August 17, 2015

ULNRC-06242

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

10 CFR 72.30

Ladies and Gentlemen:

DOCKET NUMBERS 50-483 AND 72-1045
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
RENEWED FACILITY OPERATING LICENSE NPF-30
ISFSI DECOMMISSIONING FUNDING PLAN

In accordance with the requirements of 10 CFR 72.30 on financial assurance and recordkeeping for decommissioning, Union Electric Company (Ameren Missouri) is hereby submitting a Decommissioning Funding Plan for the Independent Spent Fuel Storage Installation (ISFSI) located at the Callaway Energy Center. In addition, this submittal is consistent with NRC guidance that general licensees submit a decommissioning funding plan to the NRC no later than the date that the general licensee first uses a spent fuel storage cask to store spent fuel.

This letter does not contain any new commitments. If you have any questions on this report, please contact Mr. Tom Elwood at (314) 225-1905.

Sincerely,

Scott M

Scott Maglio
Manager, Regulatory Affairs

BFH / EMP

Attachment: 10 CFR 72.30 ISFSI Decommissioning Funding Plan

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10 CFR 72.30 ISFSI Decommissioning Funding Plan

1. Background and Introduction

The Nuclear Regulatory Commission (NRC) issued its final rule on Decommissioning Planning on June 17, 2011,[1] with the rule becoming effective on December 17, 2012. Subpart 72.30, "Financial assurance and recordkeeping for decommissioning," requires that each holder of, or applicant for, a license under this part must submit for NRC review and approval a decommissioning funding plan that contains information on how reasonable assurance will be provided that funds will be available to decommission the Independent Spent Fuel Storage Installation (ISFSI).

In accordance with the rule, this letter provides a detailed cost estimate for decommissioning the ISFSI at Callaway Energy Center (Callaway) in an amount reflecting:

1. The work is performed by an independent contractor;
2. An adequate contingency factor; and
3. Release of the facility and dry storage systems for unrestricted use, as specified in 10 CFR Part 20.1402

This letter also provides:

1. Identification of the key assumptions contained in the cost estimate; and
2. The volume of onsite subsurface material containing residual radioactivity, if any, that will require remediation to meet the criteria for license termination.

2. Spent Fuel Management Strategy

The operating license for Callaway, renewed on March 6, 2015, is set to expire on October 18, 2044. Approximately 3,782 spent fuel assemblies are currently projected to be generated over the life of the plant. Because of the breach by the Department of Energy (DOE) of its contract to remove fuel from the site, an ISFSI is being constructed with spent fuel planned to be transferred to the dry storage modules located at the ISFSI, to support continued plant operations. The ISFSI will be operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[2]).

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1 U.S. Code of Federal Regulations, Title 10, Parts 20, 30, 40, 50, 70 and 72 "Decommissioning Planning," Nuclear Regulatory Commission, Federal Register Volume 76, Number 117 (p 35512 et seq.), June 17, 2011

2 U.S. Code of Federal Regulations, Title 10, Part 72, Subpart K, "General License for Storage of Spent Fuel at Power Reactor Sites."

Completion of the ISFSI decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site. DOE's repository program assumes that spent fuel allocations will be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor.[3]

In January 2013, the DOE issued the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," in response to the recommendations made by the Blue Ribbon Commission on America's Nuclear Future and as "a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel..."[4] The report stated, "[W]ith the appropriate authorizations from Congress, the Administration currently plans to implement a program over the next 10 years that: ...[A]dvances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; ..."

Based upon DOE's latest strategy, Ameren Missouri believes that one or more monitored retrievable storage facilities could be put into place within a reasonable time. Ameren Missouri's current spent fuel management plan for the Callaway spent fuel is based in general upon the spent fuel being fully removed from the Callaway site by 2050.

Ameren Missouri's position is that the DOE has a contractual obligation to accept the spent fuel earlier than the projections set out above consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim.

3. ISFSI Decommissioning Strategy

At the conclusion of the spent fuel transfer process the ISFSI will be promptly decommissioned (similar to the power reactor DECON alternative).

