

**Request for Additional Information  
Diablo Canyon Independent Spent Fuel Storage Installation  
Docket No. 72-26  
Specific-License Renewal**

By letter dated March 9, 2022, Pacific Gas & Electric Company (PG&E) submitted a license renewal application (LRA) for License No. SNM-2511 for the Diablo Canyon (DC) Independent Spent Fuel Storage Installation (ISFSI) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22068A189). In my letter dated September 8, 2022, I acknowledged acceptance of your application for a detailed technical review and provided a proposed schedule for the U.S. Nuclear Regulatory Commission (NRC) review (ADAMS Accession No. ML22238A239). This request for additional information (RAI) identifies information needed by the NRC staff in connection with its technical review of the renewal application. The requested information is listed by chapter number and title in the renewal application. The staff used NUREG-1927, Revision 1, "Standard Review Plan for Renewal of Specific Licenses and Certificates of Compliance for Dry Storage of Spent Nuclear Fuel" and NUREG-2214, "Managing Aging Processes In Storage (MAPS) Report" in its review of the renewal application.

Each individual RAI describes information needed by the staff for it to complete its review of the renewal application and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

**RAI A.4-1**

Aging Management of Loss of Preload in Overpack Anchor Studs

**Information Needed:**

State how loss of preload will be adequately managed for the overpack anchor studs during the period of extended operations. Update the LRA as necessary.

**Issue:**

The HI-STORM 100SA overpack has an anchorage system that is design to be fastened to an embedded anchorage system in the ISFSI concrete pad. As stated in Sections 3.3.1.1.2 and 4.2.1.1.6 of the DC ISFSI updated final safety analysis report (FSAR), the anchorage system consists of 16 studs that are preloaded to approximately 157,000 lbf to maintain the integrity of the fastening mechanism embedded in the pad during a postulated design-basis event.

LRA Section A.4 states that the acceptance criteria for anchor studs are the absence of any degradations resulting from the aging effects listed in LRA Table 3-5. However, LRA Tables 3-5 and 3-7 do not lists loss of preload as an aging effect requiring management for the overpack anchor studs. NUREG-2214 states that loss of preload is an aging effect requiring aging management review since preload forces may decrease over time for the bolts. Therefore, additional information is necessary to demonstrate how loss of preload will be adequately managed for the overpack anchor studs to ensure that preloads forces remain within design limits during the period of extended operation.

**Regulatory Basis:**

This information is necessary to demonstrate compliance with 10 CFR 72.240(c).

Enclosure

## **RAI A.4-2**

### Detection of Aging Effects, Overpack Anchor Stud Sampling and Inspection Frequency

#### Information Needed:

Clarify the issues identified below for the proposed inspections frequency, methodology and sample size used for the visual inspection of the overpack anchor bolts.

#### Issues:

The “detection of aging effects” program element in LRA Section A.4 states that the program performs a sample based visual inspections of anchors studs on a 10-year inspection frequency. It also states that the proposed inspection frequency is consistent with aging management program (AMP) XI.E4, “Metal Enclosed Bus”, in NUREG-1801, Revision 2, and considered it acceptable because site-specific experience has shown than anchor stud aging degradation is a slow process.

However, additional information is necessary to clarify the following:

- It is not clear how the guidance provided in AMP XI.E4 in NUREG-1801 is applicable to the aging management of overpack studs performing a structural support function. AMP XI.E4 is intended to manage aging effects in electrical components that function as insulators and in not intended to manage components with a structural support function. In AMP XI.E4 it is stated that those components with a structural support function will be managed by the AMP XI.S6, “Structures Monitoring,” instead of the AMP XI.E4

Therefore, additional information is necessary to demonstrate how following the program recommendations for AMP XI.E4 will be sufficient to demonstrate that overpack studs will be adequately manage through the period of extended operations.

