ATRF Radiation Area Supervisors: Responsibilities and Guidelines

Definitions:

1. A **Principal Investigator** (PI) is the person directly responsible for an approved radiation program issued in writing by the ATRF Radiation Safety Committee. The PI has complete authority over all radiation workers (as defined below) in his/her program, regardless of company affiliation or supervisory status. The PI may request approval for a Radiation Area Supervisor (RAS) to assist in performing the responsibilities mentioned in this text.
2. A **Radiation Area Supervisor** (RAS) is an additional person(s) designated by the PI to assist in the monitoring, training, and record-keeping requirements of the radiation program. The RAS generally has extensive experience and familiarity with the specific procedures being used by the lab.
3. A **Radiation worker** is a person who voluntarily performs work involving sources of ionizing radiation. Such a person shall know that the work involves the use of ionizing radiation before it commences. A radiation worker works under the supervision of the PI or RAS, regardless of company affiliation or supervisory status.

The PI is ultimately responsible for a radiation program. The RAS may help with responsibilities as the PI sees fit. The PI delegates individual RAS responsibilities. Radiation Area Supervisors and their respective PI's should have an agreement as to what functions the RAS may delegate without prior approval of the PI. Please be aware that certain documents require the PI's signature.

Radiation Safety assigns a four digit number to each approved Radiation Program. This number is used to reference your radiation program on all documentation.

The following outline lists functions that an RAS may oversee or perform.

A. **Addition of Radiation Workers to a Radioisotope Program**: All perspective radiation workers must complete the following BEFORE they are authorized to work with radioactive materials at the ATRF.
   1. All radiation workers must complete the ATRF Radiation Safety Training for New Users course. This course is located on the EHS website under the online training link. Clicking on "Start Training" takes you to the training portal. If you do not have a MYNCIF account you will need to click "forget username" and start an account. The training course takes approximately 2 hours to complete.
   2. An ATRF Radioisotope Training and Experience Form must be completed for each individual to be added to the program. The form is located on the EHS website under Useful Documents in the Radiation Safety section. Be sure to choose the correct form for your program type. These forms must be signed by the perspective radiation worker as well as the Principal Investigator. Radiation Area Supervisors **cannot** sign these forms.

3. All perspective radiation workers must read and sign the Protocol Specific Training Document, usually located in a dark blue folder titled "Working Safely with Radioactivity". This document must be reviewed with each new radiation worker, regardless of prior radiation training or experience.
4. Once the above steps are complete, send the signed Training and Experience form along with a copy of the signature sheet from the Protocol Specific Training Document to the Radiation Safety Office.
5. Radiation Safety will verify completion of the Radiation Safety Training and contact the perspective radiation worker to request baseline urine and thyroid (for iodine use) bioassays.
6. Radiation Safety will send a confirmatory memo to the PI thru the RAS stating that the worker has been formally added to the radiation program. Radiation dosimeters, if applicable, will be issued at this time.

A six-month supervisory period is assigned to radiation workers based on previous experience. Please make sure that workers designated as "supervised" are properly supervised during radioactive material manipulation for six months.

B. **Training**: In addition to the "ATRF Radiation Safety Training for New Users" and "Protocol Specific Training", the ATRF Annual Radiation Safety Refresher Training course must be completed by all radiation workers every year. A memo is sent to individuals when training is due. Failure to complete refresher training before the deadline will result in suspension of radiation privileges.

C. **Inventory**: Isotope programs must keep accurate inventory of all radioisotopes. Most radioisotopes are delivered to the labs by Radiation Safety staff (RSS). ***If you receive an isotope without an accompanying yellow sheet, please call Radiation Safety at X5730.***
   1. Accompanying each isotope is a Radioactive Material Accounting Record (RMAR), or 'yellow sheet'. This represents the lab record of active inventory.
   2. All isotope usage must be recorded correctly on the RMAR.
   3. After a stock vial is empty or no longer useful, the isotope is disposed of as radioactive waste, the yellow sheet is marked as disposed or used (volume zero) and the sheet is returned to the Radiation Safety Office.
   4. Log sheets on waste containers (dry and liquid) must accurately reflect container contents and represent the record of radioactive material disposed from inventory.
   5. Periodic checks of inventory should be made to eliminate outdated stocks.

D. **Six-Month Inventory**: Bi-annual radioactive material inventory is performed in January and July by Radiation Safety personnel.
   1. An email is sent to all PIs/RAS two weeks prior to the inventory start date. Use this time to properly dispose of old stocks and return the corresponding yellow sheets.
   2. Once you receive the "Radioisotope Inventory Questionnaire", compare the provided information against your records.

