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PG&E Letter HIL-08-001

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-2514, Docket No. 72-27
Humboldt Bay Independent Spent Fuel Storage Installation

License Amendment Request 08-01
Revision to Technical Specifications Table 2.1-1

Dear Commissioners and Staff:

Enclosed is an application for amendment to Materials License No. SNM-2514, Docket No. 72-27, for the Humboldt Bay (HB) Independent Spent Fuel Storage Installation (ISFSI) in accordance with 10 CFR 72.56. The enclosed license amendment request (LAR) proposes to change the minimum initial fuel enrichment identified in Technical Specifications (TS) Table 2.1-1, "MPC-HB-HB Fuel Assembly Limits," from 2.09 wt-percent $^{235}U$ to 2.08 wt-percent $^{235}U$. This change would result in the Planar-Average Initial Enrichment identified in TS Table 2.1-1 to be specified as, "≤2.60 and ≥2.08 wt-percent $^{235}U$."

Humboldt Bay Power Plant (HBPP) Unit 3 fuel has four different types of fuel. Of these four types, the GE Type II, "C" series, fuel has the lowest enrichment, which varies between 2.08 wt-percent $^{235}U$ and 2.1 wt-percent $^{235}U$. As a result, 2.09 wt-percent $^{235}U$ was assumed to be the minimum average enrichment for all HBPP Unit 3 fuel. This average value of 2.09 wt-percent $^{235}U$ was used by Holtec in their shielding calculation as documented in Holtec Report HI-2033047, "ISFSI Dose Assessment for Humboldt Bay."

When TS Table 2.1-1 was initially developed, the average value of 2.09 wt-percent $^{235}U$ was used for the minimum Planar-Average initial enrichment. However, as stated above, some fuel assemblies have a minimum enrichment of 2.08 wt-percent $^{235}U$. Thus, the minimum enrichment value of 2.08 wt-percent $^{235}U$ for any fuel assembly should have been identified in TS Table 2.1-1. This was identified by Pacific Gas and Electric Company (PG&E) during a recent documentation verification review in preparation for loading spent fuel into the HB ISFSI.

LIMSS01

The basis for the HB ISFSI design used a maximum source term for the shielding calculations as required by ISG-6, "Establishing Minimum Initial Enrichment for the Bounding Design Basis Fuel Assembly(s)." The bounding neutron source term using the average enrichment value of 2.09 wt-percent $^{235}U$ for the lowest enrichment fuel (GE Type II, "C" series) was correctly used in Holtec Report HI-2033047. As a result, the proposed TS change does not impact ISFSI design and calculations, and has no impact on health and safety of ISFSI workers or the public.

Enclosure 1 contains a description of the proposed change and the supporting technical analyses. Enclosures 2 and 3 contain marked-up and revised TS pages, respectively.

PG&E has determined that this LAR is consistent with the considerations that govern the issuance of the initial license in accordance with 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.

NRC approval of the proposed change in this LAR is required to store those fuel assemblies with an initial enrichment of 2.08 wt-percent $^{235}U$ in the HB ISFSI. The HB ISFSI fuel loading campaign is scheduled to begin in late April 2008, and the fuel with 2.08 wt-percent $^{235}U$ enrichment is expected to be loaded in early June 2008. PG&E respectfully requests the NRC to assign a high-priority for review and approval of this LAR, and requests that the amendment be issued no later than June 5, 2008. PG&E requests the LAR be made effective upon NRC issuance, to be implemented within 30 days of issuance.

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

Executed on March 5, 2008.

If you have any questions or require additional information, please contact Mr. David Sokolsky at (707) 444-0801.

Sincerely,

John T. Conway

John T. Conway
*Senior Vice President and Chief Nuclear Officer*

gwh/4162
Enclosures
cc: Gary Butner, California Department of Public Health
Elmo E. Collins, NRC Region IV
James R. Hall, NRC
John B. Hickman, NRC
Humboldt Distribution

# EVALUATION

## 1.0 DESCRIPTION

This license amendment request (LAR) proposes to amend Materials License SNM-2514 (Reference 6.1) for the Humboldt Bay (HB) Independent Spent Fuel Storage Installation (ISFSI). The proposed change would revise Technical Specification (TS) Table 2.1-1, "MPC-HB-HB Fuel Assembly Limits," for the minimum initial fuel enrichment from 2.09 wt-percent $^{235}U$ to 2.08 wt-percent $^{235}U$. This change would result in the Planar-Average Initial Enrichment identified in TS Table 2.1-1 to be specified as, "≤2.60 and ≥2.08 wt-percent $^{235}U$."

