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Pre-conceptual design of MuSTAR for UNF Transmutation Facilities and US Energy Independence

Tuesday 3 June 2025 16:00 (2 hours)

Muons, Inc. is developing a conceptual design for a UNF Transmutation Facility that is a MuSTAR Nuclear Power Plant (NPP). It is based on a 50 MW superconducting RF proton accelerator that drives a number of subcritical molten-salt (MS) small modular reactors that each have an internal spallation neutron target. The starting points for the components are the ORNL SNS Linac and the ORNL MSRE fueled with UNF that has been converted from oxides to fluorides. This conversion process is described in our GAIN VOUCHER GRANT (ORNL/TM-2018/989) and is noteworthy in that it does not produce a plutonium stream. Online processing of the circulating MS within the sub-critical reactor containment envelope continuously removes lighter volatile radioisotopes, neutron poisons, and useful materials while leaving heavier actinides in the MS to be consumed to produce energy and to reduce the lifetime of the remnants. Molten salts, unlike solid fuel elements, do not suffer fatigue and failure due to large temperature variations as fission is turned off and on due to beam trips.

Footnotes

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Region represented

Asia

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Author: JOHNSON, Rolland (MuPlus, Inc.)

Co-authors: VOGELAAR, Bruce (Accelerator Driven Neutron Applications); GALAMBOS, John (Oak Ridge National Laboratory); CUMMINGS, Mary Anne (Muons, Inc); KAHN, Stephen (Muons, Inc); ROBERTS, Thomas (Muons, Inc)

Presenter: JOHNSON, Rolland (MuPlus, Inc.)

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