3. Complete the questionnaire with the required information. Please note that the questionnaire asks for ***volume***, not activity.
4. The completed questionnaire must be signed by the PI or RAS and returned to Radiation Safety within two weeks.
5. Radiation Safety staff will perform a random Physical Inventory Inspection for a percentage of radiation programs. If your program is selected, the RSO will schedule a time to meet with you and physically inspect your radioisotope inventory records and stock vials.

E. **Transfers/Shipment of Radioactive Materials**: Transfers of radioactive material to another radiation program must be cleared with Radiation Safety **in advance** and recorded on the accompanying RMAR. Any shipment of radioactive material off-site must also be cleared through the RSO.

F. **Disposal of Radioactive Waste**: Radioactive waste is described as any waste or discarded material that contains or is contaminated with radioactivity. It is divided into 6 major categories. If you need assistance call EHS Waste Management Staff (WMS) at x1384.

1. **Solid Radioactive Dry Waste** – consists of contaminated gloves, paper towels, bench paper, sharps (needles, syringes, pipette tips, glass, etc.), etc.
   a. All solid radioactive dry waste (including sharps) must be segregated based on the following half-life categories.
      i. Class 1: Isotopes with a half-life of less than 15 days (P-32, F-18, Tc-99m)
      ii. Class 2: Isotopes with a half-life of 15 to 100 days (P-33, Cr-51, I-125, S-35)
      iii. Class 3: Isotopes with a half-life greater than 100 days (H-3, C-14)

      *Note: In-111 and Zr-89 must be kept separate from all other isotopes due to long half-life contaminants and daughter products.
   b. Each class of solid dry radioactive waste (except for sharps) must be placed into separate, properly labeled and sealed, clear plastic bags. Each properly labeled and sealed plastic bag may contain only “solid” waste, which means no scintillation vials, liquid, stock containers or sharps. Any solid waste that does not meet the above-mentioned criteria will be returned to the generator.
   c. All sharps must be stored in a sharps container to prevent exposures or sticks. Please keep sharps separate from other dry waste and do not place them into solid radioactive dry waste containers. Follow all other dry radioactive waste labeling requirements.
   d. Each sealed bag (and sharps container) must be individually labeled with the following information
      i. Radiation program number
      ii. User name
      iii. Isotope
      iv. Activity

v. Date

e. Each properly labeled and sealed bag of solid radioactive dry waste shall be placed into the solid radioactive dry waste container and the drum/container Log (Radioactive Dry Waste Log Sheet) must be completed with a separate line entry for each bag.

f. **DO NOT** place liquid waste into solid radioactive dry waste containers.

g. Once the solid radioactive dry waste container is full; sign and date the waste log sheet, certifying it for pickup, and contact WMS, x1384, for collection. WMS will not collect containers with incomplete log sheets.

2. **Radioactive Biologicals** - includes animal bodies, excrement, organs, contaminated bedding, tissue samples, etc. containing radioactivity. Biologicals do not include paper, needles, blood-soiled lab coats, etc.

   a. All radioactive biological material should be segregated according to the following isotopic half-lives.

      i. Class 1: Isotopes with a half-life of less than 15 days (P-32, F-18, Tc-99m)

      ii. Class 2: Isotopes with a half-life of 15 to 100 days (P-33, Cr-51, I-125, S-35)

      iii. Class 3: Isotopes with a half-life greater than 100 days (H-3, C-14)

      *Note: In-111 and Zr-89 must be kept separate from all other isotopes due to long half-life contaminants and daughter products.

   b. Each class of radioactive biological waste must be placed into separate, properly labeled and sealed, clear plastic bags or containers as appropriate.

   c. Each sealed bag/container must be individually labeled with the following information

      i. Radiation program number

      ii. User name

      iii. Isotope

      iv. Activity

      v. Date

   d. Animal carcasses, organs and tissues should be kept frozen until WMS picks them up.

   e. Contact WMS, x1384, if your waste is difficult to package or seal, or for assistance with packaging.

3. **Stocks** – the original vial in which the radioisotope was received.

   a. Stock vials must be segregated by isotope, not half-life.

   b. Multiple stock vials containing the same isotope may be consolidated in a properly labeled and sealed clear plastic bag.

   c. Each stock vial or sealed bag must be properly labeled with the following information.

      i. Radiation program number

      ii. User name

      iii. Isotope

      iv. Activity

v. Date

d. Stock vials are kept separate from all other radioactive waste. **DO NOT** place stock vials into the solid radioactive dry waste.

