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April 7, 2008

PG&E Letter DIL-08-002

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

Materials License No. SNM-2511, Docket No. 72-26
Diablo Canyon Independent Spent Fuel Storage Installation

License Amendment Request 08-001
Revision to Technical Specifications 3.1.1, 3.1.4, 3.2.1, 4.1, 4.3, and 5.1.3

Dear Commissioners and Staff:

Enclosed is an application for amendment to Materials License No. SNM-2511, Docket No. 72-26, for the Diablo Canyon Independent Spent Fuel Storage Installation in accordance with 10 CFR 72.56. The enclosed License Amendment Request (LAR) proposes the following technical specification (TS) changes:

(1) TS 3.1.1, "Multi-Purpose Canister (MPC)," is proposed to clarify the required helium leak rate condition and the leak rate testing requirements. This is consistent with the Holtec International Certification of Compliance (CoC) No.1014, Amendment 3, for the HI-STORM 100 system.

(2) TS 3.1.4, "Spent Fuel Storage Cask (SFSC) Time Limitation in Cask Transfer Facility (CTF)," is proposed to be eliminated. Elimination of this TS is based on analysis of the thermal performance of the HI-STORM 100 system which shows there is no need for a required time limitation in the CTF.

(3) TS 3.2.1, "Dissolved Boron Concentration," is proposed to modify the dissolved boron concentrations required for MPC-32 canisters and, to allow linear interpolation for some enrichments consistent with the Holtec International CoC No.1014, Amendment 3, for the HI-STORM 100 system.

(4) A note is proposed to be added to both surveillance requirements of TS 3.2.1, to limit the monitoring requirement consistent with the Holtec International CoC No.1014, Amendment 1, for the HI-STORM 100 system.

NMSS01

(5) TS 4.1, "Design Features Significant to Safety," is proposed to be revised to allow use of Metamic as a neutron absorber. Metamic was approved for use in the Holtec International HI-STORM 100 system in the HI-STORM 100 CoC No. 1014 Amendment 2.

(6) The title of TS 4.3.4.a, "Permanent Load Handling Equipment," is proposed to be changed to "Weldment and Reinforced Concrete."

(7) TS 4.3.4.b, "Mobile Load Handling Equipment," is proposed to be clarified by identifying the "permanent load handling equipment" as "the cask transporter," and

(8) TS 5.1.3, "MPC and SFSC Loading, Unloading, and Preparation Program," is proposed to be modified to clarify the required maintenance of conditions in the annular gap between the MPC and the HI-TRAC transfer cask during the moisture removal processes.

Enclosure 1 contains descriptions of the proposed changes and the supporting technical analyses. Enclosures 2 and 3 contain marked-up and revised TS pages, respectively. Enclosure 4 contains changes to the TS Bases related to this request. The TS Bases changes are provided here for information only, and will only be implemented as part of the TS 5.1.1 Technical Bases Control Program after approval and implementation of the related license amendment.

Pacific Gas and Electric Company (PG&E) has determined that this LAR is consistent with the considerations that govern the issuance of initial license per 10 CFR 72.58. Pursuant to 10 CFR 51.22(b), an environmental assessment does not need to be prepared since the proposed change does not involve a significant change in the types or in the amounts of any effluent that may be released offsite, or a significant increase in the individual or cumulative occupational radiation exposure.

The change in this LAR is not required to address an immediate safety concern. PG&E requests approval of this LAR be assigned a medium priority for review and approval, and requests that the amendment be issued no later than April 2009. PG&E requests the LAR be made effective upon NRC issuance, to be implemented within 90 days of issuance.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 7, 2008.

If you have any questions or require additional information, please contact Mr. Terence Grebel at (805) 545-4160.

Sincerely,

James R. Becker
Site Vice President and Station Director

tlg/4160
Enclosures

cc: Elmo E. Collins, NRC Region IV
Michael S. Peck, NRC Senior Resident Inspector
Alan B. Wang, NRC Project Manager
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cc/enc: James R. Hall, NRC Senior Project Manager

EVALUATION

1.0 DESCRIPTION

This License Amendment Request (LAR) proposes to amend Materials License SNM-2511 (Reference 1) for the Diablo Canyon (DC) Independent Spent Fuel Storage Installation (ISFSI).

The proposed change would clarify the required helium leak rate condition and the leak rate testing requirements in Technical Specification (TS) 3.1.1, "Multi-Purpose Canister (MPC)," which is consistent with the Holtec International Certification of Compliance(CoC) No.1014, Amendment 3, for the HI-STORM 100 system (Reference 2).

The proposed change would eliminate DC ISFSI TS 3.1.4, "Spent Fuel Storage Cask (SFSC) Time Limitation in Cask Transfer Facility (CTF)," based on an analysis of the thermal performance of the DC ISFSI site specific HI-STORM 100 system, which shows there is no need for a required time limitation while in the CTF.

The proposed change modifies the dissolved boron concentrations required in the Limiting Condition for Operation (LCO) for TS 3.2.1, "Dissolved Boron Concentration," for MPC-32 canisters, and allows linear interpolation for some enrichments consistent with the Holtec International HI-STORM 100 CoC No.1014, Amendment 3, for the HI-STORM 100 system.

The proposed change adds a Note to the Surveillance Requirements (SR) of TS 3.2.1, "Dissolved Boron Concentration," to limit the monitoring requirement consistent with the Holtec International CoC No.1014, Amendment 1, for the HI-STORM 100 system (Reference 3).

The proposed changes would revise TS 4.1, "Design Features Significant to Safety," to allow the use of either Boral or Metamic as a neutron absorber. Metamic has been previously approved for use in the Holtec International HI-STORM 100 system in the Holtec International CoC No. 1014, Amendment 2, for the HI-STORM 100 system (Reference 4).

The proposed change would revise the title of TS 4.3.4.a, "Permanent Load Handling Equipment," to "Weldment and Reinforced Concrete," which would clarify the subject of the TS.

The proposed change in TS 4.3.4.b, "Mobile Load Handling Equipment," would replace "permanent load handling equipment" with "the cask transporter." This change would properly identify the transporter as not being mobile load handling equipment. The TS 5.1.3, "MPC and SFSC Loading, Unloading, and Preparation Program," change would clarify the required maintenance of conditions in the annular gap between the MPC and the HI-TRAC transfer cask for moisture removal during MPC loading or unloading operations.

2.0 PROPOSED CHANGE

This LAR proposes to revise TSs 3.1.1, 3.1.4, 3.2.1, 4.1, 4.3.4, and 5.1.3, as described below, and the specific wording changes are shown in Enclosure 2:

(1) TS 3.1.1 would be revised to clarify the required helium leak rate condition and the leak rate testing requirements.

(2) TS 3.1.4 would be deleted.

(3) TS 3.2.1 would modify the dissolved boron concentrations required for MPC-32 canisters and to allow linear interpolation of the concentration for some enrichments.

(4) TS 3.2.1 would be revised to add a Note to SR 3.2.1.1 and 3.2.1.2 as follows, "These surveillances are only required to be performed if the MPC is submerged in water or if water is to be added to, or recirculated through the MPC."

(5) TS 4.1.1.a, b and c would be revised to add Metamic Boron-10 requirements for each of the specified MPC, and TS 4.1.2, "Design Features Important to Criticality Control," would be added to define the material and testing requirements for the use of Metamic.

(6) The title of TS 4.3.4.a would be revised to "Weldment and Reinforced Concrete," which more correctly reflects its subparagraphs.

(7) TS 4.3.4.b would be revised by replacing the term "permanent load handling equipment" with "the cask transporter" as the transporter is not considered a mobile load handling equipment in the context of TS 4.3.4.b.

(8) Item (b) of Section 5.1.3, "MPC and SFSC Loading, Unloading, and Preparation Program," would be revised to clarify the maintenance of the required conditions in the annulus gap between the MPC and the transfer cask depending on which drying process is used and fuel heat load during MPC loading or unloading operations.

3.0 BACKGROUND

On March 22, 2004, the NRC issued Materials License No. SNM-2511 to the Pacific Gas and Electric Company (PG&E) to receive, possess, store, and transfer spent fuel and associated radioactive materials resulting from operation of the Diablo Canyon Power Plant (DCPP) in an ISFSI. The DC ISFSI uses the

HI-STORM 100 system, which includes the HI-STORM 100SA overpack, HI TRAC 125D transfer cask and a MPC. The DC ISFSI operation uses the transfer cask to transport a loaded MPC from the spent fuel pool to a CTF located in the vicinity of the ISFSI pads. At the CTF the MPC is transferred from the transfer cask to the overpack for long term storage at the ISFSI.

