FIU | Operations and Safety

Environmental Health & Safety

RADIATION SAFETY MANUAL

Document Number:

EHS-DOC800.00

EH&S PROGRAM AND PROCEDURE

Program Number:	Program Title:
EHS800	**Radiation Safety Manual**

Effective Date:	Revision Number:	Superseded Date:
Click or tap to enter a date.	*1*	**4/20/2016**

REQUIRED SIGNATURES

Program Owner:	Signature:	Date:
Click here to enter text.	Click or tap here to enter text.	Click or tap to enter a date.
Approved By:	**Signature:**	**Date:**
Click here to enter text.	Click or tap here to enter text.	Click or tap to enter a date.
Approved By:	**Signature:**	**Date:**
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REFERENCE AND MATERIALS

Cross References: (Program Drivers, Training Modules, Other referenced documents)

Ex. SharePoint Drive, Biosafety Manual, etc

Reference(s):	Training Module Title(s):
Ex. OSHA Standards 29 CFR1910.146	*Ex. Fire Safety, Hazcom: In Sync with GHS, etc.*

TRAINING REQUIREMENTS

Is Training Required For This Revision?

☐ **Yes** ☐ **Program** ☐ **Training Module**

Specific Jobs Requiring Training:

Ex. Welding, Electrical Work, etc.

☐ **No (If No, Please Explain)**

Click here to enter text.

Departments Impacted By This Program:

Ex. Facilities Management, Vehicle Services, Laboratories, etc.

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I. STATEMENT OF POLICY ON FLORIDA INTERNATIONAL UNIVERSITY ENVIRONMENTAL HEALTH AND SAFETY

GENERAL STATEMENT:

The University recognizes its responsibility to provide a safe environment for employees and all other members of the University community. Most accidents are avoidable. Accident prevention is fundamental to the interests of personal health and safety, and the protection of property belonging to the University or under its custody. The University also recognizes the need to maintain sensitivity to safety and health issues on the part of all persons at Florida International University, and for specialized training in safety procedures.

POLICY:

It is the policy of the University to take all practical steps to eliminate or reduce exposure of all members of the University community to accidental injury or the conditions that would be injurious to their health.

CONCURRENCE:

The University will adhere to the principals and intent of this policy statement. All practical measures will be taken to ensure the safety of the University community and that of the general public. The policies and procedures adopted by the University Radiation Protection Program will adhere to and be coordinated with the University's overall Environmental Health and Safety policy and Radiation Control Committee advisory decisions.

II. AUTHORITY

All radioactive materials in use in Florida, with the following exceptions, are under the jurisdiction of the Florida Department of Health, Bureau of Radiation Control:

1. Radioactive materials used by or in the possession of Federal Government Agencies.

2. Certain quantities of source material and special nuclear material.

3. Nuclear reactors.

The jurisdiction arises in the agreement entered into by the State of Florida and the United States Atomic Energy Commission effective 1 July 1964, in which the AEC transferred certain regulatory powers to the State under Section 274b of the Atomic Energy Act of 1954, as amended (73. Stat. 679).

In addition to the regulation of by-product material, the State assumed regulation over accelerator-produced radionuclides, naturally occurring radionuclides and required the registration of ionizing radiation producing devices.

Florida International University currently operates under a Broad Scope License issued by the Florida Department of Health. This license covers the procurement, use and disposal of radioactive material in accordance with the Florida Department of Health, Control of Radiation Hazards regulations as amended and revised on July 3, 1977 and subsequent communications from the State.

The Federal Radiation Control for the Health and Safety Act of 1968 (Public Law 90-602) provides for the regulation and inspection of all types of electronic products capable of emitting ionizing or non-ionizing electromagnetic or particulate radiation or any sonic, infrasonic or ultrasonic wave. X-ray machines, television receivers and projectors, microwave ovens, lasers, ultraviolet lights, x-ray diffraction units, electron microscopes, x-ray microprobes, diathermy units, infrared heaters, ultrasonic cleaners, radar sets and particle accelerators are examples of electronic products included in this control program.

III. INTRODUCTION

The primary purpose of the University Radiation Protection Program is to ensure safety to all personnel using radioactive materials and to make certain that sources of ionizing radiation will be procured, used and disposed of in accordance with the State of Florida Department of Health, Bureau of Radiation Control Regulations.

The University is required by Regulations to:

1. Establish an appropriate committee to determine relevant policies and procedures.

2. Appoint a radiation safety officer and a committee chairperson.

3. Maintain certain records.

4. Assure that safe procedures are followed.

The Radiation Safety Manual sets forth administrative and safety procedures and policies approved by the University Administration. This Manual provides information intended as an aid to investigators using ionizing radiation. The full cooperation of all individuals directly or indirectly associated with the use of radioactive materials is necessary in order to establish an effective radiation safety program. It is mandatory that all policies, procedures and regulations as set forth in the Manual are strictly followed. Failure to comply shall result in revocation of authorization to use radioactive material or sources of radiation under the University licenses.

This Radiation Safety Manual is based upon the:

FLORIDA DEPARTMENT OF HEALTH
CONTROL OF RADIATION HAZARD REGULATIONS
CHAPTER 64E-5
FLORIDA ADMINISTRATIVE CODE (F.A.C)

Revised July 3, 1997 and subsequent revisions

Nothing in this document should be construed as to be in contradiction of the above.

IV. RESPONSIBILITIES

Vice President for Research

- Responsible corporate officer.
- Signs all registration and license forms.

Appendix 1 shows an organizational chart. Vice President Research, a Senior Management official, is chairperson of the Radiation Control Committee (RCC). He/she may designate authority to Director EH&S or another official for routine management of the Program. The Radiation Safety Officer (RSO) reports to the Director EH&S and communicates with VP Research through the Director EH&S. The RSO manages day-to-day activities of the program. The RSO submits proposals, reports to RCC for approval, comments or vote, as necessary.

Radiation Control Committee

- The RCC establishes operating policies, practices and procedures for compliance with the regulations.
- The RCC also reviews proposals, reports, procedures, emergency response plan. Conducts periodic program audit, and communicates with the RSO.
- The RCC advises University Radiation Safety Officer (RSO) on all aspects of health and safety in relation to radiation devices and the use of radionuclides. Reviews records for compliance with established policy and procedures. Establishes new policies and procedures for compliance with any new directives from the Radiological and Occupational Health Section, Florida State Statutes.
- The RCC recommends such administrative practices and procedures as may be considered necessary. Reviews special requests and appeals. Reviews all actions taken by the Subcommittees.
- The Committee will have at least two physical meeting and two web meeting or telephonic conferences in a year.
- The RCC reviews the permits issued annually or earlier depending on the non-compliances observed during quarterly inspections and the points for the non-compliances accumulated (see section XXIII and Appendix 24, point system). The program for renewal of permits will include a review of the authorized user's safety and compliance history, types and quantity of materials requested, facilities and equipment, and training and supervision of radiation workers in the user's laboratory.

Director of Environmental Health and Safety

Acts as liaison between the Radiation Control Committee and the Vice President of Research and responsible for coordination among the various external and internal stakeholders of the FIU Radiation Protection program.

Written notice of changes to RSO assignment or other Radiation safety personnel will be made to the State regulatory authority within 30 days.

Radiation Safety Officer (RSO)

For the purposes of this document, the terms Radiation Safety Officer and Radiation Control Officer are interchangeable.

1. Supervises conduct of safety and control mechanisms related to the registration and inspection of radiation devices and the licensing and regulation of radioactive materials.
2. Formulates the University Control Plan with advice from the Committee.
3. Responsible to the Vice President for Research for safety surveys, records, reports, violations and compliance with specific license conditions and other requirements of the State Department of Health.
4. Approves all procedures that might conceivably involve radiation exposure and all changes in such procedures.
5. Consults with any potential user of radiation devices or radioactive materials and advises them as to the necessary radiation safety procedures.
6. Approves the order of all radioactive materials to be used at the University.
7. Prescribes routine radiation surveys and personnel monitoring as deemed necessary.
8. May suspend any operation which may be suspected of causing excessive radiation exposures or hazards.
9. Notifies personnel of excessive exposure to radiation.
10. Conducts inspections to verify compliance with radiation safety requirements.

Appendix 2 gives functions of the Radiation Control committee.