For purposes of providing an estimate for a funding plan, financial assurance is expected to be provided on the basis of a prompt ISFSI decommissioning scenario. In this estimate the ISFSI decommissioning is considered an independent project, regardless of the decommissioning alternative identified for the nuclear power plant.

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3 U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV – Responsibilities of the Parties, B. DOE Responsibilities, 5.(a) ... DOE shall issue an annual acceptance priority ranking for receipt of SNF and/or HLW at the DOE repository. This priority ranking shall be based on the age of SNF and/or HLW as calculated from the date of discharge of such materials from the civilian nuclear power reactor. The oldest fuel or waste will have the highest priority for acceptance, except as ..."

4 "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013

4. ISFSI Description

The Callaway ISFSI is based upon Holtec International's (Holtec) HI-STORM UMAX underground system for the dry storage of used nuclear fuel. In this system, spent fuel is stored in a multi-purpose container (MPC) and placed within an underground vertical ventilated module (VVM). The ISFSI pad is designed for 48 VVMs, although all the cells may not be needed, depending upon DOE performance.

In addition to the spent fuel stored at the ISFSI, there is projected to be five additional modules used for Greater-than-Class-C (GTCC) waste storage. The multi-purpose containers used for this GTCC waste canister are also expected to be transferred to the DOE at the same time as the spent fuel transfer.

The key constituent of a HI-STORM UMAX VVM is the Cavity Enclosure Container (CEC). The CEC is a closed bottom, open top, thick walled cylindrical vessel that has no penetrations or openings. The closure lid completes the physical embodiment of the HI-STORM UMAX VVM once the loaded MPC is placed inside the CEC. The closure lid is a steel structure filled with plain concrete and is designed to protect the VVM from the impact of the design basis missiles as well as provide an inlet and outlet for air flow.

The wall thickness of the welded steel CEC is approximately ¾ inches. The CEC rests on a foundation pad with a thickness of 2 feet 9 inches, approximately 16 feet 11 inches below the grade-level ISFSI pad.

A divider shell divides the CEC into an inlet flow downcomer and an outlet flow passage. It is a vertical cylindrical shell concentrically situated in the CEC and is not attached to the CEC, which allows its convenient removal for decommissioning.

All exposed surfaces of the CEC are made from ferritic steels that are painted and protected from corrosion. The inside surface of the CECs and the divider shells is protected by paint. In addition, one side of the divider shell is further protected by insulation.

The VVMs are surrounded by controlled low-strength material (CLSM), a self-compacted, cementitious material.

A reinforced concrete slab (ISFSI pad) surrounds the upper portion of the CEC and extends to the underside of the CEC Flange. The ISFSI pad provides robust support for a loaded transporter and to enable rainwater to flow away from the storage array. The concrete ISFSI pad is approximately 2 feet 6 inches thick.

Ameren Missouri's current spent fuel management plan for the Callaway spent fuel would result in 38 MPCs being placed at the ISFSI by the year 2044, excluding GTCC.

The storage modules used for the GTCC canisters (estimated quantity of 5) are not expected to have any interior contamination of residual activation and can be reused or disposed of by conventional means after a final status survey.

Table 1 provides the significant quantities and physical dimensions used as the basis in developing the ISFSI decommissioning estimate.

5. Key Assumptions / Estimating Approach

The decommissioning estimate is based on the configuration of the ISFSI expected after all spent fuel and GTCC material has been removed from the site. The configuration of the ISFSI is based on the station operating until the end of its current license (2044) and the DOE's spent fuel acceptance assumptions, as previously described.

The dry storage vendor, Holtec does not expect the VVMs to have any interior or exterior radioactive surface contamination.[5] It is expected that this assumption would be confirmed as a result of good radiological practice of surveying potentially impacted areas after each spent fuel transfer campaign. Any neutron activation of the steel and concrete is expected to be extremely small.[6] This assumption is adopted for this analysis.

