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PG&E Letter DCL-03-126

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

Docket No. 50-275, OL-DPR-80  
Docket No. 50-323, OL-DPR-82  
Diablo Canyon Units 1 and 2  
Request for Exemption From 10 CFR 50.68, "Criticality Accident Requirements" for  
Spent Fuel Cask Handling

Dear Commissioners and Staff:

PG&E submitted a request to amend Facility Operating License Nos. DPR-80 and DPR-82 to allow handling and loading of Holtec International's multi-purpose canisters (MPCs) and transfer cask at Diablo Canyon Power Plant (DCPP), in letter DCL-02-044, "License Amendment Request 02-03, Spent Fuel Cask Handling," dated April 15, 2002. Enclosure 2 to License Amendment Request (LAR) 02-03 requested extension of the exemption from the criticality monitoring requirements of 10 CFR 70.24, granted by the NRC on November 12, 1997, to envelope the activities associated with MPC loading as described in the LAR.

Subsequent to submittal of LAR 02-03, PG&E notified the NRC (in letter DCL-02-117, "Change in Licensing Basis Compliance from 10 CFR 70.24 to 10 CFR 50.68(b)", dated September 27, 2002) that it will revise the DCPP licensing basis to reflect compliance with 10 CFR 50.68(b) and 10 CFR 70.24(d) in lieu of 10 CFR 70.24, as modified by an exemption from the criticality monitoring requirements of 10 CFR 70.24, granted by the NRC on November 12, 1997. Therefore, the request for extension of the 1997 exemption to cover new conditions described in LAR 02-03 is no longer appropriate. Accordingly, pursuant to 10 CFR 50.12(a), Specific Exemptions, PG&E hereby requests exemption from 10 CFR 50.68(b)(1), "Criticality Accident Requirements" for Diablo Canyon Power Plant (DCPP) Units 1 and 2 for handling of the 10 CFR 72 licensed contents of the Holtec HI-STORM 100 Cask System.

On September 26, 2003, NRC issued Amendment No. 162 to Facility Operating License No. DPR-80 and Amendment No. 163 to Facility Operating License No. DPR-82 for Diablo Canyon Power Plant Units 1 and 2, respectively for changes to

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the DCCP Final Safety Analysis Report Update that were required to implement a dry cask Independent Spent Fuel Storage Installation. The September 26, 2003 NRC letter noted that the proposed request for an exemption from 10 CFR 50.68 which was submitted with LAR 02-03 would be reviewed separately.

If you have any questions regarding this request for exemption, please contact Mr. Terence Grebel at (805) 545-4160.

Sincerely,

Lawrence F. Womack  
*Vice President Nuclear Services*

pns3/4998

Enclosures

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cc/enc: Girija S. Shukla

**REQUEST FOR EXEMPTION FROM 10 CFR 50.68(B)(1),  
CRITICALITY ACCIDENT REQUIREMENTS**

**A. INTRODUCTION**

Subsequent to submittal of License Amendment Request (LAR) 02-03, PG&E notified the NRC, (in letter DCL-02-117, "Change in Licensing Basis Compliance from 10 CFR 70.24 to 10 CFR 50.68(b)", dated September 27, 2002), that it will revise the DCPD licensing basis to reflect compliance with 10 CFR 50.68(b) and 10 CFR 70.24(d) in lieu of 10 CFR 70.24, as modified by an exemption from the criticality monitoring requirements of 10 CFR 70.24, granted by the NRC on November 12, 1997. Therefore, the request for extension of the 1997 exemption to cover new conditions described in LAR 02-03 is no longer appropriate, and is replaced with this request. NRC letter dated September 26, 2003 which issued License Amendment No. 162 to Facility Operating License No. DPR-80 and Amendment No. 163 to Facility Operating License No. DPR-82 for the DCPD Units 1 and 2 respectively, noted the exemption request submitted with LAR 02-03 would be reviewed separately.

Pursuant to 10 CFR 50.12(a), Specific Exemptions, PG&E hereby requests exemption from 10 CFR 50.68(b)(1), "Criticality Accident Requirements" for Diablo Canyon Power Plant (DCPD) Units 1 and 2 for handling of the 10 CFR 72 licensed contents of the Holtec HI-STORM 100 Cask System.

