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PG&E Letter HIL-15-007

ATTN: Document Control Desk  
Director, Division of Spent Fuel Storage and Transportation  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

10 CFR 72.30

Docket No. 72-27, Materials License No. SNM-2514  
Humboldt Bay Independent Spent Fuel Storage Installation  
Decommissioning Funding Plan

Dear Commissioners and Staff:

On June 17, 2011, the NRC issued a Decommissioning Planning Rule in the Federal Register (76 FR 35512), to become effective December 17, 2012. Pacific Gas and Electric Company's (PG&E's) response to the new requirements in 10 CFR 72.30, "Financial assurance and recordkeeping for decommissioning," for a decommissioning funding plan (DFP) in 2015 dollars is contained in this letter and enclosures. PG&E is submitting this DFP for NRC review and approval in accordance with 10 CFR 72.30(b).

DFP requirements in 10 CFR 72.30(c) include addressing four specific events. PG&E's response to these four events is included in Enclosure 1 to this letter.

Enclosure 2 to this letter contains the cost estimate details that support the total Humboldt Bay Independent Spent Fuel Storage Installation (ISFSI) decommissioning cost estimate, and also includes the funding assumptions used to determine the Humboldt Bay ISFSI decommissioning costs. Enclosure 2 and information contained in this letter address the requirements in 10 CFR 72.30(b).

On December 15, 2003, PG&E submitted a license application to construct and operate the Humboldt Bay ISFSI. The license application included a Preliminary Decommissioning Plan as required by 10 CFR 72.30, that included a DFP that met the requirements of 10 CFR 72.30(c) at that time. The DFP stated that PG&E has established external sinking fund accounts for decommissioning the Humboldt Bay Power Plant Unit 3 (HBPP) as well as the Humboldt Bay ISFSI, and that assurance of funds was reported in an annual decommissioning funding report dated March 27, 2003, in accordance with 10 CFR 50.75(f). Financial assurance for decommissioning the Humboldt Bay ISFSI is provided by an external sinking fund in accordance with 10 CFR 50.75(e)(1)(ii).

Following review of the license application, the NRC issued a Safety Evaluation Report (SER), dated November 2005. SER Section 13.1.1.2, "Financial Qualifications for Humboldt Bay ISFSI," concluded that (1) PG&E's estimate of costs to construct, operate and decommission the ISFSI are reasonable, and (2) PG&E's spent fuel management program for the Humboldt Bay ISFSI provides reasonable assurance that sufficient funds are available to build, operate and decommission the ISFSI.

SER Section 13.1.1.2 also addressed the possible shortfall of funds, and determined that PG&E would request rate recovery from the California Public Utilities Commission (CPUC) if necessary. The NRC also concluded that the CPUC would likely approve justifiable PG&E requests for additional rate recovery for circumstances that could not be foreseen or reasonably avoided by PG&E. In addition, the NRC concluded that PG&E will adequately maintain segregation of decommissioning funds between HBPP and the Humboldt Bay ISFSI. To ensure segregation of funds, PG&E has established unique accounting for tracking ISFSI related work. Therefore, PG&E concludes that there is reasonable assurance, as required by 10 CFR 72.30(b), that funds will be available to decommission the Humboldt Bay ISFSI.

PG&E makes no new or revised regulatory commitment (as defined by NEI 99-04) in this letter.

If you have any questions in regard to this document, please contact Mr. Lawrence Pulley at (805) 545-6165.

I declare under penalty of perjury that the foregoing is true and correct. Executed on December 17, 2015.

Sincerely,



Edward D. Halpin  
*Senior Vice President – Power Generation and Chief Nuclear Officer*

Enclosures

cc/enc: William C. Allen, NRC Project Manager  
Marc L. Dapas, Regional Administrator, NRC Region IV  
John B. Hickman, NRC Project Manager  
Gonzalo L. Perez, California Department of Public Health  
Humboldt Distribution

PG&E'S RESPONSE TO THE FOUR EVENTS IN 10 CFR 72.30(c)



The four events in 10 CFR 72.30(c) are identified below, as well as Pacific Gas and Electric Company's (PG&E's) response to each event.