TS 3.1.1

In the issued Materials License No. SNM-2511, the TS provided for a maximum helium leak rate that would be verified through leak testing through the MPC lid confinement weld and the drain and vent port confinement welds. The proposed change would clarify both the required helium leak rate condition and the leak rate testing requirements in TS 3.1.1, to be consistent with the requirements of the Holtec International CoC No.1014, Amendment 3, for the HI-STORM 100 system.

TS 3.1.4

The HI-STORM 100 system is a passive system which depends on natural air circulation through a vent system to provide any necessary cooling during the storage of spent fuel at the ISFSI. When a loaded MPC is placed in the overpack while in the CTF, there is a reduction of available air flow for natural circulation cooling. At the time of the DC ISFSI license application, PG&E conservatively included a TS that limited the time a loaded overpack could remain in the CTF to ensure that there were no heatup issues as a result of the reduction in air flow. Holtec International has since performed a site-specific analysis for the DC configuration (Reference 5). The analysis determined that the overpack and its loaded MPC will reach steady state temperatures and pressures that are less than the short-term temperature limits and allowable pressures limits for any of the HI-STORM 100 system components and the fuel cladding. Therefore, no time limitation for the MPC transfer activities is required.

TS 3.2.1

The application for the DC ISFSI Materials License was based on the TS requirements as specified in the HI-STORM CoC No. 1014, as proposed to be amended in Holtec LAR 1014-1, including Supplements 1 through 4 to that LAR. As a result, DC ISFSI TS 3.2.1 set the limits on dissolved boron concentration for the MPC-32 canister at two levels; one for enrichments of less than or equal to 4.1 wt-percent U-235 of 2000 ppmb; and one for enrichments of greater than 4.1 wt-percent, but less than or equal to 5.0 wt-percent U-235 of 2600 ppmb. The proposed modification to LCO 3.2.1 allows linear interpolation between minimum soluble boron concentrations when loading fuel enriched between 4.1 wt-percent and 5.0 wt-percent in the MPC-32. The current TS requires that any fuel over 4.1 wt-percent enrichment be loaded under the requirements for 5.0 wt-percent enriched fuel, which is very conservative and requires large swings in the soluble boron concentration of the fuel pool (e.g., up to an additional 600 ppm ^{10}B concentration).

In the Holtec International CoC No.1014, Amendment 3, for the HI-STORM 100 system, allows linear interpolation between minimum soluble boron concentrations when loading fuel enriched to 4.1 wt-percent and 5.0 wt-percent in the MPC-32. As discussed in the CoC, the linear interpolation was permitted because the maximum multiplication factor is a near linear function of both enrichment and soluble boron concentration. This function demonstrates a saturation effect in which the reduction in reactivity for the same increase in the soluble boron concentration is reduced for higher soluble boron concentrations, and that a linear interpolation would result in a slight overestimation of the minimum soluble boron concentration for the analyzed enrichments and is conservative. The NRC reviewed this assessment as documented in the Safety Evaluation Report (SER) to Holtec International CoC No. 1014, Amendment 3, for the HI-STORM 100 system (Reference 6).

In the DC ISFSI TS 3.2.1 on dissolved boron concentration there is no limitation on the applicability of the SRs for the boron concentration in the MPC. However, in an effort to provide operational flexibility, reduce potential occupational dose, and to make TS 3.2.1 consistent with the current Holtec HI-STORM 100 system licensing bases, a note is being proposed to limit the applicability of the surveillance requirements to only when the boron concentration could be changed.

<u>TS 4.1.1, "Criticality Control," and TS 4.1.2</u>

Materials License No. SNM-2511 for the DC ISFSI incorporates the MPC capabilities as specified in the HI-STORM CoC No. 1014, as proposed to be amended in Holtec LAR 1014-1 (Reference 7). Since the issuance of Materials License SNM-2511, the NRC issued a SER for the HI-STORM 100 CoC, Amendment 2 (Reference 8). The HI-STORM 100 CoC, Amendment 2, allows MPCs in the HI-STORM 100 System to be manufactured with one of two possible neutron absorber materials: Boral or Metamic. Both materials are made of aluminum and B_4C powder. Boral has an inner core layer consisting of a combination of B_4C and aluminum powder, which is contained between two outer layers consisting of aluminum only. Metamic is a single layer material with the same overall thickness and the same credited ^{10}B loading. Metamic is a metal matrix composite consisting of a matrix of 6061 aluminum alloy reinforced with Type 1 ASTM C-750 boron carbide. The NRC SER for HI-STORM 100 System CoC, Amendment 2, found the use of Metamic to be acceptable. The NRC also had previously approved the use of Metamic in the Humboldt Bay ISFSI Materials License SNM-2514 (Reference 9). PG&E desires to have the flexibility to utilize either Boral or Metamic in MPCs employed for use at the DC ISFSI. The use of Metamic is being provided as an alternative and does not alter the license configuration of the MPC fuel baskets in any way.

TS 4.3.4.a and TS 4.3.4.b

TS 4.3.4 was intended to specify the requirements for the CTF Structure. The current title of TS 4.3.4.a, "Permanent Load Handling Equipment," does not correctly reflect the subject of TS 4.3.4. It also does not reflect its subparagraphs (TS 4.3.4.a.1 and TS 4.3.4.1.b), which properly reflect the CTF structure requirements and have nothing to do with permanent load handling equipment. As a result, the title of TS 4.3.4.a will be revised to read, "Weldment and Reinforced Concrete."

The reference to permanent load handling equipment in TS 4.3.4.b will be clarified to mean the cask transporter. The cask transporter is not considered covered by this TS and its requirements are specifically included in TS 4.3.1. This clarification to TS 4.3.4.b ensures that the scope of what is covered by this TS is accurate.

TS 5.1.3

The DC ISFSI was licensed with the capability of using two drying systems: (1) a system that operates based on removing the moisture in the MPCs through the use of vacuum, or (2) a forced helium dehydration (FHD) system, which circulates helium to remove the moisture. The vacuum system is only licensed for use on low burn up fuel (≤ 45,000 MWD/MTU). The FHD can be used on all the low burnup fuel licensed to be stored at the DC ISFSI and is capable of being used on higher burnup fuel (≥ 45,000 MWD/MTU), which is in use at the DCPP, but not currently licensed for storage at the DC ISFSI.

The HI-STORM 100 System provides an annular gap between the outside surface of the MPCs and the inside surface on the transfer cask. This gap provides some cooling capability to the drying process when it is filled with water and can be continually flushed for further cooling capability. As stated in Section 10.2.2.1 of the DC ISFSI Final Safety Analysis Report Update (UFSAR) (Reference 10) for use of the vacuum system at DC ISFSI, this annular gap needs to be maintained full and for fuel heat loads greater than 20.8 kW and must also be continually flushed to provide adequate cooling during the drying process. UFSAR Section 10.2.2.1 also states that when using the FHD system there are no water requirements for the annular gap. For the FHD process, the presence of water in the annular gap may actually slow the drying process as the FHD requires higher process temperatures than the vacuum system to adequately dry the MPCs and water would act to lower those temperatures. This LAR proposes to revise TS 5.1.3 for the DC ISFSI to clarify the maintenance of the required conditions for the annular gap for each drying systems and fuel heat load.

4.0 TECHNICAL ANALYSIS

TS 3.1.1, "Multi-Purpose Canister (MPC)"

Interim Staff Guidance (ISG)-18, "The Design/Qualification of Final Closure Welds on Austinetic Stainless Steel Canisters as Confinement Boundary for Spent Fuel Storage and Containment Boundary for Spent Fuel Transportation," provides relief from the helium leak test requirement for the structural lid to shell weld. This is acceptable if the associated welds are performed with at least two weld passes, and with liquid penetrant examinations of the root and final weld passes. No other welds were intended to be subject to this relief. As a result, Holtec revised the HI-STORM 100 Cask System CoC, to eliminate the helium leak testing for the structural lid to shell weld, and to continue to implement leakage testing of the vent and drain port cover plates. The HI-STORM 100 FSAR was also revised to be consistent with the criteria in the CoC TS. The NRC accepted this with the issue of Amendment 3 to the Holtec HI-STORM 100 CoC in 2007.

