

NEW YORK STATE DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL RADIATION PROTECTION
RADIATION GUIDE 10.14, REV. 1
RADIOACTIVE MATERIALS GUIDE FOR
SMALL RIA LABORATORIES

PURPOSE OF GUIDE

Use of radioactive materials by small RIA laboratories must be in accordance with the requirements of the New York State Sanitary Code. Applicants for licenses to use radioactive materials in such laboratories must have a program to ensure compliance with these requirements. This guide describes procedures which an applicant may adopt and will constitute a program acceptable to the Department.

All employees who handle radioactive material under the license should be given a copy of this guide and instructed in its contents.

PURPOSE OF APPENDICES TO GUIDE

The regulations require that the licensee develop and implement procedures that will ensure compliance with the regulations. Appendices A through H to this guide describe model radiation safety procedures. Each applicant should carefully read the applicable regulations and model procedures and adopt them as written whenever possible. If you are unable to adopt a particular procedure as written submit a copy of the procedure in the guide with your changes indicated in red ink. You must keep copies of these procedures with the license document when it is issued since they will be made a part of the license.

APPLICABLE REGULATIONS

All regulations pertaining to this type of license are found in Title 10, Chapter 1, Part 16 of the New York Code of Rules and Regulations (10 NYCRR 16). Chapter 1 is entitled "State Sanitary Code" and Part 16 is entitled "Ionizing Radiation." The statutory authority for the rules and regulations is found in the New York State Public Health Law, Section 225.

FILING AN APPLICATION

A license application for specific licenses for radioactive materials use should be submitted on Form DOH-370 "Application for Radioactive Materials License" and appropriate attachments. The applicant should complete all items on the application form in sufficient detail for the review staff to determine that the applicant's equipment, facilities, personnel training and qualifications, and radiation safety program are adequate to protect health and minimize danger to life and property. The Department will request additional information when necessary to provide reasonable assurance that the applicant has established an adequate radiation safety program. Such requests will delay final action on the application.

For Items 5 through 17, submit the required information on supplementary pages. You should identify and key each separate sheet or document submitted with the application to the item number on the application to which it refers. All typed pages, sketches, and, if possible, drawings should be on 8-1/2 x 11 inch paper to facilitate handling and review. If larger drawings are necessary, fold them to 8-1/2 x 11 inches.

One copy of the application, with all attachments, should be retained by the applicant, since the license will require as a condition that the licensee follow the statements and representations set forth in the application and any supplement to it. The original and one copy should be mailed to the Bureau of Environmental Radiation Protection, New York State Department of Health, 2 University Place, Room 375, Albany, New York 12203.

CONTENTS OF AN APPLICATION

The following paragraphs explain the information requested on Form DOH-370. The item numbers correspond to the appropriate section of the form.

- Item 1. a. Enter the name of physician, clinical laboratory or hospital applying for the license.
- b. Enter the address of the location where radioactive materials will be used and stored.
- Item 2. Name the individual to be contacted about this application.
- Item 3. Indicate whether this is an application for a new license, an amendment, or a renewal; and enter the license number.
- Item 4. Enter the name and title of the person who will be the Radiation Safety Officer. This should be a physician or clinical laboratory director.
- Item 5. INDIVIDUAL USERS. Submit the names and qualifications of all persons that you wish to have named as individual users. Include experience with specific radionuclides.
- Individual users may be added to the license if they meet the requirements for training as listed in section 16.2 (a) (129). This training must include at least 30 hours of instruction in the principles and practices of radiation protection, radioactivity measurement standardization and monitoring techniques and instruments, mathematics and calculations basic to the use and measurement of radioactivity, and biological effects of radiation.
- Item 6. RADIOACTIVE MATERIALS. Submit a list of the radionuclides to be used. Include the maximum activity that will be possessed at one time. Be sure to consider the activity of any radioactive waste that will be stored on site.
- Item 7. USE. Describe the intended use of the radioactive materials listed in Item 6.

Item 8. RADIATION SAFETY OFFICER. The Radiation Safety Officer will be the person responsible for assuring that all code and license conditions are complied with. This should be the physician or laboratory director who oversees the laboratory program. A laboratory director must hold an effective Certificate of Qualification as such to perform in-vitro radionuclide procedures issued by the Clinical Laboratory Center, Division of Laboratories and Research, New York State Department of Health.

Submit the name of the physician or laboratory director, and a copy of the laboratory director's Certificate of Qualification.