*The decommissioning funding plan must specifically consider the effect of the following events on decommissioning costs:*

- (1) *Spills of radioactive material producing additional residual radioactivity in onsite subsurface material.*

PG&E Response: There have not been any spills of radioactive material in the Humboldt Bay Independent Spent Fuel Storage Installation (ISFSI) area that is surrounded by the ISFSI security boundary fence. In addition, spills of radioactive material in the Humboldt Bay ISFSI area are not expected to occur because radioactive material that could spill will not be brought into the ISFSI area. (NOTE: The explosive detector sources containing radioactive material currently inside the ISFSI area are not expected to spill.) Furthermore, the all-welded construction of the multi-purpose containers (MPCs) in conjunction with the extensive inspections and testing performed during closing operations ensures that no release of radioactive effluents will occur.

The Humboldt Bay ISFSI Final Safety Analysis Report (FSAR), Section 7.3.1, states that there are no radioactive systems at the ISFSI other than the greater than Class C (GTCC) cask and overpacks containing MPCs. FSAR Section 7.3.1 further states, "The fuel is stored dry inside the MPC so that no radioactive liquid is available for leakage."

In the NRC Safety Evaluation Report (SER) dated November 2005, Section 13.1.2.1, the NRC concurred with PG&E's assessment that the Humboldt Bay ISFSI design will "minimize contamination and facilitate decommissioning." The SER states, "The confinement design of the MPCs... and the passive design of the storage system, minimize the potential for radioactive contamination to occur and to spread."

- (2) *Facility modifications.*

PG&E Response: There have been no modifications to the Humboldt Bay ISFSI vault design that could impact decommissioning costs, and no modifications are expected in the future. See response to item (3) below for more details.

- (3) *Changes in authorized possession limits.*

PG&E Response: The Humboldt Bay ISFSI vault design consists of five storage casks containing spent fuel, and one storage cask containing GTCC waste. The five spent fuel casks have been loaded into the ISFSI vault with spent fuel from the Humboldt Bay Power Plant Unit 3 (HBPP).

HBPP is currently being decommissioned and no more spent fuel will be generated. The GTCC waste cask has been loaded into the ISFSI vault with GTCC waste that was generated in the operation of HBPP. There will be no additional spent fuel casks nor GTCC waste casks placed in the Humboldt Bay ISFSI beyond that of the original design.

*(4) Actual remediation costs that exceed the previous cost estimate.*

PG&E Response: PG&E will not begin to decommission the Humboldt Bay ISFSI until after the U.S. Department of Energy takes possession of the spent fuel and GTCC waste. Currently, this is estimated to begin in 2024. Therefore, there have been no actual remediation costs that exceed previous cost estimates.

The California Public Utilities Commission (CPUC) requires PG&E to update the ISFSI decommissioning cost estimate every three years. If a revised cost estimate exceeds a previous cost estimate, PG&E will submit a request to the CPUC requesting approval of increased funding based on a justifiable reason. In the NRC SER dated November 2005, Section 13.1.1.2, the NRC concludes "...that the CPUC will likely approve justifiable requests for additional rate recovery as necessary to fully fund the decommissioning trust for circumstances that could not be foreseen or reasonably avoided by PG&E."

