

March 15, 2019
L-19-059

10 CFR 50.54(bb)
10 CFR 72.218

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT:

Beaver Valley Power Station, Unit Nos. 1 and 2
Docket No. 50-334, License No. DPR-66
Docket No. 50-412, License No. NPF-73
Beaver Valley Power Station, Unit Nos. 1 and 2, ISFSI
Docket No. 72-1043

Davis-Besse Nuclear Power Station, Unit No. 1
Docket No. 50-346, License No. NPF-3
Davis-Besse Nuclear Power Station, Unit No. 1 ISFSI
Docket No. 72-14

Perry Nuclear Power Plant, Unit No. 1
Docket No. 50-440, License No. NPF-58
Perry Nuclear Power Plant, Unit No. 1 ISFSI
Docket No. 72-69
Irradiated Fuel Management Plans

By letter dated April 25, 2018 (Accession No. ML18115A007) FirstEnergy Solutions Corp. (FES), the parent of FirstEnergy Nuclear Generation, LLC (FENGen), notified the Nuclear Regulatory Commission (NRC) of the intention to permanently cease operation of the four FENGen reactors over the next three years. The first unit scheduled for shutdown is Davis-Besse Nuclear Power Station (DBNPS) by May 31, 2020, followed by Perry Nuclear Power Plant (PNPP) and Beaver Valley Power Station, Unit No. 1 (BVPS-1) by May 31, 2021, and Beaver Valley Power Station, Unit No. 2 (BVPS-2) by October 31, 2021.

Therefore, pursuant to 10 CFR 50.54(bb), FirstEnergy Nuclear Operating Company (FENOC) hereby submits the attached Irradiated Fuel Management Plans for the FENGen facilities listed above for review and preliminary approval.

Beaver Valley Power Station, Unit Nos. 1 and 2
Beaver Valley Power Station Independent Spent Fuel Storage Installation
Davis-Besse Nuclear Power Station, Unit No. 1
Davis-Besse Nuclear Power Station Independent Spent Fuel Storage Installation
Perry Nuclear Power Plant, Unit No. 1
Perry Nuclear Power Plant Independent Spent Fuel Storage Installation
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The Irradiated Fuel Management Plans are based, in part, on decommissioning cost estimates (DCEs), which include elements associated with spent fuel management. The DCEs for the four FENGen facilities were prepared in 2018. By letter dated March 15, 2019, FENOC submitted to the NRC the decommissioning trust fund financial status report for the four FENGen facilities in accordance with 10 CFR 50.75(f)(1). Enclosures in that letter included the DCEs for BVPS 1 and 2, DBNPS, and PNPP.

The DCEs assume that each nuclear unit is placed and maintained in a condition that allows it to be safely stored and subsequently decontaminated. This approach for decommissioning is known as SAFSTOR. FENOC has not made a final determination on the decommissioning approach for any of the listed nuclear units. FENOC may select a different decommissioning option in the future for any of the listed nuclear units, recognizing that the chosen option must meet NRC requirements for decommissioning funding.

There are no regulatory commitments contained in this letter. If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager, Nuclear Licensing and Regulatory Affairs, at (330) 315-6810.

Sincerely,



Darin M. Benyak
Vice President, Nuclear Support and Regulatory Affairs

Attachments:

1. Beaver Valley Power Station, Unit No. 1 Irradiated Fuel Management Plan
2. Beaver Valley Power Station, Unit No. 2 Irradiated Fuel Management Plan
3. Davis-Besse Nuclear Power Station, Unit No. 1 Irradiated Fuel Management Plan
4. Perry Nuclear Power Plant, Unit No. 1 Irradiated Fuel Management Plan

Beaver Valley Power Station, Unit Nos. 1 and 2
Beaver Valley Power Station Independent Spent Fuel Storage Installation
Davis-Besse Nuclear Power Station, Unit No. 1
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cc: NRC Region I Administrator
NRC Region III Administrator
NRC Project Manager - FENOC Fleet
NRC Resident Inspector - Beaver Valley Power Station
NRC Resident Inspector - Davis-Besse Nuclear Power Station
NRC Resident Inspector - Perry Nuclear Power Plant
Director BRP/DEP
Site Representative BRP/DEP
Branch Chief, Ohio Emergency Management Agency, State of Ohio (NRC
Liaison)
Utility Radiological Safety Board

Attachment 1
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Beaver Valley Power Station, Unit No. 1
Irradiated Fuel Management Plan
(Eleven pages follow)

Attachment 1
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Beaver Valley Power Station, Unit No. 1
Irradiated Fuel Management Plan
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Background

10 CFR Part 50.54(bb) requires licensees to establish a program to manage and provide funding for the management of spent fuel at the reactor site until title and possession of the fuel is transferred to the United States Department of Energy (DOE) for ultimate disposal. The Beaver Valley Power Station, Unit No. 1 Irradiated Fuel Management Plan (IFMP), described herein, is based, in part, on a decommissioning cost estimate (DCE) that was prepared in 2018 for Beaver Valley Power Station, Unit Nos. 1 and 2 (BVPS-1, BVPS-2, or collectively, BVPS), which includes elements associated with spent fuel management. The DCE identifies the details, schedules, and costs associated with spent fuel management activities described in the BVPS-1 IFMP, along with license termination and site restoration activities and costs.

Pursuant to 10 CFR 50.75(f)(1) on March 15, 2019, FENOC submitted its decommissioning trust financial status report for the four FENOC-operated nuclear facilities. Enclosure A of that report is a copy of the BVPS DCE. The DCE describes the bases for the assumptions regarding DOE acceptance of spent fuel from the industry and from BVPS.

As stated in the DCE (and subject to the assumptions, qualifications, and reservations stated therein), this IFMP is based on the assumption that BVPS-1 shuts down by May 31, 2021. This IFMP presumes the DOE will commence acceptance of BVPS-1's spent fuel in 2029 and completes removal of spent fuel from the site by 2060 consistent with the most recent DOE spent fuel management and acceptance strategy¹ described below.

¹ DOE currently has no plans, program, or schedule in place for acceptance of utility spent fuel. However, for these purposes, certain simplifying assumptions must be made regarding the schedule and rate of DOE performance. Therefore, while DOE's Standard Contract governing the acceptance of spent fuel allows for alternative removal schedules, including priority for shutdown reactors and exchanges of allocations, for purposes of this estimate DOE acceptance is assumed to commence in 2029 from BVPS-1 and in accordance with spent fuel shipment schedules that are based upon published historic acceptance priority rankings by DOE. Nothing herein should be interpreted as a concession or admission of any kind for purposes other than for this submission. Such other purposes would include, but are not limited to, disputes regarding DOE's legal or contractual acceptance obligations, or damages claims for recovery of incurred costs.

Spent Fuel Management Strategy

FENOC assumes that, as stated in the DOE's "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Waste," dated January 2013, the DOE will start accepting spent fuel for storage from the nation's commercial nuclear plants beginning in 2025 for placement in a consolidated interim storage facility (CISF) that starts operation in 2025. The DCE assumes that BVPS-1 will shutdown and cease operations in 2021 and that BVPS-1 spent fuel will be accepted for placement in the CISF. Using the rankings for spent fuel receipt, as delineated in the Office of Civilian Radioactive Waste Management reports, "Annual Capacity Report," dated June 1987, and "Acceptance Priority Ranking & Annual Capacity Report," dated July 2004, BVPS-1 fuel would be accepted at the DOE storage facility starting in 2029.

The spent fuel pool will contain discharged fuel from the previous refueling cycles, as well as the final reactor core at shutdown. Immediately after shutdown, spent fuel will be located in the spent fuel pool and in canisters located on an independent spent fuel storage installation (ISFSI). During the five-year period after the shutdown, the spent fuel from the spent fuel pool would be packaged into canisters and transferred to the ISFSI for interim storage. This period provides the necessary cooling time for the spent fuel to meet the decay heat requirements for placement in dry storage.

The current BVPS dry fuel storage system consists of a Transnuclear Standardized NUHOMS multi-purpose (storage and transport) dry shielded storage canister (DSC) and a horizontal storage module (HSM). There are ten modules currently on the ISFSI pad with 37-assembly capacity DSCs. A Holtec HI-STORM FW system, with a 37-fuel assembly capacity Multi-Purpose Canister (MPC) and concrete shield overpack is expected to be used following shutdown. The DSCs and MPCs are assumed to be transferred directly to the DOE.

FENOC has constructed an ISFSI at BVPS to support BVPS-1 and BVPS-2 operations. The ISFSI operates under a general license pursuant to 10 CFR 72.210. The current size of the ISFSI pad is approximately 300 feet by 90 feet. The ISFSI will require expansion once plant operations cease in order to support spent fuel management activities. The pad expansion will be 120 feet by 90 feet. Total capacity of the consolidated pad is expected to be 88 DSCs and MPCs holding spent fuel and 6 MPCs holding greater than Class C waste. The ISFSI will continue to operate until such time that the transfer of spent fuel to the DOE can be completed. The DCE assumes that the BVPS spent fuel will be transferred to the DOE by 2060.

Table 1 provides a listing of the location of the spent fuel from 2019 until the spent fuel has been accepted by the DOE.

Table 1 – Spent Fuel Management Schedule
(BVPS-1 Fuel Assembly Location)¹

Year	BVPS-1 Pool Inventory	BVPS-1 ISFSI Inventory	DOE Acceptance of BVPS-1 Fuel
2019	1,252	370	0
2020	1,252	370	0
2021	1,409	370	0
2022	1,409	370	0
2023	1,409	370	0
2024	1,409	370	0
2025	706	1,073	0
2026	0	1,779	0
2027	0	1,779	0
2028	0	1,779	0
2029	0	1,763	16
2030	0	1,710	53
2031	0	1,657	53
2032	0	1,512	145
2033	0	1,439	73
2034	0	1,369	70
2035	0	1,369	0
2036	0	1,324	45
2037	0	1,263	61
2038	0	1,190	73
2039	0	1,117	73
2040	0	1,054	63
2041	0	1,054	0
2042	0	985	69
2043	0	924	61
2044	0	846	78
2045	0	789	57
2046	0	728	61
2047	0	659	69
2048	0	659	0
2049	0	554	105
2050	0	534	20
2051	0	469	65
2052	0	412	57
2053	0	355	57
2054	0	298	57
2055	0	241	57

Table 1 (continued)

Year	BVPS-1 Pool Inventory	BVPS-1 ISFSI Inventory	DOE Acceptance of BVPS-1 Fuel
2056	0	184	57
2057	0	127	57
2058	0	70	57
2059	0	13	57
2060	0	0	13
Total			
	-	-	1,779

Note:

1. Fuel location is as of the date of the submittal. It is assumed that no fuel is transferred from the spent fuel pool to the ISFSI until 2025.

Schedule

Table 2 provides a summary of the spent fuel management activities described in the DCE. The table provides the decommissioning period associated with the spent fuel management activity, its cost, and the approximate duration of the activity. The table does not consider ISFSI decommissioning, as this is an activity undertaken after spent fuel has been accepted by the DOE and removed from the site.

Table 2 – Spent Fuel Management Activities

Decommissioning Period	Costs (thousands, 2018 dollars) ¹	Start Date	Stop Date	Approximate Duration (years)
1 - Preparations	3,848	May 2021	December 2022	1.5
2a - Dormancy with Wet Fuel Storage	125,892	December 2022	August 2026	3.7
2b - Dormancy with Dry Fuel Storage	105,808	August 2026	January 2061	34.4
Total	235,548	-	-	-

Note:

1. The values were obtained from the BVPS DCE, which were reported in 2014 dollars. A composite escalation factor was applied to convert the values into 2018 dollars. These values differ from those in Table 3 due to the way the values in both tables were calculated.