4. **Radioactive Liquid Waste** - consists of non-hazardous buffers, salts, and water. No hazardous compounds shall be placed into these containers. The pH of each radioactive liquid waste container should be between 5 and 9, and the contents must not exhibit any characteristic hazards such as flammability, toxicity, or corrosivitity.

   a. *Bulk radioactive liquid waste* is collected in 5 gallon carboy containers supplied by WMS. Each carboy should be isotope specific and limited to the following activity per 5-gallon carboy containers. Deviations must be approved by WMS.

C-14	2 millicuries
H-3	3 millicuries
S-35	4 millicuries
I-125	1 millicurie
Cr-51	1 millicurie
P-33	1 millicurie
P-32	1 millicurie
In-111	1 millicurie

   b. *Radioactive reagent waste* is generally low-volume, high-activity solutions that do not meet the activity requirements for bulk radioactive liquid waste. Reagent waste is generally collected in smaller poly-carbonate bottles (one liter and smaller) and must be isotope specific. No hazardous compounds shall be placed into these containers. The pH of each reagent should be between 5 and 9, and the reagent must not exhibit any characteristic hazards such as flammability, toxicity, or corrosivitity.

   c. Each time liquid waste is added to the carboy or reagent bottle, the Radioactive Liquid Waste Log (Liquid Radioactive Waste Disposal Sheet) must be completed and signed. The Radioactive Liquid Waste Log must be attached to the waste container and contain the following information.

      i. User name
      ii. Radiation program number
      iii. Isotope
      iv. Activity
      v. Chemical name
      vi. Amount (liters or kilograms)
      vii. Certification signature
      viii. Date

d. All radioactive liquid waste must be stored in sealed containers. Preferably, all containers used to store radioactive liquids should have secondary containment and be opened only when adding waste.
e. The Liquid Decay Storage Facility (LDSF) reduces disposal costs and liability by decaying waste containing only P-32. Isotope-specific carboys, funnels, and equipment are provided to participating radiation programs. If your program can isolate P-32 liquids, please call X1384 for more information.
f. **DO NOT** place solid dry radioactive waste into liquid waste containers.

5. **Scintillation Vials** may or may not contain radioactivity.
   a. Non-hazardous scintillation cocktail should be used whenever possible to avoid generating mixed waste. The supply warehouse stocks non-hazardous scintillation fluid. If this does not suit your needs, please contact WMS for assistance.
   b. All scintillation vials must be segregated based on the following.
      i. Scintillation vials, containing only H-3 and/or C-14, with an average of less than or equal to 0.05 microcurie per gram or 3 x 10^4 cpm/ml for each vial may be grouped together.
      ii. Scintillation vials containing isotopes with a half-life greater than 100 days that do not meet the concentration limit above must be segregated by isotope.
      iii. Scintillation vials, containing isotopes with a half-life of less than 100 days (i.e. P-32, S-35, P-33, etc.), must be segregated by isotope. The WMS requests scintillation vials containing isotopes with a half-life of less than 100 days be stored for decay in the laboratory.
      iv. Scintillation vials that are "background" (Do Not contain any radioactive material) shall be segregated from all other scintillation vials.
   c. All scintillation vials must have a properly completed Hazardous Waste Tag attached identifying the scintillation fluid and total volume of fluid.
   d. All scintillation vials containing radioactive material must be clearly labeled as radioactive with the trefoil symbol and the words "Caution Radioactive material" and the following information.
      i. Radiation program number
      ii. User name
      iii. Isotope
      iv. Activity
      v. Date
6. **Mixed Waste** is radioactive waste that also contains chemical hazards or exhibits any characteristic hazards such as flammability, toxicity, or corrosivitity. Common chemicals include methanol or other solvents, acids, bases or metal salts such as lead or barium.
   a. Every effort should be made to **NOT** generate mixed waste.
   b. If the science dictates that mixed waste will be generated, WMS must be consulted prior to performing the experiments.

c. If mixed waste is accidentally generated, segregate it from all other waste and contact WMS as soon as possible.

7. Never place radioactive waste in the corridors, even while awaiting pickup. All radioactive waste must remain secure unless under constant surveillance.
8. To schedule a radioactive waste pickup, contact WMS no later than 8:00am on the day of the scheduled pick up either by e-mail nciradwaste@mail.nih.gov or call X1384 and leave your name, telephone extension, building and room number, program number, and type of waste, including isotope and activity.
   a. Solid radioactive dry waste pickup including stocks, reagents, animal carcasses and scintillation vials are generally picked up on Tuesdays.
   b. The 5 gallon carboys of radioactive liquid waste are generally picked up on Thursdays.
9. For more information on the disposal of radioactive waste, click on the following address: http://home.ncifcrf.gov/ehs/ehs.asp?id=92

G. **Surveys/Laboratory Monitoring**: Contamination monitoring (surveys) should be conducted after each manipulation of radioactive material. At a minimum, contamination monitoring must be performed and documented on a monthly basis for most programs.

