No. ML16319A254).

3.0 REGULATORY EVALUATION

The regulation under 10 CFR 50.54(bb) states, in relevant part:

For nuclear power reactors licensed by the NRC, the licensee shall, within 2 years following permanent cessation of operation of the reactor or 5 years before expiration of the reactor operating license, whichever occurs first, submit written notification to the Commission for its review and preliminary approval of the program by which the licensee intends to manage and provide funding for the management of all irradiated fuel at the reactor following permanent cessation of operation of the reactor until title to the irradiated fuel and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository.

Criteria and Information Evaluated to Support the 10 CFR 50.54(bb) Review

Similar to reviews of other IFMPs,¹ the NRC staff reviewed the following information submitted in support of the OPPD IFMP to evaluate and provide preliminary approval of the spent fuel management (SFM) and funding program:

- Estimated cost to isolate the spent fuel pool and fuel handling systems. For the decontamination (DECON) option, the cost to isolate the spent fuel pool and fuel handling systems may be considered part of the preparation for DECON;
- Estimated cost to construct an ISFSI or a combination of wet/dry storage;
- Estimated annual cost for the operation of the selected option (wet or dry storage or a combination of the two) until the U.S. Department of Energy (DOE) takes possession of the fuel;
- Estimated cost for the preparation, packaging, and shipping of the fuel to the DOE;
- Estimated cost to decommission the spent fuel storage facility; and
- Brief discussion of the selected storage method or methods and the estimated time for these activities.

- Information identifying the source of funds for managing spent fuel.

¹ Most recently, the safety evaluation by the Office of Nuclear Reactor Regulation related to the IFMP of Southern California Edison Company, San Onofre Nuclear Generating Station, Units 2 and 3, Docket Nos. 50-361 and 50-362 (ADAMS Accession No. ML15182A256), and to the updated IFMP of Duke Energy Florida, Inc., Crystal River Unit 3 Nuclear Generating Plant, Docket No. 50-302 (ADAMS Accession No. ML14344A408).

4.0 TECHNICAL EVALUATION

A site-specific decommissioning cost analysis was prepared by TLG Services, Inc., (TLG), which also provided projected costs associated with managing spent fuel. In addition, OPPD's PSDAR also includes a discussion of the schedule and costs associated with the management of spent fuel and site restoration. Staff considered information provided in each of these documents in performing its evaluation.

4.1 Evaluation of the IFMP

The NRC staff's review of the licensee's submittal included the SFM activities and associated cost elements of the FCS IFMP. The IFMP and SFM costs estimated by the licensee total \$405.5 million (2016 dollars) for all SFM activities. The NRC staff reviewed estimates for major SFM activities and funding requirements including capital for SFM infrastructure; spent fuel pool operation, maintenance, and isolation costs; ISFSI expansion and operating costs; emergency planning costs; security and utility staffing costs; and spent fuel transfer costs.

According to OPPD, a total of 1,264 irradiated fuel assemblies have been generated at FCS. At present, 320 irradiated fuel assemblies have already been transferred to the FCS ISFSI. The remaining 944 irradiated fuel assemblies will be loaded in dry fuel canisters and transferred to the ISFSI. The current ISFSI is located inside the Owner Controlled Area. It was designed and constructed to accommodate all FCS irradiated fuel. The ISFSI currently contains 10 dry fuel canisters storing FCS fuel. All of the fuel on the ISFSI is stored in Transnuclear NUHOMS Model Number - 32PT Dry Shielded Canisters.

The licensee provided the major IFMP activity phases, including start dates, end dates, and associated costs for each period. Decommissioning periods for the IFMP correspond to "Period 1, Preparations and Planning," "Period 2a, Dormancy with Wet Fuel Storage," and Period 2b, Dormancy with Dry Fuel Storage," as illustrated in Table 1 below.

