MPC-37P BECT Alternatives

In Amendment 7, initially submitted 5/6/2021 (ADAMS Accension No. ML21126A266), Holtec introduced the MPC-37P as a slightly modified version of the MPC-37. The purpose of the added MPC is to offload all assemblies in the Palisades spent fuel pool into dry storage, after shutdown of the Palisades plant, in the most efficient way. The MPC-37P is specifically optimized from a thermal perspective for the Palisades fuel assemblies, which have a slightly smaller cross section than standard PWR assemblies. At the time of the submittal, the plant was still operating, so the characteristics of the assemblies in the last core were not exactly known. To develop the loading patterns from a thermal and shielding perspective, certain assumptions and extrapolations were made.

After Palisades was shut down in 2022, the full characteristics of all assemblies were available, were analyzed, and then compared to the preliminary inventory used to develop the loading patterns. The following was found:

- While some of the assemblies from the last core exhibit higher assembly heat loads than initially expected, the margin in the thermal pattern, together with some reshuffling of fuel between casks, will allow a timely unloading of the pool into dry storage. Hence no modifications to the thermal loading patterns are necessary.
- However, the fuel inventory is no longer in line with the minimum cooling times that need to be met, as derived from the equations and tables in Section 2.1.6.2 and Table 2.1.12 of the FSAR (also Section 2.5.2 and Table 2.5-3 of Appendix B to the CoC). Cooling times determined using these formulas and parameters would require at least another 12 months of cooling time for some assemblies before they can be loaded. To avoid this situation, we intend to add additional and alternative set of qualifications for the MPC-37P. Additionally, the optimization of loading the fuel indicated that it is beneficial to replace a limited number of the MPC-37P systems with standard MPC-37 canisters, which provide different heat load patterns. These also need sets of fuel qualifications that are different from what is qualified right now. Currently, the fuel specifications in the FSAR and CoC have been specified as polynomials specifying the minimum cooling time as a function of fuel burnup. To simplify the use of the alternative fuel qualification, these are provided as simple lists of minimum cooling times as a function of burnup for the various locations in the basket. Dose rates are then calculated in the same way, for all permitted combinations of fuel in these lists. Dose rates for these are generally similar to those previously reported, in some locations they are slightly higher, in others slightly lower. The dose rate tables in Chapter 5 (Tables 5.1.17, 5.1.18 and 5.1.19) are updated and now show the maximum for both qualification approaches.

In summary, the following sections, tables and figures are revised or added:

- Chapter 2
    - Section 2.1.6.3 is added to discuss the alternative burnup and cooling time limits for the MPC-37P and the MPC-37.

  - Table 2.1.13 and Table 2.1.14 are added showing the alternative burnup and cooling time limits for the MPC-37P and MPC-37.
- Chapter 5
  - Section 5.1 is expanded to discuss the alternative burnup and cooling time limits.
  - Additionally, Section 5.1 is revised to provide clarification in the independence of the radiological limits from the thermal limits.
  - Tables 5.1.17, 5.1.18 and 5.1.19 are revised to show the highest dose rates from the content in Tables 5.0.6 and 2.1.13 for MPC-37P. The values also bound the dose rates from the content in Table 2.1.14 for MPC-37.
- Proposed Appendix B to the CoC
  - Section 2.5.3 is added to discuss the alternative burnups and cooling times for the MPC-37P and MPC-37.
  - Table 2.5-4 and Table 2.5-5 are added showing the alternative burnup and cooling time limits for the MPC-37P and MPC-37.