

NE-18-16168, Assessing Fuel Cycle Options for Elysium Molten Chloride Salt Fast Reactor from Spent Nuclear Fuel, Plutonium, and Depleted Uranium

Elysium Industries USA (Elysium) will pursue innovative concepts related to closing the fuel cycle and eliminating light water reactor waste. These concepts include no purification for 50+ years, or on-line purification without removal of actinides to improve plant economics worldwide at a low cost and low proliferation risk. Elysium will work with Argonne National Laboratory (ANL, with extensive experience with fast reactor fuel cycles and depletion calculations) to confirm that these fuel cycle options can be accomplished. ANL has recently improved their tools for molten salt reactor application to provide detailed and accurate modeling of these complex systems.

Through this project, Elysium intends to demonstrate the viability, safety, and economic improvement of using spent nuclear fuel and plutonium in molten chloride salt fast reactor fuel salt. A main objective is to eliminate waste and close the fuel cycle, thereby minimizing proliferation, in addition to providing dispatchable power complementary to renewables. These results will be helpful in demonstrating a revenue source in spent nuclear fuel, plutonium, and depleted uranium consumption that will be helpful in securing investors who are seeking creative solutions to costly issues. The findings will be important in selecting the preferred salt and fissile source for future nuclear applications and subsequent locations.