



# DOE-ID-INL-17-067 R2

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*Changing the World's Energy Future*

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### SECTION A. Project Title: Natrium Demonstration Reactor Support

### SECTION B. Project Description and Purpose:

AMP Robotics (AMP), in partnership with Idaho National Laboratory (INL) and Michigan Technological University (Michigan Tech), propose development of a real-time, conveyor mounted detection, and classification system using artificial neural networks (ANNs) to identify contamination within the commodity streams that can be separated out of municipal solid waste (MSW) and residue from materials recycling facilities (MRF) in the form of "whole material contamination" (e.g., metal or glass in a residual paper stream) and "contact contamination" (e.g., remaining film/gunk in or on plastic containers). These material streams, otherwise destined for landfills, are viable feedstock for bioenergy conversion processes such as pyrolysis for waste-to-energy and waste-to-fuel applications. However, understanding the effects of varying levels and types of contamination to this process yield is in its infancy and poorly understood. Amp Robotics will lead this project and will design and fabricate a conveyor-mounted, AMP Neuron vision system with Near infrared/shortwave infrared (NIR/SWIR 1000 nm to 1700nm wavelengths) cameras. This system will be shipped to INL and utilized to collect contamination data on waste materials. Amp will source pre-sorted waste materials and will send these to INL. They may include the following: polyethylene, polypropylene, polystyrene, flexible film packaging, polyethylene terephthalate (PET), PVC, polylactic acid (PLA), #7 plastic, multi-layer flexible packaging, empty containers of cleaning solution, drain cleaner, bleach, hydrogen peroxide, alkaline batteries, electronic circuit boards, aerosol cans, empty propane containers, paper containers, cardboard, paper, wood waste, yard waste, metal cans, aluminum foil, steel cans, and glass. INL will analyze these materials using the NIR/SWIR cameras and will collect these data to send to Amp Robotics. Plastic materials will be size reduced and sent to Michigan Tech for pyrolysis experiments.

1. Where will the work take place? (i.e., Which buildings, labs, etc.?) The Amp system will be located at ESL in the BFNUF bay. All work will occur there.
2. What types of wastes will be generated? (e.g., industrial, hazardous, radioactive, mixed, TRU, etc.) Waste to be generated will be all materials deemed unsuitable for pyrolysis including PET, PVC, PLA, empty containers of cleaning solutions, drain cleaner, bleach, hydrogen peroxide, alkaline batteries, circuit boards, aerosol cans, empty propane containers, cardboard, paper, wood waste and yard waste, metal cans, aluminum foil, steel cans and glass.
3. Will there be any emissions to the air? no
4. Will the project purchase any equipment? If so, what type of equipment? What happens to the equipment at the end of the project? INL will receive the Amp system which will remain at INL at the end of the project.
5. Will there be any discharges to the sewer? No discharge to sewer.

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

#### Air Emissions

**Air Emissions (Describe Impact)** The proposed action has the potential to generate radiological and chemical emissions from fuel fabrication activities from MFC's FASB, EFF, and FMF and from irradiation in ATR and TREAT. In addition, the destructive and non-destructive PIE at MFC's IMCL, HFEF, ARL, and EML will generate emissions. Air emissions are anticipated to be minor, and concentrations would not exceed the current monitored/calculated air emissions from these facilities.

MFC performs metal fuel fabrication techniques at EFF, FASB, and the Fuels Manufacturing Facility (FMF) to develop specifications for fabricating test pin fuels slugs for irradiation testing and to assess fuel characteristics. Fuel fabrication at MFC in these facilities is not a modification in accordance with Idaho Administrative Procedures Act (IDAPA) 58.01.01.201 and 40 Code of Federal Regulation (CFR) 61 Subpart H.

Experiment irradiation will be performed at ATR and TREAT. The irradiation activities in the ATR and TREAT are not modifications in accordance with Idaho Administrative Procedures Act (IDAPA) 58.01.01.201 and 40 Code of Federal Regulation (CFR) 61 Subpart H.

The irradiated specimens will be delivered to the MFC's HFEF for disassembly and then undergo routine PIE at MFC facilities, (IMCL, Analytical Research Laboratory (ARL), and EML). All radionuclide release data associated with the PIE portion of this experiment is covered by either PTC or APAD. The PIE examination at MFC is not a modification in accordance with Idaho Administrative Procedures Act (IDAPA) 58.01.01.201 and 40 Code of Federal Regulation (CFR) 61 Subpart H.

Emissions from these facilities are covered by either PTC or APAD. Radionuclide emissions are sampled/calculated and reported in accordance with Laboratory Wide Procedure (LWP)-8000 and 40 CFR 61 Subpart H.

