Recent Applications of MELCOR
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NRC uses MELCOR for a variety of regulatory applications. The code has been extensively used for design certification of new reactors (i.e., ESBWR, AP1000, APWR, ABWR, and EPR). The analyses for all the new reactors are nearly completed, and the results were compared to the vendor's calculations. MELCOR was also used to investigate a limited set of PRA success criteria issues. Many calculations intentionally assume minimal operator action and are allowed to proceed to core damage to establish minimal equipment configurations, and timings for human error probability evaluations. As part of the study, it was necessary to provide a surrogate for core damage. A fission product release and transport model for High Temperature Gas cooled Reactors (HTGRs) is being developed for the MELCOR code. HTGRs use fuel in the form of TRISO coated fuel particles embedded in a graphitized matrix. The HTGR fission product model for MELCOR is being developed to calculate the released amounts and distribution of fission products during normal operation and during accidents. Fission product release from the fuel kernel and transport through the particle coating layers is calculated using diffusion-based release models. For the initial releases during an accident, the existing MELCOR aerosol transport models, with appropriate modifications, are being explored for calculating dust and fission product transport in the reactor system and in the confinement. For the delayed releases during the accident, which occur over many hours, and even days fission product release is calculated by combining the diffusion-based release rate with the failure fraction response surface input via a convolution integral. The MELCOR2.1 plug-in for SNAP has been completed and it can be used to convert MELCOR 1.8.6 input files. Work has begun to use the SNAP animation controls to run MELCOR and provide simulator capabilities.