TS 3.1.4, "Spent Fuel Storage Cask (SFSC) Time Limitation in Cask Transfer Facility (CTF)"

A new thermal analysis, Holtec International Report HI-2053376, "Thermal-Hydraulic Analyses for Diablo Canyon Site-Specific HI-STORM System Design," (Reference 5) was performed for transfer activities in the CTF based on the site specific HI-STORM 100 system components being used at the DC ISFSI. The previous thermal analysis indicates that, of the MPC 24, 24E, 24EF, and 32 designs licensed for the DC ISFSI, the MPC-32 has the highest design-basis decay heat load, and always yields the highest cask system component and contents temperatures and the highest MPC internal pressures. As such, only the MPC-32 was evaluated in the new analysis and the MPC-24, MPC-24E, and MPC-24EF thermal performance will be bounded by that of the MPC-32 under all conditions. The methodology used in this analysis is identical to those described in the DC ISFSI UFSAR and Holtec's HI-STORM 100 System FSAR, Revision 0, as modified by LAR 1014-1. All of the assumptions described in the DC ISFSI UFSAR and the HI-STORM 100 System FSAR, Revision 0, as modified by LAR 1014-1, were applied without modification to the new analyses. The one additional assumption provided in the new analyses is an assumed boundary condition for the loaded HI-STORM in the CTF. The boundary condition is that the CTF being a steel cylinder and backed by concrete is a perfect insulator that does not permit heat from the HI-STORM to be absorbed by the CTF structure and the surrounding soil. This conservatively maximizes the computed temperatures of both the HI-STORM and the CTF.

This analysis also included an off-normal condition of a loaded HI-STORM overpack that cannot be removed from the CTF because of an equipment failure. Under such a condition, the flow of air to the bottom inlet vents would be restricted. The result of the analysis shows that all of the calculated steady state temperatures and pressures for all of the DC ISFSI HI-STORM 100 system components remain below the allowables for those components and are acceptable

The calculated and allowable steady state temperatures and pressures are provided below.

Temperature Results for HI-STORM in CTF Condition

Component	Computed Temperature [°F]	Allowable Temperature [°F]
Fuel Cladding	732	1058
MPC Basket	702	950
MPC Shell	401	775
MPC Helium Bulk	497	N/A
Inner Shell	267	400
Outer Shell	178	600
Radial Shield	223	350
CTF Inner Surface	138	N/A

MPC Internal Pressure Limits

Design Condition	Design Pressure Limit [psia]	Calculated Condition	Calculated Internal Pressure [psia]
Normal/Off-Normal	114.7	0% rods ruptured	86.8
Off-Normal	114.7	1% rods ruptured	87.9
Off Normal	114.7	10% rods ruptured	98.0
Accident	214.7	100% rods ruptured	198.3

TS 3.2.1

The DC ISFSI materials license was based on the TS requirements as specified in the HI-STORM CoC No. 1014, as proposed to be amended in Holtec LAR 1014-1, including Supplements 1 through 4 to that LAR. As a result, in the DC ISFSI TS 3.2.1 on dissolved boron concentration, the limits for the MPC-32 canister were set at two levels; one for enrichments of less than or equal to 4.1 wt-percent U-235 of 2000 ppmb; and one for enrichments of between greater than 4.1 wt-percent and less than or equal to 5.0 wt-percent U-235 of 2600 ppmb.

The proposed modification to LCO 3.2.1 allows linear interpolation between minimum soluble boron concentrations when loading fuel enriched to 4.1 wt-percent and 5.0 wt-percent in the MPC-32. The current TS requires that any fuel over 4.1 wt-percent enrichment be loaded under the requirements for 5.0 wt-percent enriched fuel, which is very conservative and requires large swings in the soluble boron concentration of the fuel pool (e.g., up to an additional 600 ppm ^{10}B concentration).

In the Holtec International CoC No.1014, Amendment 3, for the HI-STORM 100 system, this was revised to allow linear interpolation between minimum soluble boron concentrations when loading fuel enriched to 4.1 wt-percent and 5.0 wt-percent in the MPC-32 for further flexibility. As discussed in that document, the linear interpolation is permitted because the maximum multiplication factor is a near linear function of both enrichment and soluble boron concentration. In fact, this function demonstrates a saturation effect in which the reduction in reactivity for the same increase in the soluble boron concentration is reduced for higher soluble boron concentrations and that a linear interpolation would result in a slight overestimation of the minimum soluble boron concentration for the analyzed enrichments and is conservative. The NRC reviewed this assessment and accepted it with issue of the amendment.

In the Holtec International CoC No. 1014, Amendment 3 for the HI-STORM 100 system, the limit for boron concentration at equal to 4.1 percent enrichment is 1900 ppmb, however, the TS for the DCPP 10CFR50 licenses maintain the spent fuel pool concentration at 2000 ppmb. For ease of operation the boron concentration in the ISFSI TS for equal to 4.1 percent enrichment will remain at 2000 ppmb. The 2000 ppmb is conservative to the 1900 ppmb and is therefore acceptable.

In support of loading and unloading spent fuel credit is taken in the criticality analyses for boron in the water within the MPC. To preserve this analysis basis, the dissolved boron concentration of the water in the MPC must be verified to meet the TS 3.2.1.

SRs 3.2.1.1 and 3.2.1.2 require that the boron concentration in the MPC continue to be verified to be within the applicable limits every 48 hours. This periodic surveillance ensures that any change in the boron concentration while it is in the SFP is identified. There is no need to re-verify the boron concentration of the water in the MPC once it has been established unless additions are made to the MPC water or the SFP water volumes, or water is recirculated through the MPC, because these are the only credible activities that could potentially change the dissolved boron concentration during this time. The 48-hour Completion Time for the re-verification is infrequent enough to prevent excessive operational dose exposure.

A note is added to SRs 3.2.1.1 and 3.2.1.2 clarifying that these surveillances are only required to be performed when the MPC is submerged in water, or if water is to be added to, or recirculated through the MPC holding approved contents. This note was provided and approved in the Holtec HI-STORM 100 CoC No.1014, Amendment 1. There is no need to re-verify the boron concentration of the water in the MPC once it has been established and removed from the SFP unless the MPC water is to be added to, or recirculated through the MPC, because these are the only credible activities that could potentially change the dissolved boron concentration once the MPC is out of the SFP. Therefore, monitoring boron concentration on a continual frequency, once the MPC leaves the SFP, is not necessary and would unnecessarily burden the loading and unloading activities, and increase the occupational dose received by plant personnel. However, while there is water in a loaded MPC either in or out of the SFP, any additions to or, recirculation of the water volume in the MPC, will procedurally require verification of the boron concentration to be within TS limits.

TS 4.1, "Design Features Significant to Safety"

The Metamic neutron absorber is being provided as an alternative to Boral. The use of Metamic will not physically change the licensed configuration of the MPC fuel baskets and the neutron absorber's relationship to the stored fuel assemblies. As discussed and approved in License Amendment 2 of the Holtec HI-STORM 100 CoC 1014, there are some variants to the assumptions made for the criticality analysis performed for use of the Metamic when compared to the Boral. However, these variants do not change the acceptability of using either Metamic or Boral.

To support the use of Boral or Metamic, the same technical specific verification and testing requirements are being added as TS 4.1.2 that were provided in HI-STORM 100 System CoC Amendment 2. These verification and testing requirements are based on the NRC approved requirements of the Holtec HI-STORM 100 System CoC Amendment 2 and a licensing condition of the Humboldt Bay ISFSI Materials License SNM-2514.

TS 4.3.4.a and TS 4.3.4.b

The modification to TS 4.3.4.a is to correct a TS title that is not supported by the information provided in it or its subparagraphs. TS 4.3.4.a is titled, "Permanent Load Handling Equipment." The paragraphs that follow TS 4.3.4.a specify the CTF weldment structure and reinforced concrete structure of the CTF, and do not specify cask transporter requirements. As such, TS 4.3.4.a should be titled, "Weldment and Reinforced Concrete." The text in TS 4.3.4.b discusses load handling equipment other than permanent load handling equipment. The permanent load handling equipment used at DCPP to transport the transfer cask between the power plant and CTF, transfer the MPC between the transfer cask and the storage cask at the CTF, and to transport the spent fuel storage cask from the CTF and ISFSI pad is the cask transporter. The requirements for the cask transporter are contained in TS 4.3.1 not in TS 4.3.4.b. Mobile load handling equipment discussed in TS 4.3.4.b refers to mobile lifting devices that may be called upon should the cask transporter become inoperable while an

MPC is inside the CTF. In order to clarify TS 4.3.4.b, the term "permanent load handling equipment" will be changed to "the cask transporter."

TS 5.1.3

The modification to TS 5.1.3.b is to clarify what conditions need to be maintained in the annular gap between the outside wall of the MPC and the inside wall of the transfer cask during the moisture removal processes based on the drying process being used and the fuel heat load.. These conditions are contained in the DC ISFSI UFSAR Section 10.2.2.1, "Annular Gap Water Requirements." This proposed change does not change the required conditions as set forth in DC ISFSI UFSAR, Section 10.2.2.1

5.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.41, Pacific Gas and Electric Company (PG&E) has reviewed the environmental impact of the proposed amendment, and has determined that it meets the criteria for categorical exclusion set forth in 10 CFR 51.22(c)(11). The proposed changes do not significantly change the type or significantly increase the amounts of any effluents that may be released offsite. There is no significant increase in individual or cumulative occupational radiation exposures.