Decommissioning Period 1 - Preparations

During this period, the facility is placed in a condition that allows the spent fuel to be safely stored and the facility to be maintained in a condition to be subsequently decontaminated to levels that permit release for unrestricted use. The facility is left essentially intact with structures maintained in a sound condition. The process of placing the plant in safe-storage includes, but is not limited to, isolating the spent fuel storage services and fuel handling systems so that the spent fuel can be safely transferred from the spent fuel storage pool to the ISFSI for interim storage.

Decommissioning Period 2a – Dormancy with Wet Fuel Storage

During this period, the facility is in the dormancy period of SAFSTOR decommissioning. During this phase, spent fuel will remain in the spent fuel pool until it meets the criteria for transfer to dry storage. FENOC expects to construct an ISFSI pad expansion during this period. FENOC plans to begin transferring the remaining BVPS-1 spent fuel from the spent fuel pool to dry storage in 2025 and to complete the transfer of fuel to the consolidated ISFSI in 2026.

Decommissioning Period 2b – Dormancy with Dry Fuel Storage

During this period, spent fuel will remain stored on the ISFSI until DOE accepts the fuel and removes it from the site. As discussed above and in the BVPS DCE, the IFMP assumes that the DOE will begin removing fuel from BVPS-1 in 2029 and will complete the removal of spent fuel from the site in 2060, according to the schedule set forth in Table 1. During this period, programs and procedures required to support safe operation of the ISFSI will be maintained in accordance with applicable requirements. Maintenance, monitoring, and inspection of equipment, including fuel handling and shipping equipment, will be performed as required. BVPS-1 will also maintain a security force, which will safeguard the spent fuel for as long as it remains on site. Security barriers, sensors, alarms, and other surveillance equipment will be maintained as required to provide security for the ISFSI and spent fuel.

Cost Estimate

The BVPS DCE provides the basis for the costs associated with spent fuel management.

The DCE includes the cost of operating and maintaining the spent fuel pool and the ISFSI. Pool operations are expected to continue approximately 5 years after the cessation of plant operations. ISFSI operating costs are based upon an approximately 39-year period of operation following plant shutdown. The cost for

the labor and equipment to load and transfer each spent fuel canister to the ISFSI from the spent fuel pool is also included. Costs for transferring the fuel from the ISFSI into the DOE transport cask are also included in the DCE.

Operation and maintenance costs for the spent fuel pool and the ISFSI are included within the DCE and address the cost for staffing the facility, as well as security, insurance, and licensing fees. Costs are also provided within the DCE for the decommissioning of the spent fuel pool, and the ISFSI after the fuel transfer to the DOE from the ISFSI is complete.

Table 3 provides an expenditure summary for the BVPS-1 IFMP in 2018 dollars.

Table 3 – IFMP Expenditure Summary

Year	Expenditure (thousands, 2018 dollars)
2021	1,838
2022	4,736
2023	32,844
2024	32,934
2025	32,844
2026	21,034
2027	2,487
2028	7,110
2029	2,788
2030	3,389
2031	3,389
2032	3,696
2033	3,088
2034	2,487
2036	3,095
2037	3,088
2038	3,088
2039	3,389
2040	2,794
2041	3,088
2042	3,088
2043	2,788
2044	2,794

Table 3 (continued)

Year	Expenditure (thousands, 2018 dollars)
2045	2,788
2046	2,788
2047	2,788
2048	2,794
2049	2,788
2050	2,788
2051	2,788
2052	2,794
2053	2,788
2054	2,788
2055	2,788
2056	2,794
2057	2,788
2058	3,088
2059	2,788
2060	2,794
Total	229,892

Funding

FENGen is the owner of BVPS, Davis-Besse Nuclear Power Station (DBNPS), and Perry Nuclear Power Plant (PNPP). As such, the BVPS-1 funding mechanisms take into account the need to fund spent fuel management for the other FENGen facilities.

The funding for BVPS-1 spent fuel management follows the schedule described above. Funding for Periods 1 and 2a extends from 2021 to 2026. This correlates with preparation activities and transferring the spent fuel to the ISFSI pad. Period 2b funding covers the period from 2027 to 2060. This correlates to long-term storage of spent fuel on the ISFSI pad until the fuel is transferred to the DOE.

Periods 1 and 2a Funding

The total FENGen obligation for Periods 1 and 2a funding, which includes ISFSI activities and the transfer of spent fuel from the spent fuel pools to the ISFSI, for BVPS-1, BVPS-2, DBNPS, and PNPP is approximately \$620 million dollars. FENGen intends to fund this obligation through a combination of a cash deposit of \$475 million paid into a provisional trust coupled with funds in excess of those needed for license termination contained in the DBNPS and BVPS-2 nuclear decommissioning trusts (NDTs). To use the excess funds in the NDTs, exemptions from 10 CFR 50.82(a)(8)(i)(A) for DBNPS and BVPS-2 will be required. These funds will be limited to use only for the management of spent fuel at DBNPS and BVPS-2, respectively. In addition, FENGen expects to recover its costs by making claims for damages resulting from the DOE's breach of the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract) for BVPS-1. It also expects that by no later than January 1, 2027, it will be able to obtain a settlement agreement to recover costs annually. Therefore, FENGen has focused on planning to fund the expected costs through 2026 (that is, Periods 1 and 2a).

As provided in Exhibit D, "Financial Projections," of the "Disclosure Statement for the First Amended Joint Plan of Reorganization of FirstEnergy Solutions, Corp., et al., Pursuant to Chapter 11 of the Bankruptcy Code," submitted to the United States Bankruptcy Court on March 9, 2019, the reorganized debtors are expected to have nearly \$2 billion in assets upon emergence from bankruptcy, including approximately \$1.56 billion in cash and cash equivalents. FENGen anticipates that such assets would be able to fund Periods 1 and 2a spent fuel management activities for FENGen's four units by paying the approximately \$2.1 million for the 2020 DBNPS spent fuel expenditures and by placement of \$475 million into a provisional trust by the end of 2021. The provisional trust will enable use of the funds for spent fuel management activities occurring during Periods 1 and 2a. Upon the completion of the spent fuel activities in Periods 1 and 2a, the terms of the provisional trust will provide that it can be terminated, and its balance released back to FENGen.

FENGen will withdraw money from the \$475 million provisional trust to pay the BVPS-1 Periods 1 and 2a spent fuel expenditures. Table 4 provides a summary of the FENGen use of the \$475 million provisional trust. The expenditures came from the respective site-specific DCEs that were developed in 2018.

Table 4 – Periods 1 and 2a Spent Fuel Expenditures
(thousands, 2018 dollars)

Year	BVPS-1 Payments	BVPS-2 Payments	DBNPS Payments	PNPP Payments	Total FENGen Payments	Trust Value
Initial Value						475,000
2021	1,838	530	5,567	2,151	10,086	464,914
2022	4,736	2,843	31,172 ¹	7,059	45,810	419,104
2023	32,844	24,672	0 ²	54,510	112,026	307,078
2024	32,934	36,556	0 ²	54,659	124,149	182,929
2025	32,844	36,456	0 ²	54,510	123,810	59,119
2026	21,034	1,456 ³	-	34,902	57,392	1,727
Totals	126,230	102,513	36,739	207,791	473,273	-

Notes:

1. For DBNPS, the listed partial payment is associated with the provisional trust. However, money from excess funds in the NDT will be used to make the full 2022 payment based upon the December 31, 2018 NDT values. An exemption from 10 CFR 50.82(a)(8)(i)(A) will be made in order to use funds from the NDT.
2. For DBNPS these payments will be made from excess funds in the NDT by use of exemptions from 10 CFR 50.82(a)(8)(i)(A).
3. For BVPS-2 the listed partial payment is associated with the provisional trust. However, money from excess funds in the NDT will be used to make the full 2026 payment based upon the December 31, 2018 NDT values. An exemption from 10 CFR 50.82(a)(8)(i)(A) will be made in order to use funds from the NDT.

The BVPS-1 Periods 1 and 2a costs will be fully paid for by funds withdrawn from the \$475 million provisional trust.

Period 2b Funding

As described in the BVPS DCE, it is anticipated that the spent fuel will be entirely located on the ISFSI pad by 2026. The spent fuel is assumed to remain on the ISFSI pad between 2027 and 2060, when the last of the spent fuel is transferred to the DOE. There are annual costs associated with maintaining the spent fuel on the ISFSI pad during this period. FENGen generally expects to recover those costs for spent fuel management during Period 2b, through reimbursements from the DOE due to its partial breach of the DOE Standard Contract.

FENGen has an existing settlement agreement with the DOE to recover spent fuel expenditures for its four facilities. Between 2012 and 2017, FENGen has recovered more than \$193 million from the DOE. However, this settlement expires December 31, 2019, and FENGen may need to litigate with the DOE in order to obtain reimbursement of Period 1 and 2a spent fuel expenditures after that date if the current settlement agreement is not extended. Other licensees with plants in premature shutdown have litigated with DOE to obtain recovery of dry fuel storage costs and then obtained a settlement agreement. Thus, FENGen expects to obtain a settlement agreement for the Period 2b expenses and potentially some of the earlier expenses.

As FENGen recovers its damages from the DOE, adequate funds will be retained in a segregated account to fund future annual expenses. Depending upon when litigation is resolved or a settlement is reached, this may include funding for parts of Periods 1 and 2a. Once adequate funds are set aside to fund the remaining annual spent fuel management expenses pending recovery from the DOE under a settlement, the purpose of the provisional trust will have been satisfied, and the provisional trust can be terminated. Instead, FENGen will rely upon funds set aside in the segregated account.

The plan for BVPS-1 Period 2b funding process is to retain approximately \$9.3 million in the segregated account for BVPS-1. The intent is to pay for the annual ISFSI activities, then apply for recovery of the expenses from the DOE, as needed. If FENGen is unable to obtain a settlement with DOE by the end of 2026, FENGen will obtain a performance bond for approximately \$9.3 million (approximately 1.3 times the highest one-year value of ISFSI maintenance expenses). If needed, the bond will be in place by the end of 2026. The bond will be renewed annually and remain in-place until such time that a settlement with the DOE is obtained.

ISFSI Decommissioning Funding

Once the ISFSI pad is no longer needed, ISFSI decommissioning can occur. The ISFSI decommissioning is expected to be completed by 2083. ISFSI decommissioning costs will be paid from an existing provisional ISFSI trust that was established for that purpose. FENOC letter to the NRC dated December 17, 2018 (Accession No. ML18351A161) states that sufficient funding is available for ISFSI decommissioning. At this time, no additional monies are required.

Adjustments to Funding

Pursuant to 10 CFR 50.75(f)(1), and 10 CFR 50.82(a)(8)(v) and (vi), FENOC is currently required to annually report to the NRC the status of the FENGen facility NDTs. Pursuant to 10 CFR 50.54(bb), FENOC is required to report to the NRC any

significant changes to the IFMP. Since this IFMP includes funding mechanisms and values, significant changes to the funding mechanisms and values will be reported. FENOC will make any adjustments, as needed, to ensure the adequacy of the facility NDT or the FENGen provisional trust used to support the IFMP.

