

Simulation of spent nuclear fuel loading into a final waste repository

WM Symposia Poster Abstract

Gwendolyn J. Chee

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The largest barriers facing nuclear waste management in the U.S. are the political and social obstacles towards siting ~~of~~ a final waste repository. It has been shown that permanent underground disposal of nuclear waste provides excellent isolation from the human-inhabited environment [1]. Therefore, this work relies on the expectation that the chosen method of long term disposal of spent nuclear fuel (SNF) will be a deep geologic repository and that a site will eventually be selected. In this work, U.S. historical SNF inventory data [2] is used in various simulations that model different transfer and loading strategies for moving SNF from reactor sites to a final waste repository. First-in-first-out and last-in-first-out fuel allocation strategies are considered. The goal of this work is to determine which strategy best maximizes mass loading of the waste repository. These simulations are performed using Cyclus, an **agent-based** fuel cycle simulation framework, ~~which means that~~ each facility in the fuel cycle is modeled individually. For this work, a waste

In Cyclus, and they interact with one another as independent Σ agents.

conditioning facility agent and a simple heat-limited repository agent were created.

References

- ← slightly more detail about the envisioned model capabilities may fill this out.
- [1] Rob P. Rechard and Michael D. Voegele. Evolution of repository and waste package designs for Yucca Mountain disposal system for spent nuclear fuel and high-level radioactive waste. *Reliability Engineering & System Safety*, 122:53–73, February 2014.
 - [2] Josh Peterson, Bret van den Akker, Riley Cumberland, Paul Miller, and Kaushik Banerjee. UNF-ST&DARDS Unified Database and the Automatic Document Generator. *Nuclear Technology*, 199(3):310–319, 2017.