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March 14, 2013

PG&E Letter DIL-13-004

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Director, Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
11555 Rockville Pike
Rockville, MD 20852

10 CFR 72.56

Materials License No. SNM-2511, Docket No. 72-26
Diablo Canyon Independent Spent Fuel Storage Installation
Response to NRC Questions Regarding License Amendment Request 12-03 and Supplement

Dear Commissioners and Staff:

Pacific Gas and Electric Company (PG&E) Letter DIL-12-007, "License Amendment Request 12-03, 'Revision to Technical Specification (TS) 2.0, 2.3, 3.1.1, and 3.1.4,'" dated July 31, 2012, was submitted to request an amendment to Materials License No. SNM-2511, Docket No. 72-26, for the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI), to revise the TS to allow the additional loading and moving of high burnup spent fuel from the spent fuel pool to the ISFSI.

By letter dated November 5, 2012, "Diablo Canyon Independent Spent Fuel Storage Installation Material License No. SNM-2511, Amendment Request No. 3 – Acceptance Review (TAC No. L24675)," the NRC staff determined the application had sufficient technical information in scope and depth to allow the staff to proceed with the technical review. An observation was noted in the response.

On January 22, 2013, the NRC staff requested additional information required to complete the review of License Amendment Request (LAR) 12-03. On February 4, 2013, PG&E proposed to provide a submittal response to the NRC request for additional information by March 18, 2013. PG&E also agreed to provide additional information to address an observation from the LAR acceptance review. The NRC project manager agreed to the proposed response date.

This information does not affect the results of the technical evaluation or the no significant hazards consideration determination previously transmitted in PG&E Letter DIL-12-007.

NMSS24
NMSS26

Attachment 6 of the Enclosure contains information proprietary to Holtec International (Holtec). Accordingly, Attachment 5 of the Enclosure includes a Holtec affidavit pursuant to 10 CFR 2.390. The affidavit is signed by Holtec, the owner of the information. The affidavit sets forth the basis on which the Holtec proprietary information contained in Attachment 6 to the Enclosure may be withheld from public disclosure by the Commission, and it addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR 2.390 of the Commission's regulations. PG&E requests that the Holtec proprietary information be withheld from public disclosure in accordance with 10 CFR 2.390.

PG&E makes no regulatory commitments (as defined by NEI 99-04) in this letter. This letter includes no revisions to existing regulatory commitments.

In accordance with site administrative procedures and the Quality Assurance Program, the proposed amendment request for additional information response with the additional revision to the TSs has been reviewed by the Plant Staff Review Committee.

If you have any questions regarding this response, please contact Mr. Lawrence Pulley at (805) 545-6165.

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

Executed on March 14, 2013.

Sincerely,

Barry S. Allen

Barry S. Allen
Site Vice President

Mjrm/4557/50500439
Enclosure
cc: Diablo Distribution
cc/enc: Gonzalo L. Perez, California Department of Public Health
Elmo E. Collins, NRC Region IV Administrator
John M. Goshen, NRC Project Manager, Office of Nuclear Material Safety and Safeguards
Thomas R. Hipschman, NRC Senior Resident Inspector

Response to NRC Questions Regarding License Amendment Request 12-03 and Supplement

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ATTACHMENTS:

1. Proposed Technical Specification Changes (markup)
2. Proposed Technical Specification Changes (retyped)
3. Appendix R of calculation HI-2002563, "Dose Evaluation for the ISFSI at Diablo Canyon Power Station," Revision 10 – Non-Proprietary Version and cover pages

4 Holtec International Report HI-2125191, "Three-Dimensional Thermal-Hydraulic Analyses for Diablo Canyon Site-Specific HI-STORM System with up to 28.74 kW Decay Heat," Revision 1 - Non-Proprietary Version