**Attachment 2
L-19-059**

**Beaver Valley Power Station, Unit No. 2
Irradiated Fuel Management Plan
(Thirteen pages follow)**

Attachment 2
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Beaver Valley Power Station, Unit No. 2
Irradiated Fuel Management Plan
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Background

10 CFR Part 50.54(bb) requires licensees to establish a program to manage and provide funding for the management of spent fuel at the reactor site until title and possession of the fuel is transferred to the United States Department of Energy (DOE) for ultimate disposal. The Beaver Valley Power Station, Unit No. 2 Irradiated Fuel Management Plan (IFMP), described herein, is based, in part, on a decommissioning cost estimate (DCE) that was prepared in 2018 for Beaver Valley Power Station, Unit Nos. 1 and 2 (BVPS-1, BVPS-2, or collectively, BVPS), which includes elements associated with spent fuel management. The DCE identifies the details, schedules, and costs associated with spent fuel management activities described in the BVPS-2 IFMP, along with license termination and site restoration activities and costs.

Pursuant to 10 CFR 50.75(f)(1) on March 15, 2019, FENOC submitted its decommissioning trust financial status report for the four FENOC-operated nuclear facilities. Enclosure A of that report is a copy of the BVPS DCE. The DCE describes the bases for the assumptions regarding DOE acceptance of spent fuel from the industry and from BVPS.

As stated in the DCE (and subject to the assumptions, qualifications, and reservations stated therein), the IFMP is based on the assumption that BVPS-2 shuts down by October 31, 2021. This IFMP presumes the DOE will commence acceptance of BVPS-2's spent fuel in 2034 and completes removal of spent fuel from the site by 2060 consistent with the most recent DOE spent fuel management and acceptance strategy¹ described below.

¹ DOE currently has no plans, program, or schedule in place for acceptance of utility spent fuel. However, for these purposes, certain simplifying assumptions must be made regarding the schedule and rate of DOE performance. Therefore, while DOE's Standard Contract governing the acceptance of spent fuel allows for alternative removal schedules, including priority for shutdown reactors and exchanges of allocations, for purposes of this estimate DOE acceptance is assumed to commence in 2034 from BVPS-2 and in accordance with spent fuel shipment schedules that are based upon published historic acceptance priority rankings by DOE. Nothing herein should be interpreted as a concession or admission of any kind for purposes other than for this submission. Such other purposes would include, but are not limited to, disputes regarding DOE's legal or contractual acceptance obligations, or damages claims for recovery of incurred costs.

Spent Fuel Management Strategy

FENOC assumes that, as stated in the DOE's "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Waste," dated January 2013, the DOE will start accepting spent fuel for storage from the nation's commercial nuclear plants beginning in 2025 for placement in a consolidated interim storage facility (CISF) that starts operation in 2025. The DCE assumes that BVPS-2 will shutdown and cease operations in 2021 and that BVPS-2 spent fuel will be accepted for placement in the CISF. Using the rankings for spent fuel receipt, as delineated in the Office of Civilian Radioactive Waste Management reports, "Annual Capacity Report," dated June 1987, and "Acceptance Priority Ranking & Annual Capacity Report," dated July 2004, BVPS-2 fuel would be accepted at the DOE storage facility starting in 2034.

The spent fuel pool will contain discharged fuel from the previous refueling cycles, as well as the final reactor core at shutdown. Immediately after shutdown, spent fuel will be located in the spent fuel pool and in canisters located on an independent spent fuel storage installation (ISFSI). During the five-year period after the shutdown, the spent fuel from the spent fuel pool would be packaged into canisters and transferred to the ISFSI for interim storage. This period provides the necessary cooling time for the spent fuel to meet the decay heat requirements for placement in dry storage.

The current BVPS dry fuel storage system consists of a Transnuclear Standardized NUHOMS multi-purpose (storage and transport) dry shielded storage canister (DSC) and a horizontal storage module (HSM). There are ten modules currently on the ISFSI pad with 37-assembly capacity DSCs. A Holtec HI-STORM FW system, with a 37-fuel assembly capacity Multi-Purpose Canister (MPC) and concrete shield overpack, is expected to be used following shutdown. The DSCs and MPCs are assumed to be transferred directly to the DOE.

FENOC has constructed an ISFSI at BVPS to support BVPS-1 and BVPS-2 operations. The ISFSI operates under a general license pursuant to 10 CFR 72.210. The current size of the ISFSI pad is approximately 300 feet by 90 feet. The ISFSI will require expansion once plant operations cease in order to support spent fuel management activities. The pad expansion will be 120 feet by 90 feet. Total capacity of the consolidated pad is expected to be 88 DSCs and MPCs holding spent fuel and 6 MPCs holding greater than Class C waste. The ISFSI will continue to operate until such time that the transfer of spent fuel to the DOE can be completed. The DCE assumes that the BVPS spent fuel will be transferred to the DOE by 2060.

Table 1 provides a listing of the location of the spent fuel from 2019 until the spent fuel has been accepted by the DOE.

Table 1 – Spent Fuel Management Schedule
(BVPS-2 Fuel Assembly Location)¹

Year	BVPS-2 Pool Inventory	BVPS-2 ISFSI Inventory	DOE Acceptance of BVPS-2 Fuel
2019	1,257	0	0
2020	1,317	0	0
2021	1,474	0	0
2022	1,474	0	0
2023	1,474	0	0
2024	1,474	0	0
2025	1,104	370	0
2026	0	1,474	0
2027	0	1,474	0
2028	0	1,474	0
2029	0	1,474	0
2030	0	1,474	0
2031	0	1,474	0
2032	0	1,474	0
2033	0	1,474	0
2034	0	1,421	53
2035	0	1,352	69
2036	0	1,287	65
2037	0	1,216	71
2038	0	1,147	69
2039	0	1,085	62
2040	0	1,085	0
2041	0	1,021	64
2042	0	960	61
2043	0	895	65
2044	0	834	61
2045	0	834	0
2046	0	773	61
2047	0	713	60
2048	0	655	58
2049	0	594	61
2050	0	529	65
2051	0	472	57
2052	0	415	57
2053	0	358	57
2054	0	301	57
2055	0	244	57
2056	0	187	57

Table 1 (continued)

Year	BVPS-2 Pool Inventory	BVPS-2 ISFSI Inventory	DOE Acceptance of BVPS- Fuel
2057	0	130	57
2058	0	73	57
2059	0	16	57
2060	0	0	16
Total	-	-	1,474

Note:

1. Fuel location is as of the date of the submittal. It is assumed that no fuel is transferred from the spent fuel pool to the ISFSI until 2025.

Schedule

Table 2 provides a summary of the spent fuel management activities described in the DCE. The table provides the decommissioning period associated with the spent fuel program activity, its cost, and the approximate duration of the activity. The table does not consider ISFSI decommissioning, as this is an activity undertaken after spent fuel has been accepted by the DOE and removed from the site.

Table 2 – Spent Fuel Management Activities

Decommissioning Period	Costs (thousands, 2018 dollars) ¹	Start Date	Stop Date	Approximate Duration (years)
1 - Preparations	3,846	October 2021	May 2023	1.5
2a - Dormancy with Wet Fuel Storage	139,932	May 2023	January 2027	3.7
2b - Dormancy with Dry Fuel Storage	100,157	January 2027	January 2061	34
Total	243,935	-	-	-

Notes:

1. The values were obtained from the BVPS DCE, which were reported in 2014 dollars. A composite escalation factor was applied to convert the values into 2018 dollars. These values differ from those in Table 3 due to the way the values in both tables were calculated.

Decommissioning Period 1 - Preparations

During this period, the facility is placed in a condition that allows the spent fuel to be safely stored and the facility to be maintained in a condition to be subsequently decontaminated to levels that permit release for unrestricted use. The facility is left essentially intact with structures maintained in a sound condition. The process of placing the plant in safe-storage includes, but is not limited to, isolating the spent fuel storage services and fuel handling systems so that the spent fuel can be safely transferred from the spent fuel storage pool to the ISFSI for interim storage.

Decommissioning Period 2a – Dormancy with Wet Fuel Storage

During this period, the facility is in the dormancy period of SAFSTOR decommissioning. During this phase, spent fuel will remain in the spent fuel pool until it meets the criteria for transfer to dry storage. FENOC expects to construct an ISFSI pad expansion during this period. FENOC plans to begin transferring the remaining BVPS-2 spent fuel from the spent fuel pool to dry storage in 2025 and to complete the transfer of fuel to the consolidated ISFSI in 2026.

Decommissioning Period 2b – Dormancy with Dry Fuel Storage

During this period, spent fuel will remain stored on the ISFSI until DOE accepts the fuel and removes it from the site. As discussed above and in the BVPS DCE, the IFMP assumes that the DOE will begin removing fuel from BVPS-2 in 2034 and will complete the removal of spent fuel from the site in 2060, according to the schedule set forth in Table 1. During this period, programs and procedures required to support safe operation of the ISFSI will be maintained in accordance with applicable requirements. Maintenance, monitoring, and inspection of equipment, including fuel handling and shipping equipment, will be performed as required. BVPS-2 will also maintain a security force, which will safeguard the spent fuel for as long as it remains on site. Security barriers, sensors, alarms, and other surveillance equipment will be maintained as required to provide security for the ISFSI and spent fuel.

Cost Estimate

The BVPS DCE provides the basis for the costs associated with spent fuel management.

The DCE includes the cost of operating and maintaining the spent fuel pool and the ISFSI. Pool operations are expected to continue approximately 5 years after the cessation of plant operations. ISFSI operating costs are based upon an approximately 39-year period of operation following plant shutdown. The cost for

the labor and equipment to load and transfer each spent fuel canister to the ISFSI from the spent fuel pool is also included. Costs for transferring the fuel from the ISFSI into the DOE transport cask are also included in the DCE.

Operation and maintenance costs for the spent fuel pool and the ISFSI are included within the DCE and address the cost for staffing the facility, as well as security, insurance, and licensing fees. Costs are also provided within the DCE for the decommissioning of the spent fuel pool, and the ISFSI after the fuel transfer to the DOE from the ISFSI is complete.

Table 3 provides an expenditure summary for the BVPS-2 IFMP in 2018 dollars.

Table 3 – IFMP Expenditure Summary

Year	Expenditure (thousands, 2018 dollars)
2021	530
2022	2,843
2023	24,672
2024	36,556
2025	36,456
2026	36,456
2027	3,592
2028	2,578
2029	2,571
2030	2,571
2031	2,571
2032	2,578
2033	2,571
2034	2,872
2036	3,179
2037	3,172
2038	3,172
2039	3,172
2040	2,578
2041	3,172
2042	3,172
2043	3,172
2044	3,179

Table 3 (continued)

Year	Expenditure (thousands, 2018 dollars)
2045	2,872
2046	2,872
2047	2,872
2048	2,879
2049	2,872
2050	2,872
2051	2,872
2052	3,179
2053	2,872
2054	3,172
2055	2,872
2056	3,179
2057	2,872
2058	3,172
2059	2,872
2060	3,179
Total	238,037

Funding

FENGen is the owner of BVPS, Davis-Besse Nuclear Power Station (DBNPS), and Perry Nuclear Power Plant (PNPP). As such, the BVPS-2 funding mechanisms take into account the need to fund spent fuel management for the other FENGen facilities.