6.0 PRECEDENCE

The elimination of unnecessary boron concentration monitoring during loading and unloading activities outside of the spent fuel pool is included in the Holtec International HI-STORM 100 Certificate of Compliance No. 1014, Amendment 1 (Reference 3).

The revisions to the helium leak testing requirements and the boron concentration interpolation are included in the Holtec International HI-STORM 100 Certificate of Compliance No. 1014, Amendment 3 (Reference 2).

The use of Metamic was previously approved by the NRC for the Holtec International HI-STORM 100 System in Amendment 2 of the HI-STORM 100 Certificate of Compliance No. 1014 (Reference 4) and for use at the Humboldt Bay ISFSI in Materials License SNM-2514 (Reference 9).

7.0 REFERENCES

1. Materials License No. SNM-2511 for the Diablo Canyon Independent Spent Fuel Storage Installation (TAC No. L23399) dated March 22, 2004.
2. Holtec International HI-STORM 100 Certificate of Compliance No. 1014, Amendment 3, dated May 29, 2007.

3. Holtec International HI-STORM 100 Certificate of Compliance No. 1014, Amendment 1, dated July 15, 2002.
4. Holtec International HI-STORM 100 Certificate of Compliance No. 1014, Amendment 2, dated June 7, 2005.
5. Holtec International Report HI-2053376, "Thermal-Hydraulic Analyses for Diablo Canyon Site-Specific HI-STORM System Design," Revision 5, dated February 5, 2008.
6. NRC Letter to Holtec International, Amendment No. 3 to Certificate of Compliance No. 1014 for the Holtec International HI-STORM 100 Cask System, May 29, 2007.
7. HI-STORM 100 System Final Safety Analysis Report, Revision 0, as modified by LAR 1014-1, Attachment 2 to Holtec Document ID 5014442.
8. NRC Letter to Holtec International, Amendment No. 2 to Certificate of Compliance No. 1014 for the Holtec International HI-STORM 100 Cask System, June 7, 2005.
9. Materials License No. SNM-2514 for the Humboldt Bay Independent Spent Fuel Storage Installation (TAC No. L23683) dated November 17, 2005.
10. Diablo Canyon Independent Spent Fuel Storage Installation Final Safety Analysis Report Update, Revision 1.

Proposed Technical Specification Changes (mark-up)

TABLE OF CONTENTS

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. MPC helium leak rate limit *for vent and drain port cover plate welds* not met.	C.1	Perform an engineering evaluation to determine the impact of increased helium leak rate on heat removal capability and offsite dose.	24 hours
	<u>AND</u>		
	C.2	Develop and initiate corrective actions necessary to return the MPC to an analyzed condition.	7 days
D. Required Actions and associated Completion Times not met.	D.1	Remove all fuel assemblies from the MPC.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.1.1	Verify MPC cavity vacuum drying pressure is ≤ 3 torr for ≥ 30 min. <u>OR</u> While recirculating helium through the MPC cavity, verify that the gas temperature exiting the demoisturizer is ≤ 21°F for ≥ 30 min.	Once, prior to TRANSPORT OPERATIONS.
SR 3.1.1.2	Verify MPC helium backfill pressure is ≥ 29.3 psig and ≤ 33.3 psig.	Once, prior to TRANSPORT OPERATIONS.
SR 3.1.1.3	Verify that the total helium leak rate through the MPC ~~lid confinement weld~~*vent* and ~~the~~ drain ~~and vent~~ port confinement welds *meets the leaktight criteria of ANSI N14.5-1977.*~~is ≤ 5.0E-6 atm-cc/sec (He).~~	Once, prior to TRANSPORT OPERATIONS.

3.1 SPENT FUEL STORAGE CASK (SFSC) INTEGRITY

3.1.4 ~~Spent Fuel Storage Cask (SFSC) Time Limitation in Cask Transfer Facility (CTF)~~*Intentionally left blank*

~~LCO 3.1.4~~ ~~The SFSC shall not be in the CTF for greater than 22 Hours~~

~~APPLICABILITY:~~ ~~During TRANSPORT OPERATIONS while the SFSC is in the CTF.~~

~~ACTIONS~~

~~NOTE~~

~~Separate Condition entry is allowed for each SFSC.~~

~~CONDITION~~	~~REQUIRED ACTION~~	~~COMPLETION TIME~~
~~A. LCO not met.~~	~~A.1 Remove SFSC from CTF.~~	~~Immediately~~

~~SURVEILLANCE REQUIREMENTS~~

~~SURVEILLANCE~~	~~FREQUENCY~~
~~SR 3.1.4.1 Verify a SFSC in the CTF meets the time limitation.~~	~~8 hours~~

3.2 Cask Criticality Control Program

3.2.1 Dissolved Boron Concentration

LCO 3.2.1 The dissolved boron concentration in the water of the MPC cavity shall be as follows:

a. For all MPCs with one or more fuel assemblies having initial enrichment of ≤ 4.1 wt% ^{235}U: ≥ 2000 ppmb.

b. For MPC24/24E/24EF with one or more fuel assemblies having initial enrichment of > 4.1 and ≤ 5.0 wt% ^{235}U: ≥ 2000 ppmb.

c. For MPC 32 with one or more fuel assemblies having initial enrichment of ~~> 4.1 and ≤~~ 5.0 wt% ^{235}U: ≥ 2600 ppmb.

---NOTE---

For MPC-32, with maximum initial enrichments between 4.1 wt% and 5.0 wt% ^{235}U, the minimum dissolved boron concentration may be determined by linear interpolation between 2000 ppmb at 4.1wt% and 2600 ppmb at 5.0 wt% ^{235}U, based on the assembly with the highest initial enrichment to be loaded.

APPLICABILITY: During LOADING OPERATIONS and UNLOADING OPERATIONS with water and at least one fuel assembly in the MPC.

ACTIONS

---NOTE---

Separate Condition entry is allowed for each MPC.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Dissolved boron concentration not met.	A.1	Suspend LOADING OPERATIONS or UNLOADING OPERATIONS	Immediately
	<u>AND</u>		
	A.2	Suspend positive reactivity additions	Immediately
	<u>AND</u>		
	A.3	Initiate action to restore boron concentration to within limits	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
NOTE *This surveillance is only required to be performed if the MPC is submerged in water or if water is to be added to or recirculated through the MPC.*		
SR 3.2.1.1	Verify the dissolved boron concentration is met using two independent measurements.	Within 8 hours prior to commencing LOADING OPERATIONS AND Every 48 hours thereafter while the MPC is in the spent fuel pool or while water is in the MPC.
NOTE *This surveillance is only required to be performed if the MPC is submerged in water or if water is to be added to or recirculated through the MPC.*		
SR 3.2.1.2	Verify the dissolved boron concentration is met using two independent measurements.	Within 8 hours prior to commencing UNLOADING OPERATIONS AND Every 48 hours thereafter while the MPC is in the spent fuel pool or while water is in the MPC.

4.0 DESIGN FEATURES

4.1 Design Features Significant to Safety

4.1.1 Criticality Control

a. MULTI-PURPOSE CANISTER (MPC) MPC-24

1. Flux trap size: ≥ 1.09 in.

2. ^{10}B loading in the Boral neutron absorbers: ≥ 0.0267 g/cm^2 *(Boral) and ≥ 0.0223 g/cm^2 (Metamic)*

b MPC-24E and MPC-24EF

1. Flux trap size:

   - Cells 3, 6, 19, and 22: ≥ 0.776 in.
   - All Other Cells: ≥ 1.076 in.

2. ^{10}B loading in the Boral neutron absorbers: ≥ 0.0372 g/cm^2 *(Boral) and ≥ 0.0310 g/cm^2 (Metamic)*

c. MPC-32

1. Fuel cell pitch: ≥ 9.158 in.

2. ^{10}B loading in the Boral neutron absorbers: ≥ 0.0372 g/cm^2 *(Boral) and ≥ 0.0310 g/cm^2 (Metamic)*

4.1.2 Design Features Important To Criticality Control

a. Fuel spacers shall be sized to ensure that the active fuel region of intact fuel assemblies remain within the neutron poison region of the MPC basket with water in the MPC.

b. The B_4C content in Metamic shall be < 33.0 wt%.

c. Neutron Absorber Test

The minimum ^{10}B for the neutron absorber shall meet the minimum requirements for each MPC model specified in Section 4.1.1.above.