The decommissioning estimate is based on the conservative premise that a small percentage of the VVMs would contain very low levels of neutron-induced residual radioactivity that would necessitate remediation at the time of decommissioning. As an allowance, 6 of the 38 MPCs are assumed to be affected, i.e., contain residual radioactivity. The allowance quantity is based upon the number of MPCs required for the final core off-load (i.e., 193 offloaded assemblies/unit, 37 assemblies per MPC) which results in a total of 6 VVMs that contain residual radioactivity. It is assumed that these are the final VVMs offloaded; consequently they have the least time for radioactive decay of the neutron activation products.

It is not expected that there will be any residual contamination left on the concrete ISFSI pad. It is expected that this assumption would be confirmed as a result of good radiological practice of surveying potentially impacted areas after each spent fuel transfer campaign. Therefore, it is assumed for this analysis that the ISFSI pad will not be contaminated. As such, only verification surveys are included for the pad in the decommissioning estimate.

The ISFSI storage modules were constructed in the original unit 2 excavation after the non-usable sediment was removed and replaced with clean fill. The clean fill was obtained from a borrow pit and suppliers located outside of the Owner Control Area and

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5 Final Safety Analysis Report for the HI-STORM UMAX Canister Storage System, FSAR Report No. HI-2115090, Rev. 1, at page 2-120

6 Ibid.

not radiologically affected by plant Operations. It is assumed that there is no subsurface soil in the proximity of the ISFSI containing residual radioactivity that will require remediation to meet the criteria for license termination.

Costs are reported in 2015 dollars and based upon a decommissioning analysis prepared for Callaway in 2014.[7]

Decommissioning is assumed to be performed by an independent contractor. As such, essentially all labor, equipment, and material costs are based on national averages, i.e., costs from national publications such as R.S. Means' Building Construction Cost Data (adjusted for regional variations), and laboratory service costs are based on vendor price lists. Ameren Missouri, as licensee, will oversee the site activities; the estimate includes Ameren Missouri's labor and overhead costs.

Low-level radioactive waste packaging, transport and disposal costs are based on rates consistent with the most recently developed decommissioning cost estimate.

Contingency has been added at an overall rate of 25%. This is consistent with the contingency evaluation criteria referenced by the NRC in NUREG-1757.[8]

The estimate is limited to costs necessary to terminate the ISFSI's NRC license and meet the §20.1402 criteria for unrestricted use. Disposition of released material and structures is outside the scope of the estimate.

6. Cost Estimate

The estimated cost to decommission the ISFSI and release the facility for unrestricted use is provided in Table 2. The cost has been organized into three phases, including:

- An initial planning phase - empty VVMs are characterized and the specifications and work procedures for the decontamination (MPC support structure removal) developed.
- The remediation phase - residual radioactivity is removed. The empty VVMs are used as waste containers, transported to the low-level waste site, and disposed of at low-level waste.
- The final phase - license termination surveys, independent surveys are completed, and an application for license termination submitted.

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7 "Decommissioning Cost Analysis for the Callaway Energy Center," TLG Document A22-1690-001, Rev. 0, dated March 2015

8 "Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness," U.S. Nuclear Regulatory Commission's Office of Nuclear Material Safety and Safeguards, NUREG-1757, Volume 3, Revision 1, February 2012

In addition to the direct costs associated with a contractor providing the decommissioning services, the estimate also contains costs for the NRC (and NRC contractor to perform the verification survey), Ameren Missouri's oversight staff, site security (industrial), and other site operating costs.

For estimating purposes it should be conservatively assumed that all expenditures will be incurred in the year 2051, the year following all spent fuel removal.

7. Financial Assurance

This section describes the methodology by which Ameren Missouri will provide financial assurance for decommissioning the ISIFI at the end of its useful life.

ISFSI operations at Callaway are required due to the United States Department of Energy (DOE's) failure to remove spent nuclear fuel from the Callaway Energy Center in a timely manner pursuant to a written agreement. The costs for management of the spent fuel are costs for which the DOE is responsible under federal law and the Standard Contract.