- As stated in NUREG-2214, inspections under the Monitoring of Metallic Surfaces AMP are conducted at least once every 5 years. This inspection frequency is also consistent with industry codes and standards (e.g., ACI 349.3R) intended to manage structural components (including structural anchor, bolts, supports, etc.). However, AMP XI.E4 from NUREG-1801, Rev. 2, considers a 10 years inspection frequency for electrical components that do not perform a structural support function, and when those components are not exposed to an aggressive environment. As stated in the application, the site at Diablo Canyon is considered to have an aggressive environment due to its presence near the coast, and site-specific operating experience has already identified ongoing degradation in the overpack studs (which it can be reasonably assumed to continue overtime). Therefore, additional information is necessary to demonstrate how following a 10-year inspection frequency will be sufficient to demonstrate that overpack studs will be adequately manage through the period of extended operation and that the selected frequency is consistent with the MAP report recommendations.
- As stated in NUREG-2214, inspection under the Monitoring of Metallic Surfaces AMP covers 100 percent of normally accessible surfaces. However, the LRA proposed a sample size of 20 percent of the anchor stud population or a maximum of 25 anchor studs for the inspection of anchor studs. Additional information is necessary to justify the use of a different sample criteria from the one recommended in NUREG-2214.
- The AMP operating experience states that metal caps were installed to the exposed stud head. Therefore, it is not clear how visual inspections will be performed to adequately

detect the proposed aging effects for the anchor studs. Additional information is necessary to demonstrate that the overpack studs will be adequately managed using visual inspections during the period of extended operation.

Regulatory Basis:

This information is necessary to demonstrate compliance with 10 CFR 72.240(c).

**RAI A.4-3**

Detection of Aging Effects, 1.25 Times the Specified Inspection Frequency

Information Needed:

Clarify how the proposed inspection interval of 1.25 times the interval specified in the frequency is consistent with the MAPS Report recommendation and commensurate with industry codes and standards.

Issue:

The “detection of aging effects” program element in LRA Section A.4 (and other AMPs) states that the specified frequency for each inspection is met if it is performed within 1.25 times the interval specified in the frequency, as measured from the previous performance or as measured from the time a specified condition of the frequency is met. This criterion will allow for up to a 6.25-year inspection interval (i.e., 5 years x 1.25) for programs with a specified 5-year inspection frequency. The 1.25 is intended to provide operational flexibility to conduct inspections to achieve a target 5-year inspection period rather than be used as the inspection frequency itself. Therefore, it is not clear how a 6.25-year inspection interval will be consistent with the recommended interval in NUREG-2214 and commensurate with applicable codes and standards.

Based on the review of DC ISFSI technical specifications (TS), it is noted that the 25% extension is applicable to required surveillances as specified in the TS. In general, these surveillances are performed to verify that systems and components meet the limited conditions of operation (LCO) and to ensure that specific variables are within specified limits. It is noted that AMPs are generally intended to manage and monitor age-related degradations so that corrective actions can be taken before any loss of function and are not generally intended to be a substitute for TS surveillances of LCOs or design limits.

Regulatory Basis:

This information is necessary to demonstrate compliance with 10 CFR 72.240(c).

**RAI A.5-1**

Preventive Actions, Actions to Prevent Blockage of Inlet/Outlet Vents

Information Needed:

Additional information is necessary to demonstrate that no preventive actions are necessary for the DC ISFSI Reinforced Concrete Structures AMP, as discussed in NUREG-2214.

Issue:

The “preventive actions” program element in LRA Section A.5 states that the DC ISFSI Reinforced Concrete Structures AMP does not include preventive actions due to the concrete design. LRA Section 3.7.4 also states that cracking and loss of strength due to dehydration at

high temperatures for concrete exposed to air-outdoor or soil is not a credible aging effect and mechanisms. However, and as described in the FSAR, the no credibility of this aging effects is contingent upon ensuring that partial blockage of the air inlets is maintained within the analyzed condition.

FSAR Section 2.2.2.5 credits, in part, the use of **routine inspections (or alternatively, monitoring the exit vent air temperature monitored)** as some of the preventive measures used to prevent significant blockage from blowing debris, animals, etc. at vents in the HI-STORM 100 system [emphasis added]. Therefore, it is not clear why these routine inspections and/or monitoring were not considered or credited as preventive actions for the DC ISFSI Reinforced Concrete Structures AMP to ensure that analyzed temperature limits are not exceeded and thermal dehydration of the concrete remains noncredible during the period of extended operations.