4.2 Codes and Standards

The following provides information on the governing codes for the confinement boundary (important to Safety) design:

MPC (Shell and Head)	Applicable Codes	Editions/Years

4.0 DESIGN FEATURES (continued)

4.3 Cask Handling/Cask Transfer Facility

4.3.1 Cask Transporter

A site-specific cask transporter is used to transport the TRANSFER CASK between the power plant and the CASK TRANSFER FACILITY (CTF) and the SPENT FUEL STORAGE CASK (SFSC) between the CTF and ISFSI pad. The requirements for the cask transporter are as follows:

a. TRANSPORT OPERATIONS shall be conducted using the cask transporter.

b. The cask transporter fuel tank shall not contain > 50 gallons of diesel fuel at any time.

c. The cask transporter shall be designed, fabricated, inspected, maintained, operated, and tested in accordance with the applicable guidelines of NUREG-0612.

d. The cask transporter lifting towers shall have redundant drop protection features.

e. Lifting of a SFSC, loaded TRANSFER CASK, or loaded MPC outside of structures governed by 10 CFR 50 shall be performed with lifting devices that are designed, fabricated, inspected, maintained, operated and tested in accordance with the applicable guidelines of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants."

4.3.2 Storage Capacity

The Diablo Canyon ISFSI can accommodate up to 4,400 spent fuel assemblies and other NONFUEL HARDWARE. The ISFSI storage capacity will accommodate up to 140 SFSCs (138 plus 2 spare locations).

4.3.3 SFSC Load Handling Equipment

Lifting of a SFSC outside of structures governed by 10 CFR 50 shall be performed with load handling equipment that is designed, fabricated, inspected, maintained, operated and tested in accordance with the applicable guidelines of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants" as clarified by Section 4.3.4 below. The CTF requirements in Section 4.3.4 below do not apply to heavy loads governed by the regulations of 10 CFR 50.

4.3.4 CTF Structure Requirements

a. ~~Permanent Load Handling Equipment~~*Weldment and Reinforced Concrete*

1. The weldment structure of the CTF shall be designed to comply with the stress limits of ASME Code, Section III, Subsection NF, Class 3 for linear structures. All compression-loaded members shall satisfy the buckling criteria of ASME Section III, Subsection NF. The applicable loads, load combinations, and associated service condition definitions are provided in Diablo Canyon ISFSI SAR Section 4.4.5.

2. The reinforced concrete structure of the CTF shall be designed in accordance with ACI-349-1997, as clarified in Diablo Canyon ISFSI SAR Section 4.2.1.2.

(continued)

4.0 DESIGN FEATURES (continued)

b. Mobile Load Handling Equipment

Mobile load handling equipment used in lieu of ~~permanent load handling equipment~~*the cask transporter*, shall meet the guidelines of NUREG-0612, Section 5.1, with the following clarifications:

1. Mobile lifting devices shall have a minimum safety factor of two over the allowable load table for the lifting device in accordance with the guidance of NUREG-0612, Section 5.1.6(1)(a) and shall be capable of stopping and holding the load during a Design Basis Earthquake (DBE) event.
2. Mobile lifting devices shall conform to the requirements of ASME B30.5, "Mobile and Locomotive Cranes," in lieu of the requirements of ASME B30.2, "Overhead and Gantry Cranes."
3. Mobile cranes are not required to meet the guidance of NUREG-0612, Section 5.1.6(2) for new cranes.
4. Horizontal movements of the TRANSFER CASK and MPC using a mobile crane are prohibited.

5.0 ADMINISTRATIVE CONTROLS (continued)

5.1.3 MPC and SFSC Loading, Unloading, and Preparation Program

This program shall be established and maintained to implement Diablo Canyon ISFSI SAR Section 10.2 requirements for loading fuel and components into MPCs, unloading fuel and components from MPCs, and preparing the MPCs for storage in the SFSCs. The requirements of the program for loading and preparing the MPC shall be complete prior to removing the MPC from the fuel handling building/auxiliary building. The program provides for evaluation and control of the following requirements during the applicable operation:

a. Verify that no transfer cask handling operations are allowed at environmental temperatures below -18 °C [0 °F].

b. *Based on the drying process used and the heat load of the fuel involved,* ~~V~~verify the maintenance of *the required conditions* ~~water~~ in the annular gap between the loaded MPC and TRANSFER CASK during MPC moisture removal operations (loading) or MPC reflooding operations (unloading).

c. The water temperature of a water-filled or partially filled loaded MPC shall be shown by analysis to be less than boiling at all times.

d. Verify that the drying times and pressures assure that fuel cladding temperature limit is not violated and the MPC is adequately dry.

e. Verify that the inerting backfill pressure and purity assure adequate heat transfer and corrosion control.

f. Verify that leak testing assures adequate MPC integrity and consistency with offsite dose analysis.

g. Verify surface dose rates on the TRANSFER CASK are adequate to assure proper loading and consistency with the offsite dose analysis.

h. Verify surface dose rates on the SFSCs are adequate to assure proper storage and consistency with the offsite dose analysis.

i. During MPC re-flooding, verify the helium exit temperature is such that water quenching or flashing does not occur.

This program will control limits, surveillances, compensatory measures and appropriate completion times to assure the integrity of the fuel cladding at all times in preparation of and during LOADING, UNLOADING or TRANSPORT OPERATIONS, as applicable.

(continued)

Proposed Technical Specification Changes (retyped)

Remove Page	Insert Page
Table of Contents	Table of Contents
3.1-2	3.1-2
3.1-5	3.1-5
3.2-1	3.2-1
3.2-2	3.2-2
4.0-1	4.0-1
4.0-3	4.0-3
4.0-4	4.0-4
5.0-2	5.0-2

TABLE OF CONTENTS

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. MPC helium leak rate limit for vent and drain port cover plate welds not met.	C.1	Perform an engineering evaluation to determine the impact of increased helium leak rate on heat removal capability and offsite dose.	24 hours
	AND		
	C.2	Develop and initiate corrective actions necessary to return the MPC to an analyzed condition.	7 days
D. Required Actions and associated Completion Times not met.	D.1	Remove all fuel assemblies from the MPC.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.1.1	Verify MPC cavity vacuum drying pressure is ≤ 3 torr for ≥ 30 min. OR While recirculating helium through the MPC cavity, verify that the gas temperature exiting the demoisturizer is ≤ 21°F for ≥ 30 min.	Once, prior to TRANSPORT OPERATIONS.
SR 3.1.1.2	Verify MPC helium backfill pressure is ≥ 29.3 psig and ≤ 33.3 psig.	Once, prior to TRANSPORT OPERATIONS.
SR 3.1.1.3	Verify that the total helium leak rate through the MPC vent and drain port confinement welds meets the leaktight criteria of ANSI N14.5-1977.	Once, prior to TRANSPORT OPERATIONS.

3.1 SPENT FUEL STORAGE CASK (SFSC) INTEGRITY

3.1.4 Intentionally left blank

3.2 Cask Criticality Control Program

3.2.1 Dissolved Boron Concentration

LCO 3.2.1 The dissolved boron concentration in the water of the MPC cavity shall be as follows:

a. For all MPCs with one or more fuel assemblies having initial enrichment of ≤ 4.1 wt% ^{235}U: ≥ 2000 ppmb.

b. For MPC24/24E/24EF with one or more fuel assemblies having initial enrichment of > 4.1 and ≤ 5.0 wt% ^{235}U: ≥ 2000 ppmb.

c. For MPC 32 with one or more fuel assemblies having maximum initial enrichment of 5.0 wt% ^{235}U: ≥ 2600 ppmb.

-----NOTE-----

For MPC-32, with maximum initial enrichments between 4.1 wt% and 5.0 wt% ^{235}U, the minimum dissolved boron concentration may be determined by linear interpolation between 2000 ppmb at 4.1 wt% and 2600ppmb at 5.0 %wt ^{235}U, based on the assembly with the highest initial enrichment to be loaded.

APPLICABILITY: During LOADING OPERATIONS and UNLOADING OPERATIONS with water and at least one fuel assembly in the MPC.

ACTIONS

-----NOTE-----

Separate Condition entry is allowed for each MPC.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Dissolved boron concentration not met.	A.1 Suspend LOADING OPERATIONS or UNLOADING OPERATIONS	Immediately
	<u>AND</u>	
	A.2 Suspend positive reactivity additions	Immediately
	<u>AND</u>	
	A.3 Initiate action to restore boron concentration to within limits	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
---NOTE--- This surveillance is only required to be performed if the MPC is submerged in water or if water is to be added to or recirculated through the MPC. ---		
SR 3.2.1.1	Verify the dissolved boron concentration is met using two independent measurements.	Within 8 hours prior to commencing LOADING OPERATIONS <u>AND</u> Every 48 hours thereafter while the MPC is in the spent fuel pool or while water is in the MPC.
---NOTE--- This surveillance is only required to be performed if the MPC is submerged in water or if water is to be added to or recirculated through the MPC. ---		
SR 3.2.1.2	Verify the dissolved boron concentration is met using two independent measurements.	Within 8 hours prior to commencing UNLOADING OPERATIONS <u>AND</u> Every 48 hours thereafter while the MPC is in the spent fuel pool or while water is in the MPC.