The funding for BVPS-2 spent fuel management follows the schedule described above. Funding for Periods 1 and 2a extends from 2021 to 2026. This correlates with preparation activities and transferring the spent fuel to the ISFSI pad. Period 2b funding covers the period from 2027 to 2060. This correlates to long-term storage of spent fuel on the ISFSI pad until the fuel is transferred to the DOE.

Periods 1 and 2a Funding

The total FENGen obligation for Periods 1 and 2a funding, which includes ISFSI activities and the transfer of spent fuel from the spent fuel pools to the ISFSI, for BVPS-1, BVPS-2, DBNPS, and PNPP is approximately \$620 million dollars. FENGen intends to fund this obligation through a combination of a cash deposit of \$475 million paid into a provisional trust coupled with funds in excess of those needed for license termination contained in the DBNPS and BVPS-2 nuclear decommissioning trusts (NDTs). To use the excess funds in the NDTs, exemptions from 10 CFR 50.82(a)(8)(i)(A) for DBNPS and BVPS-2 will be required. These funds will be limited to use only for the management of spent fuel at DBNPS and BVPS-2, respectively. In addition, FENGen expects to recover its costs by making claims for damages resulting from the DOE's breach of the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract) for BVPS-2. It also expects that by no later than January 1, 2027, it will be able to obtain a settlement agreement to recover costs annually. Therefore, FENGen has focused on planning to fund the expected costs through 2026 (that is, Periods 1 and 2a).

As provided in Exhibit D, "Financial Projections," of the "Disclosure Statement for the First Amended Joint Plan of Reorganization of FirstEnergy Solutions, Corp., et al., Pursuant to Chapter 11 of the Bankruptcy Code," submitted to the United States Bankruptcy Court on March 9, 2019, the reorganized debtors are expected to have nearly \$2 billion in assets upon emergence from bankruptcy, including approximately \$1.56 billion in cash and cash equivalents. FENGen anticipates that such assets would be able to fund Periods 1 and 2a spent fuel management activities for FENGen's four units by paying the approximately \$2.1 million for the 2020 DBNPS spent fuel expenditures and by placement of \$475 million into a provisional trust by the end of 2021. The provisional trust will enable use of the funds for spent fuel management activities occurring during Periods 1 and 2a. Upon the completion of the spent fuel activities in Periods 1 and 2a, the terms of the provisional trust will provide that it can be terminated, and its balance released back to FENGen.

FENGen will withdraw money from the \$475 million provisional trust to pay the BVPS-2 Phase 1 and 2a spent fuel expenditures between 2021 and 2025. A withdrawal from this trust will also be made to provide a partial payment in 2026. To fully satisfy the 2026 spent fuel expenditure, FENGen intends to use excess funds in the BVPS-2 NDT.

Table 4 provides a summary of the FENGen use of the \$475 million provisional trust. The expenditures came from the respective facility DCEs that were developed in 2018. Table 5 provides a BVPS-2 NDT funding analysis that includes the license termination expenditures and the partial 2026 spent fuel expenditure. The analysis indicates that a positive balance remains in the NDT after the withdrawal for the spent fuel expenditure.

In order to withdraw funds from the NDT for use to pay for expenditures other than license termination activities, an exemption from 10 CFR 50.82(a)(8)(i)(A) is required to be made and approved by the NRC prior to the withdrawal. The exemption request will be made in advance of when the withdrawal is needed in 2026.

Table 4 – Periods 1 and 2a Spent Fuel Expenditures
(thousands, 2018 dollars)

Year	BVPS-1 Payments	BVPS-2 Payments	DBNPS Payments	PNPP Payments	Total FENGen Payments	Trust Value
Initial Value						475,000
2021	1,838	530	5,567	2,151	10,086	464,914
2022	4,736	2,843	31,172 ¹	7,059	45,810	419,104
2023	32,844	24,672	0 ²	54,510	112,026	307,078
2024	32,934	36,556	0 ²	54,659	124,149	182,929
2025	32,844	36,456	0 ²	54,510	123,810	59,119
2026	21,034	1,456 ³	-	34,902	57,392	1,727
Totals	126,230	102,513	36,739	207,791	473,273	-

Notes:

1. For DBNPS, the listed partial payment is associated with the provisional trust. However, money from excess funds in the NDT will be used to make the full 2022 payment based upon the December 31, 2018 NDT values. An exemption from 10 CFR 50.82(a)(8)(i)(A) will be made in order to use funds from the NDT.
2. For DBNPS these payments will be made from excess funds in the NDT by use of exemptions from 10 CFR 50.82(a)(8)(i)(A).
3. For BVPS-2 the listed partial payment is associated with the provisional trust. However, money from excess funds in the NDT will be used to make the full 2026 payment based upon the December 31, 2018 NDT values. An exemption from 10 CFR 50.82(a)(8)(i)(A) will be made in order to use funds from the NDT.

Table 5 - Nuclear Decommissioning Trust Funding Analysis^{1, 2, 3, 4}

Year	Beginning Balance	Deposits	Earnings	License Termination Withdrawal	Spent Fuel Withdrawal	Ending Balance
2018	383,221,237	-	-	-	-	383,221,237
2019	383,221,237	-	7,664,425	-	-	390,885,661
2020	390,885,661	-	7,817,713	-	-	398,703,375
2021	398,703,375	-	7,805,084	(8,449,180)	-	398,059,278
2022	398,059,278	-	6,861,401	(54,989,230)	-	349,931,449
2023	349,931,449	-	6,319,566	(33,953,155)	-	322,297,860
2024	322,297,860	-	6,359,823	(4,306,701)	-	324,350,982
2025	324,350,982	-	6,401,121	(4,294,934)	-	326,457,169
2026	326,457,169	-	5,743,245	(4,294,934)	(35,000,000)	292,905,479
2027	292,905,479	-	5,776,903	(4,060,320)	-	294,622,063
2028	294,622,063	-	5,811,159	(4,064,133)	-	296,369,088
2029	296,369,088	-	5,846,321	(4,053,030)	-	298,162,379
2030	298,162,379	-	5,882,187	(4,053,030)	-	299,991,536
2031	299,991,536	-	5,918,770	(4,053,030)	-	301,857,277
2032	301,857,277	-	5,955,863	(4,064,133)	-	303,749,006
2033	303,749,006	-	5,993,920	(4,053,030)	-	305,689,896
2034	305,689,896	-	6,032,737	(4,053,030)	-	307,669,603
2035	307,669,603	-	6,072,331	(4,053,030)	-	309,688,905
2036	309,688,905	-	6,112,495	(4,064,133)	-	311,737,267
2037	311,737,267	-	6,153,685	(4,053,030)	-	313,837,922
2038	313,837,922	-	6,195,698	(4,053,030)	-	315,980,590
2039	315,980,590	-	6,238,551	(4,053,030)	-	318,166,111
2040	318,166,111	-	6,282,040	(4,064,133)	-	320,384,017
2041	320,384,017	-	6,326,620	(4,053,030)	-	322,657,607
2042	322,657,607	-	6,372,092	(4,053,030)	-	324,976,669
2043	324,976,669	-	6,418,473	(4,053,030)	-	327,342,112
2044	327,342,112	-	6,465,560	(4,064,133)	-	329,743,538
2045	329,743,538	-	6,513,810	(4,053,030)	-	332,204,318
2046	332,204,318	-	6,563,026	(4,053,030)	-	334,714,314
2047	334,714,314	-	6,613,226	(4,053,030)	-	337,274,510
2048	337,274,510	-	6,664,208	(4,064,133)	-	339,874,584
2049	339,874,584	-	6,716,431	(4,053,030)	-	342,537,986
2050	342,537,986	-	6,769,699	(4,053,030)	-	345,254,655
2051	345,254,655	-	6,824,032	(4,053,030)	-	348,025,657
2052	348,025,657	-	6,879,230	(4,064,133)	-	350,840,755
2053	350,840,755	-	6,935,754	(4,053,030)	-	353,723,479

Table 5 (continued)

Year	Beginning Balance	Deposits	Earnings	License Termination Withdrawal	Spent Fuel Withdrawal	Ending Balance
2054	353,723,479	-	6,993,409	(4,053,030)	-	356,663,858
2055	356,663,858	-	7,052,217	(4,053,030)	-	359,663,045
2056	359,663,045	-	7,111,978	(4,064,133)	-	362,710,890
2057	362,710,890	-	7,173,157	(4,053,030)	-	365,831,017
2058	365,831,017	-	7,235,560	(4,053,030)	-	369,013,547
2059	369,013,547	-	7,299,210	(4,053,030)	-	372,259,728
2060	372,259,728	-	7,363,912	(4,064,133)	-	375,559,506
2061	375,559,506	-	7,428,725	(4,123,257)	-	378,864,974
2062	378,864,974	-	7,494,834	(4,123,257)	-	382,236,551
2063	382,236,551	-	7,562,266	(4,123,257)	-	385,675,559
2064	385,675,559	-	7,630,820	(4,134,553)	-	389,171,827
2065	389,171,827	-	7,700,971	(4,123,257)	-	392,749,541
2066	392,749,541	-	7,772,526	(4,123,257)	-	396,398,809
2067	396,398,809	-	7,845,511	(4,123,257)	-	400,121,063
2068	400,121,063	-	7,919,730	(4,134,553)	-	403,906,240
2069	403,906,240	-	7,995,660	(4,123,257)	-	407,778,642
2070	407,778,642	-	8,073,108	(4,123,257)	-	411,728,493
2071	411,728,493	-	8,152,105	(4,123,257)	-	415,757,340
2072	415,757,340	-	8,232,456	(4,134,553)	-	419,855,243
2073	419,855,243	-	8,314,640	(4,123,257)	-	424,046,625
2074	424,046,625	-	8,398,467	(4,123,257)	-	428,321,835
2075	428,321,835	-	7,922,730	(32,185,347)	-	404,059,218
2076	404,059,218	-	6,291,245	(89,496,954)	-	320,853,509
2077	320,853,509	-	4,122,035	(114,751,744)	-	210,223,801
2078	210,223,801	-	2,793,786	(70,534,493)	-	142,483,095
2079	142,483,095	-	1,438,972	(70,534,493)	-	73,387,574
2080	73,387,574	-	299,832	(58,395,962)	-	15,291,445
2081	15,291,445	-	18,666	(14,358,152)	-	951,959
2082	951,959	-	17,937	(55,104)	-	914,792
2083	914,792	-	17,912	(19,173)	-	913,531
2084	913,531	-	18,271	-	-	931,802

Notes:

1. The analysis is based upon the SAFSTOR approach to decommissioning.
2. The analysis was performed for constant 2018 dollars.
3. A two percent after-tax real rate of return was used in the analysis.
4. Analysis is based upon the December 31, 2018 NDT balance.

Period 2b Funding

As described in the BVPS DCE, it is anticipated that the spent fuel will be entirely located on the ISFSI pad by 2026. The spent fuel is assumed to remain on the ISFSI pad between 2027 and 2060, when the last of the spent fuel is transferred to the DOE. There are annual costs associated with maintaining the spent fuel on the ISFSI pad during this period. FENGen generally expects to recover those costs for spent fuel management during Period 2b, through reimbursements from the DOE due to its partial breach of the DOE Standard Contract.

