

SECTION A. Project Title: Flibe Molten Salt Processing – Flibe Energy, Inc.**SECTION B. Project Description**

Flibe Energy, in collaboration with Pacific Northwest National Laboratory (PNNL), proposes to develop key technologies for critical unit operations in the on-line refueling and fuel salt cleaning systems of Flibe Energy's molten salt reactor. The unit operations of interest in the project are the removal of uranium from the fuel salt so that the salt may be cleaned of fission products, and the separation and capture of volatile UF₆ for recycle, along with other volatile fluorides, exemplified in the proposed work by the most common fluorine volatile fission product, Molybdenum hexafluoride (MoF₆).

The project proposed here consists of laboratory scale experiments with non-flowing salt to answer key questions about the process chemistries and engineering considerations of select unit operations in the process. The subject of this proposal is the conversion of uranium tetrafluoride (UF₄) dissolved in the fluoride fuel salt to volatile uranium hexafluoride (UF₆) using the oxidizing/fluorinating agent nitrogen trifluoride (NF₃) that has been demonstrated to be thermally tunable and effective at volatilizing uranium and select fission and activation products. This is the first operation in a multi-step fuel salt cleaning system to recover uranium and salt free of fission and activation products for reuse; otherwise the reductive extraction system anticipated for fission product removal will remove uranium fuel from the fuel salt to a waste salt, leading to its loss from the system.

SECTION C. Environmental Aspects / Potential Sources of Impact

Radioactive Material Use - Radioactive material (RM) will be used in the course of this project. RM is tracked by lab space using Radioactive Material Tracking (RMT) tool.

Radioactive Waste Generation/Mixed Waste Generation - Radioactive waste generation will be light for this project. Waste types will be accumulated, managed according to established procedures and processes, and dispositioned according to existing profile types. Disposition will be on the Hanford site.

Chemical Use/Storage - Chemicals are managed by lab space using the Chemical Management System tool, CMS. All chemicals, by hazard class, are barcoded and inventoried against the facility Use agreement and fire zone limits.

Chemical Waste Disposal - Most waste will be considered Mixed Waste (chemical and Radioactive.) Low Level waste will also be generated and will be managed according to same procedures and workflows.

Both Flibe and PNNL have procedures in place to handle any waste that will be generated through this project. The action would not create additional environmental impacts above those already permitted at the facilities.

SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s): Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.

Note: For Categorical Exclusions (CXs) the proposed action must not: 1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; 3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; 4) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of the action, and the action is not "connected" nor "related" (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

References: B3.6 Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial development.

Justification: The activity consists of research and development activities aimed at investigating the removal of uranium from fuel salt.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) Yes No

Approved by Jason Sturm, DOE-ID NEPA Compliance Officer on 11/13/2018