It is uncertain as to whether the DOE will actually provide reimbursement for the ISFSI decommissioning costs; and, if such reimbursement is provided, when it will occur. Consequently, Ameren Missouri intends to provide financial assurance for the ISFSI decommissioning as described in the following paragraphs:

10 CFR 72.30 (e) states (in part):

> *(e) .... Financial assurance for decommissioning must be provided by one or more of the following methods:*
>
> *(5) In the case of licensees who are issued a power reactor license under part 50 of this chapter or ISFSI licensees who are an electric utility, as defined in part 50 of this chapter, with a specific license issued under this part, the methods of 10 CFR 50.75(b), (e), and (h), as applicable. In the event that funds remaining to be placed into the licensee's ISFSI decommissioning external sinking fund are no longer approved for recovery in rates by a competent rate making authority, the licensee must make changes to provide financial assurance using one or more of the methods stated in paragraphs (1) through (4) of this section.*

As Ameren Missouri has been issued a power reactor license and is an electric utility, it meets the foregoing criteria, and it intends to utilize the "External Sinking Fund" method of providing financial assurance for decommissioning the ISFSI, as defined in 10 CFR 50.75 (e) (1) (ii). This is the financial assurance method that Ameren Missouri currently uses for the Callaway Energy Center decommissioning.

Missouri regulations, cited below, require the triennial filing of updated decommissioning cost estimates and associated funding levels required for decommissioning funding assurance. Missouri regulations also provide for the changing of rates charged to ratepayers to recover any changes in funding levels necessitated by the triennial decommissioning cost estimate updates.

4 CSR 240-3.185 Submission of Reports Pertaining to the Decommissioning of Electric Utility Plants

(3) On or before September 1, 1990 and every three (3) years after that, utilities with decommissioning trust funds shall perform and file with the commission cost studies detailing the utilities' latest cost estimates for decommissioning their nuclear generating unit(s) along with the funding levels necessary to defray these decommissioning costs. These studies shall be filed along with appropriate tariff(s) effectuating the change in rates necessary to accomplish the funding required. In addition, the commission, at any time for just cause, may require a utility to file an updated decommissioning cost study, funding requirement and associated tariff(s).

4 CSR 240-20.070 Decommissioning Trust Funds

(7) Upon the filing of the appropriate tariff(s) as set in 4 CSR 240-3.180, the commission shall establish a schedule of proceedings which shall be limited in scope to the following issues:

(A) The extent of any change in the level or annual accrual of funding necessary for the utility's decommissioning trust fund; and

(B) The changes in rates which would reflect any change in the funding level or accrual rate.

To comply with the foregoing regulations, Ameren Missouri prepares an updated site-specific decommissioning cost estimate for the Callaway Energy Center every three (3) years and files this estimate and an updated funding level analysis with the Missouri Public Service Commission (MPSC). The site-specific estimate includes radiological license termination expenses, non-radiological site restoration expenses and spent fuel management expenses. The funding level analysis is based on this total decommissioning cost estimate amount. Although the external sinking fund described in 10 CFR 50.75 is for radiological decommissioning costs only, to the extent that the fund balance exceeds costs required for Part 50 radiological decommissioning, excess funds would be available for non-radiological site restoration expenses and spent fuel management expenses.

The most recent triennial update filing was made with the MPSC on April 1, 2015. (This filing was actually due on September 1, 2014, but an extension was granted by the MPSC such that the funding level analysis could incorporate the plant's operating license

extension that was not approved until early-2015.) MPSC approval is still pending in this case. The next triennial filing is required to be made no later than September 1, 2017.

Ameren Missouri has had a decommissioning cost estimate for the ISFSI prepared by the same firm that prepares the cost estimate for the Callaway Energy Center decommissioning. The estimated cost for radiological decommission of the ISFSI and release the facility for unrestricted use is $7,377,000 (2015$). Non-radiological site restoration costs for green fielding the site are estimated at an additional $1,049,000 (2015$). This estimate projects that the ISFSI decommissioning will take place in 2051.

Assuming the foregoing ISFSI decommissioning estimated costs is to be funded based on the actuarial assumptions filed with the MPSC as part of the April 1, 2015 triennial filing, Ameren Missouri would be required to make an annual contribution of $429,618 to the external sinking fund (assuming funding commencing as of January 1, 2016).