FENGen has an existing settlement agreement with the DOE to recover spent fuel expenditures for its four facilities. Between 2012 and 2017, FENGen has recovered more than \$193 million from the DOE. However, this settlement expires December 31, 2019, and FENGen may need to litigate with the DOE in order to obtain reimbursement of Period 1 and 2a spent fuel expenditures after that date if the current settlement agreement is not extended. Other licensees with plants in premature shutdown have litigated with DOE to obtain recovery of dry fuel storage costs and then obtained a settlement agreement. Thus, FENGen expects to obtain a settlement agreement for the Period 2b expenses and potentially some of the earlier expenses.

As FENGen recovers its damages from the DOE, adequate funds will be retained in a segregated account to fund future annual expenses. Depending upon when litigation is resolved or a settlement is reached, this may include funding for parts of Periods 1 and 2a. Once adequate funds are set aside to fund the remaining annual spent fuel management expenses pending recovery from the DOE under a settlement, the purpose of the provisional trust will have been satisfied, and the provisional trust can be terminated. Instead, FENGen will rely upon funds set aside in the segregated account.

The plan for BVPS-2 Period 2b funding process is to retain approximately \$4.7 million in the segregated account for BVPS-2. The intent is to pay for the annual ISFSI activities, then apply for recovery of the expenses from the DOE, as needed. If FENGen is unable to obtain a settlement with DOE by the end of 2026, FENGen will obtain a performance bond for approximately \$4.7 million (approximately 1.3 times the highest one-year value of ISFSI maintenance expenses). If needed, the bond will be in place by the end of 2026. The bond will be renewed annually and remain in-place until such time that a settlement with the DOE is obtained.

ISFSI Decommissioning Funding

Once the ISFSI pad is no longer needed, ISFSI decommissioning can occur. The ISFSI decommissioning is expected to be completed by 2083. ISFSI decommissioning costs will be paid from an existing provisional ISFSI trust that was established for that purpose. FENOC letter to the NRC dated December 17, 2018 (Accession No. ML18351A161) states that sufficient funding is available for ISFSI decommissioning. At this time, no additional monies are required.

Adjustments to Funding

Pursuant to 10 CFR 50.75(f)(1), and 10 CFR 50.82(a)(8)(v) and (vi), FENOC is currently required to annually report to the NRC the status of the FENGen facility NDTs. Pursuant to 10 CFR 50.54(bb), FENOC is required to report to the NRC any significant changes to the IFMP. Since this IFMP includes a description funding mechanisms and costs, significant changes to the funding mechanisms and costs will be reported. FENOC will make any adjustments, as needed, to ensure the adequacy of the facility NDT or the FENGen provisional trust used to support the IFMP.

Attachment 3
L-19-059

Davis-Besse Nuclear Power Station, Unit No. 1
Irradiated Fuel Management Plan
(Fourteen pages follow)

Attachment 3
L-19-059

Davis-Besse Nuclear Power Station, Unit No. 1
Irradiated Fuel Management Plan
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Background

10 CFR Part 50.54(bb) requires licensees to establish a program to manage and provide funding for the management of spent fuel at the reactor site until title and possession of the fuel is transferred to the United States Department of Energy (DOE) for ultimate disposal. The Davis-Besse Nuclear Power Station, Unit No. 1 (DBNPS) Irradiated Fuel Management Plan (IFMP), described herein, is based, in part, on a decommissioning cost estimate (DCE) that was prepared in 2018 for DBNPS, which includes elements associated with spent fuel management. The DCE identifies the details, schedules, and costs associated with spent fuel management activities described in the DBNPS IFMP, along with license termination and site restoration activities and costs.

Pursuant to 10 CFR 50.75(f)(1) on March 15, 2019, FENOC submitted its decommissioning trust financial status report for the four FENOC-operated nuclear facilities. Enclosure B of that report is a copy of the DBNPS DCE. The DCE describes the bases for the assumptions regarding DOE acceptance of spent fuel from the industry and from DBNPS.

As stated in the DCE (and subject to the assumptions, qualifications, and reservations stated therein), the IFMP is based on the assumption that DBNPS shuts down by May 31, 2020. This IFMP presumes the DOE will commence acceptance of DBNPS's spent fuel in 2030 and completes removal of spent fuel from the site by 2059 consistent with the most recent DOE spent fuel management and acceptance strategy¹ described below.

¹ DOE currently has no plans, program, or schedule in place for acceptance of utility spent fuel. However, for these purposes, certain simplifying assumptions must be made regarding the schedule and rate of DOE performance. Therefore, while DOE's Standard Contract governing the acceptance of spent fuel allows for alternative removal schedules, including priority for shutdown reactors and exchanges of allocations, for purposes of this estimate DOE acceptance is assumed to commence in 2030 from DBNPS and in accordance with spent fuel shipment schedules that are based upon published historic acceptance priority rankings by DOE. Nothing herein should be interpreted as a concession or admission of any kind for purposes other than for this submission. Such other purposes would include, but are not limited to, disputes regarding DOE's legal or contractual acceptance obligations, or damages claims for recovery of incurred costs.

Spent Fuel Management Strategy

FENOC assumes that, as stated in the DOE's "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Waste," dated January 2013, the DOE will start accepting spent fuel for storage from the nation's commercial nuclear plants beginning in 2025 for placement in a consolidated interim storage facility (CISF) that starts operation in 2025. The DCE assumes that DBNPS will shutdown and cease operations in 2020 and that DBNPS spent fuel will be accepted for placement in the CISF. Using the rankings for spent fuel receipt, as delineated in the Office of Civilian Radioactive Waste Management reports, "Annual Capacity Report," dated June 1987, and "Acceptance Priority Ranking & Annual Capacity Report," dated July 2004, DBNPS fuel would be accepted at the DOE storage facility starting in 2030.

The spent fuel pool will contain discharged fuel from the previous refueling cycles, as well as the final reactor core at shutdown. Immediately after shutdown, spent fuel will be located in the spent fuel pool and in canisters located on an independent spent fuel storage installation (ISFSI). During the five-year period after the shutdown, the spent fuel from the spent fuel pool would be packaged into canisters and transferred to the ISFSI for interim storage. This period provides the necessary cooling time for the spent fuel to meet the decay heat requirements for placement in dry storage.

The current DBNPS dry fuel storage system consists of a Transnuclear Standardized NUHOMS multi-purpose (storage and transport) dry shielded storage canister (DSC) and a horizontal storage module (HSM). There are a total of eight HSMs on the ISFSI pad, consisting of three DSCs each storing 24-assemblies and four DSCs each storing 32-assemblies (the eighth HSM was never used to store fuel). A Holtec HI-STORM FW system, with a 37-fuel assembly capacity Multi-Purpose Canister (MPC) and concrete shield overpack is expected to be used following shutdown. The DSCs and MPCs are assumed to be transferred directly to the DOE.

FENOC has constructed an ISFSI at DBNPS to support facility operations. The ISFSI operates under a general license pursuant to 10 CFR 72.210. The size of the current pad is 229 feet by 88 feet. The ISFSI may require expansion once plant operations cease in order to support spent fuel management activities. The pad expansion would be 31 feet by 88 feet. Total capacity of the consolidated pad is expected to be 43 DSCs and MPCs holding spent fuel and 4 MPCs holding greater than Class C waste. The ISFSI will continue to operate until such time that the transfer of spent fuel and waste to the DOE can be completed. The DCE assumes that the DBNPS spent fuel has been transferred to the DOE by 2059.

Table 1 provides a listing of the location of the spent fuel from 2019 until the spent fuel has been accepted by the DOE.

Table 1 – Spent Fuel Management Schedule
(Fuel Assembly Location)¹

Year	Pool Inventory	ISFSI Inventory	DOE Acceptance
2019	856	496	0
2020	1,033	496	0
2021	1,033	496	0
2022	1,033	496	0
2023	1,033	496	0
2024	515	1,014	0
2025	0	1,529	0
2026	0	1,529	0
2027	0	1,529	0
2028	0	1,529	0
2029	0	1,529	0
2030	0	1,477	52
2031	0	1,331	146
2032	0	1,331	0
2033	0	1,331	0
2034	0	1,268	63
2035	0	1,210	58
2036	0	1,153	57
2037	0	1,094	59
2038	0	1,033	61
2039	0	962	71
2040	0	962	0
2041	0	888	74
2042	0	812	76
2043	0	742	70
2044	0	742	0
2045	0	742	0
2046	0	668	74
2047	0	585	83
2048	0	585	0
2049	0	510	75
2050	0	510	0
2051	0	441	69
2052	0	386	55
2053	0	331	55

Table 1 (continued)

Year	Pool Inventory	ISFSI Inventory	DOE Acceptance
2054	0	276	55
2055	0	221	55
2056	0	166	55
2057	0	111	55
2058	0	56	55
2059	0	1	55
2060	0	0	1
Total	-	-	1,529

Note:

1. Fuel location is as of the date of the submittal. It is assumed that no fuel is transferred from the spent fuel pool to the ISFSI until 2024.

Schedule

Table 2 provides a summary of the spent fuel management activities described in the DCE. The table provides the decommissioning period associated with the spent fuel program activity, its cost, and the approximate duration of the activity. The table does not consider ISFSI decommissioning, as this is an activity undertaken after spent fuel has been accepted by the DOE and removed from the site.

Table 2 – Spent Fuel Management Activities

Decommissioning Period	Costs (thousands, 2018 dollars) ¹	Start Date	Stop Date	Approximate Duration (years)
1 - Preparations	4,502	May 2020	December 2021	1.5
2a - Dormancy with Wet Fuel Storage	147,686	December 2021	August 2025	3.7
2b - Dormancy with Dry Fuel Storage	201,419	August 2025	January 2060	34.4
Total	353,607	-	-	-

Notes:

1. The values were obtained from the DBNPS DCE, which were reported in 2014 dollars. A composite escalation factor was applied to convert the values into 2018 dollars. These values differ from those in Table 3 due to the way the values in both tables were calculated.

Decommissioning Period 1 - Preparations

During this period, the facility is placed in a condition that allows the spent fuel to be safely stored and the facility to be maintained in a condition to be subsequently decontaminated to levels that permit release for unrestricted use. The facility is left essentially intact with structures maintained in a sound condition. The process of placing the plant in safe-storage includes, but is not limited to, isolating the spent fuel storage services and fuel handling systems so that the spent fuel can be safely transferred from the spent fuel storage pool to the ISFSI for interim storage.

Decommissioning Period 2a – Dormancy with Wet Fuel Storage

During this period, the facility is in the dormancy period of SAFSTOR decommissioning. During this phase, spent fuel will remain in the spent fuel pool until it meets the criteria for transfer to dry storage. FENOC expects to construct an ISFSI pad expansion during this period. FENOC plans to begin transferring the remaining DBNPS spent fuel from the spent fuel pool to dry storage in 2024 and to complete the transfer of fuel to the consolidated ISFSI in 2025.

Decommissioning Period 2b – Dormancy with Dry Fuel Storage

During this period, spent fuel will remain stored on the ISFSI until the DOE accepts the fuel and removes it from the site. As discussed above and in the DBNPS DCE, the IFMP assumes that the DOE will begin removing fuel from DBNPS in 2030 and will complete the removal of spent fuel from the site in 2059, according to the schedule set forth in Table 1. During this period, programs and procedures required to support safe operation of the ISFSI will be maintained in accordance with applicable requirements. Maintenance, monitoring, and inspection of equipment, including fuel handling and shipping equipment, will be performed as required. DBNPS will also maintain a security force, which will safeguard the spent fuel for as long as it remains on site. Security barriers, sensors, alarms, and other surveillance equipment will be maintained as required to provide security for the ISFSI and spent fuel.