A statement must be included delineating the Radiation Safety Officer's duties and responsibility for carrying out the radiation safety program. **Appendix A** contains a model procedure. State that you will follow the model procedure or submit your changes in red ink.

Item 9. PERSONNEL TRAINING PROGRAM. You must provide a training program for individuals who work with or in the vicinity of radioactive materials. **Appendix B** to this Guide contains a model personnel training program. State that you will follow the model procedure or submit a copy of the model procedure with your changes indicated in red ink.

Item 10. INSTRUMENTATION. Submit a statement that the physician, clinical laboratory or hospital has appropriate radiation measuring instruments to carry out in-vitro clinical or laboratory tests with radioactive materials and that such tests will be performed only by personnel competent in the use of such instruments and in the handling of the radioactive materials.

a. Submit a list of all radiation detection instruments available. Include the manufacturer, model number, and type of detector for each instrument.

b. (1) Survey Meters - Survey meters must be calibrated on an annual basis. If your survey meters are sent out for calibration, submit a statement that calibrations will be performed by persons licensed to perform this service by the US Nuclear Regulatory Commission or an Agreement State and that a copy of this license will be kept on file with the calibration certificates.

(2) Quantitative Measuring Instruments - Instruments that will be used for quantitative measurements to determine compliance with Department regulations (leak tests, wipe tests, etc.) should be calibrated at six month intervals. Describe your calibration procedures.

Item 11. FACILITIES AND EQUIPMENT. Describe the available facilities and equipment at each location where radioactive material will be used. Include a description of the area(s) assigned for the receipt, storage (including waste), preparation and measurement of radioactive materials, and security procedures.

Facility diagrams must be submitted for all areas where radioactive materials are used or stored. Diagrams should include dimensions and be drawn to scale. Relevant

objects and equipment should be shown, as well as the location and wording of warning signs and the areas where monthly wipe tests are performed.

- Item 12. ORDERING AND RECEIVING. **Appendix C** to this Guide contains procedures for ordering and receiving radioactive material. State that you will follow the model procedure or submit a copy of the model procedure with your changes indicated in red ink.
- Item 13. PACKAGE OPENING. **Appendix D** to this Guide contains procedures for package opening. State that you will follow the model procedure or submit a copy of the model procedure with your changes indicated in red ink.
- Item 14. SAFETY RULES. **Appendix E** to this Guide contains model rules for the safe use of radioactive material. State that you will follow the model procedure or submit a copy of the model procedure with your changes indicated in red ink.
- Item 15. SPILLS. **Appendix F** to this Guide contains procedures for responding to spills. State that you will follow the model procedure or submit a copy of the model procedure with your changes indicated in red ink.
- Item 16. AREA SURVEYS. **Appendix G** to this Guide contains model area survey procedures. State that you will follow the model procedures or submit a copy of the model procedures with your changes indicated in red ink. Describe how efficiencies are determined for conversion of removable contamination sample results from cpm to dpm.
- Item 17.
- a. Submit your procedures for management of radioactive waste. Each licensee must develop a comprehensive program for minimizing the production of low level radioactive waste (LLRW). **Appendix H-1** contains an outline of a minimization program acceptable to the Department. State that you will adopt a minimization program which includes all items in the model outline or submit a description of your program.
 - b. Submit the information below which is relevant to those disposal options that will be used at your facility.
 - (1) Decay-in-Storage - Radioactive waste with half-lives less than 65 days can be disposed of by decay-in-storage. **Appendix H-2** contains an outline of the information which must be submitted if you request to use this disposal method.
 - (2) Disposal to Municipal Sewage System - Radioactive material may be disposed of to a municipal sanitary sewage system in accordance with NYS Department of Environmental Conservation requirements which allow disposal of soluble materials up to certain monthly limits and an annual total quantity limit of one curie. Confirm that you are on a public sewer line.

You must maintain records of the nuclides disposed of to sewage including monthly activities and total sanitary sewage released by

your facility in those intervals. The calculated concentrations or monthly activities of each nuclide disposed must be within 6 NYCRR Part 380 limits (and the sum of the fractions of each nuclide compared to its limit must be less than or equal to unity).

The sink or toilet used for discharge must be posted and should be as close as possible to the sewer connection to minimize possible contamination of plumbing. **Appendix H-3** to this guide contains example calculations for sewage disposal and a procedure for soaking in-vitro test tubes prior to sewer disposal of dissolved contents.