5. Holtec Affidavit for Holtec International Report HI-2125191, "Three-Dimensional Thermal-Hydraulic Analyses for Diablo Canyon Site-Specific HI-STORM System with up to 28.74 kW Decay Heat," Revision 1 - Proprietary Version, and the associated proprietary data files on a USB flash drive
6. Holtec International Report HI-2125191, "Three Dimensional Thermal-Hydraulic Analyses for Diablo Canyon Site-Specific HI-STORM System with up to 28.74 kW Decay Heat," Revision 1 - Proprietary Version, with associated proprietary data files on a USB flash drive

Response to NRC Questions Regarding License Amendment Request 12-03 and Supplement

On January 22, 2013, the NRC provided a request for additional information (RAI). On February 4, 2013, Pacific Gas and Electric Company (PG&E) proposed to the NRC project manager to provide a submittal response to the RAIs by March 18, 2013, and also discussed providing additional information to address an observation from the license amendment request acceptance review. PG&E's responses to the NRC questions are provided below.

NRC Question 1:

6.0 Thermal Evaluation

6.1 In addition to unloading a multi-purpose canister (MPC) containing high burn-up fuel that was loaded under Amendment No. 2, state what other specific situations may require the use of a supplemental cooling system (SCS) in the transfer cask.

Safety Analysis Report (SAR) page 3.3-3 states that heat transfer from the transfer cask may be augmented by the SCS to reduce MPC temperatures for operational handling reasons. However, no specific situation is mentioned.

This information is needed to determine compliance with 10 CFR 72.122 and 10 CFR 72.128.

PG&E Response:

Analyses show the MPC shell temperature as high as 413° F during transfer activities (Reference HI-2125191, page C-15). At this temperature, port cover plate welding, leak testing, closure ring welding, and installation of the MPC lift cleats are work activities with an increased burn hazard to the workers performing these tasks.

Using supplemental cooling invoked, which for Diablo Canyon Power Plant (DCPP) consists of just filling the HI-TRAC annulus with water, reduces the temperature down to nominal boiling (~212° F).

Even though there is no nuclear safety reason to require it, the option of using supplemental cooling would provide a decrease in burn risk to personnel handling and performing work on or around the MPC. PG&E is not proposing any additional changes to the Updated Final Safety Analysis Report (UFSAR).

NRC Question 2:

6.2 *Include in the technical specifications (TS) the ambient temperature for the cases when the MPC and HI-STORM overpack are in the ISFSI pad, the cask transfer facility, and the transport configuration.*

SAR page 4.2-23 states that as part of the new analysis two normal ambient temperatures were used based on the system configuration. As an operating parameter like the MPC backfill pressure, total decay heat per fuel assembly etc, the ambient temperature should be included in the TS because it supports the conclusions from the thermal evaluation.

This information is needed to determine compliance with 10 CFR 72.122 and 10 CFR 72.128.

PG&E Response:

PG&E is adding the following to TS section 4.1:

4.1.3 Design Features Important to Thermal Analysis

a. A maximum average yearly temperature of 65° F is the basis for a loaded overpack in the cask transfer facility, or storage on the ISFSI pad.
b. A maximum temperature of 100° F, averaged over a 3-day period, is the basis for transfer activities in the transfer cask.

Attachments 1 and 2 provide a marked-up and retyped TS page 4.0-2.

The average annual temperature at DCPPs ISFSI site is 55° F based on the measurements made at its primary meteorological tower (see Section 2.3 of the DCPP ISFSI UFSAR). An ambient temperature of 65° F was used in the thermal analyses of HI-STORM to conservatively bound this meteorological data.

The temperature during normal onsite transfer in HI-TRAC takes a few days to reach a steady state. Therefore, a more realistic ambient temperature is a 3-day rolling average ambient temperature, accounting for the temperatures during the day and the night. A 3-day rolling average at DCPP will be much lower than 100° F used in the thermal analysis, which exceeds the highest temperature recorded on site. Therefore, the fuel and other component temperatures during normal onsite transfer in HI-TRAC are expected to be much lower than the analytical values.

