

DOE-ID NEPA CX DETERMINATION Idaho National Laboratory

SECTION A. Project Title: Radiological Glovebox Research Activities at Central Facilities Area (CFA)-625

SECTION B. Project Description:
--

This work began at the Test Reactor Area (now Advanced Test Reactor Complex) at Idaho National Laboratory (INL) under Environmental Checklist (EC) INL-07-048 (OA 6). Work was subsequently moved to the Central Facilities Area building CFA-625 under EC INL-10-001 (OA 6). This EC is written as part of a routine project review and replaces INL-10-001 (OA 6).

The purpose of the radiological glovebox is to perform molecular spectroscopy, electrochemistry, and separations techniques commonly used at CFA-625 on radioactive samples that cannot be safely handled in fume hoods. Glovebox activities increase capabilities and expertise in fundamental chemistry of the actinide elements in direct support to the Fuel Cycle Research and Development, Nuclear Science and Technology (NS&T), and National and Homeland Security Science and Technology (NHSS&T) programs. Programs using the glovebox are required to have their own project specific environmental checklists to address the environmental aspects (including potential for generating transuranic (TRU) waste and volumes of TRU waste), work activities, and regulatory requirements.

Spectroscopic techniques are interfaced into the glovebox using fiber optic feedthroughs. Electrochemical studies and manipulations are carried out in the glovebox using a potentiostat and electrical feedthrough. These spectroscopic techniques require concentrations generally greater than 1.0×10^{-2} M. Chemical investigations are based on separation techniques already practiced by INL researchers, including liquid/liquid extraction, liquid/solid extraction, precipitations, and chromatographic techniques. Isotopes anticipated for this work are listed in Table 1. Actinide materials are obtained from defense-related sources. Other isotopes may be of interest as investigations develop.

Table 1.

Radioisotopes (these values represent upper limits to the amount of each isotope used in the glovebox and is evaluated by the radiological engineer).

Isotope	Molar Mass	Quantity g	Specific Activity dps/g	Activity dps	Activity Ci
Tc-99	99	1.00E-01	6.28E+08	6.28E+07	1.70E-03
U-233	233	2.00E+00	3.56E+08	7.12E+08	1.92E-02
U-235	235	1.00E+00	7.99E+04	7.99E+04	2.16E-06
U-238	238	5.00E+02	1.24E+04	6.22E+06	1.68E-04
Np-237	237	1.00E+00	2.61E+07	2.61E+07	7.05E-04
Pu-238	238	1.00E-08	6.34E+11	6.34E+03	1.71E-07
Pu-239	239	5.00E-02	2.29E+09	1.15E+08	3.10E-03
Pu-240	240	1.60E-04	8.40E+09	3.63E-02	3.36E-05
Pu-241	241	1.00E-08	3.81E+12	3.81E+04	1.03E-06
Pu-242	242	2.50E-01	1.46E+08	3.66E+07	9.89E-04
241-Am	241	1.00E-04	1.27E+11	1.27E+07	3.43E-04
243-Am	243	2.00E-02	7.39E+09	1.48E+08	3.99E-03
244-Cm	244	1.00E-04	2.99E+12	2.99E+08	8.09E-03
245-Cm	245	3.00E-05	6.35E+09	1.91E+05	5.15E-06
246-Cm	246	1.50E-04	1.14E+10	1.70E+06	4.61E-05
247-Cm	247	3.00E-06	3.35E+06	1.00E+01	2.71E-10
248-Cm	248	5.00E-02	1.57E+08	7.84E+06	2.12E-04

Some studies are carried out at elevated temperatures (not to exceed 80°C). This requires heating samples (in glass or plastic vials) using a jacketed beaker. The water for this system is circulated from a water bath outside the glovebox using feedthroughs.

In order to operate the glovebox in the inert mode, oxygen in the glovebox must be displaced with an inert gas such as argon. It is sometimes necessary to allow glovebox pressure to become positive (<10 mbar) while performing the gas exchange. Before allowing the pressure to become positive, the glove ports and bagout port are covered with blank port covers. The port covers are secured to the glovebox ports with tape. The gloves and bagout sleeve are left in place. The blank port covers are used to prevent the gloves and sleeve material from protruding from the glovebox. The emergency blower is inactivated during positive pressure operation, and the glovebox is monitored by staff when it is pressure positive. After successfully inerting the glovebox atmosphere, the glovebox is returned to negative pressure operation, the blank port covers are removed, and the emergency blower is re-activated. Once an inert atmosphere is established, the inert atmosphere is maintained by the glovebox recirculation equipment. Therefore, operating the glovebox in a positive pressure mode is infrequent.

**DOE-ID NEPA CX DETERMINATION
Idaho National Laboratory**

SECTION C. Environmental Aspects or Potential Sources of Impact:

Air Emissions - This project will generate both chemical and radiological emissions. All chemical emissions will fall far below limits established in APAD 04-09. Estimated unmitigated off-site radiological dose is less than 0.1 mr/yr. Use of nuclides not identified in this EC will require an additional review before use.

Generating and Managing Waste - Glovebox operation has the potential to generate industrial, hazardous, low-level radioactive, mixed, and TRU waste. All waste streams must have a disposition path which must be included in project specific environmental checklists. All waste will be managed by Waste Generator Services (WGS).

Releasing Contaminants - Some chemical contaminants will be released to the CFA sewage treatment system. All releases will comply with CFA Sewage Treatment Plant limits.

Using, Reusing, and Conserving Natural Resources - Actinides will be recovered for future research work. All applicable waste would be diverted from disposal in the landfill when possible. Project personnel would use every opportunity to recycle, reuse, and recover materials and divert waste from the landfill when possible. The project would practice sustainable acquisition, as appropriate and practicable, by procuring construction materials that are energy efficient, water efficient, are bio-based in content, environmentally preferable, non-ozone depleting, have recycled content, or are non-toxic or less-toxic alternatives. New equipment will meet either the Energy Star or Significant New Alternatives Policy (SNAP) requirements as appropriate (see <http://www.sftool.gov/GreenProcurement>).

SECTION D. Determine the Recommended 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.

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 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 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 B1.31 Installation or relocation of machinery and equipment

Justification: The proposed activities are consistent with CX B1.31 "Installation or relocation and operation of machinery and equipment (including, but not limited to, laboratory equipment, electronic hardware, manufacturing machinery, maintenance equipment, and health and safety equipment), provided that uses of the installed or relocated items are consistent with the general missions of the receiving structure. Covered actions include modifications to an existing building, within or contiguous to a previously disturbed or developed area, that are necessary for equipment installation and relocation. Such modifications would not appreciably increase the footprint or height of the existing building or have the potential to cause significant changes to the type and magnitude of environmental impacts."

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

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on: 7/14/2015