**B. REGULATORY REQUIREMENTS**

10 CFR 50.68(b) sets forth requirements to be met, in lieu of a monitoring system capable of detecting criticality events. Those requirements include:

- (1) Plant procedures shall prohibit the handling and storage at any one time of more fuel assemblies than have been determined to be safely subcritical under the most adverse moderation conditions feasible by unborated water.
- (2) Not relevant to the exemption request – (applies to fresh fuel in fresh fuel storage racks).
- (3) Not relevant to the exemption request – (applies to fresh fuel in fresh fuel storage racks).
- (4) Not relevant to the exemption request – (applies to spent fuel in spent fuel racks only, provided for background information). If no credit for soluble boron is taken, the k-effective of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with unborated water. If credit is taken for soluble boron, the k-effective of the

spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with borated water, and the k-effective must remain below 1.0 (subcritical), at a 95 percent probability, 95 percent confidence level, if flooded with unborated water.

- (5) Not relevant to this exemption request – (applies to non-fuel Special Nuclear Material (SNM) only).
- (6) Radiation monitors are provided in storage and associated handling areas when fuel is present to detect excessive radiation levels and to initiate appropriate safety actions.
- (7) The maximum nominal U-235 enrichment of the fresh fuel assemblies is limited to five (5.0) percent by weight.
- (8) The FSAR is amended no later than the next update which §50.71(e) of this part requires, indicating that the licensee has chosen to comply with §50.68(b).

### **C. JUSTIFICATION FOR GRANTING THE EXEMPTION REQUEST**

Regulation 10 CFR 50.12 (a) allows licensees to apply for an exemption from the requirements of Part 50 if the regulation is not necessary to achieve the underlying purpose of the rule and other conditions are met. PG&E believes that 10 CFR 50.68(b)(1) is not necessary for handling the 10 CFR 72 licensed contents of the Cask System, to achieve the underlying purpose of the rule, for the following reasons:

- (a) The design features of the Holtec multi-purpose canister (MPC) assembly preclude accidental criticality within the MPC for its licensed contents. The MPC is part of the Cask System licensed under 10 CFR Part 72. While the design credits borated water to prevent criticality with certain fuel loads, there is no credible dilution mechanism for the borated water in the MPC. Thus design and procedural controls provide assurance there will be no accidental criticality, and;
- (b) The purpose of the criticality monitors, required if this exemption is not granted, would be to ensure personnel would be alerted to a criticality event during the handling of SNM (includes fuel assemblies) and would take appropriate action. Such an accident is not credible, as noted in (a) above. Nonetheless, PG&E has radiation monitors, as required by General Design Criterion (GDC) 63, in the affected fuel storage and handling areas. These monitors will alert personnel to excessive radiation levels and allow them to initiate appropriate safety actions.

The  $k_{\text{eff}}$  ratio for the MPC is maintained below 0.95, including uncertainties, for MPCs with all allowable fuel loads. Depending on the fuel characteristics, the 10 CFR Part 72 licensing basis requires the use of borated water in the MPC to maintain  $k_{\text{eff}}$  below 0.95. Appropriate boration is ensured by a number of procedural requirements, as specified in the proposed Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI) Technical Specifications (TS) and the Diablo Canyon ISFSI Safety Analysis Report (SAR). In addition, the criticality analysis has a number of conservatisms, as highlighted below.

Radiation monitors, as required by GDC 63, are provided in fuel storage and handling areas to detect excessive radiation levels and to initiate appropriate safety actions. As discussed in Section 9.1.2.2 of the DCCP Final Safety Analysis Report (FSAR) Update, spent fuel pool (SFP) radiation monitors RM-58 and RM-59 provide for personnel protection and general surveillance of the SFP area. Continuous monitoring and recording readouts and high radiation level alarms in the control room, plus local audible and visual indicators, are provided. Portable radiation monitors are used to provide for personnel protection and general surveillance in the cask washdown area (CWA). They are provided with local audible and visual indication.

