

# DOE-ID NEPA CX DETERMINATION

## Idaho National Laboratory

### SECTION A. Project Title: FCF Fuel Cycle Glovebox Actinide Sensor Development System

### SECTION B. Project Description and Purpose:

Pyroprocessing of spent nuclear fuel (SNF) requires fuel rod decladding, oxide reduction, electrorefining, salt distillation, and cathode processing. The high temperatures (>500°C), limited accessibility, and corrosive environments in each step present challenges for material accountancy and process monitoring. The Idaho National Laboratory (INL) researches sensor technologies to satisfy the material accountancy and process monitoring requirements for commercial implementation of electrochemical treatment of SNF.

During electrorefining of metallic nuclear fuels, uranium and active elements, including transuranic (TRU) elements, in the anode oxidize and dissolve in LiCl-KCl-UCl<sub>3</sub> salt, and the purified uranium reduces at the cathode and is collected. During this process, lanthanides and transuranics accumulate in the salts. The composition of these materials in the salt, particularly UCl<sub>3</sub> and PuCl<sub>3</sub>, needs to be known for nuclear material accountability.

The proposed action researches and develops an on-line sensor for monitoring the UCl<sub>3</sub> and PuCl<sub>3</sub> concentration in the ER salt. The proposed action performs ion exchange of beta-alumina precursors in pure UCl<sub>3</sub> salt or ternary LiCl-KCl-UCl<sub>3</sub> salt, and electrochemical testing evaluates the ion exchange performance.

The proposed action installs the following equipment in the Fuel Cycle Glovebox in Room 26 in the Fuel Conditioning Facility (FCF) at the Materials and Fuels Complex (MFC):

- Small off-the-shelf Ventura-Melt furnace
- Small well furnace
- Ceramic crucibles and quartz tubes
- Electrodes similar to those used in the electrorefiner that is already in the fuel cycle glovebox

Equipment installation does not require facility modifications. The fuel cycle glovebox exhausts to the FCF Air Cell Exhaust System, thus providing two stages of HEPA filters prior to being released to the atmosphere.

Small quantities (8 ounces or less) of UCl<sub>3</sub> and LiCl-KCl-UCl<sub>3</sub> salt will be used. These are currently in FASB.

After the ion exchange process, the salt and beta-alumina materials will be transferred to FASB for cleaning; then back to fuel cycle glovebox in FCF.

### SECTION C. Environmental Aspects or Potential Sources of Impact:

#### Air Emissions

The proposed activities are covered by APAD INL-17-003 Rev 1.

#### Disturbing Cultural or Biological Resources

MFC-765/FCF (Fuel Conditioning Facility), constructed in 1963, is eligible for listing on the National Register of Historic Properties (36 CFR 60) and is considered a Category 2 historic property (INL Cultural Resource Management Office 2016, 338).

Modifications to may create impacts to the historic integrity of this property; however, the activities as described in EC INL-19-038 are exempt as Internal Reconfiguration of Active Laboratories (INL Cultural Resource Management Office 2016, 51). No effects are anticipated for historic properties within the area of potential effect (APE; 36 CFR 800.5).

#### Generating and Managing Waste

Project activities will take place in a Radiological Buffer Area (RBA)/Radioactive Management Area (RMA), therefore all waste may be characterized as radioactive. Radioactive waste would consist mainly of sample equipment, used personal protective equipment (PPE), high-efficiency particulate air (HEPA) filters, metal and ceramic debris, and UCl<sub>3</sub> and LiCl-KCl-UCL<sub>3</sub> salts (at project completion).

The proposed action uses about 20 g of depleted uranium trichloride that may be disposed as waste at the end of the project.

#### Releasing Contaminants

UCl<sub>3</sub> and LiCl-KCl-UCL<sub>3</sub> salts will be used during the project.

#### Using, Reusing, and Conserving Natural Resources

All materials would be reused and/or recycled where economically practicable. All applicable waste would be diverted from disposal where conditions allow.

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**SECTION D. Determine Recommended Level of Environmental Review, Identify Reference(s), and State Justification:** Identify the applicable categorical exclusion from 10 Code of Federal Regulation (CFR) 1021, Appendix B, give the appropriate justification, and the approval date.

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, or similar requirements of Department of Energy (DOE) or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment or facilities; (3) disturb hazardous substances, pollutants, contaminants, or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources (see 10 CFR 1021). In addition, no extraordinary circumstances related to the proposal exist that would affect the significance of the action. In addition, the action is not "connected" to other action actions (40 CFR 1508.25(a)(1) and is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1608.27(b)(7)).

**References:** 10 CFR 1021, Appendix B to Subpart D item B3.6 "Small-scale research and development, laboratory operations, and pilot projects"

Final Environmental Impact Statement for the Waste Isolation Pilot Plant (Department of Energy/Environmental Impact Statement [DOE/EIS]-0026, October 1980) and Final Supplement Environmental Impact Statement for the Waste Isolation Pilot Plant (WIPP) (SEIS-I) (DOE/EIS-0026-FS, January 1990)

Final Waste Management Programmatic Environmental Impact Statement [WM PEIS] (DOE/EIS-0200-F, May 1997) and Waste Isolation Plant Disposal Phase Supplemental EIS (SEIS-II) (DOE/EIS-0026-S-2, Sept. 1997)

**Justification:** The proposed R&D activities are consistent with CX 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); 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 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 deployment."

The impacts of transporting and disposing of waste resulting from defense activities that was placed in retrievable storage pursuant to a 1970 Atomic Energy Commission policy (see Section 1.2) and TRU waste that was reasonably expected to be generated by ongoing activities and programs was analyzed in DOE/EIS-0026 (October 1980) and the Final Supplement Environmental Impact Statement for the Waste Isolation Pilot Plant (SEIS-I) (DOE/EIS-0026-FS, January 1990).

NEPA coverage for the transportation and disposal of waste to WIPP are found in DOE/EIS-0200-F (May 1997) and Waste Isolation Plant Disposal Phase Supplemental EIS (SEIS-II) (DOE/EIS-0026-S-2, Sept. 1997), respectively. The 1990 Record of Decision (ROD) also stated that a more detailed analysis of the impacts of processing and handling TRU waste at the generator-storage facilities would be conducted. DOE has analyzed TRU waste management activities in DOE /EIS-200-F (May 1997). The WM PEIS analyzes environmental impacts at the potential locations of treatment and storage sites for TRU waste; SEIS-II addresses impacts associated with alternative treatment methods, the disposal of TRU waste at WIPP and alternatives to that disposal, and the transportation to WIPP. (SEIS-II also includes potential transportation between generator sites.)

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: 3/14/2019