- (3) Extended Storage - Wastes with half-lives in excess of 65 days which cannot be disposed by other methods may have to be stored for an extended period pending eventual disposal at a licensed LLRW disposal facility. Licensees wishing to request extended storage of waste should contact the Department for further information.

Item 18 through Item 25. Not applicable.

Item 26. **CERTIFICATE.** If the application is for a private practice, it should be signed by a senior partner or the president. If the application is for an institution, hospital, or medical center, it must be signed by its director or chief executive officer. Identify the title of the office held by the individual who signs the application. The appropriate person must sign and date the application, and the name and title of that person must be typed or printed on the lines provided.

AMENDMENTS TO LICENSES

Licensees are required to conduct their programs in accordance with statements, representations, and procedures contained in the license application and supporting documents. The license must therefore be amended if the licensee plans to make any changes in the facilities, equipment (including types of monitoring and survey instruments), procedures, authorized users, radiation safety officer, or radioactive material to be used.

Applications for license amendments may be filed either on the application form or in letter form. The application should identify the license by number and should clearly describe the exact nature of the changes, additions, or deletions. References to previously submitted information and documents should be clear and specific and should identify the pertinent information by date, page and paragraph.

Amendment applications must be signed as described in Item 26 and dated. An original and two copies of the application for amendment should be prepared, and the original and one copy should be submitted, as in the cases for new or renewal applications.

RENEWAL OF A LICENSE

An application for renewal of a license should be filed at least 30 days prior to the expiration date. This will ensure that the license does not expire until final action on the application has been

taken by the New York State Health Department as provided for in Section 16.105 of 10 NYCRR 16.

Renewal applications should be filed on Form DOH-370 appropriately supplemented, should contain complete and up-to-date information about the applicant's current program, should meet all licensing and regulatory requirements in effect at the time of renewal, and must be signed as described in Item 26 and dated. Renewal applications should also include the physician-user's training and experience or make a clear and specific reference to previous applications on which individual users received approval.

In order to facilitate the review process, the application for renewal should be submitted without reference to previously submitted documents and information (except for previously approved users).

Prepare an original and two copies of the application. Retain one copy of the application, with all attachments, because the license will require, as a condition, that the institution follow the statements and representations set forth in the application and any supplement to it. Mail the original and one copy to the Bureau of Environmental Radiation Protection, New York State Health Department, 2 University Place, Room 375, Albany, New York 12203.

LICENSE TERMINATION REQUESTS

Submit a signed Form GEN 322 indicating the disposition of the radioactive material. Form GEN 322 is available from the Bureau of Environmental Radiation Protection, New York State Health Department.

Submit survey results showing that all previously occupied areas are free of contamination and all sources of radioactive material have been removed in accordance with Section 16.10 of 10 NYCRR 16. A decontamination guide is available from the Bureau of Environmental Radiation Protection, New York State Health Department.

Such submissions must be made at least 30 days prior to relinquishing possession or control of premises where radioactive material is or has been stored or used.

LIST OF APPENDICES

Appendix

- A Radiation Safety Officer's Authority and Duties
- B Model Personnel Training Program
- C Model Guidance for Ordering and Receiving of Radioactive Material
- D Model Procedure for Safely Opening Packages Containing Radioactive Material
- E Model Rules for Safe Use of Radioactive Material
- F Model Spill Procedures
- G Model Procedure for Area Surveys
- H-1 Model LLRW Minimization Plan
- H-2 Model Decay-in-Storage Program
- H-3 Sample Calculations for Disposal to Municipal Sewage and RIA Tube-Soaking Procedure

APPENDIX A

MODEL PROCEDURE FOR AUTHORITY AND DUTIES OF THE RADIATION SAFETY OFFICER

Responsibility

The Radiation Safety Officer is responsible for:

1. Ensuring that all individuals who work with or in the vicinity of radioactive material have sufficient training and experience to enable them to perform their duties safely and in accordance with Department regulations and the conditions of the license.
2. Ensuring that all use of radioactive material is conducted in a safe manner and in accordance with Department regulations and the conditions of the license.