Irradiated Fuel Management Plan
Summary Schedule and Costs

Decommissioning Periods	Start	End	Fuel Management Cost (thousands of 2016 dollars)	Approximate Duration (years)
Period 1: Preparations and Planning	2016	2018	38,401	1.68
Period 2a: Dormancy with Wet Fuel Storage	2018	2022	175,296	4.51
Period 2b: Dormancy with Dry Fuel Storage	2023	2058	191,846	36.02
Total			405,543	42.21

With regard to spent fuel removal from the reactor site, the licensee indicated that its plan for spent fuel removal remains dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. Accordingly, this plan is based upon a 2030 start date for the DOE's acceptance of spent fuel from the industry, and considers the order by which DOE plans to retrieve spent fuel from individual nuclear power facilities including that from FCS. The licensee is therefore assuming all spent fuel will be removed from the FCS site as of 2058. Based on this information, the ISFSI will be subsequently decommissioned by the 2065 final license

termination date. The licensee maintains its position that DOE has a contractual obligation to accept fuel from FCS in a timely manner. The NRC staff accepts these assumptions with regard to the final disposition of FCS spent fuel as the Nuclear Waste Policy Act of 1982 (the Act) authorizes the DOE to ultimately enter into contracts with owners and generators of commercial spent nuclear fuel to begin taking title to (legal ownership of) spent nuclear fuel. Consistent with the IFMP, the FCS ISFSI serves to address interim storage requirements of spent fuel at the site.

With regard to the cost estimate for the IFMP and SFM activities at FCS, staff evaluated the \$405,543,000 (2016 dollars) cost estimate provided by OPPD to determine its reasonableness. The NRC staff reviews cost information from independent sources and compares and evaluates that data against information provided by licensees. One such study, "Blue Ribbon Commission On America's Nuclear Future," (Blue Ribbon Commission report) published in January 2012 for the DOE, provides cost and cost considerations for the operation and maintenance of spent fuel storage at shutdown sites. Costs cited in that report² range from \$4.5 million to \$8 million per year (2012 dollars) for SFM at shutdown sites. Accounting for inflation, and considering the IFMP operational period of 42 years (2016 to 2058), staff determined that the cost estimate provided by OPPD is in line with the higher range of costs cited in the study. In addition, staff determined that the OPPD cost estimate was comparable with a range of other licensee IFMP cost estimates previously reviewed by NRC staff. Based on the foregoing, the staff finds that the \$405.5 million cost estimate over the period of the IFMP, in 2016 dollars, to be reasonable.

NRC staff concludes that the IFMP is comprehensive, contains sufficient detail regarding activities and identified costs for managing spent fuel, and whose timeline for SFM activities is reasonable. In addition, the NRC staff finds the SFM program cost estimates to be reasonable. This conclusion is based upon staff's analysis of estimated costs presented in the FCS IFMP, and upon a comparison with data from recent studies reflected in the Blue Ribbon Commission report, and from a range of other licensee IFMP cost estimates previously reviewed by staff. Staff acknowledges that potential site-specific variances may exist among individual IFMPs.

4.2 Financial Assurance for IFMP

Pursuant to 10 CFR 50.54(bb), licensees of nuclear power plants must, within 2 years following permanent cessation of operation, submit to the NRC for review and preliminary approval, the program by which the licensee intends to manage and provide funding for the management of all irradiated fuel at the reactor, until title and possession of the fuel is transferred to the DOE for its ultimate disposal in a repository. Staff's analysis of OPPD's funding program for the management of irradiated fuel at the reactor is provided below.

OPPD asserts that it intends to fund the cost of spent fuel management out of existing operations until the 2022 timeframe. According to its 2016 annual report (ADAMS Accession No. ML17122A276), OPPD is a publicly owned utility that serves an estimated population of 820,000 people. Existing operations consist of baseload power facilities fueled by coal and natural gas, peaking units fueled by natural gas and oil, and renewable energy resources, including wind turbines and landfill-gas units. With 2016 total operating revenue of over \$1.1 billion, net cash provided from operating activities of over \$300 million, and over \$25 million in net income before a special \$960 million write-off due to ceased operations at FCS, OPPD appears to generate adequate revenue and income from existing operations, as it so states, to fund the cost of spent fuel until the 2022 timeframe.

² See page 35 of Blue Ribbon Commission report.

In addition, OPPD has direct authority to set rates required to recover its costs. This authority supports its assertion that spent fuel management costs can be funded out of existing OPPD operations.³

In addition to reliance on current ratepayer fees and revenue generated by its electric power generation operations to cover current and future SFM expenditures, OPPD maintains a separate trust account for funds that will be used for SFM expenditures. OPPD refers to this as the FCS Supplemental Decommissioning Trust Fund (SDTF). (The SDTF also contains funds for non-radiological site restoration activities. However, based on OPPD's submittal, the vast majority of those expenditures will be addressed by OPPD only after SFM activities are completed in 2058). As of December 31, 2016, the SDTF balance was \$96,296,000; OPPD projects the total cost of SFM activities to be \$405.5 million (2016 dollars).