V. PROCUREMENT PROCEDURES

For activities under the University license, when an investigator wishes to obtain radioactive materials for the first time, or obtain radionuclides in amounts or of a type outside the bounds of his/her authorized use he/she must follow the procedures set forth below. For subsequent orders of authorized radionuclides, the investigator need only follow the procedures set forth in Item "Ordering Radioactive Materials".

Authorized User Application

All individuals who wish use of radioactive materials in any type pf research must first be authorized under the University license as an authorized user. The application procedure to become an authorized user is as follows:

Submit the following information in the application packet to the Radiation Safety Officer (RSO):

1. Copy of current resume showing training and experience with radiation/radioactive materials
2. Copy of radiation training records
3. Contact information including telephone, fax, mailing address and email
4. Completed form RC1 (download from the EH&S website http://ehs.fiu.edu/Pages/default.aspx under radiation safety)
5. Project proposal that includes at minimum the following information:
    - Isotope to be used
    - Form of material – solid, liquid, gas or sealed source.
    - Quantity (activity) to be used
    - Completed form RC2 (download from the EH&S website http://ehs.fiu.edu/Pages/default.aspx under radiation safety)
    - Location where radioactive materials will be used (including detailed floor plan)
    - Detailed procedure specifying exact use of radioactive materials
    - Detailed safety procedures
    - Acknowledgement of receipt and review of the Radiation Safety Manual
    - Acknowledgment of the Point System

The RSO on receipt will review application to assure that all required items are included and are in compliance with the University Radiation Protection Program. RSO will conduct preliminary inspection of the location where radioactive materials will be used. The RSO will then forward the application to the University Radiation Control Committee (RCC) for review with his/her recommendations.

The RCC may request the applicant to attend the meeting to provide any clarifications that may be required.

If the proposal is rejected, the RSO will forward RCC concerns and recommendations to the applicant. The applicant can then address these concerns and resubmit the updated application for review.

If the proposal is approved, the Vice President of Research/ or his/her designee (e.g., Director Environmental Health & Safety) authorizes the applicant through a written communication.

Note: ***Please note that radioactive materials can be ordered and used only after the written authorization is received.***

New Proposal/New Work Location Review

If you are an authorized user under the license and you wish to start a new project and/or work at a different location you must submit a proposal for the new project with the following information to the RSO:

- Isotope to be used
- Form of material – solid, liquid, gas or sealed source.
- Quantity (activity) to be use
- Completed form RC2
- Location where radioactive materials will be used (including detailed floor plan)
- Detailed procedure specifying exact use of radioactive materials
- Detailed safety procedures
- Acknowledgement of receipt and review of the Radiation Safety Manual
- Acknowledgment of the Point System

The RSO on receipt will review application to assure that all required items are included and are in compliance with the University Radiation Protection Program. The RSO will then forward the application to the University Radiation Control Committee (RCC) for review with his/her recommendations.

The RCC may request the applicant to attend the meeting to provide any clarifications that may be required.

If the proposal is rejected, the RSO will forward RCC concerns and recommendations to the applicant. The applicant can then address these concerns and resubmit the updated application for review.

If the proposal is approved, the Vice President of Research/ or his/her designee (e.g., Director Environmental Health & Safety) authorizes the applicant through a written communication.

Note: ***Please note that radioactive materials can be ordered and used only after the written authorization is received. For example if you are authorized to use P-32 in a particular project and later decide to use S-35 in the same project, you must get approval for the use of S-35 before starting use. Similarly if you have approval for P-32 for project A and then start another project B that also involves P-32, you need to get approval for the new project before you can start work.***

Approval Procedure for Rooms where Radioactive Gases/volatile Materials are Used:

All rooms where radioactive gases are to be used or stored must first be approved by the FIU Radiation Control Committee (RCC) for the stated purpose. The procedure for approval is as follows:

The principal investigator (PI) completes and submits an application package to the RSO.

The application package must contain the following items:

- Copy of resume
- Copy of records for training in use of radioactive materials

- Completed RC-1 form (can be download from FIU EH&S web site). Give information about the training and experience with radioactive material and statement of agreement by the applicant to comply with regulations
  - Proposal for use of radioactive materials (gases) containing:

    1. What radioactive gases will be used?
    2. How much activity will be used?
    3. Where will these gases be used? (Please provide floor plan)
    4. Details of procedures for use
    5. Details of safety procedures
    6. Details of Security and access control
    7. Details of enclosure (fume hood/glove boxes), exhaust, filtration, etc.

- The Radiation Safety Officer (RSO) inspects the room and evaluates the consequence of release of the gas into the room based on the type of the radioactive gas (inert or absorbed into system, external or internal exposure, type and energy of the radiation from the gas or its progeny), radioactivity, exhaust system/filtration, and potential for exposure of personnel in the room and in the adjacent areas. The RSO recommends engineering and administrative measures required, even reduction in the quantity of radioactivity, to ensure that the exposures from the use or storage of gas to the radiation workers or members of the public (individuals who are not radiation workers) are ALARA.

- After the identified safety concerns have been addressed the RSO forwards the PI's request to RCC for review for approval/approval with comments/recommendations.
- The RCC approves the request or recommends changes/ improvement.
- The requester is informed accordingly.
- RSO informs the PI to use the room for the stated purpose after all requirements have been met.

Ordering Radioactive Materials

The following procedure must be followed when ordering approved radioactive materials under the University License.

- All requisitions for radioactive materials must clearly show that item being ordered contain radioactive materials including the isotope, the activity and the form. Example:

  Radioactive Materials
  Isotope: P32
  Form: Liquid
  Activity: 500 microcuries

- The delivery address for all radioactive material must be given as follows:

  Environmental Health & Safety, University Park, CSC 162, 11200 SW 8th Street, Miami, FL 33199.

The Radiation Safety Officer may authorize delivery of short half-life (half-life < 3 days) directly to the authorize use lab. Contact the RSO for approval.

- All requisitions shall be submitted to the Radiation Safety Officer for approval before being sent to the Purchasing Department. An e-mail/fax request for approval may be made to the RSO.

- The RSO will verify the quantity of requested nuclide is authorized for the investigator and does not exceed the inventory quota under the University License.

- The RSO will accord approval by mail/e-mail/fax.

- In the event that the Radiation Safety Officer is unavailable, the Chairperson of the Radiation Control Committee or the Director of Environmental Health & Safety or his/her designee is authorized to perform this function if an emergency purchase is required.

- All radioactive materials will be received by the Radiation Safety / Environmental Health and Safety office for monitoring and record keeping. The authorized user will be advised of the arrival of the shipment.

- Before sending any material away to be irradiated, tagged, or in any way made radioactive prior permission must be secured by the Radiation Safety Officer. Authorization for the maximum activity that can be expected from this process is required. The Radiation Safety Officer is responsible for obtaining the required permission from the Bureau of Radiation Control when necessary.

c. All radioactive materials, for use by the licensed users, will be received by the Environmental Health and Safety for logging and monitoring. Any package of such materials which appears damaged will be left untouched. The Radiation Safety Officer will be immediately notified upon detection of damage. The investigator will be advised of the arrival of the shipment. The licensee shall immediately notify the final delivery carrier and the department of Health by telephone when:

(a) Removable radioactive surface contamination exceeds the limits of

64E-5.1505(8) i.e., 22 dpm/cm^2 for alpha and 220 dpm.cm^2 for beta-gamma; on wipe 1/10 of these values; or

(b) External radiation levels exceed the limits of 64E-5.1505(9) i.e., 200 mR/h at any point on the external surface of the package, and 10 mR/h at 1 meter.

d. Copies of the requisition, Purchase order and receiving report will be retained by Environmental Health and Safety.

Procedure after Initial Approval:

a. No RC-1 Forms or other documentation are required for repeat orders

b. Submit all requisitions to the Radiation Safety Officer for the radioactive materials requested.

c. Each investigator must maintain an accurate log of receipt, use and disposal of all radioactive material in his/her possession for at least three years.

Persons requesting initial usage, unusual usage, or large quantities of radioactive materials may be requested to meet with the Radiation Control Committee for discussion of the problem involved and inspection of the facilities to be used.

Sealed Sources not on the General License:

The Radiation Safety Officer must be contacted regarding the procurement, trade-in, replenishment, transfer, relocation or disposal of any instrument or device containing radioactive materials as a sealed source. An inventory should be filed for each such sealed source. Sealed sources must be leak tested as outlined in Section XVII.

