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

Palisades Nuclear Plant  
Docket No. 50-255  
License No. DPR-20

Irradiated Fuel Management Plan and Preliminary Decommissioning Cost Estimates for  
Palisades Nuclear Plant

- References: 1) Nuclear Management Company, LLC (NMC) letter to US Nuclear Regulatory Commission (NRC), "Application for Renewed Operating License," dated March 22, 2005. (ADAMS Accession No. ML050940434)
- 2) Nuclear Management Company, LLC (NMC) letter to US Nuclear Regulatory Commission (NRC), "Decommissioning Funding Status," dated March 22, 2006. (ADAMS Accession No. ML060810686)

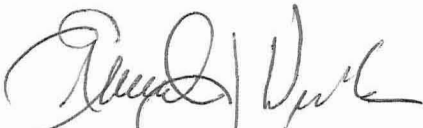
The enclosed Irradiated Fuel Management Plan (Enclosure 1) and Preliminary Decommissioning Cost Estimate (Enclosure 2) are being submitted in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.54(bb) "Conditions of Licenses," and 10 CFR 50.75(f)(2), "Reporting and Recordkeeping for Decommissioning Planning," respectively, for the aforementioned plant. As holder of the plant operating license, Nuclear Management Company, LLC (NMC) is submitting these reports on behalf of the plant owner, Consumers Energy. The financial information presented herein reflects information provided to NMC by the plant owner, Consumers Energy.

Pursuant to 10 CFR 50.54(bb), a licensee shall "submit written notification to the Commission for its review and preliminary approval of the program by which the licensee intends to manage and provide funding for the management of all irradiated fuel at the reactor following permanent cessation of operation of the reactor until title to the irradiated fuel and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository." Accordingly, the Irradiated Fuel Management Plan (Enclosure 1) is provided for your review and preliminary approval.

Additionally, 10 CFR 50.75(f)(2), "Reporting and recordkeeping for decommissioning planning" states, "each power reactor licensee shall at or about 5 years prior to the projected end of operations submit a preliminary decommissioning cost estimate which includes an up-to-date assessment of the major factors that could affect the cost to decommission." Accordingly, the Preliminary Decommissioning Cost Estimate (Enclosure 2) is provided for your review and approval.

NMC submitted a sufficient application for renewal of an operating license (Reference 1) and therefore, in accordance with 10 CFR 2.109, "Effect of Timely Renewal Application," "the existing license will not be deemed to have expired until the application has been finally determined." Although NMC is seeking license renewal, the Irradiated Fuel Management Plan and Preliminary Decommissioning Cost Estimate are submitted based on the current operating license expiration date of March 24, 2011 for Palisades Nuclear Plant. If Palisades' license is renewed, the current Irradiated Fuel Management Plan and Preliminary Decommissioning Cost Estimate would no longer be applicable and a new plan and cost estimate will be submitted in accordance with 10 CFR 50.54(bb) and 10 CFR 50.75(f)(2), respectively.

This letter contains no new commitments and no revisions to existing commitments.



Edward J. Weinkam  
Director, Nuclear Licensing & Regulatory Services  
Nuclear Management Company, LLC

Enclosures (2)

cc: Regional Administrator, USNRC, Region III  
NRR Project Manager, Palisades Nuclear Plant, USNRC  
NRC Resident Inspector, Palisades Nuclear Plant, USNRC  
Consumers Energy:  
Manager of Depreciation and Decommissioning, Jan Anderson  
Asset Manager, Steve Wawro

## **Enclosure 1**

### **Irradiated Fuel Management Plan For Palisades Nuclear Plant**

#### **Background**

The Preliminary Decommissioning Cost Estimate (see Enclosure 2) in accordance with 10 CFR 50.75(f)(2) for Palisades Nuclear Plant (PNP) evaluates a SAFSTOR decommissioning option with a March 2011 shutdown date. The Irradiated Fuel Management Plan is also based on the SAFSTOR analysis and March 2011 shutdown date. There are two licensed independent spent fuel storage installations (ISFSIs) on the PNP site. The newly constructed ISFSI was designed to store all spent fuel in dry storage if needed, including spent fuel currently stored in the old ISFSI. Consumers Energy reserves the right to choose the ultimate decommissioning option in accordance with its business needs, recognizing the need to ensure the chosen option meets NRC requirements for decommissioning funding.