Duties

The Radiation Safety Officer shall:

1. Be familiar with all pertinent New York State Health Department regulations, the terms of the license, and information submitted in support of the request for the license and its amendments.
2. Review the training and experience of all individuals who use radioactive material and determine that their qualifications are sufficient to enable them to perform their duties safely and in accordance with New York State Health Department regulations and the conditions of the license.
3. Be responsible for monitoring the institution's program to maintain individual and collective doses as low as reasonably achievable.
4. Establish a program to ensure that all individuals whose duties may require them to work in the vicinity of radioactive material (i.e. clerical, security, and housekeeping personnel) are properly instructed as required by Section 16.13 of 10 NYCRR 16.
5. Review the entire radiation safety program at least annually to determine that all activities are being conducted safely and in accordance with New York State Health Department regulations and the conditions of the license. The review shall include an examination of records, results of New York State Health Department inspection, written safety procedures, and the adequacy of the institution's management control system.
6. Ensure that the radioactive materials license is amended, when necessary, prior to any changes in facilities, equipment, policies, procedures, radioactive material, possession limits, and personnel, as specified in the license.
7. Identify problems and develop solutions.

APPENDIX B

MODEL PERSONNEL TRAINING PROGRAM

It may not be assumed that safety instruction has been adequately covered by prior professional or occupational training, board certification, etc. Also ancillary personnel (i.e. clerical, housekeeping, security) whose duties may require them to work in the vicinity of radioactive material (whether escorted or not) need to be informed about radiation hazards and appropriate precautions. A training program that provides necessary instruction for all personnel should be written and implemented.

A. Personnel will be instructed:

1. Before assuming duties with, or in the vicinity of, radioactive materials.
2. During annual refresher training.
3. Whenever there is a significant change in duties, regulations, or the terms of the license.

B. Instruction for individuals in attendance will include the following subjects:

1. Applicable regulations and license conditions.
2. Areas where radioactive material is used or stored.
3. Potential hazards associated with radioactive material in each area where the employees will work.
4. Appropriate radiation safety procedures.
5. Licensee's in-house work rules.
6. Each individual's obligation to report unsafe conditions to the Radiation Safety Officer.
7. Appropriate response to emergencies or unsafe conditions.
8. Worker's right to be informed of occupational radiation exposure and bioassay results, including special rights for declared pregnant women.
9. Locations where the licensee has posted or made available notices, copies of pertinent regulations, and copies of pertinent licenses and license conditions (including applications and applicable correspondence), as required by 10 NYCRR 16.13.

10. Question and answer period.

APPENDIX B, cont.

- C. Records of initial and refresher training will be maintained for inspection by the department and will include:
1. The name of the individual who conducted the training,
 2. The names of the individuals who received the training,
 3. The dates and duration of the training session,
 4. A list of the topics covered, and
 5. The results of tests administered to determine the effectiveness of training.

APPENDIX C

MODEL GUIDANCE FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

1. The Radiation Safety Officer or a sole designate must authorize each order for radioactive materials and ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded.
2. The Radiation Safety Officer will establish and maintain a system for ordering and receiving radioactive material. The system must contain the following information:
 - 1) Written records that identify the isotope, chemical form, activity, and supplier will be made.
 - 2) The above records will be checked to confirm that material received was ordered through proper channels.
3. For deliveries during normal working hours, the Radiation Safety Officer will tell carriers to deliver radioactive packages directly to a specified area.
4. For deliveries during off-duty hours, the Radiation Safety Officer will tell security personnel or other designated persons to accept delivery of radioactive packages in accordance with procedures outlined in the sample memorandum below.

Sample Memorandum

MEMO TO: Chief of Security

FROM: Radiation Safety Officer

SUBJECT: Receipt of Packages Containing Radioactive Material

The security guard on duty shall accept delivery of packages containing radioactive material that arrive during other than normal working hours. Packages should be placed on a cart or wheelchair and taken immediately to the RIA Laboratory, Room _____. Unlock the door, place the package on top of the counter, and relock the door.

If the package appears to be damaged, immediately contact one of the individuals identified below. Ask the carrier to remain at the hospital until it can be determined that neither the driver, nor the delivery vehicle is contaminated.

If you have any questions concerning this memorandum, please call our Radiation Safety Officer, _____, at extension _____, or at home _____.