All users holding or responsible for controlled radioactive materials, listed in the license or amendments to it, shall report the quantities and activity levels of materials in their possession to the RSO on a semi-annual basis. Such reporting will be performed by the user, on the semi-annual basis or at the request of the RSO. The report must identify the type of material held, the form in which it is being used, and the activity levels currently indicated or assayed.

Devices Producing Ionizing Radiation:

The Radiation Safety Officer must be contacted regarding the procurement, modification, transfer, relocation or disposal of any device capable of producing potentially hazardous ionizing radiation. All such devices must be registered with the State Department of Health by the Radiation Safety Officer. This equipment will be inspected periodically by the Radiation Safety Officer. See Section XVIII.

VI. RADIATION SAFETY INSTRUMENTATION AND EQUIPMENT

The responsible investigator must ascertain that suitable survey instruments, personnel monitoring devices, and other equipment necessary to assure radiation safety are available for his/her facilities and that the equipment is in working condition.

1. Survey Instruments:

Calibrated survey instruments which are appropriate to the type and level of ionizing radiation used must be available to the investigator. For nuclides that cannot be properly detected by a survey meter, appropriate sensitive instrumentation must be available. Survey meters shall be calibrated annually and records maintained.

2 Personnel Monitoring:

The personnel dosimetry program is managed by the RSO through Environmental Health & Safety (EH&S). EH&S shall maintain permanent records of dosimetry badge readings.

Personnel monitoring devices must be worn by personnel as specified below and/or in such instances as deemed necessary by the RSO. EH&S also distributes to users of monitoring badges reports of their annual and termination exposures.

a. Dosimetry badges shall be worn when:

1. An individual enters or works in a radiation area where he/she may receive a dose in any calendar quarter in excess of 25% of the maximum permissible exposure levels specified in section XI.

2. Working with any apparatus (such as x-ray machines, Klystron tubes, electron microscopes, etc.) capable of producing or emitting ionizing radiation and as deemed necessary by the RSO.

b. Additional Personnel Dosimeters (Finger Badges):

An additional dosimetry badge shall be worn in hazardous operations if area or other types of monitors are not adequate in the judgment of Radiation Safety Officer and/or the University Radiation Control Committee.

All dosimetry badges are to be obtained from Environmental Health & Safety. To obtain a new badge the "Badge Request Form" must be completed and sent Environmental Health & Safety. The form can be downloaded from the EH&S website http://ehs.fiu.edu/Pages/default.aspx under radiation safety.

Dosimetry badges will be processed as frequently as recommended by the supplier.

Handling and processing of dosimetry badges shall be the responsibility of Environmental Health & Safety. In the event that an overexposure is indicated, or suspected, it is the responsibility of the investigator to notify the Radiation Safety Officer immediately.

Permanent records of dosimetry badge readings will be maintained by Environmental Health & Safety (EH&S) on all personnel wearing dosimetry badges.

Whenever an individual's dosimetry badge is lost or damaged it should be reported to Environmental Health & Safety immediately so that a new badge can be issued.

All monitored personnel shall comply with the following with regard to personnel dosimetry devices:

A. Never use another worker's TLD.
B. Wear badges on torso, at or above the waist and below the shoulder, and wear dosimeter(s), if recommended by the RSO, beside the badge.
C. Store badges with the control badges whenever possible. Always keep badges from extreme environmental conditions such as intense heat or light which may affect a badge's ability to accurately record radiation exposure.
D. Return badges to the Environmental Health & Safety promptly at the end of each use period (e.g., a quarter for whole body badges and a month for finger badges) to ensure rapid processing.
E. Spare/visitor badges assigned to new hires or contract employees can only be worn for the monitoring period (quarter for whole body badge) and assigned imprinted with the worker's name and /or other form of identification. New badges, if required, will be ordered for the next monitoring period.

Individuals requiring dosimetry badges shall not start work prior to receipt of the appropriate badges. Each authorized user is responsible for the dosimetry badges for the individuals working under his/her supervision. The timely return of badges is an essential part of the dosimetry program and non-compliance with this may result in suspension or cancellation of privileges to use radioactive materials under the University License.

VII. PERSONNEL RESTRICTIONS

No person who is under 18 years of age may work in radiation areas or handle radioactive materials except by special permission from the Radiation Control Committee.

Radiation Material Users:

A. Students

All students working with radioactive material will do so under the supervision of an authorized user. The user must be in the same building as the student and available to allow students to use radioactive materials under their supervision, but not necessarily in their physical presence. In no case will students be allowed to use radioactive materials when the authorized user (or another authorized user with whom prior arrangement has been made) is unavailable for direct supervision as described above.

All staff and students, both graduate and undergraduate, must attend a Radiation Safety training upon assignment to a project laboratory where radioactive materials are used. Attendance at such a training must be verified and a record of attendance shall be filed with the Radiation Safety Officer. Such training will be conducted by the RSO, or RSO contracted, approved organizations as appropriate to the project, equipment and materials being handled. The individual attending the training shall take an exam at the end and results will be kept on file for three years. Each new user shall be granted access to the Radiation Control Program through EH&S website.

VIII. LABORATORY SURVEYING AND MONITORING

The authorized user has the responsibility to act as Radiation Safety Officer of his/her laboratory, to enforce these regulations and to insure that the personnel of the laboratory are properly informed as to the hazards and uses of radioactive material.

Each investigator is responsible for making, or causing to be made, routine area surveys to assure the absence of contamination in his laboratory. Permanent records of these surveys will be maintained. A floor plan of each lab where radioactive materials have been or are being used will be drawn and areas marked where wipe tests or survey meter readings have been made. These records must be retained and made available for inspection.

The Radiation Control Officer, at his/her own discretion or upon the request of an investigator, may monitor a laboratory or an experimental setup periodically. The inspection will consist of wipe-test and/or other forms of surface monitoring and a review of the user's records of compliance with regulations as outlined in this Radiation Control Plan. The authorized user will be notified of the impending inspection and his/her presence will be required.

The Radiation Safety Officer will require that action be taken to decontaminate laboratory areas outside of hoods, dry boxes and other enclosed areas not susceptible to transfer of activity if the revealed contamination from wipe-tests exceeds the following limits:

- In **normal radioactive areas**
  20 DPM ALPHA/100 cm2
  100 DPM BETA-GAMMA/100 cm2

- In **hot labs**
  20 DPM ALPHA/100 cm2
  500 DPM BETA-GAMMA/100 cm2

Normal radioactive areas are defined as those areas within the captioned laboratories not ordinarily expected to be used for studies utilizing radioactive materials.

Hot Labs are defined as those designated with appropriate signs as radioactive handling areas.

All users will survey their laboratories at the end of each day when radioactive materials are received or used, and the results recorded on the same day, even if negative. These records will be maintained for DOH inspections.

Appendix 11 gives details of the survey requirements. If contamination levels are higher than the action levels given above, the authorized user is responsible to undertake decontamination for the area.

IX. RADIOACTIVE WASTE DISPOSAL

Disposal of radioactive wastes depend on a number of factors, e.g., type of radiation, energy, half-life, etc. In view of this, disposal procedures are to be arranged with the Radiation Safety Officer.

Radioactive waste will be segregated according to type (dry or liquid) and half-life. Separate containers will be used for radioactive waste that fall into the short-lived category having a half-life of 120 days or less; and long half-life waste, having half- lives greater than 120 days.`

Disposal of short half-life waste will be in accordance with FAC 64E-5.328.

Dry Waste:

Special waste containers for radioactive waste disposal are to be available in all laboratories in which radionuclides are used. All radioactive material users should contact the Radiation Safety Officer regarding the type of dry waste containers recommended.

Dry wastes such as paper towels, disposable pipets, absorbent bench paper etc. will be packed in plastic bags. The amount of dry waste must be kept minimized. Always monitor waste and insure that only contaminated waste is stored as radioactive waste. Red bags labeled as radioactive material should not be used to store or pack any other material, or used for regular garbage.

Care should be exerted by laboratory managers to prevent any unauthorized use of specially marked bags and/or containers. It is particularly inappropriate to place radioactive waste in bio-hazard bags unless the waste is both radioactive and a biohazard.