This Irradiated Fuel Management Plan also considers impact of the spent fuel currently stored at Consumers Energy's Big Rock Point Nuclear Plant (BRP) in Charlevoix County, Michigan. BRP was permanently shut down on August 29, 1997. The spent fuel currently resides in an on-site ISFSI.

#### **Spent Fuel Management Strategy**

The NRC requires (10 CFR 50.54(bb)) that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the U. S. Department of Energy (DOE). Interim storage of the fuel will be in the storage pool and/or ISFSIs located on the PNP site until the DOE has completed the transfer. The ISFSIs are independently licensed and operated and will accommodate the inventory of spent fuel residing in PNP's storage pool at the conclusion of the required cooling period. The newly constructed ISFSI was designed to store all spent nuclear fuel on-site. Once the spent fuel is emptied, the Auxiliary Building can be prepared for long-term storage.

The spent fuel pool will remain operational for a minimum of eight years following the cessation of operations. The pool will be isolated and a spent fuel island created. Over the eight-year period, the spent fuel will be packaged into transportable steel canisters for loading into DOE-provided transport casks. The canisters will be stored in concrete overpacks at the PNP ISFSIs until the DOE is able to receive them.

The shipping of spent nuclear fuel assemblies to DOE during decommissioning is based upon several assumptions. Consumers Energy directed TLG Services, Inc. to prepare the "Decommissioning Cost Study for Palisades Nuclear Plant" using 2010 as the year DOE would begin accepting spent fuel. The DOE generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority, and Consumers Energy has no allocations in year 1. It is assumed that the BRP would first use Consumers' allocations, beginning in year 2. Shipment of PNP spent fuel would commence once BRP spent fuel had been completely removed from the site. For purposes of the TLG study, this date was assumed to be 2013. However, any delay in the startup of the repository or decrease in the rate of acceptance will correspondingly prolong the transfer.

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process and result in the fuel remaining at the site longer. In the SAFSTOR scenario, spent fuel is expected to remain at the site for approximately 37 years after the cessation of operations. Consequently, costs are included within this analysis for the continued operation of the storage pool and ISFSIs, as required, and for the long-term caretaking of the spent fuel until the year 2048. At the conclusion of the spent fuel transfer process, each ISFSI will be decommissioned.

Operation and maintenance costs for the storage facilities (ISFSIs and the spent fuel pool) are included within the estimate below and address the cost for staffing the facilities, maintenance of necessary operational requirements as well as security, insurance, and licensing fees. The estimate includes the costs to purchase, load, and transfer the fuel storage canisters to an ISFSI. A cost-estimate for spent fuel management at PNP under the SAFSTOR scenario may be found in Table 2.

In the event that PNP ceases operation in 2011, PNP will continue to comply with existing NRC licensing requirements, including the operation and maintenance of the systems and structures needed to support continued operation of the spent fuel pool and each ISFSI, as necessary, under the decommissioning scenario ultimately selected. In addition, PNP will also comply with applicable license termination requirements in accordance with 10 CFR 50.82 with respect to plant shutdown and post-shutdown activities including seeking such NRC approvals and on such schedules as necessary to satisfy these requirements consistent with the continued storage of irradiated fuel.

### **Cost Estimate and Funding For Spent Fuel Management Based on the SAFSTOR Decommissioning Option**

The "Decommissioning Cost Study for Palisades Nuclear Plant," developed by TLG Services, Inc. included cost estimates of \$297.9 million for spent fuel management, \$584.1 million for decommissioning and \$78.3 million for site restoration using a SAFSTOR scenario (Table 2). The total cost to decommission is estimated to be \$960.3 million in 2003 dollars. The NRC minimum decommissioning financial assurance requirement as reported in Reference 2 and set forth in 10 CFR 50.75(c) for PNP is approximately \$327.2 million.