Humboldt Bay Power Plant (HBPP) Unit 3 fuel has four different types of fuel. Of these four types, the GE Type II, "C" series, fuel has the lowest enrichment, which varies between 2.08 wt-percent $^{235}U$ and 2.1 wt-percent $^{235}U$. As a result, 2.09 wt-percent $^{235}U$ was assumed to be the minimum average enrichment for all HBPP Unit 3 fuel. This average value of 2.09 wt-percent $^{235}U$ was used by Holtec in their shielding calculation as documented in Holtec Report HI-2033047, "ISFSI Dose Assessment for Humboldt Bay," (Reference 6.2).

When TS Table 2.1-1 was initially developed, the average value of 2.09 wt-percent $^{235}U$ was used for the minimum Planar-Average Initial Enrichment. However, as stated above, some fuel assemblies have a minimum enrichment of 2.08 wt-percent $^{235}U$. Thus, the minimum enrichment value of 2.08 wt-percent $^{235}U$ for any fuel assembly should have been identified in TS Table 2.1-1. This was identified by Pacific Gas and Electric Company (PG&E) during a recent documentation verification review in preparation for loading spent fuel into the HB ISFSI.

The basis for the HB ISFSI design used a maximum source term for the shielding calculations as required by ISG-6, "Establishing Minimum Initial Enrichment for the Bounding Design Basis Fuel Assembly(s)," (Reference 6.3). The bounding neutron source term using the average enrichment value of 2.09 wt-percent $^{235}U$ for the lowest enrichment fuel (GE Type II, "C" series) was correctly used in Holtec Report HI-2033047. As a result, the proposed TS change does not impact ISFSI design and calculations, and has no impact on health and safety of ISFSI workers or the public.

In addition, the title of Table 2.1-1 is proposed to be editorially changed to delete a hyphen.

## 2.0 PROPOSED CHANGE

This LAR proposes to change TS Table 2.1-1 to specify the Planar-Average Initial Enrichment to be, "≤2.60 and ≥2.08 wt-percent $^{235}U$." In addition, the title of Table 2.1-1 is proposed to be changed to, "MPC-HB HB FUEL ASSEMBLY LIMITS."

## 3.0 BACKGROUND

On November 17, 2005, the NRC issued Materials License No. SNM-2514 to PG&E to receive, possess, store, and transfer spent fuel and associated radioactive materials resulting from operation of HBPP Unit 3 into an ISFSI. The HB ISFSI uses the HI-STAR HB, which is the Holtec International HI-STAR 100 dry cask system, as modified for the HBPP Unit 3 spent fuel. The HI-STAR HB is both a storage and transportation cask that provides structural protection and radiation shielding for the multi-purpose canister (MPC-HB) containing the spent fuel.

TS Table 2.1-1 currently specifies the Planar-Average Initial Enrichment to be, "≤2.60 and ≥2.09 wt-percent $^{235}U$." The basis of design for the ISFSI used a maximum source term for the shielding calculations as required by ISG-6. The bounding neutron source term using the average enrichment value of 2.09 wt-percent $^{235}U$ for the lowest enrichment fuel (GE Type II, "C" series) was correctly used in Holtec Report HI-2033047. When transposed into TS Table 2.1-1, the average enrichment value per assembly of 2.09 wt-percent $^{235}U$ was used instead of the lowest enrichment value of 2.08 wt-percent $^{235}U$.

## 4.0 TECHNICAL ANALYSIS

HBPP Unit 3 fuel has four different types of fuel. Of these four types, the GE Type II, "C" series, fuel has the lowest enrichment, which varies between 2.08 wt-percent $^{235}U$ and 2.1 wt-percent $^{235}U$. The design characteristics of GE Type III fuel assembly were chosen as design inputs for the shielding analysis because it has the highest uranium mass loading, and therefore, will have a higher source term for the same burnup and cooling time than the other HB fuel designs. In addition, the GE Type III fuel assembly comprises the largest fraction of the HBPP spent fuel inventory. However, the lower enrichment value from GE Type II, "C" series, fuel was used in the model for conservatism. Holtec Report HI-2033047 assumed that the HB ISFSI facility is filled to its maximum capacity with 6 HI-STAR casks loaded with fuel of 23,000 MWD/MTU burnup, 2.09 wt-percent $^{235}U$ initial average enrichment, and 29-year cooling time at the time of loading. This modeling method was done to provide extra conservatism, and minimize the requirement to make cask loading meet average values. The average values for burnup is 14772 MWD/MTU, and the average enrichment is 2.35 wt-percent $^{235}U$ for the entire 390 assemblies to be loaded.