Liquid Waste:

Small quantities of liquid wastes which are soluble or dispersible in water may be discharged into the sewage system according to Florida Department of Health Regulations. Consult the Radiation Safety Officer for allowable quantities of various radionuclides that can be disposed of in this manner. Records must be maintained for these disposals.

CAUTION: INCINERATION AND BURIAL OF RADIOACTIVE WASTES ARE NOT PERMITTED UNDER FLORIDA DEPARTMENT OF HEALTH REGULATIONS; EXCEPT ONLY C-14 AND H-3 DESCRIBED IN SECTION 64E-5.329, F.A.C., MAY BE INCINERATED PROVIDED THE CONCENTRATION IS BELOW 0.05 MICROCURIES PER GRAM.

SHORT HALF-LIFE WASTE

Short half-life wastes (120 days or less) will be stored for at least 10 half-lives, and then surveyed to insure background radiation levels before final disposal. The plastic bag or any other container used for disposal to a county or city landfill, or any other location should not contain any radioactive labels or marking. Do not use biohazardous waste bags unless the waste has biological hazards other than radioactivity.

The short lived waste must be labeled with the tags provided by the RSO. The following is the minimum information to be included on the tag/label.

1. Year and I or II half of the year
2. Building and lab number

3. Solid or liquid
4. Running number of waste package for the applicable half year
5. Radionuclide
6. Approximate radioactivity of radionuclide
7. Dose rate (mR/h)

Example of a label for 0.1 milliCuries of solid P-32 package 1 waste to be picked up in May 2014 from Academic Health Center-1 lab 209, showing 10 mR/h

2014 (I)-AHC1:209-Solid001-P32-0.1 mCi-10 mR/h

The second waste package from the same lab whether solid of liquid will be labeled as Solid002 or liquid002 as below for 0.05 mCi activity showing 5 mR/h:

2014 (I)-AHC1:209-Liquid002-P32-0.05 mCi-5 mR/h

The labels will be affixed on two opposite side of the package.

Short half-life radioactive waste that has hazardous components will be disposed as hazardous wastes according to RCRA regulations after holding it for decay for a minimum of 10 half-lives and when the surface dose rate is indistinguishable from the background.

Short half-life radioactive waste that has biohazardous components will be disposed as biohazardous waste after holding it for decay for a minimum of 10 half-lives and when the surface dose rate is indistinguishable from the background.

Caution signs and labels for radioactive waste containers:

Dry and Liquid Waste

Containers for such radioactive waste must be conspicuously posted with an appropriate radiation caution sign.

Radioactive Waste Disposal

All waste radioactive material will then be transferred to the Radioactive Waste Storage Room located in AHC4/123A. This room shall remain locked at all times and will be off-limits to custodial personnel. Authorized radioactive material users from EH&S and the Radiation Safety Officer are the only persons authorized entry to the waste storage room.

Short Half-life Waste

All such waste will be either disposed through the sanitary sewer or will be removed to the waste storage room.

All Records of radioactive waste released will be maintained by the Authorized user and will be available for inspection by the DOH office.

It is the responsibility of the authorized user to insure that the short-lived waste he/she generates is removed from the radioactive waste storage area when the 10 half-lives have transpired.

Long Half-life Waste

All the long half-life waste is to be stored in the radioactive storage room in AHC4/123A in the section designated for such waste.

The RSO will monitor the quantity of waste and when he/she determines that a shipment has to be made, an outside contractor will be hired to remove the waste.

The State Office of Radiation Control will be notified at least forty eight (48) hours in advance of shipping low-level radioactive waste to a commercial treatment, storage or disposal facility. The notification will be made by either calling (407) 297-2095, or writing the office of Radiation Control, Radioactive Materials Program, Department of Health and Rehabilitative Services, Post Office Box 15490, Orlando, Florida 32858.

If a waste is to be incinerated, the notification shall include the location and owner of the incinerator and a copy of the contract between FIU and the incineration company.

Specialized wastes, obtained from US Department of Energy will be returned to the originating site or disposed of in accordance with the appropriate sections of this document, and by direction of the RSO.

UPDATE- Radioactive Waste Shipment

For shipment of long-lived waste FIU will engage services of companies like Bionomics, Duratek, Permafix, etc.

For packing and transportation comply with requirement of sections 64E-5.1501 and 64E-5.1502, F.A.C. and 49 CFR 171.15.

Employees involved in work that affects hazardous material transportation safety will receive hazmat training before performing such functions.

The following papers accompany the waste:

Shipping paper
Container and Waste Description
Emergency Response Information

X. SHIELDING OF STORED RADIOACTIVE MATERIALS

As a general rule, when radioactive material is stored in a laboratory facility it must be shielded in such a manner that the exposure rate at the surface of the shield does not exceed 2.5 milliroentgens per hour.
.

Normally, gamma emitting radionuclides will be shielded in lead containers or behind lead bricks. Strong beta emitting radionuclides should utilize plastic or glass containers or shields as a primary barrier. Lead may be used on the outside of the plastic or glass container as a secondary barrier.

The storage area for radionuclides should preferably be in a hood or in a remote area of the laboratory so that personnel in the laboratory or in the adjoining rooms or hallway will not be exposed.

Each storage facility will be inspected by the Radiation Safety Officer to determine compliance with regulations. If the materials require refrigerated storage, the dedicated refrigerator must be appropriately identified, labeled with the radiation symbol, and food storage prohibitions enforced. Such refrigerated storage must be within an approved laboratory or containment and secured by the RSO or authorized user.

XI. MAXIMUM PERMISSIBLE EXPOSURE

The maximum permissible exposures (MPE) are specified by Florida Division of Health Regulations as set forth in the Rules and Regulations for Control of Radiation Hazards.

Since any radiation exposure is undesirable it is important that all exposures be **A**s **L**ow **A**s **R**easonably **A**chievable. The maximum permissible exposures for Florida International University are set forth below:

Occupational Dose Limits for Adults:

A. The Annual limit, which is the more limiting of:
   i. The total effective dose equivalent equal to 1 rem; or
   ii. The sum of deep the dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye equal to12 rem.

B. The annual limit to the lens of the eye, to the skin, and to the extremities are:
   i. The lens dose equivalent of 3 rem, and
   ii. A shallow dose equivalent of12 rem to the skin or to any extremity.

The total effective dose equivalent is sum of the deep dose equivalent and the committed effective dose equivalent.

Deep Dose Equivalent, which applies to external whole body whole body exposure, means the dose equivalent at a tissue depth of 1 centimeter.

Committed Dose Equivalent means dose equivalent to organs or tissues of reference that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

Committed Effective Dose Equivalent is the sum of products of weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to each of these organs or tissues

It is noted that these MPE's are significantly lower than those required by state law. These exposure levels are easily achievable as long as the level of use remains at present levels. This MPE level is an important facet of the University A.L.A.R.A. (As Low As Reasonably Achievable) program.

Occupational Dose Limits for Minors:

The annual occupational dose limits for minors are 10 percent of the annual occupational dose limits specified above for adult workers.

Dose Limits for Individual Members of the Public:

The total effective dose equivalent to individual members of the public from the licensed or registered operations shall not exceed 0.1 rem per year.

Pregnant Workers

Declared pregnant workers will be required to observe the limits imposed by FAC 64E-5.311.

"Declared pregnant woman" means a woman who has voluntarily informed in writing of her pregnancy and the anticipated date of conception.

The exposure limits set by regulations for a declared pregnant woman (Appendix 18) are:

500 mrem during the entire pregnancy
50 mrem during any one month

Maximum Permissible Exposures to Concentrations of Radioactive Material in Restricted Areas:

No staff member or student shall possess or use radionuclides in such a manner as to result in an individual being present in an area where the concentration of the radioactive material approaches the concentration in air allowed by the Florida Division of Health. The RSO should be contacted on any problems where the radionuclides to be used are not listed by the Florida Department of Health.

Reporting Overexposures:

In the event of a suspected overexposure of any personnel the Radiation Safety Officer must be notified at once. In certain instances the State requires immediate notification of personnel exposures. The investigator responsible for the area in which a radiation exposure is received by a person which is equal to or exceeds the maximum permissible exposures must follow the procedure outlined below:

a. Provide the Radiation Safety Officer written details of the exposure.

b. Describe the procedures which will be followed to prevent recurrence of such an exposure.