**10 CFR 72.30 HUMBOLDT BAY INDEPENDENT SPENT FUEL STORAGE  
INSTALLATION DETAILED DECOMMISSIONING COST ESTIMATE**



## **10 CFR 72.30 Humboldt Bay Independent Spent Fuel Storage Installation Decommissioning Cost Estimate**

### **1. Background and Introduction**

The Nuclear Regulatory Commission (NRC) issued its final rule on Decommissioning Planning on June 17, 2011,<sup>[1]</sup> 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 Humboldt Bay Power Plant Unit 3 (HBPP3) 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**

HBPP3 shut down on July 2, 1976, and is currently in a decommissioning status. All of the spent fuel generated during operations, 390 spent fuel assemblies, are currently in storage in the on-site ISFSI. The ISFSI is operated under a Part 72 Site Specific License.

Completion of the ISFSI decommissioning process is dependent upon the Department Of Energy's (DOE's) ability to remove spent fuel and Greater than Class C (GTCC) waste from the site. DOE's repository program assumes that

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<sup>1</sup> 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

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.<sup>[2]</sup> Pacific Gas and Electric's (PG&E's) current spent fuel management plan for the HBPP3 spent fuel is based in general upon: 1) a 2024 start date for DOE initiating transfer of commercial spent fuel to a federal facility, and 2) completion of spent fuel receipt by year 2025.

### **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) by removing and disposing of residual radioactivity and verifying that remaining materials satisfy NRC release criteria.

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.

### **4. ISFSI Description**

The HBPP3 ISFSI is a unique design. Spent fuel is stored in the Holtec International (Holtec) HI-STAR HB system, located inside an underground steel-lined concrete vault. The HI-STAR HB system is comprised of an all-welded multi-purpose canister (MPC-HB) designed to store up to 80 HBPP fuel assemblies inside a bolted-lid steel overpack. The HI-STAR HB system is a shortened version of the HI-STAR 100 System. The system is designed such that both the MPC and steel overpack are expected to be transferred to the DOE at the time of spent fuel transfer. As a result there are not expected to be any remaining HI-STAR overpacks at the time of decommissioning.

PG&E's spent fuel management project for the HBPP3 spent fuel has resulted in 390 spent fuel assemblies being placed in 5 HI-STAR HB storage casks.

In addition to the spent fuel casks located in the ISFSI vault after shutdown there is one additional cask used for GTCC waste storage. The storage overpack used for this GTCC waste canister is expected to be transferred to the DOE at the time of GTCC waste and spent fuel transfer.

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<sup>2</sup> 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 ..."



The cask storage vault is comprised of six below-grade, cylindrical storage cells that are structural units constructed of steel-reinforced concrete with a carbon steel liner. Each storage cell is approximately 9 feet in diameter by 11 feet, 7 inches deep. The vault bottom is 3 feet thick reinforced concrete. There is an approximate 7 feet thickness of concrete on each end of the vault and 5-1/2 feet on the longitudinal sides of the vault. The concrete wall thickness varies around the circumference of the storage cells and has a minimum thickness of approximately 1 foot - 9 inches of concrete between adjacent cells. Each of the storage cells accommodates one cask (either a loaded HI-STAR HB overpack or the GTCC cask). The top of the vault elevation (without the storage cell lids installed) is approximately flush with grade. The lids are approximately 16-1/4 inches high, not including the height of the lid bolt caps.

The remaining vault structure is not expected to contain residual radioactivity.

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, GTCC waste and storage overpacks have been removed from the site, and the assumptions associated with DOE's spent fuel acceptance, as previously described.

Since HBPP3 is not operating, and all spent fuel is currently in storage, the current configuration of the ISFSI vault is the expected configuration at the time of decommissioning. The nominal vault dimensions (concrete poured areas) are approximately 20 feet in width, and 77 feet in length.

The decommissioning estimate is based on the premise the steel overpack will be transferred to the DOE along with the spent fuel and GTCC waste.

It is not expected that the remaining storage cell surfaces will have any interior radioactive surface contamination. 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. To validate this assumption, the estimate accounts for the characterization of two of the storage cells; it is likely that some of this characterization will take place before the last of the fuel is removed from the ISFSI in order to establish a more definitive decommissioning scope.

