Attachment 2 to Holtec Letter 5018064

Amendment Request 1032-5, RSI Response

SUMMARY OF PROPOSED CHANGES (SOPC), Revision 2

Proposed Change #1

Addition of new heat load patterns for the MPC-89 and MPC-37 (standard and short length), and revision of minimum required cooling time for fuel to 1.2 years for MPC-89 and 2 years for MPC-37. These patterns also include locations for damaged fuel at higher per cell heat load limits than previously authorized. These changes are shown in the marked changes to Appendix B included with this request. Add one additional new heat load pattern (pattern 3), with two variations for DFC locations, for the MPC-89.

Reason for Proposed Change #1

The new patterns requested in this change support storage of fuel assemblies with higher per assembly heat loads in the HI-STORM FW MPCs. These patterns support sites planning to shutdown to offload fuel into dry storage sooner. These patterns also address the storage of higher heat load damaged fuel and fuel debris in damaged fuel containers.

Justification for Proposed Change #1

The new loading patterns have been thermally evaluated and found to maintain component temperatures and MPC cavity pressure below the required limits. Supporting thermal analyses have been performed, and are included in Chapter 4 of the FSAR. Additional supporting changes have also been included in Chapters 2, 3, 5, and 6 of the FSAR. Marked up copies of the affected chapters are included, as well as proposed CoC pages to include the new patterns.

In Chapter 3, analyses (using conservatively bounding temperatures, temperature contours, pressures and weights) used in the justification of these changes were previously added to the FSAR in support of other changes under 10CFR72.48. Holtec is not requesting NRC review of these changes, and as such they are labeled with the appropriate 10CFR72.48 number in the margin of the affected chapter.

Proposed Change #2

Addition of four new fuel types, 10x10I, 11x11A, 7x7C and 8x8G to the approved contents in CoC 1032, Appendix B.

Reason for Proposed Change #2

This proposed change allows storage of additional fuel types in the HI-STORM FW System.

Justification for Proposed Change #2

Criticality analyses of the new fuel were performed and the results of these analyses have been added to Chapter 6. The new fuel types were determined to be bounded by the design basis fuel already analyzed in the FSAR for thermal and as a consequence, for structural; for shielding the design basis assembly in the FSAR is still considered representative; therefore, no additional analyses were required. Marked copies of FSAR Chapters 2 and 6 are provided to show the changes.

Proposed Change #3

It is proposed to add an exception to the ASME Code to allow the use of certain duplex stainless steels in the HI-STORM FW system.

Reason for Proposed Change #3

Duplex stainless steel material can have improved corrosion resistance properties, and therefore is added to the list of options under the Alloy X designation.

Justification for Proposed Change #3

Duplex stainless steel material has been evaluated, and is included in the attached, revised Alloy X Appendix (HI-STORM FW FSAR Appendix 1.A). The structural and thermal limits for the duplex stainless steel material have been evaluated and shown to be acceptable for use in the HI-STORM FW system. This same change has been added to the HI-STORM 100 (Amendment 12), and NRC staff feedback and RSIs on that amendment have been incorporated into this application. Affected pages of FSAR Chapter 3 are also provided.

Proposed Change #4

It is proposed to revise the calculation for evaluating effective fuel conductivities to utilize FLUENT.

Reason for Proposed Change #4

This change aligns all calculations on a common computational platform.

Justification for Proposed Change #4

FLUENT is able to calculate the effective fuel conductivities, and is consistent with the method previously submitted and used in Amendment 4 for the MPC-32ML and MPC-31C. The thermal evaluations presented in the proposed FSAR pages for Chapter 4 show that with this computational method to calculate the effective fuel conductivities, the HI-STORM FW thermal model demonstrates that all temperatures remain below their design limits. Additionally, as part of this change, Chapter 1 has been updated to add a revise the Metamic-HT emissivity specifications. This change aligns with manufacturing process enhancements made in Metamic-HT production.

Proposed Change #5

Add Damaged Fuel Isolator (DFI) to CoC 1032 Appendix A.

SUMMARY OF PROPOSED CHANGES (SOPC), Revision 2

Reason for Proposed Change #5

This change allows fuel assemblies which are damaged, but can be handled by normal means, to be stored directly in an MPC instead of being placed in a Damaged Fuel Container (DFC) prior to loading into the MPC. Affected pages of CoC Appendix A & B are also provided.