4.0 DESIGN FEATURES

4.1 Design Features Significant to Safety

4.1.1 Criticality Control

a. MULTI-PURPOSE CANISTER (MPC) MPC-24

1. Flux trap size: ≥ 1.09 in.
2. ^{10}B loading in the Boral neutron absorbers: ≥ 0.0267 g/cm^2 (Boral) and ≥ 0.0223 g/cm^2 (Metamic)

b MPC-24E and MPC-24EF

1. Flux trap size:
   - Cells 3, 6, 19, and 22: ≥ 0.776 in.
   - All Other Cells: ≥ 1.076 in.
2. ^{10}B loading in the Boral neutron absorbers: ≥ 0.0372 g/cm^2 (Boral) and ≥ 0.0310 g/cm^2 (Metamic)

c. MPC-32

1. Fuel cell pitch: ≥ 9.158 in.
2. ^{10}B loading in the Boral neutron absorbers: ≥ 0.0372 g/cm^2 (Boral) and ≥ 0.0310 g/cm^2 (Metamic)

4.1.2 Design Features Important To Criticality Control

a. Fuel spacers shall be sized to ensure that the active fuel region of intact fuel assemblies remain within the neutron poison region of the MPC basket with water in the MPC.

b. The B_4C content in Metamic shall be < 33.0 wt%.

c. Neutron Absorber Test

The minimum ^{10}B for the neutron absorber shall meet the minimum requirements for each MPC model specified in Section 4.1.1.above.

(continued)

4.0 DESIGN FEATURES (continued)

4.3 Cask Handling/Cask Transfer Facility

4.3.1 Cask Transporter

A site-specific cask transporter is used to transport the TRANSFER CASK between the power plant and the CASK TRANSFER FACILITY (CTF) and the SPENT FUEL STORAGE CASK (SFSC) between the CTF and ISFSI pad. The requirements for the cask transporter are as follows:

a. TRANSPORT OPERATIONS shall be conducted using the cask transporter.

b. The cask transporter fuel tank shall not contain > 50 gallons of diesel fuel at any time.

c. The cask transporter shall be designed, fabricated, inspected, maintained, operated, and tested in accordance with the applicable guidelines of NUREG-0612.

d. The cask transporter lifting towers shall have redundant drop protection features.

e. Lifting of a SFSC, loaded TRANSFER CASK, or loaded MPC outside of structures governed by 10 CFR 50 shall be performed with lifting devices that are designed, fabricated, inspected, maintained, operated and tested in accordance with the applicable guidelines of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants."

4.3.2 Storage Capacity

The Diablo Canyon ISFSI can accommodate up to 4,400 spent fuel assemblies and other NONFUEL HARDWARE. The ISFSI storage capacity will accommodate up to 140 SFSCs (138 plus 2 spare locations).

4.3.3 SFSC Load Handling Equipment

Lifting of a SFSC outside of structures governed by 10 CFR 50 shall be performed with load handling equipment that is designed, fabricated, inspected, maintained, operated and tested in accordance with the applicable guidelines of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants" as clarified by Section 4.3.4 below. The CTF requirements in Section 4.3.4 below do not apply to heavy loads governed by the regulations of 10 CFR 50.

4.3.4 CTF Structure Requirements

a. Weldment and Reinforced Concrete

1. The weldment structure of the CTF shall be designed to comply with the stress limits of ASME Code, Section III, Subsection NF, Class 3 for linear structures. All compression-loaded members shall satisfy the buckling criteria of ASME Section III, Subsection NF. The applicable loads, load combinations, and associated service condition definitions are provided in Diablo Canyon ISFSI SAR Section 4.4.5.

2. The reinforced concrete structure of the CTF shall be designed in accordance with ACI-349-1997, as clarified in Diablo Canyon ISFSI SAR Section 4.2.1.2.

(continued)

4.0 DESIGN FEATURES (continued)

b. Mobile Load Handling Equipment

Mobile load handling equipment used in lieu of the cask transporter, shall meet the guidelines of NUREG-0612, Section 5.1, with the following clarifications:

1. Mobile lifting devices shall have a minimum safety factor of two over the allowable load table for the lifting device in accordance with the guidance of NUREG-0612, Section 5.1.6(1)(a) and shall be capable of stopping and holding the load during a Design Basis Earthquake (DBE) event.
2. Mobile lifting devices shall conform to the requirements of ASME B30.5, "Mobile and Locomotive Cranes," in lieu of the requirements of ASME B30.2, "Overhead and Gantry Cranes."
3. Mobile cranes are not required to meet the guidance of NUREG-0612, Section 5.1.6(2) for new cranes.
4. Horizontal movements of the TRANSFER CASK and MPC using a mobile crane are prohibited.

5.0 ADMINISTRATIVE CONTROLS (continued)

5.1.3 MPC and SFSC Loading, Unloading, and Preparation Program

This program shall be established and maintained to implement Diablo Canyon ISFSI SAR Section 10.2 requirements for loading fuel and components into MPCs, unloading fuel and components from MPCs, and preparing the MPCs for storage in the SFSCs. The requirements of the program for loading and preparing the MPC shall be complete prior to removing the MPC from the fuel handling building/auxiliary building. The program provides for evaluation and control of the following requirements during the applicable operation:

a. Verify that no transfer cask handling operations are allowed at environmental temperatures below -18 °C [0 °F].

b. Based on the drying process used and the heat load of the fuel involved, verify the maintenance of the required conditions in the annular gap between the loaded MPC and TRANSFER CASK during MPC moisture removal operations (loading) or MPC reflooding operations (unloading).

c. The water temperature of a water-filled or partially filled loaded MPC shall be shown by analysis to be less than boiling at all times.

d. Verify that the drying times and pressures assure that fuel cladding temperature limit is not violated and the MPC is adequately dry.

e. Verify that the inerting backfill pressure and purity assure adequate heat transfer and corrosion control.

f. Verify that leak testing assures adequate MPC integrity and consistency with offsite dose analysis.

g. Verify surface dose rates on the TRANSFER CASK are adequate to assure proper loading and consistency with the offsite dose analysis.

h. Verify surface dose rates on the SFSCs are adequate to assure proper storage and consistency with the offsite dose analysis.

i. During MPC re-flooding, verify the helium exit temperature is such that water quenching or flashing does not occur.

This program will control limits, surveillances, compensatory measures and appropriate completion times to assure the integrity of the fuel cladding at all times in preparation of and during LOADING, UNLOADING or TRANSPORT OPERATIONS, as applicable.

(continued)

**Proposed Technical Specification Bases Changes
(mark-up for Information Only)**

C.1

If the helium leakrate limit *for vent and drain port cover plate welds* haves been determined not to be met during TRANSPORT OPERATIONS or STORAGE OPERATIONS, an engineering evaluation is necessary to determine the impact of increased helium leak rate on heat removal and off-site dose. Since the HI-STORM OVERPACK is a ventilated system, any leakage from the MPC is transported directly to the environment. Since an increased helium leak rate represents a potential challenge to MPC heat removal and the off-site doses calculated in the SAR confinement analyses, reasonably rapid action is warranted. The Completion Time is sufficient to complete the engineering evaluation commensurate with the safety significance of the CONDITION.

C.2

Once the cause and consequences of the elevated leak rate from the MPC *vent and drain port cover plate welds* are determined, a corrective action plan shall be developed and initiated to the extent necessary to return the MPC *vent and drain port cover plate welds* to an analyzed condition. Since the recovery mechanisms can range over a broad scale based on the evaluation performed under Required Action C.1, different recovery strategies may be necessary. Since an elevated helium leak rate represents a challenge to heat removal rates and off-site doses, reasonably rapid action is required. The Completion Time is sufficient to develop and initiate the corrective actions commensurate with the safety significance of the CONDITION.

D.1

If the MPC fuel cavity cannot be successfully returned to a safe, analyzed condition, the fuel must be placed in a safe condition in the spent fuel pool. The Completion Time is reasonable based on the time required to replace the transfer lid with the pool lid, perform fuel cooldown operations, re-flood the MPC, cut the MPC lid welds, move the TRANSFER CASK into the spent fuel pool, remove the MPC lid, and remove the spent fuel assemblies in an orderly manner and without challenging personnel.

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.1.1.1, SR 3.1.1.2, and SR 3.1.1.3

The long-term integrity of the stored fuel is dependent on storage in a dry, inert environment. For moderate burnup fuel cavity dryness may be demonstrated either by evacuating the cavity to a very low absolute pressure and verifying that the pressure is held over a specified period of time or by recirculating dry helium through the MPC cavity to absorb moisture until the demoisturizer exit temperature reaches and remains below the acceptance limit for the specified time period. A low vacuum pressure or a demoisturizer exit temperature meeting the acceptance limit is an indication that the cavity is dry.