Regulatory Basis:

This information is necessary to demonstrate compliance with 10 CFR 72.240(c).

**RAI A.5-2**

Detection of Aging Effects, General Area Walkdowns

Information Needed:

Additional information is necessary to clarify if general area walkdowns are conducted annually and if they will be credited in the AMP, as recommended in NUREG-2214.

Issue:

As stated in NUREG-2214, an applicant may credit maintenance activities conducted in accordance with the FSAR for the general area walkdowns. However, it does not clear if general area walkdowns are conducted for the site, at what frequency, and if they are being credited for the DC ISFSI Reinforced Concrete Structures AMP.

LRA Section A.5 states that the DC ISFSI Reinforced Concrete Structures AMP performs visual inspections of 100 percent of the accessible above-grade areas of the ISFSI storage pads and CTF structural concrete. However, the AMP do not describe any general area walkdowns conducted for reinforced concrete structures.

Regulatory Basis:

This information is necessary to demonstrate compliance with 10 CFR 72.240(c).

**RAI A.6-1**

Preventive Actions, Storage in Sheltered Environment

Information Needed:

Additional information is necessary to determine why the preventive actions for proper storage of the cask transportation system was not credited in the Cask Transportation System Aging Management Program to demonstrate that associated aging effects will not occur, and aging management is not required.

Issue:

The “preventive actions” program element in LRA Table A.6 and Section 9.4.3.3.6 states that the Cask Transportation System AMP is a condition monitoring program that does not provide guidance for preventing aging degradation. However, the staff noted that AMR line items in the application credits preventive actions to justify not having to manage some of the aging effects as follows:

- LRA Tables 3-6 and 3-8 identifies some aging effects/mechanism as not applicable for specific materials (e.g., K-Spec fiber) because a proper storage location is used to provide a sheltered/controlled environment for the cask transportation system when not in used. For these components, no associated aging management was provided for the components and the action of proper storage is credited to ensure that the equipment is isolated from chemicals hazards and/or other harsh environments that may degrade the component over time.

Based on the application, this preventive action is relied upon to ensure that these components are shielded from harsh environments that may cause degradations. The action is also credited for not having to monitor or inspect the associated aging effects that otherwise would have been inspected if not stored in the proper location. Therefore, the NRC considers the storage requirements a preventive action.

Regulatory Basis:

This information is necessary to demonstrate compliance with 10 CFR 72.240(c).

**RAI A.6-2**

Parameters Monitored or Inspected, Cracking

Information Needed:

Additional information is necessary to demonstrate how cracking will be adequately managed by the AMP during the period of extended operations for the cask transportation system and the cask transfer facility (CTF). Update the LRA as needed.

Issue:

The “parameters monitored or inspected” program element in LRA Table A.6 describes the different parameters to be monitored and inspected by the AMP. During its review, it was noted that cracking was not listed as one of the aging effects or associated parameters that will be monitored and inspected by the AMP.

In the application, LRA Tables 3-6 and 3-8 indicates that cracking due to fatigue is not being managed for these components because there is no time limited aging analysis (TLAA) associated with these subcomponents. However, for license renewal, the need to manage cracking is not limited to having or not a TLAA. Lifting systems may exhibit deformation and/or cracking in structural members and welds as a result of its ongoing use even if a fatigue analysis was not performed or a TLAA does not exists. Furthermore, and as stated in the application, plant operating experience has already identified weld cracking in several components during routine inspections. Therefore, it is not clear why the AMP did not address cracking as an aging effect requiring management and/or how cracking was considered as not requiring to be manage for these components.

Regulatory Basis:

This information is necessary to demonstrate compliance with 10 CFR 72.240(c).