The basis for the HB ISFSI design used a maximum source term for the shielding calculations as required by ISG-6. The ISG states, "...the SAR should specify the minimum initial enrichment as an operating control and limit for cask use, or justify the use of a neutron source term, in the shielding analysis, that specifically bounds the neutron sources for fuel assemblies to be placed in the cask." In addition, ISG-6 states, "Lower enriched fuel irradiated to the same burnup as higher enriched fuel produces a higher neutron source."

There are 88 assemblies of GE Type II fuel with an average minimum enrichment of 2.11 wt-percent $^{235}U$. Forty-four of these 88 assemblies have a minimum enrichment of 2.08 wt-percent $^{235}U$. By loading all 44 of the 2.08 wt-percent $^{235}U$ into the MPC-HB with any combination of the remaining fuel assemblies having higher enrichments, the resulting average would be at least 2.09 wt-percent $^{235}U$, which is bounded by the Holtec analysis. The basis of the shielding calculation HI-2033047 was to select a conservative grouping on a "per cask" basis, and therefore, the average minimum value of 2.09 wt-percent $^{235}U$ was correctly applied in the shielding calculations. As a result, the proposed TS change does not impact ISFSI design and calculations, and has no impact on health and safety of ISFSI workers or the public.

## 5.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.41, Pacific Gas and Electric Company has reviewed the environmental impact of the proposed amendment, and has determined that it meets the criteria for categorical exclusion set forth in 10CFR51.22(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 REFERENCES

6.1 Materials License No. SNM-2514 for the Humboldt Bay Independent Spent Fuel Storage Installation (TAC No. L23683) dated November 17, 2005.

6.2 Holtec International Report HI-2033047, "ISFSI Dose Assessment for Humboldt Bay", Revision 1, dated September 15, 2004.

6.3 Interim Staff Guidance 6, "Establishing Minimum Initial Enrichment for the Bounding Design Basis Fuel Assembly(s)," Revision 0.

**Proposed Technical Specification Changes (mark-up)**

TABLE 2.1-1

MPC-HB-HB FUEL ASSEMBLY LIMITS

A. Allowable Contents (Notes 1 and 2)

1. Uranium oxide, INTACT FUEL ASSEMBLIES and DAMAGED FUEL ASSEMBLIES, with or without channels, meeting the criteria specified in Table 2.1-2 and the following specifications.

| | |
|---|---|
| Cladding type | ZR (Notes 3 and 4) |
| Planar-Average Initial enrichment | ≤ 2.60 and ≥ 2.~~09~~08 wt% $^{235}U$. |
| Post-irradiation cooling time per assembly | ≥ 29 years |
| Average burnup per assembly | ≤ 23,000 MWD/MTU |
| Decay heat per assembly | ≤ 50 Watts |
| Decay heat per SFSC | ≤ 2000 Watts |
| Fuel assembly length | ≤ 96.91 inches (nominal design) |
| Fuel assembly width | ≤ 4.70 inches (nominal design) |
| Fuel assembly weight | ≤ 400 lb (including channel and DFC) |

B. Quantity per MPC-HB: Up to 80 fuel assemblies.

C. DAMAGED FUEL ASSEMBLIES must be stored in a DAMAGED FUEL CONTAINER. Allowable Loading Configurations: Up to 28 DAMAGED FUEL ASSEMBLIES in DAMAGED FUEL CONTAINERS, can be stored in the peripheral fuel storage locations as shown in Figure 2.1-1, or up to 40 DAMAGED FUEL ASSEMBLIES in DAMAGED FUEL CONTAINERS, can be stored in a checkerboard pattern as shown in Figure 2.1-2. The remaining fuel storage locations may be filled with INTACT FUEL assemblies meeting the above applicable specifications, or with INTACT FUEL assemblies optionally stored in DFCs.

**NOTE 1**: Fuel assemblies with channels may be stored in any fuel cell location.

**NOTE 2**: The total quantity of damaged fuel permitted in a single DAMAGED FUEL CONTAINER is limited to the equivalent weight and special nuclear material quantity of one intact fuel assembly.

**NOTE 3**: ZR means any-zirconium-based fuel cladding material authorized for use in a commercial nuclear power plant reactor.

**NOTE 4:** Storage as a DAMAGED FUEL ASSEMBLY of material in the form of loose debris consisting of zirconium clad pellets, stainless steel clad pellets, unclad pellets or rod segments up to a maximum of one equivalent fuel assembly is allowed.

**Proposed Technical Specification Changes (retyped)**

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| **Table 2.1-1** | **Table 2.1-1** |

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