The low probability of an inadvertent criticality, together with adherence to GDC 63, achieve the underlying purpose and constitute a basis for granting an exemption to the requirement of 10 CFR 50.68(b)(1) for onsite Cask System operations.

Specific requirements for granting exemptions from the provisions of 10 CFR 50 are set forth in 10 CFR 50.12, "Specific exemptions". Under 10 CFR 50.12 (a), the NRC is authorized to grant exemptions upon a demonstration that the exemptions are: (1) authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security, and (2) special circumstances are present.

Special circumstances are present whenever:

- "(i) Application of the regulation in the particular circumstances conflicts with other rules or requirements of the Commission; or
  - (ii) Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule; or
  - (iii) Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated; or
- ..."

The following analysis addresses each of these requirements and demonstrates that the NRC should grant the requested exemption.

1. The exemption is authorized by law.

The NRC's authority to grant requests for exemptions from 10 CFR 50 is codified in 10 CFR 50.12. Similar authority, codified in 10 CFR 70.14, has been used to grant similar exemptions from the criticality monitoring requirements of 10 CFR 70.24. Therefore, the granting of exemptions is explicitly authorized by the NRC's regulations. The proposed exemption will not present an undue risk to the public health and safety, and is consistent with the common defense and security. As described below, the use, storage, and handling of SNM at DCPD provides adequate protection of the health and safety of the public, and precludes loss or diversion of SNM. In particular, this discussion focuses on the following points: design characteristics, technical specification requirements, procedural controls, and existing accident analyses as applied to the deployment of the Cask System at DCPD.

#### *Use of Special Nuclear Material*

SNM is present at DCPD Units 1 and 2, principally in the form of nuclear fuel.

Accidental criticality of SNM while in the Cask System is precluded through compliance with the proposed Diablo Canyon ISFSI TS requirement of a dissolved boron concentration in the MPC, criticality control design features of the MPC and Cask System, and design and operating controls and limits as defined in the Diablo Canyon ISFSI SAR. These measures include design and analyses to ensure criticality margins are maintained with any allowable load, uncertainties, and accident conditions, and MPC loading plan to ensure 10 CFR 72 licensed loading requirements are met, with multiple independent verifications of the plan and its implementation.

Criticality design and analyses are described in detail in the Diablo Canyon ISFSI SAR, Sections 3.3.1.4 and 4.2.2.3.5, which reference Chapter 6 of the HI-STORM 100 Cask System FSAR. There are a number of conservative assumptions used in the HI-STORM 100 Cask System criticality analyses, including not taking credit for fuel burnup or fuel-related burnable neutron absorbers, and only crediting 75 percent of B-10 isotope loading in the Boral neutron absorbers in the MPC fuel cell basket.

Finally, since access to the SNM in the MPC is controlled in the same manner as other SNM through appropriate procedures and safeguards (see "Handling of Special Nuclear Material"), there are no concerns associated with loss or diversion of the SNM.

*Storage of Special Nuclear Material*

SNM, in the form of 10 CFR 72 licensed contents, is located temporarily in one additional location not previously described – within the Cask System. The Cask System is designed to preclude criticality by:

- (1) incorporation of permanent neutron absorbing material (Boral) attached to the MPC fuel basket walls with a minimum required loading of the  $^{10}\text{B}$  isotope,
- (2) favorable geometry provided by the MPC fuel basket,
- (3) loading of fuel assemblies is performed in water with a soluble boron content as specified in the proposed Diablo Canyon ISFSI TS, and
- (4) design of the Cask System to withstand postulated load handling events with the acceptance criteria of no adverse effects on the criticality configuration of contents in the MPC.

Analyses demonstrate with these features that  $k_{\text{eff}}$  is maintained at less than 0.95 under all conditions, including accidents.

*Handling of Special Nuclear Material*

The handling of SNM in the Cask System is discussed in this exemption request and in the Diablo Canyon ISFSI SAR. In all cases, it is procedurally controlled and structures, systems, and components are designed to preclude conditions involving criticality concerns.

