

## LABORATORY RULES FOR RADIOACTIVE MATERIAL USERS

### I. GENERAL RULES

- A. **Do not** smoke, eat or drink in laboratory, nor dispose of any food related items/containers in lab.
- B. **Wear** a lab coat or special clothing when working with radioisotope. **Do not** roll up sleeves.
- C. **Wear** film badge and/or ring dosimeter at all times whenever any radioisotope usage occurs in lab.
- D. **Wear** gloves, on both hands, when working with radioisotope.
- E. **Label** use areas, waste and storage containers, equipment used and the sink used for liquid waste disposal.
- F. **Use** hood if any doubt about spraying or volatilization.
- G. **Do not** put mouth in contact with any apparatus.
- H. **Survey meter** (daily check must be performed) should be nearby and turned on when working with radioisotope to periodically check your gloved hands for contamination. If they are contaminated, **replace** gloves.
- I. **Survey** yourself before leaving the immediate radioisotope use area.
- J. **Wash** hands thoroughly upon completing your radioisotope work and before leaving the lab.
- K. All radioactive labels and/or symbols on packages or elsewhere, prior to disposal, must be completely obliterated or **defaced**.
- L. At the end of the work day **record** usage amounts, disposals and receipts of radioactive materials (chemical form, nuclides, amounts, P.O. No.).
- M. All forms of radioactive materials must be secured (locked) when they are not directly supervised (at all time).

### II. LABORATORY SURVEYS

- A. At the end of each day's work: **survey** all work surfaces, hoods, sinks, cabinets, floors, equipment used, waste storage areas, stock storage areas, counting room, as well as your hands, clothing, and shoes. **Surveys must include** both radiation (**meter**) surveys and removable contamination (**wipe**) surveys. **Record** all results (pre and post clean up) in a logbook. All levels greater than twice background are considered contaminated. Document background values.
- B. Proper **decontamination** of all contaminated areas, equipment and personnel, as well as surveying the areas involved, is to be carried out prior to leaving the lab.

### III. RADIOACTIVE WASTE STORAGE AND DISPOSAL

- A. **Separate** all **wastes** by form (solids/liquids/animal tissue) and by half-life.
- B. **Separate** radioactive **waste** from hazardous, biohazard or municipal waste.
- C. **Dispose** of radioactive waste using proper containers (leak-proof for liquids/non-punctured for solids) that are labeled.
- D. No more than **300** microCuries (amount to be approved by the RSC) of **H<sub>2</sub>O soluble, non-hazardous** liquid waste per month per laboratory may be **disposed** into the sanitary sewer via an approved sink. **Flush** radioactive waste into sewer with no less than 10 liters of water. **Record** disposal in logbook. **Monitor** the sink, record results, decontaminate, if necessary. See "*Sanitary Sewer Release Criteria*" (approved amounts and forms) in the *Radiation Safety Handbook Appendix 13*.

### IV. EMERGENCIES - ACCIDENTS AND/OR SPILLS

**A. Area Contamination Accidents**

1. Immediately **evacuate** all personnel in danger of contamination.
2. Without endangering personnel, attempt to **stop the spread** of contamination. **Notify Radiation Safety** immediately. See “*Spill Notification Action Limits*” in the *Radiation Safety Handbook Appendix 13*. **If no answer, call** OU Police.
3. **Decontaminate** the area. Spills should be decontaminated under direct or indirect supervision of Radiation Safety. See “*Decontamination Procedures*” in the *Radiation Safety Handbook Appendix 13*.
4. **Monitor** and **record** incident (estimate activity involved) & all survey results (both pre and post clean up) in logbook.

**B. Personnel Contamination Accidents**

1. Try to **decontaminate** clothing first before removing. Ask for assistance from other coworkers, if necessary, to prevent the spread of contamination. **Remove** contaminated clothing, if necessary, making sure all contaminated clothing is left in the lab. **Flush** contaminated wounds with water. **Call** Radiation Safety and Poison Control for advice concerning ingestion. See “*Personnel Decontamination*” in the *Radiation Safety Handbook Appendix 13*. **Monitor** and **record** incident (estimate activity involved) & all survey results (both pre and post clean up) in logbook.
2. At the earliest possible moment **notify** Radiation Safety. **If no answer, call** OU Police.
3. If there is a serious injury, **transport** the injured person immediately to Hudson Health Center or O'Bleness Hospital.
4. If it is suspected that an **exposure** to more than 1000 mrem has occurred, **notify** Radiation Safety.

\*\*For all radiation accidents Stop what you are doing, Warn others, Initiate decontamination procedures: contain the spill, call Radiation Safety, clean it up and Monitor or S.W.I.M. Be sure to notify Radiation Safety at the earliest possible moment.

**Post** the telephone numbers for all emergencies nearest the most accessible telephone. **Learn** the location of such a telephone and the nearest fire extinguisher, fire pull, eye wash and emergency shower (both of which should be checked monthly).