It is not expected that there will be any residual contamination left on any exterior surfaces of the concrete vault. 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 and GTCC waste transfer campaign. Therefore, it is assumed for this analysis that the ISFSI vault will not be contaminated.

There is no known subsurface material in the proximity of the ISFSI area containing residual radioactivity that will require remediation to meet the criteria for License Termination.

To support an application for License Termination, the estimate assumes that a Final Status Survey will be performed. This will likely include a 100 percent survey of the concrete storage cell and lid surfaces, and a significant fraction of the immediate area surrounding the vault.

For the purposes of meeting 10 CFR 20.1402 requirements, only the costs of characterizations and surveys are included in the decommissioning cost estimates because of the expected absence of radioactive material and need for remediation.

Decommissioning is assumed to be performed by an independent contractor. As such, essentially all contractor 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. Those craft labor positions that are expected to be provided locally, are consistent with fully burdened contractor labor rates used in the most recently developed Diablo Canyon decommissioning cost estimate, escalated to 2015 dollars. These craft labor rates are assumed to be representative of contractor rates charged in the Humboldt Bay geographical area. PG&E, as licensee, will oversee the site activities; the estimate includes PG&E's labor and overhead costs.

Costs are reported in 2015 dollars.

Contingency has been added at an overall rate of 25 percent. This is consistent with the contingency evaluation criteria referenced by the NRC in NUREG-1757.<sup>[3]</sup>

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<sup>3</sup> "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



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 non-contaminated 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 storage cells are characterized.
- The remediation phase – There is no expected remediation therefore the estimate does not include any costs during this phase.
- The final phase - License termination surveys, independent surveys are completed, and an application for license termination submitted.

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), PG&E'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 2026, the year following all spent fuel removal.



**Table 1**  
**Significant Quantities and Physical Dimensions**

ISFSI Vault

Item	Length (ft)	Width (ft)	Residual Radioactivity
ISFSI Vault	77	20	No

ISFSI Storage Cell

Item	Value	Notes (all dimensions are nominal)
Overall Height (inches)	160	From base of cell to the top of the lid
Diameter (inches)	107	Inner diameter of storage cell
Lid Diameter (inches)	120	
Lid Thickness (inches)	16	
Quantity (total)	6	Spent Fuel (5) GTCC (1)
Quantity (with residual radioactivity)	0	
Surface Area of an Individual Storage Cell and Lid (square feet)	570	

**Table 2**  
**ISFSI Decommissioning Costs<sup>1</sup> and Waste Volumes**

	(thousands, 2015 dollars)						Waste Volume	Person-Hours		
	Removal	Packaging	Transport	Disposal	Other	Total	(ft3)	Contractor	Licensee	NRC / NRC Contractor
<b>Decommissioning Contractor</b>										
Planning (characterization, specs and procedures)	-	-	-	-	76.4	76.4	-	312	-	-
Remediation (no expected remediation)	-	-	-	-	-	-	-	-	-	-
License Termination (radiological surveys)	-	-	-	-	450.4	450.4	-	3,098	-	-
<b>Subtotal</b>	-	-	-	-	526.8	526.8	-	3,410	-	-
<b>Supporting Costs</b>										
NRC and NRC Contractor Fees and Costs	-	-	-	-	117.9	117.9		-	-	536
Insurance	-	-	-	-	25.2	25.2		-	-	-
Security (industrial)	-	-	-	-	66.0	66.0		1,881	-	-
PG&E Oversight Staff	-	-	-	-	176.4	176.4		-	1,881	-
<b>Subtotal</b>	-	-	-	-	385.4	385.4	-	1,881	1,881	536
<b>Total (w/o contingency)</b>	-	-	-	-	912.2	912.2	-	5,291	1,881	536
<b>Total (w/25% contingency)</b>						1,140.3				

Note 1: For funding planning purposes decommissioning costs can be assumed to be incurred in year 2026

Note 2: Columns may not add due to rounding