NRC Question 3:

6-3 Clarify why the SCS may be necessary to lower the MPC temperatures for transfer operations.

The application states that the SCS is only needed for unloading operations since based on the thermal analysis; the temperatures are below allowable limits for transfer operations for high burnup fuel. It is not clear to the staff why the applicant needs to lower MPC temperatures by using a SCS.

This information is needed to determine compliance with 10 CFR 72.122 and 10 CFR 72.128.

PG&E Response:

See response to NRC Question 6-1.

NRC Question 4:

6-4 Obtain the grid convergence index (GCI) for the cases when the MPC is in the HI-STORM, the Cask Transfer Facility (CTF), and transfer configuration using at least four grids.

Appendix E to Holtec Report HI-2125191 provides the GCI calculation based on a three-grid solution. However, ASME V&V 20-2009 states that a minimum of four grids is required to demonstrate that the observed order p is constant for a simulation series.

This information is needed to determine compliance with 10 CFR 72.122 and 10 CFR 72.128.

PG&E Response:

Holtec performed grid sensitivity studies for all three cases – MPC in HI-STORM, HI-STORM System in the CTF, and MPC in the HI-TRAC, following the guidelines given in ASME V&V 20-2009 to confirm a grid-independent computational fluid dynamic (CFD) solution for thermal performance of these systems. The baseline or the first mesh for the analysis of the system was based on prior experience with computational modeling and mesh development for similar dry storage systems. This baseline mesh was constructed with sufficient number of cells in all directions based on prior experience such that it predicts temperature field with reasonable accuracy. This mesh incorporates the requirement for near-wall modeling which significantly impacts the fidelity of numerical solutions. The flow in the viscosity-affected region in the annulus between MPC and HI-STORM must be suitably resolved, including the viscous sublayer. This requires a fine mesh near the wall, i.e., the CFD solution must achieve y^+ close to 1 in the near wall regions. To further demonstrate the adequacy of this mesh, a series of grid sensitivity studies were performed with additional meshes to provide assurance on mesh independency.

In order to perform such a study, two additional distinct grid sizes, with increasing number of meshes were used to perform the same analysis.

- The grid refinement of each mesh ensured that physics of fluid flow and heat transfer was captured in both fluid and solid regions.
- In order to achieve this, the mesh was refined along both radial and axial directions of the thermal model.
- The grid refinement was performed in a systematic manner with focus on areas of thermal concern like the MPC internals, flow annulus between MPC and HI-STORM overpack in addition to refinement in the MPC shell, MPC lid, overpack lid, and concrete. (Note that the grid refinement was also done for MPC in HI-TRAC reference HI-2125191 Appendix E, Section E.5)

The mesh refinement in fluid region is more critical than the solid region due to the complexity of fluid flow. A significant mesh refinement in solid regions is not necessary since they only take part in conduction while a meticulous mesh refinement is essential in fluid zones which take part in all three modes of heat transfer. Since HI-STORM and HI-TRAC casks are long vertical storage systems, the flow is mostly uniform in the axial direction with no significant flow in the angular direction.

Each thermal model (MPC in HI-STORM, HI-STORM System in the CTF, and MPC in the HI-TRAC) was evaluated on three meshes of different size in Holtec Report HI-2125191. Based on the results reported in Holtec Report HI-2125191, the peak cladding temperatures (PCTs) are within 5° C of each other between the baseline mesh and the finest mesh. The PCTs for all these meshes are at least 30° C below the cladding temperature limit of 400° C in all conditions. Considering the small difference in the predicted peak temperatures even after significant mesh refinement and the margins to the temperature limits, a fourth mesh study will not change any of the safety conclusions made in Holtec Report HI-2125191.