Cost Estimate

The DBNPS DCE provides the basis for the costs associated with spent fuel management.

The DCE includes the cost of operating and maintaining the spent fuel pool and the ISFSI. Pool operations are expected to continue approximately 5 years after the cessation of plant operations. ISFSI operating costs are based upon an approximately 40-year period of operation following plant shutdown. The cost for the labor and equipment to load and transfer each spent fuel canister to the ISFSI from the spent fuel pool is also included. Costs for transferring the fuel from the ISFSI into the DOE transport cask are also included in the DCE.

Operation and maintenance costs for the spent fuel pool and the ISFSI are included within the DCE and address the cost for staffing the facility, as well as security, insurance, and licensing fees. Costs are also provided within the DCE for the decommissioning of the spent fuel pool, and the ISFSI after the fuel transfer to the DOE from the ISFSI is complete.

Table 3 provides an expenditure summary for the DBNPS IFMP in 2018 dollars.

Table 3 – IFMP Expenditure Summary

Year	Expenditure (thousands, 2018 dollars)
2020	2,121
2021	5,567
2022	38,672
2023	38,672
2024	38,778
2025	25,582
2026	5,260
2027	5,260
2028	5,275
2029	10,384
2030	6,463
2031	5,861
2032	5,275
2033	5,861
2035	5,861
2036	5,876
2037	5,861
2038	5,861
2039	5,861
2040	5,275
2041	5,861
2042	5,861
2043	5,561
2044	5,575
2045	5,561
2046	5,561
2047	5,561
2048	5,575
2049	5,561
2050	5,561
2051	5,561
2052	5,575
2053	5,561

Table 3 (continued)

Year	Expenditure (thousands, 2018 dollars)
2054	5,561
2055	5,561
2056	5,575
2057	5,561
2058	5,861
2059	5,861
2060	0
Total	346,407

Funding

FENGen is the owner of Beaver Valley Power Station, Unit Nos. 1 and 2 (BVPS-1 and BVPS-2, respectively), DBNPS, and Perry Nuclear Power Plant (PNPP). As such, the DBNPS funding mechanisms take into account the need to fund spent fuel management for the other FENGen facilities.

The funding for DBNPS spent fuel management follows the schedule described above. Funding for Periods 1 and 2a extends from 2020 to 2025. This correlates with preparation activities and transferring the spent fuel to the ISFSI pad. Period 2b funding covers the period from 2026 to 2059. This correlates to long-term storage of spent fuel on the ISFSI pad until the fuel is transferred to the DOE.

Periods 1 and 2a Funding

The total FENGen obligation for Periods 1 and funding, which includes ISFSI activities and the transfer of spent fuel from the spent fuel pools to the ISFSI, for BVPS-1, BVPS-2, DBNPS, and PNPP is approximately \$620 million dollars. FENGen intends to fund this obligation through a combination of a cash deposit of \$475 million paid into a provisional trust coupled with funds in excess of those needed for license termination contained in the DBNPS and BVPS-2 nuclear decommissioning trusts (NDTs). The exception to this is that the 2020 DBNPS spent fuel expenditures of approximately \$2.1 million will be paid by FENGen's parent. To use the excess funds in the NDTs, exemptions from 10 CFR 50.82(a)(8)(i)(A) for DBNPS and BVPS-2 will be required. These funds will be limited to use only for the management of spent fuel at DBNPS and BVPS-2, respectively. In addition, FENGen expects to recover its costs by making claims for damages resulting from DOE's breach of the Standard Contract for Disposal of Spent Nuclear Fuel and/or

High-Level Radioactive Waste (Standard Contract) for DBNPS. It also expects that by no later than January 1, 2026, it will be able to obtain a settlement agreement to recover costs annually. Therefore, FENGen has focused on planning to fund the expected costs through 2025 (that is, Periods 1 and 2a).

As provided in Exhibit D, "Financial Projections," of the "Disclosure Statement for the First Amended Joint Plan of Reorganization of FirstEnergy Solutions, Corp., et al., Pursuant to Chapter 11 of the Bankruptcy Code," submitted to the United States Bankruptcy Court on March 9, 2019, the reorganized debtors are expected to have nearly \$2 billion in assets upon emergence from bankruptcy, including approximately \$1.56 billion in cash and cash equivalents. FENGen anticipates that such assets would be able to fund Periods 1 and 2a spent fuel management activities for FENGen's four units by paying the approximately \$2.1 million for the 2020 DBNPS spent fuel expenditures and by placement of \$475 million into a provisional trust by the end of 2021. The provisional trust will enable use of the funds for spent fuel management activities occurring during Periods 1 and 2a. Upon the completion of the spent fuel activities in Periods 1 and 2a, the terms of the provisional trust will provide that it can be terminated, and its balance released back to FENGen.

FENGen will withdraw money from the \$475 million provisional trust to pay the DBNPS Periods 1 and 2a spent fuel expenditures for 2021 and partially in 2022. To fully satisfy the 2022 spent fuel expenditure and the spent fuel expenditures between 2023 through 2025, FENGen intends to use excess funds in the DBNPS NDT.

Table 4 provides a summary of the FENGen use of the \$475 million provisional trust. The expenditures came from the respective facility DCEs that were developed in 2018. Table 5 provides a DBNPS NDT funding analysis that includes the license termination expenditures and the partial 2022 spent fuel expenditure. The analysis indicates that a positive balance remains in the NDT after the withdrawal for the spent fuel expenditure.

In order to withdraw funds from the NDT for use to pay for expenditures other than license termination activities, an exemption from 10 CFR 50.82(a)(8)(i)(A) is required to be made and approved by the NRC prior to the withdrawal. The exemption request will be made in advance of when the withdrawal is needed in 2022.

Table 4 – Periods 1 and 2a Spent Fuel Expenditures
(thousands, 2018 dollars)

Year	BVPS-1 Payments	BVPS-2 Payments	DBNPS Payments	PNPP Payments	Total FENGen Payments	Trust Value
Initial Value						475,000
2021	1,838	530	5,567	2,151	10,086	464,914
2022	4,736	2,843	31,172 ¹	7,059	45,810	419,104
2023	32,844	24,672	0 ²	54,510	112,026	307,078
2024	32,934	36,556	0 ²	54,659	124,149	182,929
2025	32,844	36,456	0 ²	54,510	123,810	59,119
2026	21,034	1,456 ³	-	34,902	57,392	1,727
Totals	126,230	102,513	36,739	207,791	473,273	-

Notes:

1. For DBNPS, the listed partial payment is associated with the provisional trust. However, money from excess funds in the NDT will be used to make the full 2022 payment based upon the December 31, 2018 NDT values. An exemption from 10 CFR 50.82(a)(8)(i)(A) will be made in order to use funds from the NDT.
2. For DBNPS these payments will be made from excess funds in the NDT by use of exemptions from 10 CFR 50.82(a)(8)(i)(A).
3. For BVPS-2 the listed partial payment is associated with the provisional trust. However, money from excess funds in the NDT will be used to make the full 2026 payment based upon the December 31, 2018 NDT values. An exemption from 10 CFR 50.82(a)(8)(i)(A) will be made in order to use funds from the NDT.

Table 5 - Nuclear Decommissioning Trust Funding Analysis^{1, 2, 3, 4}

Year	Beginning Balance	Deposits	Earnings	License Termination Withdrawal	Spent Fuel Withdrawal	Ending Balance
2018	562,958,730	-	-	-	-	562,958,730
2019	562,958,730	-	11,259,175	-	-	574,217,905
2020	574,217,905	-	10,552,856	(46,575,098)	-	538,195,663
2021	538,195,663	-	8,983,464	(89,022,463)	-	458,156,664
2022	458,156,664	-	8,888,813	(6,216,031)	(7,500,000)	453,329,446
2023	453,329,446	-	8,168,828	(6,216,031)	(38,672,000)	416,610,244
2024	416,610,244	-	7,431,984	(6,233,061)	(38,778,000)	379,031,166
2025	379,031,166	-	6,947,909	(6,053,735)	(25,582,000)	354,343,340
2026	354,343,340	-	6,970,831	(5,801,782)	-	355,512,390
2027	355,512,390	-	6,994,212	(5,801,782)	-	356,704,820
2028	356,704,820	-	7,017,743	(5,817,675)	-	357,904,887
2029	357,904,887	-	7,042,062	(5,801,782)	-	359,145,168
2030	359,145,168	-	7,066,868	(5,801,782)	-	360,410,254
2031	360,410,254	-	7,092,169	(5,801,782)	-	361,700,641
2032	361,700,641	-	7,117,659	(5,817,675)	-	363,000,625
2033	363,000,625	-	7,143,977	(5,801,782)	-	364,342,820
2034	364,342,820	-	7,170,821	(5,801,782)	-	365,711,859
2035	365,711,859	-	7,198,202	(5,801,782)	-	367,108,279
2036	367,108,279	-	7,225,812	(5,817,675)	-	368,516,415
2037	368,516,415	-	7,254,293	(5,801,782)	-	369,968,926
2038	369,968,926	-	7,283,343	(5,801,782)	-	371,450,487
2039	371,450,487	-	7,312,974	(5,801,782)	-	372,961,679
2040	372,961,679	-	7,342,880	(5,817,675)	-	374,486,884
2041	374,486,884	-	7,373,702	(5,801,782)	-	376,058,804
2042	376,058,804	-	7,405,140	(5,801,782)	-	377,662,163
2043	377,662,163	-	7,437,208	(5,801,782)	-	379,297,589
2044	379,297,589	-	7,469,598	(5,817,675)	-	380,949,511
2045	380,949,511	-	7,502,955	(5,801,782)	-	382,650,684
2046	382,650,684	-	7,536,978	(5,801,782)	-	384,385,880
2047	384,385,880	-	7,571,682	(5,801,782)	-	386,155,780
2048	386,155,780	-	7,606,762	(5,817,675)	-	387,944,867
2049	387,944,867	-	7,642,862	(5,801,782)	-	389,785,947
2050	389,785,947	-	7,679,683	(5,801,782)	-	391,663,848
2051	391,663,848	-	7,717,241	(5,801,782)	-	393,579,308
2052	393,579,308	-	7,755,233	(5,817,675)	-	395,516,865
2053	395,516,865	-	7,794,302	(5,801,782)	-	397,509,385

Table 5^{1, 2, 3, 4} (continued)

Year	Beginning Balance	Deposits	Earnings	License Termination Withdrawal	Spent Fuel Withdrawal	Ending Balance
2054	397,509,385	-	7,834,152	(5,801,782)	-	399,541,755
2055	399,541,755	-	7,874,799	(5,801,782)	-	401,614,773
2056	401,614,773	-	7,915,942	(5,817,675)	-	403,713,039
2057	403,713,039	-	7,958,225	(5,801,782)	-	405,869,482
2058	405,869,482	-	8,001,354	(5,801,782)	-	408,069,055
2059	408,069,055	-	8,045,345	(5,801,782)	-	410,312,618
2060	410,312,618	-	8,085,363	(6,044,475)	-	412,353,506
2061	412,353,506	-	8,126,511	(6,027,959)	-	414,452,058
2062	414,452,058	-	8,168,482	(6,027,959)	-	416,592,582
2063	416,592,582	-	8,211,292	(6,027,959)	-	418,775,915
2064	418,775,915	-	8,254,629	(6,044,475)	-	420,986,069
2065	420,986,069	-	8,299,162	(6,027,959)	-	423,257,272
2066	423,257,272	-	8,344,586	(6,027,959)	-	425,573,900
2067	425,573,900	-	8,390,919	(6,027,959)	-	427,936,860
2068	427,936,860	-	8,437,848	(6,044,475)	-	430,330,233
2069	430,330,233	-	8,486,045	(6,027,959)	-	432,788,320
2070	432,788,320	-	8,535,207	(6,027,959)	-	435,295,568
2071	435,295,568	-	8,585,352	(6,027,959)	-	437,852,962
2072	437,852,962	-	8,636,170	(6,044,475)	-	440,444,656
2073	440,444,656	-	8,688,334	(6,027,959)	-	443,105,031
2074	443,105,031	-	8,378,589	(24,175,581)	-	427,308,040
2075	427,308,040	-	7,439,135	(55,351,290)	-	379,395,885
2076	379,395,885	-	4,836,350	(137,578,409)	-	246,653,825
2077	246,653,825	-	3,138,393	(89,734,170)	-	160,058,048
2078	160,058,048	-	1,621,045	(79,005,780)	-	82,673,313
2079	82,673,313	-	335,904	(65,878,097)	-	17,131,121
2080	17,131,121	-	4,571	(16,902,552)	-	233,140
2081	233,140	-	2,547	(105,814)	-	129,872
2082	129,872	-	1,386	(60,589)	-	70,668
2083	70,668	-	1,413	-	-	72,082

Notes:

1. The analysis is based upon the SAFSTOR approach to decommissioning.
2. The analysis was performed for constant 2018 dollars.
3. A two percent after-tax real rate of return was used in the analysis.
4. Analysis is based upon the December 31, 2018 NDT balance.