Justification for Proposed Change #5

The DFI is designed to prevent the migration of fissile material in bulk or coarse particulate form from the nuclear fuel stored in its cellular storage cavity. The DFI replaces the use of the DFC for damaged fuel which is able to be handled by normal means. No new structural analyses are added as DFI's are not used to handle damaged fuel, and their inclusion does not results in increase of temperatures, pressures and weights beyond those used in the design basis structural calculations.

Proposed Change #6

Add two versions of the standard HI-TRAC VW. Version V adds a natural circulation feature. Version V2 adds the option for removable neutron shield.

Reason for Proposed Change #6

This change will allow full loading of the MPCs at plants which are limited by the reactor building crane or other crane weight limits, used for movement of the loaded HI-TRAC.

Justification for Proposed Change #6

The removable neutron shield will provide the necessary shielding to maintain occupational dose ALARA during the fuel loading and transfer operation of the MPC in the HI-TRAC to the stackup location at Oyster Creek. The Oyster Creek reactor building crane has a weight limit which prevents movement of a fully loaded MPC-89 in the HI-TRAC with the filled water jacket. The removeable neutron shield replaces the shielding previously provided by the filled water jacket during the transfer of the loaded HI-TRAC to the stack up location and during stack up operation.

New structural evaluations for HI-TRAC VW Versions V and V2 are added in FSAR Chapter 3.

Proposed Change #7

Add option for cyclic vacuum drying for all MPCs.

Reason for Proposed Change #7

This change will allow drying of high burnup fuel (HBF) upto design basis heat loads under cycles of drying (heatup) and cooldown by helium.

Justification for Proposed Change #7

The proposed change allows an option to use vacuum drying with time limits for all MPCs containing HBF and loaded with heat loads greater than threshold heat load. Related changes are made to CoC Appendix A Table 3-1.

Proposed Change #8

Addition of fuel assemblies containing blended low enriched uranium (BLEU) as approved contents.

Modify the glossary section of the FSAR and definition section in the CoC by addition of the definition for BLEU fuel assemblies.

Modify section 5.4.6 of the FSAR by adding a shielding evaluation required if BLEU fuel assemblies are stored in HI-STORM FW. Add note to FSAR Tables 2.1.2 and 2.1.3 And CoC Appendix B Tables 2.1-2 and 2.1-3 for BLEU fuel.

Reason for Proposed Change #8

At some sites, utilities utilize nuclear fuel that is blended low-enriched uranium (BLEU) for use as fuel in commercial nuclear reactors. BLEU is formed by a procedure known as “downblending,” from weapons-grade highly enriched uranium where the percentage of uranium-235 is reduced, making it suitable for power generation.

Justification for Proposed Change #8

The specifications ensure that the BLEU material is not different in substantive ways from commercial spent fuel. Because of the radiological characteristics the difference in the resulting fission products, whether using BLEU or commercial spent fuel, is negligible. Therefore, there is no difference in structural, thermal or criticality parameters that would affect storage of assemblies containing BLEU fuel material. BLEU fuel material may contain higher amount of cobalt impurity which may result in a higher gamma source term. A shielding evaluation that is required for assemblies with higher cobalt content is presented in the shielding chapter, section 5.4.6.

Proposed Change #9

Deleted

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Clarifications and Editorial Suggestions in the CoC/FSAR

- CoC Appendix A, definition of Repaired/Reconstituted Fuel Assembly has been modified to clarify that if dummy stainless steel rods are present in the loaded spent fuel assemblies, the dummy/replacement rods will be considered in the site-specific dose calculations.
- Clarification to address hafnium rods. These halfnium rods are addressed in the HI-STORM FW FSAR, Section 5.2.3.2 as being bounded by other Control Rod Assembly (CRA) absorber materials. These hafnium rods are explicitly added to Appendix B.
- Definition of Damaged Fuel Isolator (DFI) added to Appendix A and FSAR.
- Minor Deviation from the Prescribed Loading Pattern added to CoC 1032 Appendix B Section 2.3 to allow one slightly thermally-discrepant fuel assembly per quadrant to be loaded.
- CoC 1032 Appendix B, correct typographical error in Table 2.1-2 under the 16x16C fuel class to correct the number of fuel rod locations to 235.
- Correct typographical error in CoC Appendix A Table 3-1 to bring into agreement with FSAR Table 4.5.19.
- Clarification to CoC Appendix B section 2.3.1 to clarify that VDS is permitted for high burnup fuel with drying time limits as provided in CoC Appendix A Table 3-1. The text in section 2.3.1 was unclear and did not match Table 3-1.