**Applicability:** Instron Instrument

**Radiological Work Scope:**

Working with Solid Alpha/Beta/Gamma Emitting Samples in the Advanced Materials Lab

**Operating Envelope:**

**Estimated Dose (person-mrem) anticipated for work activity:** <100 mrem/year

**Radiological Conditions:**

* General area (mR/hr) beta/gamma: < 70mR/hr at 30cm
* General area (mrem/hr) neutron: NA
* Contact (mRad/hr) beta/gamma: Variable as a function of the source used.
* Contamination (dpm/100 cm2 beta/gamma): **< 70 dpm/100cm2**; if greater than 70 dpm/100cm2 stop work, leave equipment in a safe status, decontaminate, and re-survey
* Contamination (dpm/ 100 cm2 alpha): **< 7 dpm/100cm2**; if greater than 7 dpm/100cm2 stop work, leaving equipment n a safe status, contact the CSO and or laboratory lead decontaminate, and re-survey
* Contamination: Any radioactive contamination detected which demonstrates a quantity of radioactive material present that is greater than Lc (2.33\*sqrt(background), will be brought to the attention of the CSO, Lab Lead, or alternate designee. The operational goal in accordance with good practice and ALARA is to not tolerate detectable removable contamination at any ISU facility.
* Airborne activity (µCi/mL): This project is not anticipated to generate any airborne radioactive contamination; however, TSO staff will obtain confirmatory air samples.
* Derived airborne concentration (DAC): N/A
* Other: None

**Contamination Protocol:** (Describe who, when, what and how contamination is prevented and surveyed)

Under the direction of the Responsible User, contamination surveys will be performed periodically and after any operations that involve dispersible radioactive materials. Removable contamination surveys will be performed by the researchers or the equipment operators engaged in the project. A great deal of focus shall be given to the containment of dispersible radioactive materials and the prevention of radioactively contaminating capital equipment. Our goal is to maintain a radiologically pristine environment. The appropriate use of absorbent disposable laboratory mats, fume hoods, and glove boxes is encouraged when ever feasible. Dispersible sources shall be stored in sealable containers. Surveys of personnel (frisking) shall be conducted frequently especially when removing PPE or after handling dispersible sources of radioactive material. Frequent personnel surveys will prevent the unintended spread of radioactive contamination.

**Dosimetry Requirements:**

Whole body beta/gamma dosimeter must be worn next to your body. Do not attach your dosimeter onto lanyard. It **must** be worn between your neck and waste and attached to your shirt.

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| Dosimetry Type: | Whole body beta/gamma dosimeter | | | | | Whole body neutron dosimeter | | | |
|  | Multi-pack type: |  | | | | | | | |
|  | Electronic dosimeter (ED) | | | Extremity dosimetry (optional at discretion of performer | | | | | |
|  |  | | |  | | | | | |
| **Lab Lead/CAES Safety Officer Coverage:** | | | Continuous | | End of work | | At job start | Periodic | |
| **PPE requirements**  Lab Coat, Safety Glasses, Two pairs of gloves (clothe gloves optional), latex gloves, and then nitrile gloves.  When moving or working directly with the radiological material two pairs of gloves are required. The latex gloves must be taped to your lab coat (remain clean at all times) and then nitrile gloves worn over the latex gloves. Nitrile gloves should be changed often. | | | | | | | | |  |
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**Required Training:**

* **Standard CAES Rad Training: (see CAES Radiological Primer and Lab Orientation)**
* **Activity/Project-Specific Radiation Safety Training:**

Instrument operators will be trained and observed to demonstrate proficiency in performing instrument surveys and contamination checks before they are allowed to perform these functions independently. The training function is performed by the CSO, lab lead or their designees.

**Special Conditions:** Contact Lab Lead or CSO before moving radioactive materials from the MaCS to Advanced Materials lab or to a different location within the lab.

**Contamination Control**:

* Always change-out and dispose of Nitrile gloves following the handling of potentially contaminated sources. Do not wear gloves, especially those that may have become contaminated outside MaCS and into other areas of the CAES building; such practices demonstrate a disregard for contamination control. Perform personnel surveys promptly after removing PPE.

**Survey Requirements:**

* Follow ISU personnel survey requirements for entering and leaving all posted areas
* Use established ISU procedures for conducting contamination surveys
* Survey tools used to handle samples after each use.
* Perform detailed surveys of analysis equipment following the removal of each source.

Detailed surveys will consist of a combination of removable contamination surveys and direct scans as appropriate to verify potentially affected areas are not contaminated.

Promptly report any incidence of radioactive contamination to the CSO and laboratory lead.

**Evaluation Points:**

* Instruments must be surveyed for contamination before and after the analysis of each set of sample
* Personnel contamination surveys (frisking) is to be performed after PPE is removed, prior to exiting the MaCS and Advanced Materials laboratory, and any time when contamination may be suspected.

**Limiting Conditions That Void the RSP**

* Removable contamination > 70 dpm/100 cm2 beta/gamma or 7 dpm/100 cm2 alpha is measured after initial attempts to remove contamination from contamination area or equipment
* Radiation levels > 70 mR/ hr at 30-cm away from a radiation source.
* Personnel frisk identifies contamination at any time.

**If any of these conditions are met, Stop Work, place job in safe condition, cease use of this RWP as written and notify the Lab Lead and CSO.**

**Best Practices:**

* Follow good ALARA Practices when handling radiological sources:
* Minimize time in which radioactive sources are exposed.
* Use tongs and similar long-handled tools to handle samples and increase distance to source.
* Set up portable shielding as appropriate to minimize field during sample manipulation and loading. Consult with the CSO about additional shielding if any particular source produces an exposure rate of greater than 5 mRem in any one hour in the general work area. When shielding is being employed always evaluate and question the suitability of structure supports to avoid crushing injuries or damage to capital equipment.
* Perform frequent surveys of work areas. Remember: You are ultimately responsible for your own safety and that of your coworkers. Always maintain a questing attitude.