#### Discharging to Surface-, Storm-, or Ground Water

N/A

#### Disturbing Cultural or Biological Resources

N/A

#### Generating and Managing Waste

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TRU Waste: Irradiated sample debris and PIE waste may generate TRU waste and mixed TRU waste. Irradiated sample debris and secondary waste may total as much as 5 kg. Final packaging of irradiated sample debris and PIE waste may result in low-level waste instead of TRU waste. Project personnel would work with WGS to characterize and properly dispose of all waste.

### Releasing Contaminants

When chemicals are used during the project there is the potential for spills that could impact the environment (air, water, soil).

### Using, Reusing, and Conserving Natural Resources

All materials will be reused and recycled where economically practicable. All applicable waste will be diverted from disposal in the landfill where conditions allow.

**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, items B3.6, "Small-scale research and development, laboratory operations, and pilot projects"

Final Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Resumption of Transient Testing of Nuclear Fuels and Materials (DOE/EA-1954, February 2014).

Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement and Record of Decision (DOE/EIS-0203, 1995) and supplemental analyses (DOE/EIS-0203-SA-01 and DOE/EIS-0203-SA-02) and the Amended Record of Decision (1996)

Final Environmental Impact Statement for the Waste Isolation Pilot Plant (DOE/EIS-0026, October 1980) and Final Supplement Environmental Impact Statement for the Waste Isolation Pilot Plant (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, September 1997)

Final Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada National Security Site and Off-Site Locations in the State of Nevada (DOE/EIS-0426, December 2014).

Final Environmental Assessment and Finding of No Significant Impact for the Replacement Capability for Disposal of Remote-Handled Low-Level Radioactive Waste Generated at the Department of Energy's Idaho Site (DOE/EA-1793, December 2011)

### 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."

DOE evaluated the environmental impacts of transient irradiations in the TREAT reactor, including 1) transporting experiment materials between MFC and TREAT, 2) pre- and post-irradiation radiography, 3) PIE of test components at HFEF or other MFC facilities, and 4) waste generation and disposal in the Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Resumption of Transient Testing of Nuclear Fuels and Materials (DOE/EA-1954, February 2014).

After PIE, irradiated test pin segments and PIE remnants will be stored with other similar DOE-owned irradiated materials and experiments at MFC, most likely in the HFEF or the Radioactive Scrap and Waste Facility (RSWF) in accordance with DOE's

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Programmatic SNF Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (FEIS) and ROD (DOE/EIS-0203, 1995) and supplemental analyses (DOE/EIS-0203-SA-01 and DOE/EIS-0203-SA-02) and the Amended Record of Decision (February 1996). Ultimate disposal of the irradiated test pin segments and PIE remnants will be along with similar DOE-owned irradiated materials and experiments currently at MFC. Irradiated sample debris and secondary waste could total as much as 20-30 Kg. Categorizing this material as waste is supported under Department of Energy Order (DOE O) 435.1, Att. 1, Item 44, which states "...Test specimens of fissionable material irradiated for research and development purposes only...may be classified as waste and managed in accordance with this Order..."

Transportation, receiving, and storing used nuclear fuel, as well as, research and development for used nuclear fuel management is covered by DOE's Programmatic Spent Nuclear Fuel (SNF) Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement and Record of Decision (DOE/EIS-0203, 1995) and supplemental analyses (DOE/EIS-0203-SA-01 and DOE/EIS-0203-SA-02) and the Amended Record of Decision (February 1996). The analysis includes those impacts related to transportation to, storage of, and research and development related to used nuclear fuel at the INL (see Tables 3.1 of the SNF Record of Decision (May 30, 1995) and Table 1.1 of the Amended Record of Decision [February 1996]. The EIS limits the number of shipments to the INL, and the proposed activities would fall within the limits of the EIS.

The potential for transportation accidents has already been analyzed in the SNF EIS (Section 5.1.5 and Appendix I-5 through I-10). NEPA coverage for the transportation and disposal of waste to WIPP are found in 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), respectively. The 1990 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. The Department has analyzed TRU waste management activities in the Final Waste Management Programmatic Environmental Impact Statement (WM PEIS) (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.

The environmental impacts of transferring LLW from the INL Site to the Nevada National Security Site were analyzed in the 2014 Final Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada National Security Site and Off-Site Locations in the State of Nevada (DOE/EIS-0426) and DOE's Waste Management Programmatic EIS (DOE/EIS-200). The fourth Record of Decision (ROD) (65 FR 10061, February 25, 2000) for DOE's Waste Management Programmatic EIS established the Nevada National Security Site as one of two regional LLW and MLLW disposal sites.

Onsite disposal of RH-LLW was analyzed in the Final Environmental Assessment for the Replacement Capability for Disposal of Remote-Handled Low-Level Radioactive Waste Generated at the Department of Energy's Idaho Site (DOE/EA-1793, 2011).

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

Approved by Jason L. Anderson, DOE-ID NEPA Compliance Officer on: 05/17/2022