<b>Radiation Safety (Susan Hopkins)</b>	740-593-1666	<b>OU Police</b>	740-593-1911
<b>Environmental Health &amp; Safety</b>	740-593-1666	<b>Poison Control</b>	800-222-1222
<b>Alan Watts (Home)</b>	740-698-9631	<b>Ambulance</b>	911
<b>(Office)</b>	740-593-4176		
<b>David Schleter (Office)</b>	740-597-2950		
<b>(Cell)</b>	740-591-0557		
<b>Supervisor (please list)</b>			

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For more information concerning Radiation Safety, please see the *Radiation Safety Handbook*.

Radiation Safety is a division of Environmental Health & Safety, Hudson Health Center, Athens, Ohio 45701

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## Sanitary Sewer Release Criteria

A licensee may release a maximum of **300 uCi/month** of **licensed material** into the sanitary sewer if and only if the material is **readily soluble** or is **readily dispersible biological material, in water**. The licensee **must** be ready to **produce** the **required criteria** for **what constitutes soluble or biologically dispersible**. Examples of solubility criteria for liquid effluents sometimes can be obtained from radioisotope vendors such as NEN, ICN, AMERSHAM, etc. Otherwise, common literature data must be used (i.e. Handbook of Chemistry and Physics - CRC Press, Lange's Handbook of Chemistry - McGraw - Hill, Water Chemistry by Snoeynik and Jenkins, Standard Methods for the Examination of Water and Wastewater - American Public Health Association - Washington, D.C.) or the solubility must be determined from actual filtration and analysis of suspended solids (ASTM Method D 1888 - 78, "Standard Test Methods for Particulate and Dissolved Matter, Solids, or Residue in Water" and the American Public Health Association Method 7110 from Standard Methods for the Examination of Water and Wastewater can be used. Citing one of these references is acceptable for solubility criteria and other reference(s) for the biological dispersible material may be cited but the reason for the reference must be produced upon request.

Sanitary sewer release amounts, although stipulated above as 300 uCi/month maximum, will be **considered on an individual basis** (from an application to use radioactive materials and the procedures that apply) by the Radiation Safety Committee. Their criteria for acceptance will be based on monthly water consumption data, of the building where the person who submits the application will be disposing of radioactive liquid wastes, and that OAC 3701:1-38-12 restrictions are met. The regulation so noted refers to Appendix C "Concentrations for Release to Sanitary Sewerage," which stipulates dilution factors by isotope (uCi/ml). These factors cannot be exceeded when you divide the total activity of the isotope disposed for the month (entire building) by the total water used (ml) for that building for that month. The fraction that results is additive to the other fractions for the other isotopes disposed of that month in that building and the sum cannot exceed 1. **Therefore, the dilution factor for each isotope involved cannot be exceeded nor can the additive sums of the fractions for all isotopes involved exceed 1.**

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## Spill Notification Action Limits

An **unexpected spill** or event that involves **1 uCi or more** is an **immediately reportable** situation to EH&S **via the telephone**. A **follow up letter** will be sent to EH&S explaining the incident in addition to documenting the affair in the laboratory log book. Documentation should include survey (meter and wipe) results - both pre and post clean up and an estimate of the activity and radioisotope involved as well as the time, date, individual(s) involved and location of the incident. These will all be required actions.

An **exception** to this rule would be:

If the spill or event is **1 uCi or more** but is **incidental to the procedure** or it is an unexpected spill or event but is **totally contained** (bench paper, tray or some type of container), then the happening will be recorded in the lab log book with survey (meter and wipe) results - both pre and post clean up of the area involved, showing that all is under control. You must notify EH&S about the spill via the **telephone only** (does not have to be immediate - within one day) where further action may or may not be enacted.

If a spill or event is **less than 1 uCi** then those involved will be required to log in their records what happened and their survey (meter and wipe) results - both pre and post clean up of the area involved, showing that all is under control. You must notify EH&S about the spill via the **telephone only** (within two days) where further action may or may not be enacted.

For further **clarification** contact the Radiation Safety Office at 593-4176 or 593-1666.

## PERSONNEL DECONTAMINATION

**The radioisotope activities that most of the researchers on campus work with are low enough that whenever personal contamination occurs patience and an informed approach to deal with the problem calmly, slowly but deliberately and effectively is not only preferred but the safest.**

Decontamination procedures can begin while waiting for Radiation Safety or transfer to Hudson Health Center or O'Bleness Hospital.

Always try to decontaminate yourself (clothing) first before considering removing any articles of clothing. If you must do so, be sure to leave all contaminated items in the lab. Upon realizing that you are contaminated seek out help from coworkers, so that they can make telephone calls (Radiation Safety, emergency services, etc.), get cleaning supplies, turn on water faucets, handle the survey meter to monitor clean up efforts, etc., so that the spread of contamination can be minimized.