The total mesh size of the finest mesh is close to 4.7 million cells for HI-STORM in the CTF case. Adding a fourth mesh would increase the total mesh size to 10.3 million cells which is computationally intensive to work with. The procedure used by Holtec to achieve a mesh independent solution generally followed the guidelines of ASME V&V 20-2009 and best practice methods for CFD.

A minimum of four grids is only required to demonstrate that the observed order p is constant for a simulation series. As explained in the response to NRC Question 5, the calculated value p was not used in the GCI calculation for the CTF and transfer configuration. Instead, an apparent order p equal to 1.0 was used in the GCI calculation. In this situation, it is not necessary to demonstrate that the observed order p is constant.

NRC Question 5:

6-5 *Calculate the GCI based on an apparent order p equal to 1.0 for the CTF and transfer configuration.*

Appendix E to Holtec Report HI-2125191 provides the GCI calculation for these configurations. However, the calculated apparent order is more than twice the theoretical value used in the analysis model (second order) provided by the applicant.

This information is needed to determine compliance with 10 CFR 72.122 and 10 CFR 72.128.

PG&E Response:

In the GCI calculation, the measurement of discretization convergence is cubic root of the average volume size. The thermal model incorporates all three heat transfer modes: conduction, convection, and radiation. For different heat transfer modes, the measurement of discretization convergence differs (e.g., the convergence of conduction problem in finite volume method is characterized by Δx (in space)) while the convergence of radiation problem depends on the number of surface facets. The grid refinement was performed in a systematic manner with focus on areas of thermal concern like the MPC internals. Thus, the refinement ratio from the coarse mesh to the fine mesh is not constant over the entire domain, which can also cause the calculated convergence order to be different from the theoretical value (the calculated apparent order 'p' for the meshes used in the grid convergence study is different from the theoretical value (second order) of the method).

To address the difference in calculated convergence order from the theoretical value, an estimate of GCI is made using 'p' equal to 1, where the convergence rates are assumed to be 1st order though the solver is 2nd order accurate. The GCI calculations in Appendix E of Holtec Report HI-2125191 are revised.

NRC Question 6:

6-6 *Perform the thermal analysis for the HI-STORM, CTF, and transfer configurations to identify the uncertainties in the model and quantify the peak cladding temperature (PCT) difference contributed by each of the following modeling errors:*

a) *The representation of water density using Boussinesq approximation. Real fluid property as function of temperature and pressure should be implemented for the running fluids to assess any approximation such as Boussinesq on the final Computational Fluid Dynamics (CFD) results.*

b) *The representation of fuel rods using porous media and effective thermal conductivity. In the porous media approximation, fuel rods were approximated hydraulically by using frictional and inertial resistance. Also effective thermal conductivity was used to model radiation and conduction heat transfer in the assembly instead of using the real geometry. Effective thermal conductivity was also used in the air gap between the MPC and the transfer cask. Calculations should be performed to assess the sensitivity on the final results (i.e., peak cladding temperature) to possible changes in frictional losses, inertial losses, and use of effective thermal conductivity.*

This information is needed to determine compliance with 10 CFR 72.122 and 10 CFR 72.128.

PG&E Response:

A series of sensitivity studies were performed to address the staff's concerns on the uncertainties in the thermal model. Since the predicted temperatures in the case of HI-STORM in CTF bounds those in HI-STORM under normal long-term storage conditions, the former case was adopted to perform all the sensitivity studies related to HI-STORM. The following changes are made to the thermal model as part of the sensitivity studies:

Case 1 - Effective thermal conductivity of the fuel region is reduced by 10 percent.

Case 2 - The flow resistance through the fuel region is increased to $1x10^6$ $1/m^2$.

To perform these studies, the converged mesh (Mesh 4) as reported in Table B.5.11 of Holtec Report HI-2125191 was adopted for all the sensitivity studies. The PCTs and other cask components from these sensitivity studies are reported in Tables 1 and 2 of this enclosure. The following is a summary of results of the sensitivity studies performed:

Case 1 - As the effective thermal conductivity is reduced by 10 percent, the PCT increases by 3° C to a value of 369° C which is below the fuel temperature limit of 400° C. All other MPC and overpack component temperatures are well below their respective long-term temperature limits.