As of December 31, 2005, the PNP decommissioning trust fund balance was \$544.1 million. As approved by Michigan Public Service Commission (MPSC), this fund is being supplemented with annual contributions of approximately \$5.5 million through the end of 2011. Adjustments to annual contributions amounts require Michigan Public Service Commission (MPSC) approval in rate proceedings. To the extent that the trust fund balance exceeds costs required for radiological decommissioning, trust fund monies, in conjunction with Consumers Energy operating revenues, will be used to pay for spent fuel management.

The following items are key costs estimates:

(1) The estimated cost to isolate the spent fuel pool and fuel handling systems is \$9.6 million. This cost is based on spent fuel pool isolation costs at other decommissioning facilities and engineering judgment. This cost is considered part of the activities

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necessary to maintain the spent fuel in a safe and controlled state both during the initial decommissioning activities and during the fuel cool-down period.

(2) Annual costs (excluding labor) of approximately \$977,000 and \$60,000 are used for operation and maintenance of the spent fuel pool and each ISFSI, respectively.

(3) Annual cost for spent fuel management in the ISFSI is estimated at approximately \$6 million (Table 1, years 2033-2047). This cost is based on actual costs at decommissioned facilities, estimated costs for facilities similar to PNP, and engineering judgment. These costs would be incurred annually during the storage period.

(4) An average cost of \$250,000 is used for labor to load/transport the spent fuel from the pool to the ISFSI pad, based on industry experience.

(5) The ISFSI Decontamination & Dismantling costs are estimated at \$8.3 million.

The following schedule shows the fuel management costs as it relates to decommissioning periods for a SAFSTOR with dry storage scenario:

Period # (a)	Title	Cost 2003\$ (thousands) <sup>(b)</sup>	Period Duration, Months
0/1	SAFSTOR Preparations (includes pre-shutdown early planning costs)	15,531	18.0
2	12.5 Year Dormancy Maintenance (includes spent fuel transfer to ISFSI)	160,398	150.0
3	Decommissioning Preparations	2,987	18.1
4	Delayed Decommissioning	8,232	49
5b	Site Restoration	3,707	19.5
5c	Post Decommissioning ISFSI Operations (annual average of approximately \$6 million)	98,777	198.9
5d, e, f	ISFSI Decontamination & Site Restoration	8,318	6.0
	TOTALS <sup>(c)</sup>	297,950	459.5

(a) Figure 4.2, Decommissioning Timeline, TLG Services, Inc. Decommissioning Cost Study for Palisades Nuclear Plant. March 2004.

(b) Table C, TLG Services, Inc. Decommissioning Cost Study for Palisades Nuclear Plant. March 2004.

(c) Columns may not add due to rounding.



## Enclosure 2

### **Palisades Nuclear Plant Preliminary Decommissioning Cost Estimate**

#### **I. Introduction**

This report presents a summary of the preliminary estimate of the cost to decommission Palisades Nuclear Plant (PNP), as required by 10CFR50.75(f)(2). This cost estimate is based on the "Decommissioning Cost Study for Palisades Nuclear Plant" conducted by TLG Services, Inc. and premised on the assumption that the plant permanently ceases to operate in March 2011. The estimate assumes the eventual removal of all contaminated and activated plant components and structural materials, such that the operating licenses may be terminated to permit unrestricted use of the site. Although Nuclear Management Company, LLC (NMC) is currently seeking license renewal for PNP, this cost estimate is being submitted based on the current operating license expiration date for PNP. If license renewal for PNP is granted, this Preliminary Decommissioning Cost Estimate would no longer be applicable and a new estimate will be submitted in accordance with 10CFR50.75(f)(2).

#### **II. Comparison of the Preliminary Cost Estimate to the Minimum Required Decommissioning Fund**

The minimum decommissioning financial assurance requirement for PNP, as reported in Reference 2 and set forth in 10CFR50.75(c), is approximately \$327.2 million. The total preliminary decommissioning cost estimate base on the "Decommissioning Cost Study" is approximately \$960.3 million. This estimate includes approximately \$584.1 million for decommissioning costs, \$297.9 million for spent fuel management and \$78.3 million for site restoration (Table 2).