AS LOW AS REASONABLY ACHIEVABLE (ALARA) POLICY

ALARA is a philosophy of excellence used in one's day-to-day work with radioactive materials and radiation sources. It is when one strives to keep one's radiation exposure As Low As Reasonably Achievable.

Some changes in procedures can greatly reduce one's radiation exposure. The ALARA philosophy encourages one to actively seek out these methods of exposure reduction.

Examples include the use of tongs to handle radioactive material vials containing large activities or high energy emitters. Carrying a vial of radioactive material in a secondary container to increase the source-to-hand distance is also a procedure that helps to keep radiation exposure ALARA.

1. Management Commitment

A. Florida International University is committed to keep individual and collective doses as low as is reasonably achievable (ALARA). In accord with this commitment, we hereby describe an administrative organization for radiation safety and have established the necessary written policies, procedures, and instructions to foster the ALARA concept within our institution. Appendix 1 of this manual shows organization chart for management of radiation program, which describes functions of the Chairperson of the Radiation Control Committee, Radiation Control Committee (RCC) and the Radiation Safety Officer (RSO).

B. The RCC will review any modifications or changes as recommended by the RSO as a result of the annual review of the radiation safety program performed by the RSO.

C. Modifications to operating and maintenance procedures and to equipment and facilities will be made if they will reduce exposures unless the cost, in our judgment, is considered to be unjustified. We will be able to demonstrate, if necessary, that improvements have been sought, that modifications have been considered, and that they have been implemented when reasonable. If modifications have been recommended but not implemented, we will be prepared to describe the reasons for not implementing them.

D. In addition to maintaining doses to individuals as low as is reasonably achievable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level.

2. Delegation of Authority

(1) Management will delegate authority to the RSO for enforcement of the ALARA concept.

(2) Management will support the RSO when it is necessary for the RSO to assert authority.

3. Authorized Users

A. New Methods of Use Involving Potential Radiation Doses

(1) The authorized user will consult with the RSO during the planning stage before using radioactive materials for new uses.

(2) The authorized user will review each planned use of radioactive materials to ensure that doses will be kept ALARA.

3. B. Authorized User's Responsibility to Supervise Individuals

(1) The authorized user will explain the ALARA concept and the need to maintain exposures ALARA to all supervised individuals.

(2) The authorized user will ensure that supervised individuals who are subject to occupational radiation exposure are trained and educated in good health physics practices and in maintaining exposures ALARA.

XII. EMERGENCY PROCEDURES; SPILL CONTROL

In the event of an accident (spill, atmosphere contamination, overexposure, etc.), the Radiation Safety Officer, ext. 70489/72621) shall be notified immediately without such action causing excessive spreading of contamination. In the event the radiation Safety officer cannot be reached, utilize the emergency call list given in this section and posted in the radiological labs. The University Public Safety X 76626 can be contacted for after office hour numbers. Decontamination procedures necessary shall be the responsibility of the experimenter and/or his supervisor, and shall be carried out under the direction of the RSO or person(s) designated by him/her, and with the cognizance of the other University officials who may be responsible for the facility or laboratory.

The following protective action guides are to serve as a basic philosophy for evacuation and implementation of the state radiological emergency plan resulting from a major radiological accident (based on EPA, office of radiation programs recommendations of September, 1974, and state of Florida Radiological Emergency Plan, May, 1975)

1. General Public:
The limits of 64E-5.312 (1) (a) and (c) will apply. Survey in accordance with 64E-5.314 will be accomplished as required by RSO.

TEDE less than 0.1 rem projected dose in a year from licensed operation.

Deep Dose Equivalent in unrestricted areas not to exceed 0.002 rem in any one hour.

(1) Protective action may not be warranted where higher than normal risks could be anticipated from protective action.

2. Emergency Workers:

Values as specified in 64E-5.309.

3. Lifesaving Activities:

Values as specified in 64E-5.309.

Radioactive materials are normally handled using all recommended precautions and preventive measures. However, the possibility of unplanned spill or contamination exists. If this serious problem is encountered, decontamination activities must be carried out as soon possible, and every effort should be made to prevent the spread contamination.

First- Isolate the area and notify the Radiation Safety Officer. **(305) 348-0489**

Second- Determine the extent and type of contamination.

There can be two levels of contamination, high when activity is greater than 100 microcurie per liter volume or low when activity is less than 100 microcurie per liter volume.

Follow Radiological Emergency Plan (Appendix 19) for various types of emergencies. Ensure contamination on clothing, body parts, equipment or building materials is within the limits.

A. Clothing:

Contaminated clothing should be monitored and separated into two categories:

1. Clothing exhibiting no detectable activity can be laundered according to ordinary laundry procedures.
2. Clothing exhibiting low-level or high-level contamination should be soaked in Versene or similar chelating agent, thoroughly rinsed, monitored with the survey meter and dried. If the activity is not reduced to a suitable level so that it gives a contact dose rate of10 micro R/h, above background, the clothing should be handled as radioactive waste. The wash and rinse liquids may require handling as radioactive waste.
3. See Supplementary procedures for clean-up of radioactive spills and decontamination posters.

B. Skin:

1. Wash approximately 2 minutes with mild pure soap in tepid water with a good lather, covering the affected area thoroughly. A soft brush may be used. Particular attention should be given to the nails and cuticles when the hands are contaminated. Avoid rough scrubbing. Repeat 2 or 3 times if necessary.

C. Decontamination of Surfaces and Building Materials:

Area will be declared as restricted entry, by RSO, requiring rubber and respiratory protection. The area will be cordoned off and marked accordingly.

There are three common types of contamination:

1. The radionuclide is in a small volume of liquid and dries after it reaches the surface.
2. The radionuclide is in a larger volume of liquid and is wiped off before it dries. The remainder then dries before it is cleaned.
3. The radionuclide is airborne and has become attached to dust or other particulates in the air before depositing on the surface.

Initial decontamination should be done by wiping with a cloth damp with a chelating solution. All decontamination procedures must be carried out while wearing disposable gloves, protective footwear, and other appropriate protective measures such as face masks if airborne contamination is a possibility. An appropriate survey should be made after each sweep to determine the level.

The wiping cloth, gloves, washing and rinsing solutions, etc. must be treated as radioactive waste until monitoring determines otherwise.
The area must be kept isolated until appropriate surveys demonstrate activities no higher than background. The Radiation Safety Officer must certify the area to contamination free.

SUPPLEMENTARY PROCEDURES FOR CLEAN-UP OF RADIOACTIVE SPILLS

Radioactive materials are normally handled using all recommended precautions and preventive measures. However, the possibility of an unplanned spill or contamination, exists. If this serious problem is encountered, decontamination activities must be carried out as soon as possible, and every effort should be made to prevent the spread of contamination.

First determine the extent and type of contamination, low or high. Low level contamination spill is defined as any spill involving less than 100 microcurie per liter volume and high level contamination is defined as any spill involving greater than 100 microcurie per liter volume.

Once the level of contamination is determined, follow by immediately removing the spilled surface activity. The following procedure is believed to be more effective and less time consuming, which is of great importance.

A. Clothing:

Contaminated clothing should be monitored and separated into two categories:

1. Clothing exhibiting no detectable activity can be laundered according to ordinary laundry procedures.

2. Clothing exhibiting contamination should be soaked in Versene, monitored with the survey meter and dried. If the activity is not reduced to a suitable level, the clothing should be discarded.

B. Skin:

1. Wash approximately 2 minutes with mild pure soap in tepid water with a good lather, covering the affected area thoroughly. A soft brush may be used. Particular attention should be given to the nails and cuticles when the hands are contaminated. Repeat 2 or 3 times if necessary.
2. For low level activity contamination, spot clean contaminated skin areas using a 5% water solution of the solid mixture of 30% regular detergent, 65% Calgon, and 5% Carboxymethyl Cellulose. Avoid prolonged scrubbing of the contaminated area. Use the brush lightly to prevent scratching or eroding the skin. Rinse with tepid water.

3. If contamination is with a radioactive grease compound, Mechanic's waterless hand cleaning cream is more effective and less irritating.

4. If contamination persists, wash the skin with dilute HCl and follow by washing with soap. Then rinse well with cold water.

5. For persistent contamination, a mixture of 8% Carboxy methyl cellulose, 3% detergent, 1% Versene, and 88% water may be homogenized into a cream and rubbed into the skin from 3 to 5 minutes. Then rinse thoroughly with warm water. This is generally used only as an extreme method because Versene often increases the rate of absorption of the radio element.