Period 2b Funding

As described in the DBNPS DCE, it is anticipated that the spent fuel will be entirely located on the ISFSI pad by 2025. The spent fuel is assumed to remain on the ISFSI pad between 2026 and 2059, when the last of the spent fuel is transferred to the DOE. There are annual costs associated with maintaining the spent fuel on the ISFSI pad during this period. FENGen generally expects to recover those costs for spent fuel management during Period 2b, through reimbursements from the DOE due to its partial breach of the DOE Standard Contract.

FENGen has an existing settlement agreement with the DOE to recover spent fuel expenditures for its four facilities. Between 2012 and 2017, FENGen has recovered more than \$193 million from the DOE. However, this settlement expires December 31, 2019, and FENGen may need to litigate with the DOE in order to obtain reimbursement of Period 1 and 2a spent fuel expenditures after that date if the current settlement agreement is not extended. Other licensees with plants in premature shutdown have litigated with DOE to obtain recovery of dry fuel storage costs and then obtained a settlement agreement. Thus, FENGen expects to obtain a settlement agreement for the Period 2b expenses and potentially some of the earlier expenses.

As FENGen recovers its damages from the DOE, adequate funds will be retained in a segregated account to fund future annual expenses. Depending upon when litigation is resolved or a settlement is reached, this may include funding for parts of Periods 1 and 2a. Once adequate funds are set aside to fund the remaining annual spent fuel management expenses pending recovery from the DOE under a settlement, the purpose of the provisional trust will have been satisfied, and the provisional trust can be terminated. Instead, FENGen will rely upon funds set aside in the segregated account.

The plan for DBNPS Period 2b funding process is to retain approximately \$13.5 million in the segregated account for DBNPS. The intent is to pay for the annual ISFSI activities, then apply for recovery of the expenses from the DOE, as needed. If FENGen is unable to obtain a settlement with DOE by the end of 2025, FENGen will obtain a performance bond for approximately \$13.5 million (approximately 1.3 times the highest one-year value of ISFSI maintenance expenses). If needed, the bond will be in place by the end of 2025. The bond will be renewed annually and remain in-place until such time that a settlement with the DOE is obtained.

ISFSI Decommissioning Funding

Once the ISFSI pad is no longer needed, ISFSI decommissioning can occur. The ISFSI decommissioning is expected to be completed by 2082. ISFSI decommissioning costs will be paid from an existing provisional ISFSI trust that was established for that purpose. FENOC letter to the NRC dated December 17, 2018 (Accession No. ML18351A161) states that sufficient funding is available for ISFSI decommissioning. At this time, no additional monies are required.

Adjustments to Funding

Pursuant to 10 CFR 50.75(f)(1), and 10 CFR 50.82(a)(8)(v) and (vi), FENOC is currently required to annually report to the NRC the status of the FENGen facility NDTs. Pursuant to 10 CFR 50.54(bb), FENOC is required to report to the NRC any significant changes to the IFMP. Since this IFMP includes a description funding mechanisms and costs, significant changes to the funding mechanisms and costs will be reported. FENOC will make any adjustments, as needed, to ensure the adequacy of the facility NDT or the FENGen provisional trust used to support the IFMP.

**Attachment 4
L-19-059**

**Perry Nuclear Power Plant, Unit No. 1
Irradiated Fuel Management Plan
(Eleven pages follow)**

Attachment 4
L-19-059

Perry Nuclear Power Plant, Unit No. 1
Irradiated Fuel Management Plan
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Background

10 CFR Part 50.54(bb) requires licensees to establish a program to manage and provide funding for the management of spent fuel at the reactor site until title and possession of the fuel is transferred to the United States Department of Energy (DOE) for ultimate disposal. The Perry Nuclear Power plant, Unit No. 1 (PNPP) Irradiated Fuel Management Plan (IFMP), described herein, is based, in part, on a decommissioning cost estimate (DCE) that was prepared in 2018 for PNPP, which includes elements associated with spent fuel management. The DCE identifies the details, schedules, and costs associated with spent fuel management activities described in the PNPP IFMP, along with license termination and site restoration activities and costs.

Pursuant to 10 CFR 50.75(f)(1) on March 15, 2019, FENOC submitted its decommissioning trust financial status report for the four FENOC-operated nuclear facilities. Enclosure C of that report is a copy of the PNPP DCE. The DCE describes the bases for the assumptions regarding DOE acceptance of spent fuel from the industry and from PNPP.

As stated in the DCE (and subject to the assumptions, qualifications, and reservations stated therein), this IFMP is based on the assumption that PNPP shuts down by May 31, 2021. This IFMP presumes the DOE will commence acceptance of PNPP's spent fuel in 2034 and completes removal of spent fuel from the site by 2060 consistent with the most recent DOE spent fuel management and acceptance strategy¹ described below.

¹ DOE currently has no plans, program, or schedule in place for acceptance of utility spent fuel. However, for these purposes, certain simplifying assumptions must be made regarding the schedule and rate of DOE performance. Therefore, while DOE's Standard Contract governing the acceptance of spent fuel allows for alternative removal schedules, including priority for shutdown reactors and exchanges of allocations, for purposes of this estimate DOE acceptance is assumed to commence in 2034 from PNPP and in accordance with spent fuel shipment schedules that are based upon published historic acceptance priority rankings by DOE. Nothing herein should be interpreted as a concession or admission of any kind for purposes other than for this submission. Such other purposes would include, but are not limited to, disputes regarding DOE's legal or contractual acceptance obligations, or damages claims for recovery of incurred costs.

Spent Fuel Management Strategy

FENOC assumes that, as stated in the DOE's "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Waste," dated January 2013, the DOE will start accepting spent fuel for storage from the nation's commercial nuclear plants beginning in 2025 for placement in a consolidated interim storage facility (CISF) that starts operation in 2025. The DCE assumes that PNPP will shutdown and cease operations in 2021 and that PNPP spent fuel will be accepted for placement in the CISF. Using the rankings for spent fuel receipt, as delineated in the Office of Civilian Radioactive Waste Management reports, "Annual Capacity Report," dated June 1987, and "Acceptance Priority Ranking & Annual Capacity Report," dated July 2004, PNPP fuel would be accepted at the DOE storage facility starting in 2034.

The spent fuel pool will contain discharged fuel from the previous refueling cycles, as well as the final reactor core at shutdown. Immediately after shutdown, spent fuel will be located in the spent fuel pool and in canisters located on an independent spent fuel storage installation (ISFSI). During the five-year period after the shutdown, the spent fuel from the spent fuel pool would be packaged into canisters and transferred to the ISFSI for interim storage. This period provides the necessary cooling time for the spent fuel to meet the decay heat requirements for placement in dry storage.

The current PNPP dry fuel storage system consists of a Holtec International HI-STORM 100S System (with a 68-fuel assembly capacity). The system consists of a Multi-Purpose Canister (MPC) (storage and transport) and a concrete shield (overpack). The MPCs are assumed to be transferred directly to the DOE.

FENOC has constructed an ISFSI at PNPP to support plant operations. The ISFSI operates under a general license pursuant to 10 CFR 72.210. The current size of the ISFSI pad is 347 feet by 75 feet. The ISFSI may require expansion once plant operations cease in order to support spent fuel management activities. The pad expansion would be 40 feet by 75 feet. Total capacity of the consolidated pad is expected to be 80 MPCs holding spent fuel and 5 MPCs holding greater than Class C waste. The ISFSI will continue to operate until such time that the transfer of spent fuel to the DOE can be completed. The DCE assumes that the PNPP spent fuel and has been transferred to the DOE by 2060.

Table 1 provides a listing of the location of the spent fuel from 2019 until the spent fuel has been accepted by the DOE.

Table 1 – Spent Fuel Management Schedule
(Fuel Assembly Location)¹

Year	Pool Inventory	ISFSI Inventory	DOE Acceptance
2019	3,285	1,360	0
2020	2,945	1,700	0
2021	3,693	1,700	0
2022	3,693	1,700	0
2023	3,693	1,700	0
2024	3,693	1,700	0
2025	1,041	4,352	0
2026	0	5,393	0
2027	0	5,393	0
2028	0	5,393	0
2029	0	5,393	0
2030	0	5,393	0
2031	0	5,393	0
2032	0	5,393	0
2033	0	5,393	0
2034	0	5,267	126
2035	0	4,839	428
2036	0	4,634	205
2037	0	4,404	230
2038	0	4,393	11
2039	0	4,106	287
2040	0	3,855	251
2041	0	3,582	273
2042	0	3,283	299
2043	0	3,283	0
2044	0	3,002	281
2045	0	2,714	288
2046	0	2,714	0
2047	0	2,430	284
2048	0	2,150	280
2049	0	2,150	0
2050	0	1,868	282
2051	0	1,868	0
2052	0	1,658	210
2053	0	1,448	210
2054	0	1,238	210
2055	0	1,028	210
2056	0	818	210

Table 1 (continued)

Year	Pool Inventory	ISFSI Inventory	DOE Acceptance
2057	0	608	210
2058	0	398	210
2059	0	188	210
2060	0	0	188
Total	-	-	5,393

Note:

1. Fuel location is as of the date of the submittal.

Schedule

Table 2 provides a summary of the spent fuel management activities described in the DCE. The table provides the decommissioning period associated with the spent fuel program activity, its cost, and the approximate duration of the activity. The table does not consider ISFSI decommissioning, as this is an activity undertaken after spent fuel has been accepted by the DOE and removed from the site.