#### **III. Assessment of Major Factors That Could Affect Preliminary Cost Estimate**

##### **A. Decommissioning Option/Method**

This Preliminary Decommissioning Cost Estimate assumes a SAFSTOR decommissioning option with dry storage of spent nuclear fuel. This estimate assumes PNP cessation of operation in March 2011 and a Department of Energy (DOE) spent fuel repository open in 2010. Interim storage of the fuel will be in the storage pool and/or an ISFSI located on the PNP site until the DOE assumed title to the spent fuel. The ISFSIs, which are independently licensed and operated, will accommodate the inventory of spent fuel residing in PNP's storage pool at the conclusion of the required cooling period. Once emptied, the Auxiliary Building will be prepared for long-term storage. Decommissioning of the ISFSIs will commence once DOE has accepted title to all PNP fuel. This cost estimate scenario includes the decontamination and dismantlement of the facility, spent fuel management and restoration of the site.

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### B. Potential for Known or Suspected Contamination

The Preliminary Decommissioning Cost Estimate does not assume the remediation of any significant volume of contaminated soil. This assumption may be affected by continued plant operations and/or future regulatory actions, such as the development of site-specific release criteria.

### C. LLW Disposition Plan

Low Level (Radioactive) Waste (LLW) disposal costs include processing, packaging, shipping, and burial/vendor costs. Palisades currently has access to the disposal facility in Barnwell, South Carolina; however, future use of this facility is likely to be limited. This Preliminary Decommissioning Cost Estimate assumes that additional disposal capacity will be available to support reactor decommissioning, particularly for the isolation of the more highly radioactive material. Therefore, for estimating purposes, waste disposal costs were generated using available pricing schedules for the currently operating facilities, i.e., at Barnwell in South Carolina and the Envirocare facility in Utah. Due to the high cost per cubic foot of LLW disposal, decontamination, recycling, conditioning and metal processing were incorporated into the decommissioning cost calculations in order to reduce the overall LLW disposal costs.

### D. Preliminary Schedule of Decommissioning Activities

A schedule of the decommissioning scenario is illustrated in Table 2. Activity and period-dependent costs are estimated for each of the 5 decommissioning time periods, post-decommissioning ISFSI operation, and ISFSI decontamination and decommissioning. These time periods are briefly described in Section IV, below.

### E. Other Factors That Could Significantly Affect the Cost to Decommission

NMC is currently unaware of any major site-specific factors that could have a significant effect on the cost of decommissioning. In order to anticipate unknown or unplanned occurrences during decommissioning, e.g. tool breakage, accidents, illnesses, weather delays, and labor stoppages, contingencies are applied to the cost estimates. Contingencies are defined in the American Association of Cost Engineers "Project and Cost Engineers' Handbook" as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The amount of contingency depends on the status of design, procurement and construction; and the complexity and uncertainties within the defined project scope. The "Decommissioning Cost Study" conducted by TLG Services, Inc, examined the major activity-related problems (decontamination, segmentation, equipment handling, packaging, transport, and waste disposal) that necessitate a contingency. The composite contingency value calculated for the PNP SAFSTOR alternative is 20.37%. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

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### IV. Preliminary Cost Estimate Considerations

The Preliminary Decommissioning Cost Estimate is based on costs associated with the entire decommissioning work scope, including those activities related to the following periods of the decommissioning project: (0/1) SAFSTOR Preparations, (2) Dormancy, (3) Decommissioning Preparations, (4) Decommissioning Operations and (5) Site Restoration. The cost estimate also includes ISFSIs operating and decommissioning costs. The scope of each of those activities is described below. Disposition of LLW is also accounted for in the Preliminary Decommissioning Cost Estimate, as described in Section III.C, above.