1. Authorized radioisotope programs must perform and document a contamination swipe survey **at least once a month** in all authorized use areas of the program regardless of the quantities of radioactive material utilized within the month.
2. A Geiger counter, with the appropriate calibrated detector, may aid in performing the survey for high-energy beta and gamma emitters such as P-32, Cr-51, In-111, etc.
3. Surveys are performed by wiping a surface area of 100cm^2 with filter paper, or other approved swiping material, and then determining the activity with a liquid scintillation counter (LSC) or gamma counter (GC) as appropriate. A positive (sealed source H-3 and/or C-14 standards for the LSC or Cs-137 or other gamma emitter for the GC) and negative (background standard) control shall be run along with the swipes. The positive and negative controls must be included on the LSC and/or GC survey printout each month.
4. The decontamination action level for the ATRF is 220 dpm/100 cm^2 removable contamination. Radioactive contamination must be cleaned to ALARA levels.
   a. **Removable contamination:** Any contamination that may be removed with routine cleaning using such cleaning agents as Count-Off™ or soap and water, and paper towels. Removable contamination should leave no trace behind, and should be below the limits listed above or at background radiation levels after cleaning.
   b. **Non-removable contamination**: Any contamination detected above limits listed above after proper cleaning. Non-removable contamination must be properly labeled with the following and properly shielded.

i. The trefoil symbol and the words “Caution Radioactive Material”. Radiation tape can be used to meet this requirement.
ii. The isotope
iii. The activity in dpm
iv. The date of contamination.

5. All positive contaminations must be properly cleaned, re-swiped, and read on the LSC / GC with a printout attached to the original results. The positive and negative controls must be run with all re-swipes.
6. All documented surveys must include:
   a. A properly completed standard ATRF Contamination Survey Results sheet or equivalent.
   b. A diagram or map indicating the locations of the swipe/survey points. The diagram/map shall show the locations of benches, desks, sinks, hoods, etc. within all authorized use areas belonging to the program.
      i. Each swipe/survey point taken should be numbered on the diagram/map so that any contaminated areas in need of decontamination can be readily identified.
      ii. Areas tested should be representative of areas where contamination might be expected as well as some areas where contamination would not be expected.
   c. The original LSC / GC results and any rerun/re-swipe results with the positive and negative controls indicated on the printouts.
7. Each properly documented monthly contamination survey must be kept on file in the laboratory for review by RSO/RSS. It is recommended that all authorized radiation workers know where this file is kept.

H. **Radiation Safety Monthly Surveys**: Monthly surveys performed by Radiation Safety are done to maintain a broad surveillance program at the facility level, and to alert programs of potential problem areas if a contamination or deficiency is found.
1. Contamination swipe tests, as well as survey meter tests where appropriate, will be performed and documented by Radiation Safety for each radiation program at the ATRF on a monthly basis. Radiation Safety will check for:
   a. Labeling—Entrance to room
   b. Labeling—Refrigerator/freezer/storage area
   c. Labeling—Waste containers
   d. Labeling—Radioactive materials
   e. Labeling—Hoods
   f. Labeling—Contaminated equipment
   g. Use of absorbent paper as needed
   h. Routine use of shielding as needed
   i. Routine use of PPE (lab coat, gloves, eyewear)
   j. Use of dosimeter as needed
   k. No food or drinks in lab
   l. Survey meter available/current calibration/batteries ok
   m. Security
   n. Sink Contamination

o. Other issues

2. Maximum permissible removable contamination level is 220 dpm/100 cm^2. If any swipe results meet or exceed these levels, they will be re-read to check for accuracy. The staff will report contaminations to laboratory personnel via phone message as well as survey report.
3. All contaminations found by RSS must be cleaned and re-swiped by laboratory personnel on the radiation program. The PI/RAS is responsible for ensuring that the Contamination Clean-up Sheet attached to the Survey Report is completed with post clean-up dpm results. The Contamination Clean-up Sheet must be returned to the RSO within 72 hours (3 days) of receipt.
4. Any deficiencies noted by RSO will be addressed in the Monthly Survey Report as well as an accompanying Deficiency Memo. A written response, indicating corrective actions taken, must be forwarded to the RSO within 5 days of receipt.
5. Records checks will be performed quarterly by RSS during routine monthly surveys. RSO will evaluate monthly surveys performed by the program and review any radioisotope inventory.
   a. RSS will verify that the program is documenting a survey for all authorized areas on the program at least once each month. RSS will also verify that any contaminations found by the program are appropriately decontaminated and that positive and negative controls are run with each survey.
   b. Radioactive Material Accounting Records (yellow sheets) will be checked to ensure the use of licensed material is being accurately recorded.