APPENDIX D

MODEL PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIAL

For all packages, the following procedures for opening packages will be carried out:

- a. Put on gloves to prevent hand contamination.
- b. Visually inspect package for any sign of damage (i.e. wetness, crushed). If damage is noted, stop procedure and notify Radiation Safety Officer.
- c. Open the package with the following precautionary steps:
 - 1) Open the outer package (following manufacturer's directions, if supplied) and remove packing slip.
 - 2) Open inner package and verify that contents agree with those on packing slip.
 - 3) Check integrity of final source container (i.e. inspect for breakage of seals or vials, loss of liquid, or discoloration of packaging material).
 - 4) If anything is other than expected, stop and notify the Radiation Safety Officer.
- d. If there is any reason to suspect contamination, wipe external surface of final source container and remove wipe to low background area. Assay the wipe with an appropriate instrument. The procedure manual should specify the instrument and method to use. Record amount of removable radioactivity (i.e. dpm/100 cm², etc.). Take precautions against the spread of contamination as necessary.
- e. Monitor the packing material and packages for contamination before discarding.
 - 1) If contaminated, treat as radioactive waste.
 - 2) If not contaminated, obliterate radiation labels before discarding in regular trash.
- f. Maintain records of the results of checking each package.

APPENDIX E

MODEL RULES FOR SAFE USE OF RADIOACTIVE MATERIAL

1. Wear laboratory coats or other protective clothing at all times in areas where radioactive materials are used.
2. Wear disposable gloves at all times while handling radioactive materials.
3.
 - a. Do not eat, drink, smoke, or apply cosmetics in any area where radioactive material is stored or used.
 - b. Do not store food, drink, or personal effects with radioactive material.
4. Dispose of radioactive waste only in specially designated and properly shielded and labeled receptacles.
5. Never pipette by mouth.
6. Segregate pipetting devices used with radioactive materials from those used with non-radioactive solutions.
7. Survey radioactive materials areas for contamination monthly. Decontaminate if necessary.
8. Confine radioactive solutions in containers that are clearly labelled.

APPENDIX F

MODEL SPILL PROCEDURES

1. **NOTIFY:** Notify persons in the area that a spill has occurred.
2. **PREVENT THE SPREAD:** Cover the spill with absorbent paper.
3. **CLEAN UP:** Use disposable gloves. Carefully fold the absorbent paper and pad. Insert into a plastic bag and dispose of in the radioactive waste container. Also insert into the plastic bag all other contaminated materials such as disposable gloves.
4. **SURVEY:** Wipe the area around the spill. Be sure removable contamination is less than 200 dpm/100 cm² for radioiodines and 1000 dpm/100 cm² for all other radionuclides.
5. **REPORT:** Report incident to the Radiation Safety Officer.

APPENDIX G

MODEL PROCEDURE FOR AREA SURVEYS

Removable Contamination Surveys

1. Survey Areas (Be sure to include floor surfaces)
 - a. In laboratory areas where only small quantities of radioactive material are processed (less than 200 microcuries at a time), survey monthly for removable contamination.
 - b. In radioactive materials storage and radioactive waste storage areas, survey monthly for removable contamination.
2. The wipe sample assay procedure should be sufficiently sensitive to detect the presence of 1000 dpm/100 cm² of removable contamination (200 dpm/100 cm² for isotopes of iodine). You must use a radioactive source with a known amount of activity to convert sample measurements (usually in counts per minute) to dpm.
3. Immediately notify the Radiation Safety Officer if you find unexpectedly high levels.

Records

1. Keep a record of contamination survey results. It must include the following information:
 - a. The date, area surveyed, and equipment used.
 - b. The name or initials of the person who made the survey.
 - c. A drawing of the areas surveyed and contamination action levels as established by the Radiation Safety Officer.
 - d. Measured contamination levels in dpm/100 cm².
 - e. Actions taken in the case of contamination and follow-up survey information.
2. The Radiation Safety Officer will review and initial the record at least monthly and also promptly in those cases in which action levels were exceeded.

APPENDIX H-1

LOW-LEVEL RADIOACTIVE WASTE MINIMIZATION PLAN

1. All sealed sources which are expected to be routinely exchanged will only be obtained from providers which guarantee to receive them back.
2. No "non-disposable" radioactive materials will be acquired under our radioactive materials license unless it can be demonstrated that a non-radioactive or "disposable" radioactive alternative is not reasonably available.
3. Any "non-disposable" radioactive materials that are permitted to be acquired will be limited to the minimum amount needed.
4. All uses of "non-disposable" radioactive materials will be conducted so as to minimize waste production.
5. All persons engaged in work under the radioactive materials license will receive initial training and annual refresher training in policies and procedures to minimize production of "non-disposable" LLRW.

Note: "Non-disposable" radioactive materials are those that can not be held for decay, discharged to a municipal sewer, or returned to a vendor, but must be held on-site for extended storage.