A summary of activities and time duration for each SAFSTOR period follows (see Table 2 for cost estimates for each period):

**(0/1) SAFSTOR Preparations:** Includes preliminary engineering and planning to permanently de-fuel the reactor, revision of technical specifications applicable to operating conditions and requirements, a characterization of the facility and major components, and the development of the Post-Shutdown Decommissioning Activities Report (PSDAR). This period includes activities including, but not limited to, transfer of the spent fuel to the ISFSI, draining and de-energizing of non-contaminated systems, disposal of contaminated filter elements and resin beds, decontamination of the reactor coolant system, draining of the reactor vessel, preparing lighting, alarm, and security systems, and performing radiation surveys. Period duration is estimated at 18 months.

**(2) Dormancy:** Includes 24-hour security and surveillance, preventative and corrective maintenance of security systems, area lighting, buildings, heating and ventilation, routine radiological and environmental surveillance programs, and maintenance of structural integrity. Transfer of remaining spent fuel in the spent fuel pool to the ISFSI. Shipments of spent fuel from the ISFSI to the DOE should begin and occur throughout this period. Period duration is estimated at 150 months.

**(3) Decommissioning Preparations:** Includes reactivation of site services, engineering and planning, a detailed site characterization, the assembly of a decommissioning management organization, specification of transport and disposal requirements for activated and/or hazardous materials, final planning for decommissioning activities and the writing of activity specifications and detailed procedures. Period duration is estimated at 18.1 months.

**(4) Decommissioning Operations:** Includes physical decommissioning activities associated with the removal and disposal of contaminated and activated components and structures, including the successful termination of the 10CFR50 operating license. Period duration is estimated at 49 months.

**(5) Site Restoration:** Includes activities required to remove contaminated materials and verify that residual radionuclide concentrations are below NRC limits. This will include prompt removal of site structures, removal of foundations and exterior walls to a nominal depth of three feet below grade, and fill and grading of the site. Period duration is estimated at 19.5 months.



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**ISFSI Operations and Decommissioning:** The ISFSIs will continue to operate under a separate and independent license following the termination of the 10CFR50 license. At the conclusion of spent fuel operations, each ISFSI will be decommissioned. Once the canisters are removed, the modules will be dismantled, the storage pad removed, and the area will be graded and landscaped. Period duration is estimated at 204.9 months.

### **V. Plans for Adjusting Levels of Funding**

NMC submitted a sufficient application for renewal of an operating license (Reference 1) and therefore, in accordance with 10 CFR 2.109, "Effect of Timely Renewal Application," "the existing license will not be deemed to have expired until the application has been finally determined." Although NMC is seeking license renewal, the Preliminary Decommissioning Cost Estimate is submitted based on the current operating license expiration date for PNP—March 24, 2011. If license renewal for Palisades is granted, the Preliminary Decommissioning Cost Estimate would no longer be applicable and a new plan and cost estimate will be submitted in accordance with 10 CFR 50.75(f)(2).

The cost to decommission PNP is estimated to be \$960.3 million in 2003 dollars. The "Decommissioning Cost Study" for PNP developed by TLG Services, Inc. included cost estimates of approximately \$584.1 million for decommissioning costs, \$297.9 million for spent fuel management and \$78.3 million for site restoration using a SAFSTOR scenario. The total estimated decommissioning costs by period and decommissioning activity are provided in Tables 1 and 2.

The NRC minimum decommissioning financial assurance requirement for PNP as reported in Reference 2 and set forth in 10CFR50.75(c) is approximately \$327.2 million. As of December 31, 2005, the PNP decommissioning trust fund balance was \$544.1 million.

Consumers Energy applies reasonable earnings rates to the decommissioning funds throughout the decommissioning periods described above. In addition, the Preliminary Decommissioning Cost Estimate includes reasonable escalation factors for the decommissioning activities. Based on a cash flow analysis for the decommissioning activities to be performed for the periods described above, NMC believes that there is reasonable assurance that adequate decommissioning funds will be available to decommission PNP as described herein (assuming a 2011 shutdown). Consumers Energy plans to review the decommissioning fund status on a regular basis as described above.