Case 2 - As the flow resistance is increased to 1x10^6 1/m^2, the PCT increases from 366° C to 387° C (below the limit of 400° C). All other MPC and overpack component temperatures are also below their respective long-term temperature limits.

The sensitivity studies of HI-STORM in CTF show that the impact of reduced effective thermal conductivity is not as significant as that of the increased flow resistance. Therefore, the independent sensitivity study of reduced effective thermal conductivity was not performed for HI-TRAC. Instead, a sensitivity study including both reduced effective thermal conductivity and increased flow resistance was performed. The following are two sensitivity studies performed on the HI-TRAC thermal model:

Case 3 - The flow resistance through the fuel region is increased to 1x10^6 1/m^2.

Case 4 - The flow resistance through the fuel region is increased to 1x10^6 1/m^2 and the effective thermal conductivity of the fuel region is reduced by 10 percent.

Besides the changes in the effective thermal conductivity and flow resistance, the following modifications were made in both Case 3 and Case 4:

i. Water density is represented by specifying the density variation with temperature instead of using the Boussinesq approximation.
ii. The annular gap between MPC and HI-TRAC is now modeled as a fluid that participates in all three modes of heat transfer – conduction, convection and radiation. Conservatively, no credit for any radial thermal expansion between MPC and HI-TRAC is taken in the thermal model.

The converged mesh (Mesh 3) as reported in Table C.1 of Holtec Report HI-2125191 was adopted for the sensitivity studies for HI-TRAC. The PCTs and other cask components are reported in Tables 3 and 4 of this enclosure. The following is a summary of results of the sensitivity studies performed:

Case 3 – As the flow resistance is increased to 1x10^6 1/m^2, with explicitly modeled annular gap and temperature-dependent water density, the PCT increases from 362° C to 389° C. All other MPC and HI-TRAC component temperatures are well below their respective temperature limits.

Case 4 - As the flow resistance is increased to 1x10^6 1/m^2 and the effective thermal conductivity is reduced by 10 percent, with explicitly modeled annular gap and temperature-dependent water density, the PCT increases from 362° C to 391° C. All other MPC and HI-TRAC component temperatures are well below their respective temperature limits.

These sensitivity studies performed to address the uncertainties in the thermal model are documented in Holtec Report HI-2125191. The safety conclusions made in Holtec Report HI-2125191 remain unaffected.

Table 1 – Maximum Temperatures and MPC Cavity Pressure for HI-STORM in CTF with 10% Reduction in Fuel Effective Thermal Conductivity (CASE 1)

Component	Temperature °C (°F)	Temperature Limit °C (°F)
Fuel Cladding	369 (696)	400 (752)
MPC Basket	365 (689)	385 (725)
Basket Periphery	283 (541)	385 (725)
MPC Shell	209 (407)	232 (450)
Overpack Inner Shell	137 (278)	177 (350)
Overpack Outer Shell	62 (144)	177 (350)
Lid Bottom Plate	117 (242)	177 (350)
Lid Top Plate	83 (182)	177 (350)
Overpack Body Concrete[1]	95 (203)	149 (300)
Overpack Lid Concrete[1]	99 (210)	149 (300)
Average Air Outlet	90 (193)	-
MPC Cavity Pressure kPa (psig)		
Normal Condition (No Rod Rupture)	535.5 (77.7)	689.3 (100)

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[1] Maximum section average temperature is reported.

