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MANAGING SPENT NUCLEAR FUEL FROM GENERATION TO FINAL DISPOSAL: INTEGRATION OF THE BACK-END OF THE NUCLEAR FUEL CYCLE

Management of spent nuclear fuel (SNF), produced from nuclear reactors, consists of three main components: storage, transportation, and disposal. Of these three components, disposal is not occurring in the United States (US) and transportation has occurred on an intermittent basis. Short-term storage of commercial SNF generally occurs in either the reactor pool or dry storage casks on the operating or former site of the nuclear reactor. No consolidated interim storage facility (ISF) for commercial SNF has been implemented yet. More importantly, the designs for the current at-reactor dry storage casks at commercial nuclear reactors have evolved in an ad-hoc fashion. For example, the current size of the canisters in the dry storage casks could severely limit disposal options, specifically, the geologic media that could viably directly dispose of the SNF without very long-term storage or reopening of the canisters. Consequently, storage is not integrated with disposal to form a coherent system for managing SNF.

The lack of substantial integration between storage, transport, and disposal of SNF does not mean that SNF is not currently stored safely. SNF is, and can continue to be, stored, transported, and disposed of safely in accordance with US Nuclear Regulatory Commission regulations. An important question, however, is the cost to provide the required level of safety. The lack of integration means that costly solutions may have to be implemented to address problems that could have been avoided with deliberate integration, or that some aspect of SNF management is delayed substantially because of the lack of integration.

This work reviews (1) the current state of the three components for managing SNF in the US, (2) past recommendations for moving toward an integrated storage, transport, and disposal system for SNF, and (3) progress –or lack thereof – in implementing those recommendations and where further steps might be taken. A key conclusion from this work is that consolidated interim storage can provide an important integrating function within the waste management system (although not sufficient by itself), in addition to the currently functioning storage of SNF on-site at commercial nuclear reactors.

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