

Radiation Safety Training for Custodial Personnel

ISU Radiation Safety Office,
208-282-5652

Course Objective: Upon completion of this course, the participant will have an introductory knowledge of the health-risks associated with radiation, procedures to maintain ALARA exposure, purposes and functions of warning signs and devices, observation of NRC Form 3 material, areas where radionuclides are used at ISU, obligation to report unsafe conditions to the RSO, emergency procedures, and the worker's right to be informed of occupational radiation exposure.

Health Risks Associated with Exposure to Radiation or Radioactive Materials

Radiation is the transfer of energy through space. This implies that there exists a space around any radiation emitter that is full of energy. This energy may be hazardous to your health. The degree of the hazard depends upon the type and quantity of radiation.

- **Chronic radiation exposure** involves low levels of ionizing radiation over a long period of time. Among the possible effects of chronic exposure are the increased risk of developing cancer and cataracts. Also, research indicates possible genetic effects in humans from radiation damage to sperm and egg cells. Genetic damage may result in birth defects; furthermore, an exposed worker's genetic effects may be passed along to future generations.
- **Acute radiation exposure** is the result of a large dose in a short period of time. An acute exposure, where recovery is probable, includes the following possible effects: lowering of the white blood cell count, nausea, bacterial infections, vomiting, loss of appetite, reddening of the skin, diarrhea, fatigue, hair loss, and possible sterility. In a more severe exposure, the victim may suffer fever, abdominal pains, explosive diarrhea, internal bleeding, infection, shock, convulsions, coma, and ultimately death.

NOTE: Any type of radiation that is used on the ISU campus that is strong enough to cause this type of exposure is kept inaccessible and is always in a well-marked area.

Procedures to Maintain Exposure As Low As Reasonably Achievable (ALARA)

ALARA is an acronym that stands for the concept of reducing both internal and external exposure to ionizing radiation to a level that is As Low As Reasonably Achievable. The ALARA concept requires that tasks to be performed in a restricted area must be reviewed to ensure that all pertinent controls are applied. This concept is integrated into all site activities involving radioactive materials and is the responsibility of all individuals involved.

Time: The less time spent exposed to a radioactive source, the less exposure there is. Keep in mind that exposures to radiation are additive in their effect.

- Preplan the task.
- Use only the number of people required for the job.
- Have all the necessary tools prior to entering the area.

- Work efficiently but swiftly.
- Do the job right the first time.
- Perform as much work outside the area as possible.

Distance: The farther away from the source the smaller the amount of exposure. Staying away from a radiation source, even a few feet, will greatly reduce worker exposure.

- Be familiar with radiological conditions in the area.
- During work delays, move to lower dose rate areas.

Shielding: Shielding places protective materials between the worker and the source; for example: walls, barriers, or protective clothing.

Warning Signs and Protective Devices Employed at ISU

Many warning signs and protective devices are employed at ISU to reduce exposure to radiation or radioactive materials. Radioactive materials are kept in an inaccessible area in containers designed for proper shielding.

Signage:



Radiation Symbol

- **Yellow and magenta/black tape** on the floors. This marks off the area where radiation exposure is likely to occur.
- **Yellow and magenta/black rope.** This is used to restrain people from entering a radiation area.
- Most importantly locks if an area, room, or container is locked there is a reason for it!

Observation of Nuclear Regulatory Commission Regulations for the Protection of Personnel from Exposure to Radiation or Radioactive Materials (NRC Form 3 material)

This material comes in the form of a poster that is posted at the entry of every radiation area. It discusses the NRC, responsibilities of employers, inspections, discrimination, and scope of NRC's power.

Areas Where Radionuclides are Used at ISU

Radionuclides are most commonly used in the following buildings: Gale Life Sciences, Lillibridge Engineering, Physical Sciences (Chemistry), Leonard Hall, Physical Sciences (Garrison Hall), Student Health, Roy F. Christiansen, and at the Idaho Accelerator Center.

Obligation to Report Unsafe Conditions to the Radiation Safety Office and/or Applicable Authorities

The Radiation Safety Officer (RSO) is the individual appointed by the Vice President for Academic Affairs and approved by the Nuclear Regulatory Commission to administer the radiation protection program and to provide technical guidance to the Radiation Safety Committee and to radiation users. The RSO is responsible for investigating spills, losses, thefts, unauthorized receipts, uses, transfers, disposals, and other deviations from approved radiation safety practice and implement corrective actions as necessary. The RSO reports to the Vice

President for Academic Affairs on administrative matters and to the Radiation Safety Committee on technical matters. The RSO receives direction from the RSC with regard to policy and provides technical advice to the Committee, radiation users, and the administration. The current RSO is John Longley. Your obligation to report unsafe conditions to the RSO and/or applicable authorities will be discussed at further length during training.

Radiation Emergency Procedures

Any accident, injury or loss of control of a radiation source that could cause an excessive or uncontrolled radiation exposure to any individual is referred to as a radiation emergency.

Basic Emergency Responses:

1. **Protect People:** Assist injured persons and prevent any further injury. If the situation involves a radiation-producing machine, the machine should be turned off. For medical assistance, dial 8-911 immediately and report the nature of the illness or injury. Inform the 911 dispatcher that the injured individual may be contaminated with radioactive material. If you are qualified to render first aid, do so without regard to the presence of radioactivity. Notify Public Safety, at 282-2515, of the situation. Security will provide assistance and will aid in directing emergency response personnel to the scene. Except for the usual precautions for moving an injured person, individuals should immediately leave the room or area until the extent of the radiological hazard has been evaluated. However, all individuals should remain available in the vicinity until checked for contamination or exposure.
2. **Contain the Hazard:** Any of the following actions appropriate to the situation should be performed **PROVIDED** they can be carried out safely:
 1. Turn off radiation producing machines.
 2. Cover containers of radioactive materials.
 3. Place absorbent material on spilled liquids.
 4. Close the sash on fume hoods, but **do not** turn off exhaust fans.
 5. Close doors to the area and post signs or guards to prevent unauthorized entry.
 6. Allow no one to leave the area without being checked for contamination.

Workers Right to be Informed of Occupational Radiation Exposure and Bioassay Results

It is a federal law that workers who are exposed to radiation have the right to be informed of any exposures and also the results of any bioassays performed.

This will be discussed more during the training session.

Transportation of Radioactive Material

Only Radiation Safety personnel is in charge with the transportation of radioactive materials between University buildings or to another institutions.

If you routinely work in areas that involve radiation and would like additional information and/or additional training on safe working practices, please contact our Office as we will be happy to assist.

Questions/Comments: Radiation Safety Office at 282-5652 or visit our web page at: <https://www.isu.edu/ehs/radiation-safety/>