Having the proper helium backfill pressure ensures adequate heat transfer from the fuel to the fuel basket and surrounding structure of the MPC. Meeting the helium leak rate limit ensures there is adequate helium in the MPC for long term storage and the leak rate assumed in the confinement analyses remains bounding for off-site dose.

The leakage rate acceptance limit is ~~specified in units of atm-cc/ sec. This is~~ a mass-like leakage rate as specified in ANSI N14.5 (1997). This is defined as the rate of change of the pressure-volume product of the leaking fluid at test conditions. This allows the leakage rate as measured by a mass spectrometer leak detector (MSLD) to be compared directly to the acceptance limit without the need for unit conversion from test conditions to standard, or reference conditions.

All three of these surveillances must be successfully performed once, prior to TRANSPORT OPERATIONS to ensure that the conditions are established for SFSC storage, which preserve the analysis basis supporting the cask design.

(continued)

B 3.1 FUEL INTEGRITY

B 3.1.4 Spent Fuel Storage Case (SFSC) Time Limitation in Cask Transfer Facility (CTF)
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BASES

BACKGROUND	The SFSC heat removal system is a passive, air-cooled, convective heat transfer system that ensures heat from the MULTI-PURPOSE CANISTER (MPC) is transferred to the environs by the chimney effect. Relatively cool air is drawn into the annulus between the OVERPACK and the MPC through the four inlet air ducts at the bottom of the OVERPACK. The MPC transfers its heat from the canister surface to the air via natural convection. The buoyancy created by the heating of the air creates a chimney effect and the air is forced back into the environs through the four outlet air ducts at the top of the OVERPACK. However, while the SFSC is in the CTF there is a reduced cooling capability over this normal storage configuration because of ambient air access restrictions. As a result, over time the decay heat produced by the spent fuel may cause exceedance of the short term temperature limit of the fuel cladding or damage the shielding material. To ensure that this does not take place the time that a SFSC, with a loaded MPC, is allowed to be in the CTF shall be limited to 22 hours. If other CTF lifting mechanisms are not operable, the cask transporter is designed and shall be used to remove the loaded SFSC from the CTF without additional assistance using the HI-STORM Lift Links and Lifting Brackets*Lifting mechanisms and equipment used at the CTF for SFSC handling shall be designed per NUREG-0612.*
APPLICABLE SAFETY ANALYSIS	The thermal analyses of the SFSC take credit for the decay heat from the spent fuel assemblies being ultimately transferred to the ambient environment surrounding the OVERPACK*SFSC*. Transfer of heat away from the fuel assemblies ensures that the fuel cladding and other SFSC component temperatures do not exceed applicable limits. Under normal storage conditions, the four inlet and four outlet air ducts are unobstructed and full airflow (i.e., maximum heat transfer for the given ambient temperature) occurs. However while the SFSC is in the CTF the restricted airflow around the SFSC decreases heat transfer capability. This case has been bounded by an analysis of a loaded TRANSFER CASK being in a loading pit with no external ventilation capability and is provided in the HI-STORM 100 System FSAR, Section 4.5.2. In that analysis, there is assumed to be only 10 percent of the normal heat transfer capability. Based on this, the temperature inside the MPC is shown not to reach the short-term limit of the fuel cladding within the first 22 hours. This analysis is considered bounding of the SFSC because the thermal inertia of the SFSC is greater then that of the TRANSFER CASK, therefore the heat-up is much slower. As a result, providing a time limitation of 22 hours for the SFSC to be in the CTF is conservative and adequate to ensure that the short-term temperature limits will not be met or exceeded.

BASES (continued)

LCO	The SFSC, containing a loaded MPC, must not remain in the CTF for greater than 22 hours. This time limitation ensures that the decay heat generated by the approved content in a loaded MPC does not reach or exceed the approved content or other SFSC component temperature design limits.
APPLICABILITY	The LCO is applicable during TRANSPORT OPERATIONS while a SFSC containing a loaded MPC is in its lowered position in the CTF. If an OVERPACK in the CTF does not contain an MPC, which contains approve contents, then this LCO does not apply.
ACTIONS	A note has been added to the ACTIONS, which states that for this LCO, separate condition entry is allowed for each SFSC. This is acceptable since the Required Actions for each condition provide appropriate compensatory measures for each SFSC not meeting the LCO. Subsequent SFSCs that don't meet the LCO are governed by subsequent condition entry and application of associated Required Actions. A.1 If the LCO cannot be met the loaded SFSC must be removed from the CTF immediately to ensure adequate heat removal capability exist to prevent exceeding the short-term fuel cladding and SFSC component temperature limit. *NUREG-0612 qualified lifting mechanisms and equipment shall be used to remove the SFSC from the CTF*If the normal lifting mechanisms of the CTF are not capable of moving the loaded SFSC out of the CTF, the cask transporter shall be used to remove the loaded SFSC from the CTF. While the SFSC is in the CTF the restricted airflow around the SFSC decreases heat transfer capability. This case has been bounded by an analysis of a loaded TRANSFER CASK being in a loading pit with no external ventilation capability. In that analysis, there is assumed to be only 10 percent of the normal heat transfer capability. Based on this, the temperature inside the MPC is shown not to reach the short-term temperature limit of the fuel cladding within the first 22 hours. This analysis is considered bounding because the thermal inertia of the SFSC is greater when compared to the TRANSFER CASK, therefore the heat-up is much slower. As a result, providing a time limitation of 22 hours for the SFSC to be in the CTF is conservative and adequate to ensure that the short-term temperature limits will not be met or exceeded.

(continued)

BASES

ACTIONS	A.1 (continued) The Completion Time for this Required Action is immediately. The bounding analysis shows that the temperature inside the MPC does not reach the short-term temperature limit of the fuel cladding within the first 22 hours. As a result, providing a time limitation of 22 hours for the SFSC to be in the CTF is conservative and requiring immediate action to remove the loaded SFSC will ensure that the short-term temperature limits will not be met or exceeded.
SURVEILLANCE REQUIREMENTS	SR 3.1.1 The integrity of the stored fuel is dependent on the ability of the SFSC to reject heat from the MPC to the environment. Verification that a loaded SFSC does not remain in the CTF for more then 22 hours will ensure that the short-term temperature limits will not be met or exceeded. The Frequency of *once per 8 hours while a SFSC is in the CTF will ensure that the* 22 hours *time limitation* from the initial movement of a loaded SFSC into the CTF or from a loaded MPC being lowered into an empty SFSC*OVERPACK* in the CTF is *not exceeded. The once every 8 hours verification is* reasonable based on the time necessary for SFSC components to heat up to unacceptable temperatures assuming design basis heat loads, and allowing*s* for corrective actions to take place. This surveillance is only required if the*a* SFSC contains a loaded MPC and is in the CTF.
REFERENCES	1.Diablo Canyon ISFSI SAR Section 3.4, Table 3.4-2 2.Diablo Canyon ISFSI SAR Section 4.4 3.Diablo Canyon ISFSI SAR Sections 7.1, 7.2, and 7.3 4.Diablo Canyon ISFSI SAR Section 8.1 5.Diablo Canyon ISFSI SAR Sections 8.2.11, 8.2.12, 8.2.15, and 8.2.17

B 3.2 SPENT FUEL STORAGE CASK (SFCS) CRITICALITY CONTROL

B 3.2.1 Dissolved Boron Concentration

BASES

BACKGROUND

A TRANSFER CASK with an empty MULTI-PURPOSE CANISTER (MPC) is placed in the spent fuel pool (SFP) and loaded with fuel assemblies and associated NONFUEL HARDWARE meeting the requirements of Section 2.0, Approved Contents.

After loading the MPC, an MPC lid is placed on the MPC along with a lid retention device attached to the TRANSFER CASK. The TRANSFER CASK with the MPC inside is removed from the SFP to a washdown area. In the washdown area, the MPC lid is welded in place and the MPC is leak tested, drained, dried, and backfilled with helium. The TRANSFER CASK and accessible portions of the contained MPC are also surveyed to ensure that any radioactive contamination is within administrative limits.

For those MPCs containing fuel assemblies of relatively high initial enrichment, credit is taken in the criticality analyses for boron in the water within the MPC. To preserve the analysis basis, users must verify that the dissolved boron concentration of the water in the MPC meets specified limits when there is fuel and water in the MPC. This may occur during LOADING OPERATIONS and UNLOADING OPERATIONS.