I. **Radiation Program Renewal Application/Six-Month Program Review**: To ensure accurate and updated program information, a Six-Month Program Review is performed bi-annually as well as a more intensive Program Renewal process that is submitted on a periodic basis.

1. Six-Month Program Reviews are sent with the Six-Month Radiation Inventory Questionnaire every January and June. Review the provided information and check for accuracy. Report any discrepancies to the RSO by making changes on the Program Summary and returning by the required date.
2. Program Renewal Applications are submitted periodically. Included in the application are:
   a. A new Radiation Training and Experience form for each person on the radiation program.
   b. A copy of the current signature sheet from the Protocol Specific Training Document (PST) containing each radiation worker's signature.
   c. For radiation producing machines (EM/X-ray) and irradiator programs, dated documentation of completion of equipment-specific training for each person listed on the renewal application.
   d. Appropriate signatures as requested on the application forms.

e. The completed renewal application must be returned to the RSO within two weeks. A confirmatory memo is sent to the PI/RAS indicating that requested changes have been made for the program.

J. **Amendments to Program**: Requests for amendments to a radiation program must be submitted in writing to the RSO. Only the PI or the RAS has the authority to request an amendment. A program must be amended, in writing, when any of the following takes place:

1. Radiation workers are added or removed.
2. Changes occur in authorized radioisotopes. (for individuals or the program)
3. Activity usage levels increase or decrease. (for program or individuals)
4. Substantial changes are made in protocol design.
5. Rooms are added to or removed from the program.

A confirmatory memo is sent indicating that the requested changes have been made.

K. **Personal Monitoring Reports**: Radiation workers authorized to manipulate radioisotopes that emit high-energy betas, gamma rays, or x-rays will be issued dosimetry devices. These devices are designed to measure radiation exposure.

1. Radiation workers who are authorized to manipulate 10 mCi or more of P-32, perform iodinations, and radiopharmacy or radiochemistry workers will be issued thermoluminescent dosimeter (TLD) ring badges.
2. Radiation Safety Staff change dosimetry devices based on program requirements (weekly, monthly or quarterly). Dosimetry devices should be kept attached to a lab coat or in the general vicinity of the radiation worker's laboratory space, but ***away*** from any radiation sources.
3. The location of dosimetry devices should be consistent to assist RSS in locating them and to reduce the number of lost devices.
4. Dosimetry Reports from our dosimeter provider are sent to the PI or RAS. All badged radiation workers have access to their personnel exposure data. The dosimetry report becomes part of a person's permanent record reflecting lifetime exposure.

L. **Labeling and Signage**: All areas where radioactive materials are used or stored shall be conspicuously posted with a standard "Caution – Radioactive Materials" sign. Below is a list of common areas and equipment that may need labeling:

1. Entrances to Authorized Use Areas
2. Radiation storage units such as lock boxes, freezers or refrigerators
3. Containers for radioactive materials
4. Hoods used to manipulate radioactive material
5. Radioactive material itself
6. Items/equipment that is contaminated

Please do not label smaller laboratory equipment such as pipettes and scalpels simply because it is used with radioactive material.

M. **Security and Storage**: All radioactive material and ionizing radiation sources must be kept secured from unauthorized removal or under constant surveillance at all times!

1. Unless under direct and immediate observation, storage units containing radioactive materials shall REMAIN LOCKED during working hours. This applies to refrigerators/freezers, cabinets, or lock boxes containing stock isotopes, as well as waste containers. Otherwise, the room or area must be secured.
2. All waste receptacles and storage units containing radioisotopes that cannot be secured must be located in areas where access can be controlled (e.g., laboratory rooms, equipment rooms, anterooms).
3. Untended laboratory rooms containing unsecured radioactive material or other sources of ionizing radiation must be locked, even during daytime hours.
4. Corridors are not secured areas. Using and storing radioactive materials or other sources of ionizing radiation in these areas is prohibited.
5. All radioactive materials must be secured from unauthorized removal before leaving the area at the end of the day.

Violations of radioactive material security policies may result in suspension of radioactive material use privileges for the entire radiation program.