Moreover, as noted above, accident analyses have demonstrated that a postulated fuel handling accident (i.e., a dropped fuel assembly) will not create conditions that exceed design basis limits. In addition, the proposed Diablo Canyon ISFSI TS and SAR specifically address the limiting conditions for use of the Cask System to ensure against an accidental criticality event.

The procedural controls discussed above ensure that handling of SNM is authorized and monitored, thus minimizing the potential opportunity for loss or diversion. Consequently, the issuance of the required exemption would not affect the capability to ensure that SNM is safeguarded during handling.

Therefore, conformity with the requirement of 10 CFR 50.68(b)(1) is not necessary for the handling of SNM, and granting of this exemption request will not endanger life or property or the common defense and security.

It should be noted that, in the event this exemption request is granted, PG&E will remain in compliance with the requirements of 10 CFR 50.68(b)(1) and 10 CFR 50, Appendix A, GDC 18, 1967 (equivalent to GDC 63, 1971), for onsite SNM management, exclusive of Cask System operations.

As discussed in Section 9.1.2.2 of the DCPD FSAR Update, SFP radiation monitors RM-58 and RM-59 provide for personnel protection and general surveillance of the SFP area. Continuous monitoring and recording readouts and high radiation level alarms in the control room, plus local audible and visual indicators, are provided. Portable radiation monitors are used to provide for personnel protection and general surveillance in the CWA. They are provided with local audible and visual indication.

In the event of a radiation monitor alarm, workers qualified to work in radiologically-controlled areas are trained, as a part of the General Employee Training, to either respond to guidance from chemistry and radiation protection (C&RP) personnel that might be in the area, or to evacuate the area immediately and report the alarm to C&RP personnel at Access Control.

## 2. Special circumstances are present

The following "special circumstances" identified in 10 CFR 50.12 (a)(2), are applicable:

- (a)(2)(ii) Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule; or
- (a)(2)(iii) Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated.

Each of these 10 CFR 50.12(a)(2) criteria are reviewed below.

- (a)(2)(ii) Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

The explicit language of 10 CFR 70.24 does not identify the purpose(s) for requiring an accidental criticality monitoring system and the associated emergency procedures. However, the NRC has stated, in their November 12, 1997 exemption, "The purpose of the criticality monitors

required by 10 CFR 70.24 is to ensure that if a criticality were to occur during the handling of SNM, personnel would be alerted to that fact and would take appropriate action.”

As discussed above, the design characteristics of, and safety analyses for, the Holtec HI-STORM 100 Cask System, as well as the associated procedural controls and technical specification requirements, ensure that conditions for accidental criticality are precluded. Nonetheless, in the very unlikely event of a criticality event, monitors will provide indications and alarms, as described herein.

Therefore, the application of 10 CFR 70.24(a) to DCPD Units 1 and 2 would not serve, and is not necessary to achieve, the underlying purpose of this requirement, and an exemption from the requirements of 10 CFR 50.68(b)(1) for handling of the 10 CFR 72 licensed contents of the Holtec HI-STORM 100 Cask System is justified.

(a)(2)(iii) Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated.

A criticality accident monitoring system requires a considerable expenditure of resources, including the design and installation of the system, the development and implementation of any associated emergency procedures, and the operation and maintenance of the system for the life of the plant. In light of the purpose of an accidental criticality monitoring system, the expenditures could otherwise be put to better use improving the operation of the plant. Accordingly, compliance with 10 CFR 50.68 (b)(1) for handling of the 10 CFR 72 licensed contents of the Holtec HI-STORM 100 Cask System would result in an undue hardship and other costs that are significantly in excess of those likely contemplated when this regulation was adopted.

#### **D. CONCLUSION**

The low probability of an inadvertent criticality during Cask System operations, together with adherence to GDC 63, constitutes good cause for granting an exemption to the requirement as requested.

Because exemption from the requirement of 10 CFR 50.68(b)(1) for handling of the 10 CFR 72 licensed contents of the Holtec HI-STORM 100 Cask System is authorized by law, will not present an undue risk to the public health and safety, is

consistent with the common defense and security, for which special circumstances are present, and is requested for good cause, we respectfully submit that, in accordance with the requirements of 10 CFR 50.12(a), the NRC should grant the requested exemption.