### **RAI A.6-3**

#### Detection of Aging Effects, Qualification of Inspectors

##### Information Needed:

Additional information is necessary to demonstrate that the proposed qualification for the personnel inspecting and/or evaluating the condition of concrete structural components is consistent with industry's codes and standards.

##### Issue:

The "detection of aging effects" program element in LRA Table A.6 states that personnel evaluating the results are degreed engineers with one or more years of structural inspection experience. However, for personnel performing an evaluation of the concrete portions, the ACI-349.3R states, in part, that the personnel should possess one of the following qualifications: (a) be a licensed professional engineer with knowledge of concrete structures and performance requirements, or (b) be a graduated civil or structural engineer with at least 10 years' experience in concrete structures and knowledge of the performance requirements. As stated in LRA Table A.6, the AMP also includes visual inspection of normally accessible concrete portions adjacent to the CTF liner and lateral restraints to manage the embedded CTF liner and lateral restraints aging effects.

For personnel performing the inspections, the ACI-349.3R states, in part, that they should possess one of the following qualifications: (a) be graduated civil or structural engineer with over one year of experience, or (b) possess at least five years of experience in the inspection and testing of concrete structures. Furthermore, Section 9.4.3.3.6 does not describe the qualification requirements for the inspectors.

##### Regulatory Basis:

This information is necessary to demonstrate compliance with 10 CFR 72.240(c).

### **RAI 4.6.1-1**

#### Overpack Steel Structure Not a TLAA

##### Information Needed:

Additional information is necessary to demonstrate that no time-based assumption was used in the overpack structural steel and overpack anchorage analyses.

##### Issue:

In LRA Section 4.6.2, the application states that "the postulated conditions experienced by the overpack are infrequent or one-time occurrences that do not contribute significantly to fatigue."

Therefore, the application concluded that there is no TLAA because no time-based assumption was used. However, it is not clear how a "one-time occurrence" was not considered a time-based assumption for the analyzed condition of the overpack steel structure. It is noted that load cycles estimates are based on an assumed number of cycles for each event, and the selected number of events is based on the expected number of occurrences of that event during the specified period (i.e., 20-40 years).

##### Regulatory Basis:

This information is necessary to demonstrate compliance with 10 CFR 72.240(c).

Reference:

PG&E Calculation OQE-008 Rev. 1

**RAI 4.6.3-1**

HI-TRAC Transfer Cask and Lifting Trunnion Blocks Analysis Not a TLAA

Information Needed:

Additional information is necessary to demonstrate that no time-based assumption was used in the HI-Track transfer cask and lifting trunnion blocks analysis.

Issue:

In LRA Section 4.6.3 the application states that “the transfer cask is designed for repeated normal condition handling operations with high factors of safety, particularly for the lifting trunnions, to assure structural integrity. The resulting cyclic loading produces stresses that are well below the endurance limit of the trunnion material, and therefore, will not lead to a fatigue failure in the transfer cask.” Based on the review of the HI-STORM CoC updated FSAR, it is noted in section 3.4.11 that the HI-TRAC transfer cask was engineered for 40 years of design life. Therefore, it is unclear how the statements considered for a design life of 40 years remains applicable up to 60 years of operations. It is noted that cycle loadings considered for a design life of 40 years may vary from does consider for a design life of 60 years. Furthermore, additional information is necessary to demonstrate that no time-based assumption was used in the cycling loading analysis based on the design life of 40 years established by the CoC.

Regulatory Basis:

This information is necessary to demonstrate compliance with 10 CFR 72.240(c).

**RAI-E-1**

Please revise the Environmental Report (ER) to reflect Pacific Gas and Electric Company’s (PG&Es) decision to change vendors for handling the storage of spent fuel at the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI).

Discussion

On April 6, 2022, PG&E announced in a press release that it had selected Orano USA as the vendor to safely transfer the remaining spent fuel from Diablo Canyon Power Plant (DCPP) operations to onsite interim dry storage in the site ISFSI. Previously, Holtec International was the vendor for these operations.