C. Decontamination of Surfaces and Building Materials:

There are three common types of contamination:

1. The radionuclide is in a small volume of liquid and dries after it reaches the surface.

2. The radionuclide is in a larger volume of liquid and is wiped off before it dries. The remainder then dries before it is cleaned.

3. The radionuclide is airborne and has become attached to dust or other particulates in the air before depositing on the surface.

Initial decontamination should be done by wearing personal protective equipment and vacuuming or wiping with a damp wipe. If unsuccessful, try scrubbing with soap and water.

Decontamination

Decontamination of anything utilized in the exclusion zone, interior to the laboratory or authorized area, and the contamination reduction areas (personnel and/or equipment) is an integral part of the system to contain and minimize the potential for the movement of contamination from on-site to off-site areas. Personnel decontamination is highly site-specific and will be determined with consideration for the following factors:

a. Types of on-site contaminants
b. Levels of contamination
c. Personal protection levels utilized, garments and respiration filtration apparatus
d. Work activities performed
e. Reason for leaving the site

Decontamination procedures will be performed on all equipment leaving the exclusion zone to prevent the off-site migration of contaminants. The equipment used on-site will be decontaminated at the end of the project or between individual work operations, as specified in the site operations plan, or by direction of the URSO or authorized supervisory user. Additional efforts to limit the potential for environmental exposure will include the rinsing of the contaminated surfaces with decontamination solutions selected by the RSO, the collection and disposal of the waste water as hazardous waste (or in compliance with the specifications in the site operations plan), and the supervision of these activities by the RSO.

Decontamination Solutions

Solution A: Solution containing 5% Sodium Carbonate (Na_2CO_3) and 5% Trisodium Phosphate (Na_3PO_4)

Solution B: Solution containing 10% Calcium Hypochlorite ($CaCl_2O_2$)

Solution C: Solution containing 5% Trisodium Phosphate (Na_3PO_4)
A good general purpose rinse.

Solution D: A dilute solution of Hydrochloric acid (HCl) (Maintain pH of 3)

Solution E: A dilute solution of phosphate free analytical quality detergent

The following Emergency response protocol will be laminated and posted as authorized by the RSO.

SPECIAL RESPONSE PROTOCOL

See Appendix 19 RADIOLOGICAL EMERGENCY PLAN

General Guidelines

In all cases of physical injury, even minor injuries, medical attention and hospitalization take precedence over contamination concerns. Contact Public Safety at x75911 to request medical assistance

Plan ahead and equip your lab with spill response supplies such as paper towels, cleaning agent, extra waste bags and gloves. The five key steps to follow are:

Stop ... working - get your thoughts together and don't panic
Presume ... everything is contaminated until proven otherwise
Inform ... the RSO and others in the area about the spill
Localize ... the spilled material to contain the spill
Label ... or cordon off the area to limit access

Emergency Contacts

Radiation Safety Officer: **(305) 348-0489** or **(305) 348-2621**
Alternate Radiation Safety Officer: **(305) 348-6849** or **(305) 348-2621**
Public Safety: **(305) 348-2626** or **(305) 348-5911**

XIII. Bioassay

a. Biological samples, e.g. urine, feces, blood, tissue biopsies and expired air, may be taken from all personnel who are working with heavy elements, millicurie quantities of tritium or other radionuclides, at intervals specified by the Radiation Safety Officer. Biological samples will be taken from all personnel who have ingested or who are suspected to have ingested radioactive materials.

   Special tests for determining the presence of radioactive materials in the body are desirable for persons handling intermediate or high-level quantities of unconfined radioactive materials. These tests may be ordered at the direction of the Radiation Safety Officer.

b. Suspected Ingestion
   If you suspect that any radioactive material may have been ingested by any personnel, the following steps should be taken:
   - Immediately contact the RSO
   - The RSO will investigate the incident
   - If the RSO determines that a bioassay is required an outside consultant will be contracted to conduct the bioassay testing.

- Based on the test results the RSO will determine what further actions should be taken

Iodine Bioassay

Condition under which Bioassay is Necessary

Routine bioassay is required when an individual handles in open form unsealed quantities of radioactive iodine that exceed those shown in the Table below. The quantities shown apply to both the quantity handled at any one time or integrated as the total amount of activity introduced into a process by an employee over any 3-month period (65E-5, 1320(1), F.A.C.).

Iodine 125 or Iodine 131 activity handled in unsealed form making bioassay necessary		
Types of Operation	**Volatile or dispersible**	**Bound to nonvolatile agent**
Process in open room or bench with possible escape of Iodine from process vessels	1 mCi	1 mCi
Processes with possible escape of iodine carried out within a fume hood of adequate design, face velocity, and performance reliability	1 mCi	10 mCi
Processed carried out within glove boxes, ordinarily closed, but with possible release of iodine from process and occasional exposure to contaminated box and box leakage	10 mCi	100 mCi

(a) A bioassay shall be taken within 72 hours of initial use of radioiodine and every 2 weeks thereafter. When radioiodine use is on an infrequent basis (less than every 2 weeks), a bioassay shall be taken within 10 days of the last day of use.

(b) If the thyroid burden at the time of measurement exceeds 0.12 microcurie (4.44 KBq) of iodine 125 or 0.04 microcurie (1.48 KBq) of iodine 131, the following actions shall be taken:

1. An investigation of the operations involved, including air and other facility surveys, shall be carried out to determine the cause(s);
2. Corrective actions that will eliminate or lower the potential for further exposures shall be implemented;
3. A repeat bioassay shall be taken within 2 weeks of the previous measurement and shall be evaluated within 24 hours after the measurement in order to confirm the presence of internal radioiodines; and
4. Notification reports must be provided as required by Rules 64E-5.345, and 64E-5.347, F.A.C., or as required by conditions of the license; and

(c) A record of each bioassay shall be maintained for inspection by the department in an auditable form for 3 years and shall include the date of the bioassay, the name of the individual, and the thyroid burden at the time of the measurement.

All workers handling these activities of iodine 125/Iodine 131 or close to the process so that intake is possible should participate in bioassay program.

Procedure:

- The bioassay procedure consists of thyroid scan using a scintillation probe- a NaI detector with a thin window attached to a rate meter or a scaler.
- Any instrument that is used to monitor an individual's thyroid, as part of an Iodine bioassay program, must be calibrated annually. In addition, the counting efficiency should be determined using a thyroid phantom and Iodine standard.

Whenever the thyroid at the time of measurement exceeds 0.12 microcurie (4.44 KBq) of iodine 125 or 0.04 microcurie (1.48 KBq) of iodine 131, the actions described above shall be take.

Tritium bioassay

Condition Under Which Bioassay Is Necessary

Routine bioassay is necessary when quantities of tritium processed by an individual at any one time or the total amount processed per month exceed those for the forms of tritium shown in the table below (65E-5, 1320(2), F.A.C.):

Types of Operation	HTO and Other Tritiated Compounds (Including Nucleotide Precursors)	Tritium (HT or T) Gas in Sealed Process Vessels
Process in open room or bench with possible escape of tritium from process vessel	0.1 Ci	100 Ci
Processes with possible escape of tritium carried out within a fume hood of adequate design, face velocity and performance reliability.	1.0 Ci	1000 Ci
Processes carried out with glove boxes that are ordinary closed but with possible release of tritium from process vessels and occasional exposure to contaminated box and box leakage	10 Ci	10,000 Ci

(a) A bioassay shall be taken within 72 hours of initial use of tritium and every 2 weeks thereafter. When work with tritium is on an infrequent basis (less frequent than every 2 weeks), a bioassay shall be taken within 10 days of the last day of use.

(b) If the urinary tritium concentration exceed 5 microcuries (185 KBq) per liter at the time of the measurement the following actions shall be taken:

1. An investigation of the operations involved, including air and other facility surveys, shall be carried out to determine the cause(s);
2. Corrective actions that will eliminate or lower the potential for further exposures shall be implemented;
3. A repeat bioassay shall be taken within 1 week of the previous measurement and shall be evaluated within 1 week after the measurement. Internal dose commitments shall be estimated using at least two bioassays and other survey data, including the probable times of intake of tritium; and
4. Notification reports must be provided as required by Rules 64E-5.345, and 64E-5.347, F.A.C., or as required by conditions of the license; and

(c) A record of each bioassay shall be maintained for inspection by the department in an auditable form for 3 years and shall include the date of the bioassay, the name of the patient, and the urinary tritium concentration at the time of the measurement.