Ameren Missouri intends to make a filing with the MPSC to submit the ISFSI decommissioning cost estimate and funding level analysis as an "addendum" or "revision" to the decommissioning filing it made on April 1, 2015. Revised rate tariffs will also be submitted in order for the additional ISFSI decommissioning costs to be recovered from ratepayers. A separate sub-account will be established within the external sinking fund to segregate the ISFSI decommissioning funding from the plant decommissioning funding.

Ameren Missouri will refund to Missouri ratepayers any DOE reimbursement amounts received for costs of decommissioning the ISFSI whereby Ameren Missouri previously collected those decommissioning costs from Missouri ratepayers as Missouri rate tariffs.

As 10 CFR 72.30 (c) states, in part:

> *(c) At the time of license renewal and at intervals not to exceed 3 years, the decommissioning funding plan must be resubmitted with adjustments as necessary to account for changes in costs and the extent of contamination.*

To comply with this requirement, Ameren Missouri intends to obtain updated site-specific decommissioning cost estimates for the ISFSI concurrently with updated plant decommissioning cost estimates and file both on a triennial basis with the MPSC, along with updated funding level analyses, as required by Missouri regulations. As previously indicated, the next filing will be made by September 1, 2017, and then every three (3) years thereafter. Concurrent with these MPSC filings, updated ISFSI cost estimates and funding level analyses will be submitted to the NRC in accordance with 10 CFR 72.30 (c).

Table 1
Significant Quantities and Physical Dimensions

ISFSI Pad

Item	Length (feet)	Width (feet)	Depth (feet)	Residual Radioactivity
ISFSI Pad	157.5	143.6	2.5	No

ISFSI HI-STORM UMAX

Item	Value	Notes (all dimensions are nominal)
Cavity Enclosure Container Inside Height (inches)	181	
Cavity Enclosure Container Inside Diameter (inches)	86	
Quantity (total)	43	Spent Fuel (38) + GTCC (5)
Quantity (with residual radioactivity)	6	Equivalent to the number of VVMs used to store last complete core offload)
Potentially Activated Steel and Concrete (pounds)	847,767	
Misc. Low-Level Radioactive Waste (pounds)	3,289	
Low-Level Radioactive Waste (cubic feet)	13,299	Excluding transfer cask
Low-Level Radioactive Waste (packaged density)	64	Average weight density

Other Potentially Impacted Items

Item	Value	Notes
Number of VVMs used for GTCC storage	5	No residual radioactivity

Table 2
ISFSI Decommissioning Costs[1] and Waste Volumes

	Costs (thousands, 2015 dollars)						Waste Volume	Person-Hours	
	Removal	Packaging	Transport	Disposal	Other	Total	Cubic Feet	Craft	Oversight and Contractor
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	221	221	-	-	1,024
Remediation (activated metal removal)	528	97	94	2,285	-	3,003	13,299	7,472	-
License Termination (radiological surveys)	-	-	-	-	1,102	1,102	-	9,549	-
Subtotal	**528**	**97**	**94**	**2,285**	**1,323**	**4,327**	**13,299**	**17,021**	**1,024**
Supporting Costs									
NRC and NRC Contractor Fees	-	-	-	-	414	414	-	-	776
Insurance	-	-	-	-	119	119	-	-	-
Property Taxes	-	-	-	-	94	94	-	-	-
Plant Energy Budget	-	-	-	-	57	57	-	-	-
Corporate A&G	-	-	-	-	337	337	-	-	-
Security (industrial)	-	-	-	-	205	205	-	-	4,971
Ameren Missouri Oversight	-	-	-	-	350	350	-	-	3,771
Subtotal	-	-	-	-	**1,575**	**1,575**	-	-	**9,519**
Total (w/o contingency)	**528**	**97**	**94**	**2,285**	**2,899**	**5,902**	**13,299**	**17,021**	**10,543**
Total (w/25% contingency)	**660**	**121**	**117**	**2,857**	**3,623**	**7,377**			

Note 1: for funding planning purposes decommissioning costs can be assumed to be incurred in year 2051