6.3 Effect of Transportation of Higher Burnup Spent Nuclear Fuel

At the time the analyses for this report were completed, the authorized maximum burnup for the spent fuel transported in any of the casks studied was 45 GWD/MTU. Current reactor operations result in spent fuel with burnup levels higher than this. A detailed examination of the effect of the higher burnup levels is outside the scope of this document, but this section provides some general insights on possible impacts resulting from transporting these higher burnup spent fuels.

The regulatory external dose rates would still need to be met, so there would be no effect on incident-free transport or on the results from accidents that do not result in cask damage. The higher burnup fuel will have to be cooled longer before it is transported to meet the cask's decay heat and dose rate limits and the expected radiation emanating from the fuel should not change substantially. Therefore, results from loss of shielding accidents would not change substantially. For those accidents that are severe enough to result in a release path from the cask, the acceleration level is great enough to fail the cladding of all of the fuel, whether it is high burnup or not. The fuel region of higher burnup fuel is more fractured and has a rim layer with a higher concentration of radionuclides. This will lead to the rod-to-cask release fraction being greater but will not affect the cask-to-environment release fraction (Table 5-10 gives the release fractions used in this study.) In addition, the isotopic mixture of the higher burnup fuel cooled for a longer period of time will contain more transuranic isotopes and less fission product isotopes. Insufficient data exists to accurately estimate the rod-to-cask release fractions for higher burnup fuel. If the release fractions remain the same, the effect of the change in radionuclide inventory increases the number of A_2s released by a factor of 3.5. This increase would not alter the conclusions of this study.

Comment [r1]: What is the support for this statement?

Comment [r2]: No experimental evidence for this statement

Comment [r3]: What is the proof for this stement/ The longer cooling time will result in more ecay but you start with more. At what time is there a crossover between these two effects?

Comment [JRC4]: Is there no reasonable bounding estimate for higher burn-up rod-to-cask release fractions? Uncertainty is a few orders of magnitude.