Participation

All individuals involved in the processing of tritium under conditions specified in the above table should participate in the bioassay program.

Types Of Bioassay That Should Be Performed

1. Baseline (pre-employment or pre-operational)
   A baseline bioassay should be conducted not more than one month prior to the individual beginning work with tritium in amounts that would require participation in the bioassay program.

2. Emergency
   If the initial sample or other data indicates a possible exposure high enough to warrant immediate medical attention, a complete and immediate follow-up should be conducted.

3. Post-Operational and Termination of Usage
   A bioassay should be performed within one month after the last possible exposure to tritium such as when operations are being discontinued, or when the individual is terminating activities with potential exposure.

4. Diagnostic
   Follow-up bioassay should be performed as soon as possible but within one week of any sample exceeding levels given as action points, in order to confirm the initial results and in the case of a single intake, to allow an estimate of the effective half-life of the tritium in the body.

Frequency Of Sampling

A bioassay sample of at least 50 ml of urine should be taken within 72 hours following entry of an individual into an area where operations require bioassay and then every month or more frequently thereafter, as long as the individual is working with tritium. When work with tritium is on an infrequent basis (less frequently than every month), bioassay should be performed within 10 days of the end of the work period during which tritium was handled.

Action Points and Corresponding Actions

Monthly and Other Sampling

1. If urinary excretion rates exceed 5 µCi/L, but are less than 50 µCi/L, the following course of action should be taken:

    a) An investigation of the operations involved, including air and surface contamination monitoring, should be carried out to determine the causes of the exposure and evaluate the potential for further exposures or for the possible involvement of other individuals.

    b) Any reasonable corrective actions that the survey indicates may lower the potential for further exposures should be implemented.

    c) A repeat urine sample should be taken within one week of the previous sample and should be evaluated within a week after collection. Internal dose commitments should be estimated using at least these two urine sample evaluations and other survey data, including the probable times of the intake of tritium.

    d) Any evidence indicating that further work in the area might result in an individual receiving a dose commitment in excess of the limits established in 64E-5.304, should serve as cause to remove the individual from work in this operation until the sources of exposure is discovered and corrected.

    e) Reports or notification must be provided as required by 64E-5.344 and 64E-5.345 of Chapter 64E-5 or as required by conditions of the license.

2. If urinary excretion rates exceed 50 µCi/L , the following course of action should be taken:

    a) Carry out all steps in item 1

    b) If the projected dose commitment exceeds levels for whole body as provided in 64E-5.304 of Chapter 64E-5, provide appropriate notification to DOH.

    c) Refer the case to appropriate medical/health physics consultation for recommendations regarding immediate therapeutic procedures that may be carried out to accelerate removal of tritium from the body and reduce the dose to as low as is reasonably achievable.

    d) Carry out repeated sampling (24 hr urine collections) at approximately one-week intervals at least until samples show an excretion rate less than 5 µCi/L. If there is a possibility of long term organic compartments of tritium that require evaluation, continue sampling as long as necessary

to ensure that appreciable exposures to these other compartments do not go undetected and to provide estimates of total dose commitments.

Any individual working with tritium at Florida International University in any manner, and in any amount, may, if they wish, have a bioassay performed for their own information by contacting the radiation safety office.

XIV. TRANSFER OF RADIONUCLIDES, SEALED SOURCES AND RADIATION PRODUCING DEVICES

1. On Campus Transfers:

Since approval for use of ionizing radiation sources are given only for the original working area, radioactive materials and other sources of ionizing and non-ionizing radiation shall not be transferred without approval of the Radiation Safety Officer.

2. Off Campus Transfers:

If the proper legal agreement exists between two institutions and the receiving institution has a license permitting receipt of a particular radionuclide, a transfer may be made with the approval of the Radiation Safety Officers of both institutions. A radiation producing device may be transferred after notification of and approval by the Radiation Safety Officers of both institutions. The University Radiation Safety Officer is responsible for obtaining the necessary approval from the Bureau of Radiation Control.

Procedures for Transporting Radioactive Materials

This procedure is subject to audit by the Radiation safety Officer (RSO).

This procedure is for transporting excepted quantity of radioactive materials. Excepted quantity refers to a Class 7 (radioactive) material, which meets the following requirements:

- Its activity per package does not exceed the limits specified in the Table 7 (49 CFR 173.425) or the authorized use limit, whichever is lower.
- The radiation level at any point on the external surface of the package does not exceed 0.5 mR/h
- The removable surface contamination on the external surface of the package does not exceed 2.2 dpm/cm^2 for alpha and 22 dpm/cm^2 for beta-gamma.

RSO or Alternate do the following:

1. Check the integrity of the package, radioactive material and radioactivity. Perform survey that includes radiation dose measurement and wipe check.
2. If the material is to be delivered to a Principal Investigator (PI) contact the PI who has ordered materials. Assure that he/she or a radiation worker will be available in the laboratory to receive the package.
3. Place the material in a radioactive material transport container. Make sure that the radioactive material package or the transport container used has enough packing material to withstand the shocks during transport. If the radioactive material is in liquid form, line the inside bottom of the container with enough quantity of vermiculite so as to absorb twice the quantity of liquid in packages.
4. Make sure the outside of the inner package bears the marking “radioactive”.
5. Make sure that the package bears the following statement enclosed in or on the package: “The package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package- limited quantity of material, UN2910”
6. Place the transport container(s) in the EH&S vehicle. Secure the container(s) firmly so that they do not move during transport.

7. Check the integrity of the package, deliver it to the user along with the "Radioactive Material Use Record" form and obtain signatures on the radioactive material package log form for receipt (by the user) of the radioactive material and the use record form.
8. File the radioactive material package log form.

Please see Appendix 10 for **RADIOACTIVE MATERIAL USE RECORD**

FIU FLORIDA INTERNATIONAL UNIVERSITY
Environmental Health & Safety
11200 SW 8TH Street, CSC 162 ● Miami, FL 33199 ● Tel (305) 348-2621 ● Fax (305) 348-3574 ● http://ehs.fiu.edu

RADIOACTIVE PACKAGE LOG ☎ (305) 348-0489

Isotope	Activity	Invoice #	P.O #	Date and time received	Shipped By	Addressee	Surface Scan Background (<50 mR/Hr))	Delivery Date and time	Delivered to (Print Name)	Received Disposal Form Initial	Signature

XV. RADIATION CAUTION SIGNS

Each investigator is responsible for obtaining and posting of proper warning signs in all areas in which ionizing radiation are used. The investigator shall consult with the Radiation Safety Officer before placing any signs in operating facilities.

The philosophy of signage is to insure that no person can unknowingly enter an area where radioactive material are stored or utilized. Therefore, appropriate signs should be prominently displayed:

a) At any entrance door to a room or laboratory where radioactivity is used or stored.

b) On any storage locker *(i.e.* refrigerator, cabinet, etc.) which contains radioactive materials.

c) On the designated radioactive materials handling sink(s).

d) On the designated disposal containers.

e) On any other structure or area which meets the philosophical basis cited above. Consult the Radiation Safety Office for further clarifications.

Additionally, other signs which prohibit smoking, eating and drinking in the designated areas are required. There should be signs which designate a portion of a room as being a "hot lab" if that is the laboratory organization.

Signs must be posted as required. Appropriate signs will be available from the Radiation Safety Officer.

XVI. RADIOISOTOPE FACILITIES

Because of the concern for radiation safety, sources of ionizing radiation are not to be used in any facility or area outside of those specifically designated by the Radiation Control Safety Plan and Licensing materials.

The rooms and/or areas specified are on file with the license application. Any changes to these specifications will require approval from the Radiation Control Committee or an amendment to the license. The authorized users are expressly not authorized to transfer material from one facility to another without approval from the Radiation Safety Office.

When radioactive materials are no longer being used at a location, the location needs to be decommissioned. Contact the RSO in order to get the required closeout survey completed and for removal of the room from the list of authorized locations.

Before any facility, which was used for radioactive work, is released for unrestricted use thorough survey of the facility will be conducted. Survey will first be conducted by the principal investigator who will submit the report to the Radiation Safety Officer. The Radiation Safety Officer/Radiation consultant will then conduct survey to confirm that the facility can be released. Regulatory Guide 1.86(NRC 1974), Termination of Operating Licenses for Nuclear Reactors gives criteria for acceptable surface contamination levels.