**Table 1 <sup>(a)</sup>**  
**PNP Schedule of Annual Expenditures: SAFSTOR Scenario**  
(Thousands, 2003 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2008	0	0	0	0	8,698	8,698
2009	0	0	0	0	0	0
2010	0	0	0	0	0	0
2011	31,770	4,089	951	1,395	14,531	52,736
2012	31,337	5,504	1,103	1,253	12,854	52,051
2013	11,754	67	905	29	15,330	28,086
2014	11,754	67	905	29	15,330	28,086
2015	11,754	67	905	29	15,330	28,086
2016	11,786	67	908	29	15,372	28,163
2017	11,754	67	905	29	15,330	28,086
2018	11,754	67	905	29	15,330	28,086
2019	6,037	67	439	29	8,280	14,852
2020	2,767	67	172	29	4,251	7,286
2021	2,760	67	171	29	4,239	7,266
2022	2,760	67	171	29	4,239	7,266
2023	2,760	67	171	29	4,239	7,266
2024	2,767	67	172	29	4,251	7,286
2025	33,132	460	751	29	8,467	42,840
2026	47,846	19,175	896	13,849	17,353	99,119
2027	48,137	18,246	873	25,880	8,247	101,384
2028	45,222	4,710	686	20,784	6,547	77,950
2029	45,099	4,697	684	20,727	6,530	77,737
2030	18,915	2,255	282	1,157	12,902	35,512
2031	23,616	7,190	171	0	17,358	48,336
2032	10,958	3,053	107	0	9,858	23,977
2033	1,608	0	60	0	4,301	5,969
2034	1,608	0	60	0	4,301	5,969
2035	1,608	0	60	0	4,301	5,969
2036	1,612	0	60	0	4,313	5,985
2037	1,608	0	60	0	4,301	5,969
2038	1,608	0	60	0	4,301	5,969
2039	1,608	0	60	0	4,301	5,969
2040	1,612	0	60	0	4,313	5,985
2041	1,608	0	60	0	4,301	5,969
2042	1,608	0	60	0	4,301	5,969
2043	1,608	0	60	0	4,301	5,969
2044	1,612	0	60	0	4,313	5,985
2045	1,608	0	60	0	4,301	5,969
2046	1,608	0	60	0	4,301	5,969
2047	1,608	0	60	0	4,301	5,969
2048	1,624	705	60	22	20,023	22,434
2049	2,490	1,027	0	2,590	2,048	8,155
<sup>(b)</sup>	<b>454,688</b>	<b>71,920</b>	<b>14,198</b>	<b>88,027</b>	<b>331,491</b>	<b>960,325</b>

**Table 2 <sup>(a)</sup>**  
**PNP Summary of SAFSTOR Cost Estimate by Period Cost and Activity Cost**  
**(Thousands, 2003 dollars)**

	<b>Total Contingency</b>	<b>Total Costs</b>	<b>NRC License Term Costs</b>	<b>Spent Fuel Management Costs</b>	<b>Site Restoration Costs</b>
<b>Period 0: Pre-Shutdown Early Planning</b>	305	8,698	0	8,698	0
<b>Period 1: Transition &amp; Preparations</b>	13,855	96,323	89,490	6,833	0
<b>Period 2: Dormancy</b>	22,478	229,730	69,332	160,398	0
<b>Period 3: Preparations</b>	14,756	110,217	106,256	2,987	974
<b>Period 4: Decommissioning Operations</b>	50,131	312,938	299,777	8,232	4,929
<b>Period 5: Site Restoration, ISFSI Operations and D&amp;D</b>	9,609	78,794	2,678	3,707	72,409
<b>Post-Decommissioning ISFSI Operations</b>	50,237	115,308	16,531	98,777	0
<b>ISFSI Decontamination &amp; Decommissioning</b>	1,156	8,318	0	8,318	0
<sup>(b)</sup>	<b>162,527</b>	<b>960,325</b>	<b>584,064</b>	<b>297,948</b>	<b>78,312</b>

<sup>(a)</sup> TLG Services, Inc. Decommissioning Cost Study for Palisades Nuclear Plant. March 2004.

<sup>(b)</sup> Columns may not add due to rounding.