APPENDIX H-2

DECAY-IN-STORAGE PROGRAM FOR LOW-LEVEL RADIOACTIVE WASTE

Describe your management program for radioactive waste with half-lives up to 90 days that is to be decayed-in-storage including a description of:

1. any waste processing that will be done.
2. the facility used for storage (e.g. an 8 x 10 foot concrete block room without windows that is climate-controlled and sprinklered).
3. the waste packages to be used. If packages are stored for more than a year they should be sturdy enough for the purpose (e.g. commercially available waste boxes 11" square x 22" high constructed of heavy cardboard and lined with heavy gauge plastic).
4. package arrangement (e.g. storage area will hold 60 boxes stacked 3 high with walkways to allow visual inspection of all packages).
5. security; state how access to the room will be controlled (e.g. room will be locked when not in use and only stated individuals will have a key).
6. staffing; describe who will supervise the program, place packages into storage, conduct wipe tests and surveys, etc.
7. operations; describe your system for managing the decay-in-storage program. The following model may be used:
 - i. Each box will be assigned an I.D. number.
 - ii. A written log will be kept where we will enter the box I.D. number, initial start date for empty box, date when it is full and goes into storage, contents of the box and projected date of removal from storage (after at least 10 half-lives).
 - iii. The log information will also be written on each box and a radiation label will be applied.
 - iv. Monthly inspections of packages in storage will be done along with wipe surveys of the storage area. Procedures will specify actions to be taken by staff if packaging appears to be degrading.
 - v. At disposal the date will be recorded in the log, radiation labels will be defaced, and the waste disposed of.
8. training; confirm that all persons engaged in work under the license will receive initial training and annual refresher training that will ensure compliance with your procedures for decay-in-storage of LLRW.
9. possession limits; be sure to evaluate whether the activity of the waste to be decayed in storage will require an increase in any of your license possession limits and submit an amendment request if an increase is needed.

APPENDIX H-3

DISPOSAL INTO THE SANITARY SEWER SYSTEM

1. No one may discharge radioactive material into a sanitary sewer system unless:
 - the material is readily soluble in water; or
 - is biological material* that is readily dispersible in water; and
 - the total quantity released does not exceed monthly and yearly limits.
2. Storm sewers may not be used.
3. Private sewage disposal systems may not be used without first obtaining a permit from the NYS Department of Environmental Conservation.
4. Sewage volumes must be documented (water or sewage bills).
5. All releases must be documented, calculations and limits of 6 NYCRR Part 380, Table III must be met. This values are also listed in Appendix 16-C, Table 3, of Part 16

EXAMPLE: Disposal of Iodine 125

Monthly water flow through building = 5000 gallons
 $5000 \text{ gal} \times 3785.3 \text{ ml/gal} = 1.9 \text{ E}+07 \text{ ml}$
Table 3 limit = $2 \text{ E}-05 \text{ uCi/ml}$

Monthly: If 300 uCi are disposed of monthly,
 $300 \text{ uCi} / 1.9 \text{ E}+07 \text{ ml} = 1.6 \text{ E}-5 \text{ uCi/ml}$

This is less than the Table 3 limit.

Yearly: 3600 uCi (3.6 mCi) are disposed.
This is less than the 1 curie annual limit.

6. If more than one radionuclide is disposed of to sewage, the concentration limits and Table 3 limits must be adjusted so that the "sum-of-the-ratios" does not exceed unity. (See the footnotes to Table 3 of Appendix 16-C)

* Biological material is material derived from living organisms.

APPENDIX H-3, cont.

SOAKING PROCEDURE FOR RIA TUBES

The following procedure has been found to be effective in RIA Laboratories and research laboratories utilizing RIA procedure. This procedure virtually eliminates the need for dry solid waste disposal of radionuclides used in RIA procedures (I-125 and Co-57) as the residual radioactivity remaining on and in the coated tubes and coated beads used as solid-phase separators is extracted into a liquid which may then be released into the sanitary sewer system.

Coated tubes and beads are soaked in a household bleach solution (either neat or 50% diluted) for a period of 12 or more hours. At the end of this period, the contents may be aspirated and disposed of in the sanitary sewer. The tubes and beads are then rinsed with water which is also disposed of in the sanitary sewer system. The remaining tubes and beads may then be placed in an autoclave bag for biohazard sterilization or other proper mode of disposal.

Before routine use of this procedure you should confirm that the method is effective, designate and post the sink to be used and perform the appropriate calculations to ensure that Part 380 limits will be met. Records of nuclides and quantities disposed, water flow and periodic confirmatory measurements of soaked tubes must be kept for review by the Department.