Table 2 – Maximum Temperatures and MPC Cavity Pressure for HI-STORM in CTF with Increased Flow Resistance (CASE 2)

Component	**Temperature °C (°F)**	**Temperature Limit °C (°F)**
Fuel Cladding	387 (729)	400 (752)
MPC Basket	384 (723)	385 (725)
Basket Periphery	288 (551)	385 (725)
MPC Shell	207 (405)	232 (450)
Overpack Inner Shell	135 (275)	177 (350)
Overpack Outer Shell	63 (146)	177 (350)
Lid Bottom Plate	116 (241)	177 (350)
Lid Top Plate	84 (182)	177 (350)
Overpack Body Concrete[2]	94 (201)	149 (300)
Overpack Lid Concrete[2]	99 (210)	149 (300)
Average Air Outlet	88 (191)	-
MPC Cavity Pressure kPa (psig)		
Normal Condition (No Rod Rupture)	540.6 (78.4)	689.3 (100)

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[2] Maximum section average temperature is reported.

Table 3 – Maximum Temperatures and MPC Cavity Pressure for HI-TRAC under Normal On-Site Transfer Condition with Increased Flow Resistance, Fluid Annular Gap and Temperature-Dependent Water Density (CASE 3)

Component	**Temperature °C (°F)**	**Short-Term Operation Temperature Limit °C (°F)**
Fuel Cladding	389 (732)	Moderate Burnup Fuel: 570 (1058) High Burnup Fuel: 400 (752)
MPC Basket	386 (727)	510 (950)
Basket Periphery	289 (552)	510 (950)
MPC Shell	217 (423)	413 (775)
HI-TRAC Inner Shell	126 (259)	204 (400)
Water Jacket Outer Shell	112 (234)	177 (350)
Water Bulk Temperature in Water Jacket	109 (228)	153 (307)
Axial Neutron Shield[3]	131 (268)	149 (300)
MPC Cavity Pressure kPa (psig)		
Normal Condition (No Rod Rupture)	557.3 (80.9)	689.3 (100)

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[3] Maximum section average temperature is reported.

Table 4 – Maximum Temperatures and MPC Cavity Pressure for HI-TRAC under Normal On-Site Transfer Condition with Increased Flow Resistance, 10% Reduction in Fuel Effective Thermal Conductivity, Fluid Annular Gap and Temperature-Dependent Water Density (CASE 4)

Component	Temperature °C (°F)	Short-Term Operation Temperature Limit °C (°F)
Fuel Cladding	391 (735)	Moderate Burnup Fuel: 570 (1058) High Burnup Fuel: 400 (752)
MPC Basket	387 (729)	510 (950)
Basket Periphery	290 (553)	510 (950)
MPC Shell	216 (420)	413 (775)
HI-TRAC Inner Shell	126 (259)	204 (400)
Water Jacket Outer Shell	110 (231)	177 (350)
Water Bulk Temperature in Water Jacket	108 (226)	153 (307)
Axial Neutron Shield[4]	131 (268)	149 (300)
MPC Cavity Pressure kPa (psig)		
Normal Condition (No Rod Rupture)	557.3 (80.9)	689.3 (100)

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[4] Maximum section average temperature is reported.

In the NRC acceptance letter for LAR 12-03, dated November 5, 2012, an observation was made concerning shielding evaluation as delineated below:

NRC Observation

> *In amendment No. 2 to Materials License no. SNM-2511 the licensee provided a shielding evaluation to allow the DC ISFSI to be loaded with high burnup fuel. The burnup was increased to 69,000 MWd/MTU for assemblies with 4.8 wt% U-235 initial enrichment, with an initial cooling time of five years. In previous amendments the licensee stated that the dose rates calculated for an overpack for the original shielding analyses for the MPC-32 bound the dose rates for a HISTORM 100SA overpack. However, for amendment request no. 3, the staff determined that some information regarding source term calculations may be missing. The staff verified that the maximum allowable average burnup per fuel assembly (MWd/MTU) corresponded to the maximum allowable decay heat per storage location. The staff also determined that for the maximum source term, there was no minimum enrichment described. The applicant should provide this information in to support the shielding evaluation of amendment request No. 3.*

PG&E Response

Appendix R to calculation HI-2002563 was developed to present a source term comparison between the source terms used in the main body of the report and the fuel inventory of DCPP in order to prove that the source terms, which were used in the main body of the report, bound the fuel inventory provided by PG&E.