To properly decontaminate personnel, it is necessary to first define the areas of contamination by means of proper monitoring techniques. Special emphasis should be placed on the location of any hot spots on the individual. The mildest methods of cleansing should be attempted first, progressing to more harsh methods when necessary to avoid abrading the skin. Cleansing methods in order of harshness are as follows:

1. Flushing with water
2. Soap and warm water
3. Mild abrasive soap, soft brush and water
4. Detergent
5. Mixture 50% powdered detergent and 50% cornmeal
6. Complexing solution (contains a stable form of the radioisotope, i.e. PBS for P-32)
7. Solvent, i.e. scintillation fluid
8. Mild organic acid (citric acid, dilute acetic acid)

Chemical treatment is to be used only when absolutely necessary and then only under the direction of Radiation Safety.

After removal of contamination, individuals should take a thorough shower with special attention to washing the hair, hands and fingernails.

In all personnel decontamination procedures, every effort should be made to prevent the spread of contamination.

Remember to always call Radiation Safety as soon as possible whenever personnel contamination is involved.

## DECONTAMINATION PROCEDURES

All spills of radioactive material must be cleaned promptly. The responsibility for cleaning up the spill rests on the individual working in the area involved and responsible for the spill. Under no circumstances should an untrained person attempt to examine or clean up a spill of radioactive material. Please call radiation safety for assistance if necessary @ 593-1666. No spill/accident is too small for outside help.

The following general procedures should be followed when dealing with *spills* of radioactive material:

**Major Spills ( $\geq 1$  uCi)** - Those spills involving significant radiation hazards to personnel shall be decontaminated under the direct supervision of the radiation safety staff or appointed individual. Radiation Safety must be notified immediately.

1. Notify all personnel not involved with the spill to vacate the area at once. Have an evacuee notify radiation safety of the incident.
2. Affected persons should limit their movement to confine the spread of contamination.
3. Stop further spread, contain the spill. If the material is liquid, place an absorbent material such as paper towels, tissues, sponges, etc. over the spill to prevent its spread. If the material spilled is powdered solid, attempt to contain its spread by covering the area with a protective barrier such as a drip tray, empty beaker, dampened material (paper or towels). If appropriate, close doors and windows, turn off room ventilation fans to prevent the spread of the powdered material.
4. Remove contaminated clothing at once, if necessary. Flush contaminated skin areas thoroughly with water. See "*Personnel Decontamination*" procedures. Use emergency showers and eye washes, if necessary.
5. Be sure the hood is on to draw the contamination out of the lab. Close doors and windows, if appropriate. If possible, shut off ventilating equipment that may transport contaminated air from the contaminated area to other parts of the building. Remember that the fire alarm can be used for emergency purposes to vacate the building, if necessary.
6. Vacate and post/cordon off the contaminated area, if necessary.
7. Assemble in a nearby safe or clean area and begin monitoring and decontamination of affected persons. Do Not Leave the Area unless adequately decontaminated or with the permission of Radiation Safety.
8. The person responsible for the spill shall prepare a report\* of the incident and follow up procedures for the Radiation Safety Office. See "*Spill Notification Action Limits*" in the *Radiation Safety Handbook, Appendix 13*.

**Record pertinent information in the survey logbook [\*incident, including activity and complete survey results, both pre and post surveys (meter and wipes), who was involved, etc.].**

**Minor Spills** - Spills involving little or no radiation hazard to personnel may be decontaminated by laboratory personnel under the direction of the laboratory supervisor. Wear film badge and ring dosimeter and appropriate protective clothing including rubber gloves and lab coat. Radiation Safety must be notified in a short period of time.

1. Contain the spill. If the material is a liquid, place an absorbent material such as paper towels, tissues, sponges, etc. over the spill to prevent its spread. If the material spilled is powdered solid, attempt to contain its spread by covering the area with a protective barrier such as a drip tray, empty beaker, dampened material (paper or towels). If appropriate, close doors and windows, turn off room ventilation fans.
2. Inform others of the spill. Adjust your response to the seriousness of the spill. Instruct those personnel present in the room at the time of the spill to remain in an evacuation area to prevent contamination spread. Evacuated personnel should not eat, drink, or smoke until they are monitored and found free of contamination.
3. Decontaminate the area. Plan ahead. Provide adequate protection and supplies for personnel involved in the contamination. Cover cleaned areas with plastic or paper to prevent its recontamination. Place all contaminated items in the proper waste containers.
4. Monitor the area. Using appropriate survey techniques, monitor the progress of the decontamination. Monitor all personnel and materials before releasing them to clean areas. See “*Laboratory Decommissioning*” in the *Radiation Safety Handbook, Appendix 14*, for approved decontaminated levels. Record spill\* and follow-up procedures taken, into logbook.