Under Condition 8A of Materials License SNM-2511, PG&E is authorized to store up to 2100 metric tons uranium (MTU) of intact spent fuel assemblies, damaged fuel assemblies and fuel debris in the Diablo Canyon ISFSI. PG&E is currently employing Holtec HI-Storm 100SA casks to store spent fuel in the Diablo Canyon ISFSI. The Holtec system emplaces storage casks vertically on the ISFSI storage pads.

The Orano USA system identified by PG&E in its press release is the Extended Optimized Storage NUHOMS® system. This system uses horizontal storage modules for the storage of spent nuclear fuel.

Section F1.2 of PG&E's ER submitted on March 9, 2022, states that "[n]o major construction or refurbishment projects are currently planned ... during the license renewal period." Section F4.1 of PG&E's ER states "[t]he [proposed action] does not include refurbishment or new construction."

### Request

Please revise the ER to provide a full description of the Orano USA system to be employed at the Diablo Canyon ISFSI and address the environmental impacts associated with the deployment of this system at the ISFSI. This discussion should include the impacts from constructing and operating the new system, along with any changes as needed to the existing ISFSI storage pads and ISFSI site to accommodate the new system.

Sections 6.3 and 6.4 of NRC's NUREG-1748 (NRC, 2003) provide a discussion of the environmental resource areas and the potential environmental issues to be considered in evaluating the potential impacts of an applicant's proposed action.

### Basis

This information is needed to determine compliance with the following requirements:

- 10 CFR 51.45(b), "[Environmental considerations](#)," requires, in part that "[t]he environmental report shall contain a description of the proposed action, ..." and
- 10 CFR 51.45(b)(1) requires that the environmental report should also discuss "[t]he impact of the proposed action on the environment."
- 10 CFR 51.60(b)(1)(iii) requires an environmental report for "[s]torage of spent fuel in an independent spent fuel storage installation ..."

### References

NRC, 2003. "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." NUREG-1748. ADAMS Accession No. ML032450279. August 2003.

NRC, 2016. "Enclosure 1: Materials License No. SNM2511 Amendment No. 5 [Letter to B. S. Allen re: Amendment No. 5 to Materials License No. SNM-2511 for the Diablo Canyon Independent Spent Fuel Storage Installation]." ML16104A373. April 7, 2016.

PG&E, 2022b. "PG&E Selects Orano USA as Vendor to Safely Transfer Spent Nuclear Fuel to Dry Storage at Diablo Canyon Power Plant." April 6, 2022.

PG&E, 2022a. "Diablo Canyon Independent Spent Fuel Storage Installation - License Renewal Application for the Diablo Canyon Independent Spent Fuel Storage Installation." ML22068A189. March 9, 2022.

### RAI-E2

Please provide as needed any correspondence related to the California Coastal Commission's (CCC's) certification that PG&E's renewal of the Diablo Canyon ISFSI operations would be consistent with the Federally-approved State Coastal Zone Management program.



### Discussion

In table F.1.5-1 of the ISFSI license renewal application, PG&E states that it is seeking certification from the CCC that the proposed renewal of operations at the Diablo Canyon ISFSI would be consistent with the California Coastal Zone Management program.

Under the Coastal Zone Management Act of 1972, applicants for a federal license, permit or financial assistance must attach a consistency certification issued by the state coastal agency before the federal agency can approve a license or permit or grant financial assistance.

### Request

Please provide the CCC's certification that renewal of the Diablo Canyon ISFSI license is consistent with the California Coastal Zone Management program.

### Basis

This information is needed to determine compliance with the following requirements:

- 10 CFR 51.45(b), "[Environmental considerations](#)," requires, in part that "[t]he environmental report shall contain a description of the proposed action, ..." and
- 10 CFR 51.45(b)(1) requires that the environmental report should also discuss "[t]he impact of the proposed action on the environment."

### References

Coastal Zone Management Act of 1972. 16 U.S.C. 1451 *et seq.*

PG&E, 2022a. "Diablo Canyon Independent Spent Fuel Storage Installation - License Renewal Application for the Diablo Canyon Independent Spent Fuel Storage Installation." ML22068A189. March 9, 2022.