A boron dilution analysis has been performed and submitted to the NRC in PG&E Letters DCL-03-150 and DIL-03-014 to determine the time available for operator action to ensure criticality does not occur in an MPC-32 during LOADING OPERATIONS and UNLOADING OPERATIONS. The analysis results show that operators have approximately 5 hours available to identify and terminate the source of unborated water flow from the limiting boron dilution event to ensure criticality in the MPC-32 does not occur. To minimize the possibility of a dilution event, a temporary administrative control will be implemented while the MPC is in the SFP that will require, with the exception of the 1-inch line used to rinse the cask as it is removed from the SFP, at least one valve in each potential flow path of unborated water to the SFP to be closed and tagged out. During the cask rinsing process, the MPC will have a lid in place that will minimize entry of any unborated water into the MPC. The flow path with the highest potential flow rate of 494 gpm will be doubly isolated by having two valves closed and tagged out while the MPC is in the SFP.

BASES

LCO

Compliance with this LCO ensures that the stored fuel will remain subcritical with a $k_{eff} \leq 0.95$ while water is in the MPC. The LCO provides the minimum concentration of soluble boron required in the MPC water based on type of MPC and the initial enrichment of the fuel.

LCO 3.2.1.a provides the minimum concentration of soluble boron required in any of the MPCs if one or more fuel assemblies are loaded with an initial enrichment of ≤ 4.1 wt% U-235. LCO 3.2.1.b provides the minimum concentration of soluble boron required in MPC-24/24E/24EF if one or more fuel assemblies are loaded with an initial enrichment of > 4.1 wt% and ≤ 5.0 wt% U-235. ~~LCO 3.2.1.c provides the minimum concentration of soluble boron required in MPC-32 if one or more fuel assemblies are loaded with an initial enrichment of ≤> 4.1 wt% and ≤ 5.0 wt% U-235.~~ *LCO 3.2.1.c provides the minimum concentration of soluble boron required in MPC-32 if one or more fuel assemblies are loaded with a maximum initial enrichment of 5.0 wt% U-235.*

A note has been added to the LCOs, which states that, "For MPC-32, with maximum initial enrichments between 4.1 wt% and 5.0 wt% ^{235}U, the minimum dissolved boron concentration may be determined by linear interpolation between 2000 ppmb at 4.1wt% and 2600 ppmb at 5.0 wt% ^{235}U, based on the assembly with the highest initial enrichment to be loaded. This linear interpolation is acceptable because the maximum multiplication factor is a near linear function of both enrichment and soluble boron concentration. This function demonstrates a saturation effect in which the reduction in reactivity for the same increase in the soluble boron concentration is reduced for higher soluble boron concentrations and that a linear interpolation results in a slight overestimation of the minimum soluble boron concentration required for the analyzed enrichments. This was accepted by the NRC with the approval of the Holtec HI-STORM 100 Cask System Certificate of Compliance, Amendment 3 and the associated safety evaluation report.

All INTACT FUEL ASSEMBLIES loaded into the MPC-24, MPC-24E, MPC-24EF, and MPC-32 are limited by analysis to maximum enrichments of 5.0 wt% U-235.

For all INTACT FUEL ASSEMBLIES loaded into an MPC that contains DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS, the maximum initial enrichment of the INTACT FUEL ASSEMBLES is limited to the maximum initial enrichment of the DAMAGED FUEL ASSEMBLIES and FUEL DEBRIS (i.e., 4.0 wt% U-235).

APPLICABILITY

The dissolved boron concentration LCO is applicable whenever an MPC-24, MPC-24E, MPC-24EF, or MPC-32 has at least one fuel assembly in a storage location and water in the MPC.

During LOADING OPERATIONS, the LCO is applicable immediately

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.2.1.1

When the MPC is placed in the SFP the dissolved boron concentration in the MPC water must be verified by two independent measurements to be within the applicable limit within 8 hours prior to entering the applicability of the LCO. For LOADING OPERATIONS, this means within 8 hours prior to loading any approved content into the cask.

The use of two independent measurements provides reasonable assurance that the dissolved boron LCO limit is met and maintained. The 8 hours limitation is considered a reasonably short time period which minimizes any potential for changes in the critical dissolved boron concentration prior to loading and still allows flexibility in the operation. Once the dissolved boron concentration has been verified a change in this concentration is not credible unless there is some action specifically taken to modify it. During the period between verification and loading all changes in water volume including additions or subtractions in the SFP or MPC; recirculation of water through the MPC; or the addition or dilution of the dissolved boron concentration in the SFP or MPC to be loaded, will be administratively controlled. If any of these actions or operations takes place during the 8-hour period, the dissolved boron concentration will be re-verified to be within limits prior to loading any authorized contents in the MPC.

In addition, while the MPC is in the SFP ~~or while water is in the MPC~~ the boron concentration will continue to be verified to be within the applicable limits every 48 hours. This reflects the premise that normally there is no real need to re-verify the boron concentration of the water in the MPC after it is removed from the SFP unless water is to be added to, or recirculated through the MPC, because these are the only credible activities that could potentially change the dissolved boron concentration during this time. The 48-hour Completion Time for the re-verification is infrequent enough to prevents the interference of unnecessary sampling activities ~~while lid closure welding and other MPC storage preparation activities are taking place in an elevated radiation area atop the MPC.~~ However, it is often enough to ensure that any change in the concentration for any reason is detected in a reasonable time to take proper action. Plant procedures shall specifically ensure that any water to be added to, or recirculated through the MPC is at a dissolved boron concentration greater than or equal to the minimum boron concentration specified in the LCO.

SR 3.2.1.1 is modified by a note which states that SR 3.2.1.1 is only required to be performed if the MPC is submerged in water or if water is to be added or recirculated through the MPC. This reflects the premise of this SR which is to ensure, once the correct boron concentration is established, it need only be verified thereafter if the MPC is a state where the concentration could be changed. Once the MPC is removed from the spent fuel pool adding water to the MPC or recirculating water through the MPC are the only credible activities that could potentially change the boron concentration. This note prevents unnecessary sampling activities during lid closure welding and other

MPC storage preparation activities in an elevated radiation area atop the MPC.

Plant procedures shall ensure that any water to be added to, or recirculated through the MPC is at a boron concentration greater than or equal to the minimum boron concentration specified in the LCO for the approved content of the MPC.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.2.1.2

For UNLOADING OPERATIONS, this means verifying the source of borated water to be used to reflood the MPC within 8 hours prior to commencing reflooding operations. This ensures that when the LCO is applicable (upon introducing water into the MPC), the LCO will be met.

The use of two independent measurements provides reasonable assurance that the dissolved boron LCO limit is met and maintained in the source of water. The 8 hours limitation is considered a reasonably short time period which minimizes any potential for changes in the critical dissolved boron concentration in the source of water prior to introduction into the MPC and still allows flexibility in the operation. Once the dissolved boron concentration has been verified a change in this concentration is not credible unless there is some action specifically taken to modify it. During the period between verification and introducing the water into the MPC all changes in water source or volume including additions or subtractions in the source; or the addition or dilution of the dissolved boron concentration in the source will be administratively controlled. If any of these actions or operations takes place during the 8-hour period, the dissolved boron concentration in the source water will be re-verified prior to introducing any water into the MPC to be unloaded.

In addition, while the MPC to be unloaded is in the SFP ~~or while water is in the MPC to be unloaded~~ the dissolved boron concentration will continue to be verified to be within the applicable limits every 48 hours. This reflects the premise that normally there is no real need to re-verify the dissolved boron concentration of the water in the MPC unless water is to be added to, or recirculated through the MPC, because these are the only credible activities that could potentially change the dissolved boron concentration during this time.

The 48-hour Completion Time for the re-verification is infrequent enough to prevent the interference of unnecessary sampling activities while MPC UNLOADING OPERATIONS are taking place in an elevated radiation area atop the MPC. However, it is often enough to ensure that any change in the concentration for any reason is detected in a reasonable time to take proper action. Plant procedures shall specifically ensure that any water to be added to, or recirculated through the MPC is at a dissolved boron concentration is greater than or equal to the minimum dissolved boron concentration specified in the LCO.

SR 3.2.1.2 is modified by a note which states that SR 3.2.1.~~1~~2 is only required to be performed if the MPC is submerged in water or if water is to be added or recirculated through the MPC. This reflects the premise of this SR which is to ensure, once the correct boron concentration is established, it need only be verified thereafter if the MPC is in a state where the concentration could be changed. During the unloading process the MPC is refilled with borated water while it is outside of the spent fuel pool. During this process the boron concentration will be verified to meet the TS limits. Once the boron *concentration is verified the addition of water to the MPC, or the recirculation of the water through the MPC are the only credible activities that could potentially change the boron concentration. As a result, continued surveillance per SR 3.2.1.2 is unnecessary. Once the MPC is placed back into the spent fuel pool verification will continue under SR 3.2.1.2.*

Plant procedures shall ensure that any water to be added to, or recirculated through the MPC is at a boron concentration greater than or equal to the minimum boron concentration specified in the LCO for the approved content of the MPC.

REFERENCES

1. Diablo Canyon ISFSI SAR Section 4.2