In Table 5 below, 3 burnup/enrichment combinations are shown for 15X15 B&W fuel. The cooling time is fixed at 5 years. A combination of minimum enrichment and maximum burn up that bound a range of assemblies were selected.

In Table 5 below, Source Term A was chosen from the main body of the report. Source Term B was taken as a theoretical source term which bound all fuel with enrichments less than 3.2 percent. The upper burnup limit for this group is 45,000 MWd/MTU as there are no assemblies with enrichments between 2-3.2 percent which exceed this burnup. Source Term C addresses assemblies with enrichments higher than 3.2 percent and burnup up to 57,500 MWd/MTU.

One assembly with 57,800 MWd/MTU burnup is not addressed by source Term C. Because source Term A is based on a higher burnup and lower enrichment than this assembly, Source Term A is bounding.

Table 6 below shows the neutron and photon strength for Source Terms A, B, and C. The neutrons per second, emitted from each energy group for Source A, exceed that of Sources B and C. The same applies to the photon source term; the number of photons per second, emitted from each energy group for Source A, exceeds that of Sources B and C, with the only exceptions being photons in the energy range of 2.5-3.0 MeV and 3.0-4.0 MeV. However, as shown in Table 6 below, these groups don't contribute significantly to the dose rate as the number of photons emitted in these groups is very low. In addition, the difference between the source strengths is minor.

Since only Appendix R of calculation HI-2002563 was revised in support of this response, the non-proprietary version of this calculation revision provided as Attachment 3 to this enclosure contains only the Appendix R pages and cover page for the calculation.

Table 5 - Bounding Source Terms A, B, and C

Source Term	Burnup (MWd/MTU)	Cooling Time (years)	Enrichment (wt.% $_{235}$U)
A	69,000	5	4.8
B	45,000	5	2.0
C	57,500	5	3.2

Table 6 - Neutron and Photon strength

Neutrons **5 year cooling**

lower energy	upper energy	69000 MWd/MTU	45000 MWd/MTU	57500 MWd/MTU
(MeV)	(MeV)	4.80%	2.0%	3.20%
6.43	20.00	2.60E+07	1.84E+07	2.46E+07
3.00	6.43	2.92E+08	2.07E+08	2.76E+08
1.85	3.00	3.21E+08	2.27E+08	3.02E+08
1.40	1.85	1.82E+08	1.29E+08	1.72E+08
0.90	1.40	2.48E+08	1.76E+08	2.34E+08
0.40	0.90	2.71E+08	1.92E+08	2.56E+08
0.10	0.40	5.31E+07	3.76E+07	5.01E+07
	Total	1.39E+09	9.87E+08	1.32E+09

Photons **5 year cooling**

lower energy	upper energy	69,000 MWd/MTU	45,000 MWd/MTU	57,500 MWd/MTU
(MeV)	(MeV)	4.80%	2.0%	3.20%
0.01	0.02	1.10E+15	7.61E+14	9.38E+14
0.02	0.03	6.23E+14	4.43E+14	5.36E+14
0.03	0.05	7.81E+14	5.44E+14	6.66E+14
0.05	0.07	4.97E+14	3.48E+14	4.24E+14
0.07	0.10	3.49E+14	2.47E+14	2.99E+14
0.10	0.15	3.94E+14	2.82E+14	3.39E+14
0.15	0.30	3.11E+14	2.24E+14	2.68E+14
0.30	0.45	1.63E+14	1.25E+14	1.45E+14
0.45	0.70	5.67E+15	3.82E+15	4.83E+15
0.70	1.00	1.44E+15	9.43E+14	1.23E+15
1.00	1.50	2.15E+14	1.46E+14	1.84E+14
1.50	2.00	8.08E+12	6.53E+12	7.41E+12
2.00	2.50	3.36E+12	3.19E+12	3.32E+12
2.50	3.00	1.29E+11	1.34E+11	1.36E+11
3.00	4.00	1.62E+10	1.68E+10	1.71E+10
4.00	6.00	5.99E+07	4.26E+07	5.67E+07
6.00	8.00	6.90E+06	4.91E+06	6.53E+06
8.00	11.00	7.94E+05	5.65E+05	7.51E+05
	Total	1.16E+16	7.89E+15	9.87E+15

