6.3 Effect of Transportation of Higher Burnup Spent Nuclear Fuel

At the time the analyses for this report were completed, the maximum burnup for the spent fuel authorized for transport in any of the casks studied was 45 GWD/MTU. Current reactor operations result in spent fuel with burnup levels 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 results 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. Higher burnup fuel is more likely to fail in an impact accident and the rod-to-cask release fraction may be higher. (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 have more plutonium and americium and less uranium (the amount of the fission product radioisotopes and curium will be about the same). The combination of these effects would increase the dose consequence from the release accidents, but probably by less than a factor of 10. This increase would not alter the conclusions of this study.

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Comment [JRC1]: At the impact velocities required for a release, I thought we assumed all fuel failed? Does it matter if high-burnup fuel is more fragile and would fail at lower impact velocities if the lower velocities don't fail the cask?

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Comment [JRC2]: Any basis here – judgement? …but based on general consideration of the effects involved, the increase would probably be less than a factor of 10.

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