As presented in its application, OPPD's projected SFM expenditures through year 2022 (2016 dollars) total \$213,695,000 (current year dollars), and will be paid from revenues and income generated by current operations. The licensee also provided a "Spent Fuel Management Expenditures" spending plan (2016 dollars) and a cash flow analysis that reflect SFM expenditures and SDTF balances through 2058, the final year in which spent fuel will require management at FCS.

Finally, OPPD also will rely on reimbursements from the DOE to fund IFMP activities, pursuant to the terms of the settlement agreement between OPPD and the United State Government, concerning DOE's breach of its contract to accept and dispose of spent fuel and high-level waste at FCS.⁴ DOE has agreed to reimburse OPPD for "Allowable and Reasonable Costs." Allowable costs which are "those costs incurred by Plaintiff [OPPD] for managing and storing SNF/HLW [Spent Nuclear Fuel/High Level Waste] which were foreseeable in the event of DOE's Delay, and that Plaintiff would not have incurred but for, and which are directly related to, DOE's Delay in performance of its acceptance obligations under the Contract."

Staff evaluated the cost of SFM activities of \$405.5 million against projected funding sources as presented by OPPD. As OPPD states, SFM expenses through end-of-year 2022 (see Table 1 above, for Period 1 and 2a) are anticipated to be fully covered from the revenue and income generated out of existing OPPD operations. In addition to decommissioning-related funding amounts collected through retail rates, OPPD reports positive net income for most operating years; except for 2016, in which OPPD recognized write-offs of FCS-related assets and related contract termination fees of \$959,575,000, OPPD had positive net income of \$32 million, \$52 million, \$55 million, and \$55 million each year in 2015, 2014, 2013, and 2012, respectively. Accordingly, staff finds these assumptions about funding from OPPD's existing operations reasonable, and concludes that adequate funds for SFM will be available through the end of 2022.

Beyond 2022 (see Table 1 above, for Period 2b) and its reliance on funding from existing operations, OPPD will rely on funding from the SDTF (current balance of \$96.3 million), including projected growth of the SDTF fund balance, as well as from cash flow into the SDTF from additional fund collections. In its analysis, staff considered OPPD's authority to set rates

³ July 28, 2017, OPPD letter to the NRC addressing guarantee of payment of deferred premiums. OPPD states that, "as an all-public power state, Nebraska does not have a state commission with electric rate jurisdiction; the District's (OPPD) Board of Directors is empowered to establish electric rates." ADAMS Accession No. ML17209A102.

⁴ ADAMS Accession No. ML18080A081.

necessary to meet decommissioning and SFM needs into the future, as necessary, and its history of consistent positive net income. In its analysis, the NRC staff determined that OPPD's assumptions regarding revenue and income generated by its operations in servicing its customer base, potential growth of SDTF assets, and future collections for SFM from 2023 through 2058, coupled with authority to set electric generation fees as necessary, provide a reasonable basis by which OPPD intends to meet its SFM obligations. Finally, based on anticipated payments from DOE reimbursements as earlier cited, staff determined that OPPD will have an additional, substantive source of funding to address IFMP expenses. Therefore, the NRC staff concludes that OPPD's IMFP complies with 10 CFR 50.54(bb), and approves the program on a preliminary basis.

5.0 CONCLUSION

The NRC staff finds that the licensee's program to manage and provide funding for the management of all irradiated fuel is adequate and provides sufficient detail regarding the associated funding mechanisms. Further, the staff has determined that the elected actions within the program are consistent with NRC requirements for licensed possession of irradiated nuclear fuel and that these actions will be implemented in a timely basis. Therefore, the staff concludes that the FCS IFMP complies with 10 CFR 50.54(bb) and approves the plan on a preliminary basis.

Principal Contributors: R. Turtill
S. Harwell
K. Lois

Date: March 30, 2018

SUBJECT: FORT CALHOUN STATION, UNIT 1 - REVIEW OF THE IRRADIATED FUEL
 MANAGEMENT PLAN (CAC NO. MF9553; EPID L-2017-LLL-0009)
 DATED MARCH 30, 2018

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***via memo**

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