Enclosure
Attachment 1
PG&E Letter DIL-13-004

Proposed Technical Specification Changes (markup)

Insert 1:

4.1.3 Design Features Important to Thermal Analysis

a. A maximum average yearly temperature of 65° F is the basis for a loaded overpack in the cask transfer facility, or storage on the ISFSI pad.

b. A maximum temperature of 100° F, averaged over a 3-day period, is the basis for transfer activities in the transfer cask.

INSERT 1

4.0 DESIGN FEATURES (continued)

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
Material Procurement	ASME III, NB-2000	ASME Code, 1995 Edition. 1997 Addenda
Design	ASME III, NB-3200	ASME Code, 1995 Edition. 1997 Addenda
Fabrication	ASME III, NB-4000	ASME Code, 1995 Edition. 1997 Addenda
Examination	ASME III, NB-5000	ASME Code, 1995 Edition. 1997 Addenda

Any specific alternatives to these codes and standards, and the codes and standards for other components followed for the Diablo Canyon ISFSI storage system, are provided in the Diablo Canyon ISFSI Safety Analysis Report (SAR).

4.2.1 Alternatives to Design Codes, Standards, and Criteria

Proposed construction/fabrication alternatives to the above MPC design codes and standards, including alternatives in SAR Table 3.4-6, may be used when authorized by the Director of the Office of Nuclear Material Safety and Safeguards or designee. The licensee should demonstrate that:

1. The proposed alternatives would provide an acceptable level of quality and safety, or
2. Compliance with the specified requirements of ASME Code Section III, 1995 Edition with Addenda through 1997, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Requests for relief in accordance with this section shall be submitted in accordance with 10 CFR 72.4.

(continued)

Proposed Technical Specification Changes (retyped)

Remove Page	Insert Page
4.0-2	4.0-2

4.0 DESIGN FEATURES (continued)

4.1.3 Design Features Important to Thermal Analysis

a. A maximum average yearly temperature of 65° F is the basis for a loaded overpack in the cask transfer facility, or storage on the ISFSI pad.

b. A maximum temperature of 100° F, averaged over a 3-day period, is the basis for transfer activities in the transfer cask.

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
Material Procurement	ASME III, NB-2000	ASME Code, 1995 Edition. 1997 Addenda
Design	ASME III, NB-3200	ASME Code, 1995 Edition. 1997 Addenda
Fabrication	ASME III, NB-4000	ASME Code, 1995 Edition. 1997 Addenda
Examination	ASME III, NB-5000	ASME Code, 1995 Edition. 1997 Addenda

Any specific alternatives to these codes and standards, and the codes and standards for other components followed for the Diablo Canyon ISFSI storage system, are provided in the Diablo Canyon ISFSI Safety Analysis Report (SAR).

4.2.1 Alternatives to Design Codes, Standards, and Criteria

Proposed construction/fabrication alternatives to the above MPC design codes and standards, including alternatives in SAR Table 3.4-6, may be used when authorized by the Director of the Office of Nuclear Material Safety and Safeguards or designee. The licensee should demonstrate that:

1. The proposed alternatives would provide an acceptable level of quality and safety, or
2. Compliance with the specified requirements of ASME Code Section III, 1995 Edition with Addenda through 1997, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Requests for relief in accordance with this section shall be submitted in accordance with 10 CFR 72.4.

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