Table 2 – Spent Fuel Management Activities

Decommissioning Period	Costs (thousands, 2018 dollars) ¹	Start Date	Stop Date	Approximate Duration (years)
1 - Preparations	4,568	May 2021	December 2022	1.5
2a - Dormancy with Wet Fuel Storage	208,007	December 2022	July 2026	3.7
2b - Dormancy with Dry Fuel Storage	307,995	July 2026	January 2061	34.4
Total	520,570	-	-	-

Note:

1. The values were obtained from the PNPP DCE, which were reported in 2014 dollars. A composite escalation factor was applied to convert the values into 2018 dollars. These values differ from those in Table 3 due to the way the values in both tables were calculated.

Decommissioning Period 1 - Preparations

During this period, the facility is placed in a condition that allows the spent fuel to be safely stored and the facility to be maintained in a condition to be subsequently decontaminated to levels that permit release for unrestricted use. The facility is left essentially intact with structures maintained in a sound condition. The process of placing the plant in safe-storage includes, but is not limited to, isolating the spent fuel storage services and fuel handling systems so that the spent fuel can be safely transferred from the spent fuel storage pool to the ISFSI for interim storage.

Decommissioning Period 2a – Dormancy with Wet Fuel Storage

During this period, the facility is in the dormancy period of SAFSTOR decommissioning. During this phase, spent fuel will remain in the spent fuel pool until it meets the criteria for transfer to dry storage. FENOC expects to construct an ISFSI pad expansion during this period. FENOC plans to begin transferring the remaining PNPP spent fuel from the spent fuel pool to dry storage in 2025 and to complete the transfer of fuel to the consolidated ISFSI in 2026.

Decommissioning Period 2b – Dormancy with Dry Fuel Storage

During this period, spent fuel will remain stored on the ISFSI until the DOE accepts the fuel and removes it from the site. As discussed above and in the PNPP DCE, the IFMP assumes that the DOE will begin removing fuel from PNPP in 2034 and will complete the removal of spent fuel from the site in 2060, according to the schedule set forth in Table 1. During this period, programs and procedures required to support safe operation of the ISFSI will be maintained in accordance with applicable requirements. Maintenance, monitoring, and inspection of equipment, including fuel handling and shipping equipment, will be performed as required. PNPP will also maintain a security force, which will safeguard the spent fuel for as long as it remains on site. Security barriers, sensors, alarms, and other surveillance equipment will be maintained as required to provide security for the ISFSI and spent fuel.

Cost Estimate

The PNPP DCE provides the basis for the costs associated with spent fuel management.

The DCE includes the cost of operating and maintaining the spent fuel pool and the ISFSI. Pool operations are expected to continue approximately 5 years after the cessation of plant operations. ISFSI operating costs are based upon an approximately 39-year period of operation following plant shutdown. The cost for

the labor and equipment to load and transfer each spent fuel canister to the ISFSI from the spent fuel pool is also included. Costs for transferring the fuel from the ISFSI into the DOE transport cask are also included in the DCE.

Operation and maintenance costs for the spent fuel pool and the ISFSI are included within the DCE and address the cost for staffing the facility, as well as security, insurance, and licensing fees. Costs are also provided within the DCE for the decommissioning of the spent fuel pool, and the ISFSI after the fuel transfer to the DOE from the ISFSI is complete.

Table 3 provides an expenditure summary for the PNPP IFMP in 2018 dollars.

Table 3 – IFMP Expenditure Summary

Year	Expenditure (thousands, 2018 dollars)
2021	2,151
2022	7,059
2023	54,510
2024	54,659
2025	54,510
2026	34,902
2027	8,036
2028	8,058
2029	8,036
2030	8,036
2031	8,036
2032	8,058
2033	12,652
2034	8,637
2035	9,839
2036	8,959
2037	8,937
2038	8,036
2039	9,238
2040	9,260
2041	9,238
2042	9,539
2043	8,637
2044	8,959

Table 3 (continued)

Year	Expenditure (thousands, 2018 dollars)
2045	8,637
2046	8,937
2047	8,637
2048	8,959
2049	8,637
2050	8,937
2051	8,637
2052	8,959
2053	8,937
2054	8,937
2055	8,937
2056	8,959
2057	8,937
2059	8,937
2060	8,959
Total	509,865

Funding

FENGen is the owner of Beaver Valley Power Station, Unit Nos. 1 and 2 (BVPS-1 and BVPS-2, respectively), Davis-Besse Nuclear Power Station (DBNPS), and PNPP. As such, the PNPP funding mechanisms take into account the need to fund spent fuel management for the other FENGen facilities.

The funding for PNPP spent fuel management follows the schedule described above. Funding for Periods 1 and 2a extends from 2021 to 2026. This correlates with preparation activities and transferring the spent fuel to the ISFSI pad. Period 2b funding covers the period from 2027 to 2060. This correlates to long-term storage of spent fuel on the ISFSI pad until the fuel is transferred to the DOE.

Periods 1 and 2a Funding

The total FENGen obligation for Periods 1 and 2a funding, which includes ISFSI activities and the transfer of spent fuel from the spent fuel pools to the ISFSI, for BVPS-1, BVPS-2, DBNPS, and PNPP is approximately \$620 million dollars. FENGen intends to fund this obligation through a combination of a cash deposit

of \$475 million paid into a provisional trust coupled with funds in excess of those needed for license termination contained in the DBNPS and BVPS-2 nuclear decommissioning trusts (NDTs). To use the excess funds in the NDTs, exemptions from 10 CFR 50.82(a)(8)(i)(A) for DBNPS and BVPS-2 will be required. These funds will be limited to use only for the management of spent fuel at DBNPS and BVPS-2, respectively. In addition, FENGen expects to recover its costs by making claims for damages resulting from the DOE's breach of the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract) for PNPP. It also expects that by no later than January 1, 2027, it will be able to obtain a settlement agreement to recover costs annually. Therefore, FENGen has focused on planning to fund the expected costs through 2026 (that is, Periods 1 and 2a).

As provided in Exhibit D, "Financial Projections," of the "Disclosure Statement for the First Amended Joint Plan of Reorganization of FirstEnergy Solutions, Corp., et al., Pursuant to Chapter 11 of the Bankruptcy Code," submitted to the United States Bankruptcy Court on March 9, 2019, the reorganized debtors are expected to have nearly \$2 billion in assets upon emergence from bankruptcy, including approximately \$1.56 billion in cash and cash equivalents. FENGen anticipates that such assets would be able to fund Periods 1 and 2a spent fuel management activities for FENGen's four units by paying the approximately \$2.1 million for the 2020 DBNPS spent fuel expenditures and by placement of \$475 million into a provisional trust by the end of 2021. The provisional trust will enable use of the funds for spent fuel management activities occurring during Periods 1 and 2a. Upon the completion of the spent fuel activities in Periods 1 and 2a, the terms of the provisional trust will provide that it can be terminated, and its balance released back to FENGen.

FENGen will withdraw money from the \$475 million provisional trust to pay the PNPP Periods 1 and 2a spent fuel expenditures. Table 4 provides a summary of the FENGen use of the \$475 million provisional trust. The expenditures came from the respective site-specific DCEs that were developed in 2018.

Table 4 – Periods 1 and 2a Spent Fuel Expenditures
(thousands, 2018 dollars)

Year	BVPS-1 Payments	BVPS-2 Payments	DBNPS Payments	PNPP Payments	Total FENGen Payments	Trust Value
Initial Value						475,000
2021	1,838	530	5,567	2,151	10,086	464,914
2022	4,736	2,843	31,172 ¹	7,059	45,810	419,104
2023	32,844	24,672	0 ²	54,510	112,026	307,078
2024	32,934	36,556	0 ²	54,659	124,149	182,929
2025	32,844	36,456	0 ²	54,510	123,810	59,119
2026	21,034	1,456 ³	-	34,902	57,392	1,727
Totals	126,230	102,513	36,739	207,791	473,273	-

Notes:

1. For DBNPS, the listed partial payment is associated with the provisional trust. However, money from excess funds in the NDT will be used to make the full 2022 payment. An exemption from 10 CFR 50.82(a)(8)(i)(A) will be made in order to use funds from the NDT.
2. For DBNPS these payments will be made from excess funds in the NDT by use of exemptions from 10 CFR 50.82(a)(8)(i)(A).
3. For BVPS-2 the listed partial payment is associated with the provisional trust. However, money from excess funds in the NDT will be used to make the full 2026 payment. An exemption from 10 CFR 50.82(a)(8)(i)(A) will be made in order to use funds from the NDT.

The PNPP Periods 1 and 2a costs will be fully paid for by funds withdrawn from the \$475 million provisional trust.

Period 2b Funding

As described in the PNPP DCE, it is anticipated that the spent fuel will be entirely located on the ISFSI pad by 2026. The spent fuel is assumed to remain on the ISFSI pad between 2027 and 2060, when the last of the spent fuel is transferred

to the DOE. There are annual costs associated with maintaining the spent fuel on the ISFSI pad during this period. FENGen generally expects to recover those costs for spent fuel management during Period 2b, through reimbursements from the DOE due to its partial breach of the DOE Standard Contract.

FENGen has an existing settlement agreement with the DOE to recover spent fuel expenditures for its four facilities. Between 2012 and 2017, FENGen has recovered more than \$193 million from the DOE. However, this settlement expires December 31, 2019, and FENGen may need to litigate with the DOE in order to obtain reimbursement of Period 1 and 2a spent fuel expenditures after that date if the current settlement agreement is not extended. Other licensees with plants in premature shutdown have litigated with the DOE to obtain recovery of dry fuel storage costs and then obtained a settlement agreement. Thus, FENGen expects to obtain a settlement agreement for the Period 2b expenses and potentially some of the earlier expenses.

As FENGen recovers its damages from the DOE, adequate funds will be retained in a segregated account to fund future annual expenses. Depending upon when litigation is resolved or a settlement is reached, this may include funding for parts of Periods 1 and 2a. Once adequate funds are set aside to fund the remaining annual spent fuel management expenses pending recovery from the DOE under a settlement, the purpose of the provisional trust will have been satisfied, and the provisional trust can be terminated. Instead, FENGen will rely upon funds set aside in the segregated account.

The plan for PNPP Period 2b funding process is to retain approximately \$16.5 million in the segregated account for PNPP. The intent is to pay for the annual ISFSI activities, then apply for recovery of the expenses from the DOE, as needed. If FENGen is unable to obtain a settlement with DOE by the end of 2026, FENGen will obtain a performance bond for approximately \$16.5 million (approximately 1.3 times the highest one-year value of ISFSI maintenance expenses). If needed, the bond will be in place by the end of 2026. The bond will be renewed annually and remain in-place until such time that a settlement with the DOE is obtained.

ISFSI Decommissioning Funding

Once the ISFSI pad is no longer needed, ISFSI decommissioning can occur. The ISFSI decommissioning is expected to be completed by 2083. ISFSI decommissioning costs will be paid from an existing provisional ISFSI trust that was established for that purpose. FENOC letter to the NRC dated December 17, 2018 (Accession No. ML18351A161) states that sufficient funding is available for ISFSI decommissioning. At this time, no additional monies are required.

Adjustments to Funding

Pursuant to 10 CFR 50.75(f)(1), and 10 CFR 50.82(a)(8)(v) and (vi), FENOC is currently required to annually report to the NRC the status of the FENGen facility NDTs. Pursuant to 10 CFR 50.54(bb), FENOC is required to report to the NRC any significant changes to the IFMP. Since this IFMP includes a description funding mechanisms and costs, significant changes to the funding mechanisms and costs will be reported. FENOC will make any adjustments, as needed, to ensure the adequacy of the facility NDT or the FENGen provisional trust used to support the IFMP.