Procedure for using Radioactive Materials at Temporary Sites

1. The authorized user shall submit proposal to RSO for use of radioactive materials at a temporary site.
2. He/she shall be authorized user for the radioactive material he/she plans to use.
3. The proposal shall describe details of the temporary site, its location, method for containment of the radioactive material/spills, controls for the safety, access control to the site and security of the radioactive material.
4. The RSO shall visit the site and ensure that the proposed safety and security measures are adequate and achievable.
5. The RSO will forward the proposal to RCC with his/her recommendations for approval/vote/comments.
6. The RSO will inform the user to resubmit the proposal with changes, if the RCC recommends so.
7. After the proposal is approved by RCC the RSO will ask the user to complete safety and security measures.
8. The RSO will approve the site for radioactive work after the user has complied with the safety and security requirements.
9. For radioactive work at any site belonging to an institution other than FIU, FIU shall reach an agreement with that institution for use of the site, its safety and security.

XVII. SEALED SOURCE LEAK TESTS

Procurement

The Radiation Safety Officer must be consulted regarding the procurement, trade-in, replenishment, transfer, relocation or disposal of any instrument or device containing radioactive materials as a sealed source.

Individuals who wish to procure any equipment that contains a sealed sources or a stand-alone sealed source must complete the "Application for Procurement of Sealed Source" and submit it to the RSO for approval.

Leak tests

All sealed sources will be leak tested (by the user/by an outside consultant) at intervals not to exceed six months, unless more frequent intervals are prescribed. The RSO will assure that these tests are conducted and reports are kept on file.

Environmental Health & Safety will maintain data on sealed sources and records of leak tests.

Inventory

The RSO will conduct a semi-annual inventory of all registered sealed sources to assure that the records on file are accurate.

GENERAL LICENSE SOURCES

All purchases of radioactive materials shall be authorized by the RSO. Individuals that purchase any source including check sources are required to report and register the sources with the Radiation Safety Office. Annual inventory of these sources shall also be performed and records maintained.

XVIII. REGISTRATION OF DEVICES CAPABLE OF PRODUCING IONIZING RADIATION

All machines and devices capable of producing potentially harmful ionizing radiation must be registered with the Radiation Safety Officer. The following types of machines and apparatus are among those which must be registered:
i. Medical and dental x-ray machines, including fluoroscopes
ii. X-ray diffraction units
iii. Electron microscopes
iv. Particle microscopes
v. Static eliminators functioning by emitting ionizing radiation
vi. Any other equipment which may produce potentially hazardous ionizing radiation.

1. Description of the equipment, to include type, make, model, PKV, PMA, and date of installation (For particle accelerators or other "special apparatus" provide the pertinent information when the equipment is not described by these specifications).

2. Location of installation, to include building and room number when possible.

3. Department and/or person responsible for operation of the machine.

4. Qualifications of persons in charge.

5. Summary of calibration information on the machine.
a. For non-medical x-ray and other apparatus:
b. Pertinent information on the radiation output of the apparatus should he given if possible.
6. Copy of summary of protection surveys performed on the device and description of any personnel monitoring regularly performed.

The Radiation Safety Officer will register all radiation producing devices with the Department of Health, Bureau of Radiation Control, Radiation Machine Section, P.O. Box 210, Jacksonville, FL 32231. Phone: (904) 359-6363; Fax: (904) 359-6362.

XIX. INDIVIDUAL RESPONSIBILITY FOR RADIATION PROTECTION

Each individual who is designated as a user of or who has contact with any radioactive material and/or is an operator of a radiation producing machine, is responsible for:

a. Keeping his exposure to radiation as low as possible, and specifically below the Maximum Permissible Exposures, listed under Part XI of this Radiation Control Plan.

b. Wearing the prescribed monitoring equipment such as dosimetry badges and pocket dosimeters in radiation areas.

c. Utilizing all appropriate protective measures such as:

1. Wearing protective clothing whenever contamination is possible.

2. Wearing gloves and respiratory protection devices where necessary.

3. Using pipette filling devices. Never pipette radioactive liquids by mouth.

4. Performing radioactive work within confines of an exhaust hood or glove box unless previous examination has indicated the safety or working in the open.

d. Surveying his hands, shoes, and body for radioactivity, and removing all loose contamination before leaving radiation areas.

e. Eliminating smoking or eating in areas where radioactive materials are present. Smoking is prohibited in FIU. Eating may be permitted in an office adjacent to such as area when it has been demonstrated that the office is free of contamination. Refrigerators will not be used jointly for foods and radioactive materials.

f. Maintaining good personal hygiene.

1. Keep fingernails short and clean.

2. Do not work with radioactive materials if there is a break in the skin below the wrist.

3. Wash hands and arms thoroughly before handling any object which goes to the mouth, nose, or eyes.

g. Checking the immediate areas of hoods, benches, etc., where radioactive materials are being used, at least once daily for contamination. Any contamination should be removed immediately. If such removal is not possible, the area shall be clearly marked and the Radiation Safety Officer notified.

h. Keeping the area containing radioactive materials neat and clean. The work area should be free of equipment and materials not required for the immediate procedure.

Keep or transport materials in appropriate containers, preferably double containers, to prevent breakage or spillage and to insure adequate shielding. Wherever practical keep work surfaces covered with absorbent material, preferably stainless steel trays or pans, to limit and collect spillage in case of accident.

i. Labeling and isolating radioactive waste and equipment, such as glassware, used for radioactive materials. Once equipment is used for radioactive substances, it shall not be used for other work or sent from the area to cleaning facilities, repair shops, or to surplus, until demonstrated to be free of contamination.

j. Reporting accidental release, inhalation, ingestion, or injury involving radioactive materials to his supervisor and the Radiation Safety Officer, and carrying out their recommended corrective measures. The individual shall cooperate in any and all attempts to evaluate his exposure.

k. Carrying out decontamination procedures when necessary and taking the necessary steps to prevent any additional spread of contamination.

XX. RADIATION TRAINING PROGRAM

Statement of Intent:

The requirements of the training program, outlined below, are minimum qualification standards and it is intended that all users should meet and exceed the requirements of this section.

1. All personnel entering radiation hazard areas are required to qualify for entry by:
    - Satisfying the restrictions as identified in Section VII of this manual.
    - Signing and understanding the briefing sheet for the activity they are to be performing.
    - Such briefing will be read to the personnel by the authorized user and signatures will be required as an acknowledgment of the safety principles to be observed and the responsibility of the individual regarding the ALARA program. All workers will be familiarized with the location of and content of notices posted in conformance with FAC 64E-5.323. All individuals engaged in licensed or registered activities will be instructed in the requirements and obligations of FAC 64E-5.903.
    - The authorized user will, forward the originals of these documents to the RSO who will maintain the records for five years. The user shall retain copies on hand for the personnel currently authorized for entry.

2. All named authorized users will be required to satisfy the State regarding their qualification for that status.

3. Named users and the RSO shall be required to maintain their currency and familiarity with the devices and materials they are handling. The RSO will determine the level and extent of training required for these activities, notwithstanding State regulatory direction.

4. Authorized User training per FAC 64E-5.1307 will be the standard for acceptance of new users who do not otherwise possess training or experience acceptable to the RSO and the State regulatory authority.

5. Hazardous Materials training for both radioactive and non-radioactive hazards will be required for users who may be exposed to such hazards in the course of their work, or as directed by the RSO. Such training may be obtained from commercial or Government programs and will be to the standards of 47CFR 172 or those acceptable to the RSO. Such training is also available at FIU website.

6. FIU conducts training programs of the following different types:

    - On-line radiation safety training, which can be taken from any computer with internet connection. This will serve the purpose of refresher training for the current authorized users (FAC 64E-5.1309) and radiation workers. Refresher training is required every 3 years.
    - As a part of the initial training for all radiation workers hands-on classroom training is required, in addition to on-line training. The class room radiation training seminars are delivered, as required, usually two to four per year.

    The topics covered in these trainings are:

- Principles and fundamentals of radiation protection and safety practices- radiation and contamination, posting and labeling, Dose limits, control of exposures-ALARA
- Radioactivity measurement
- Use of radiation detection instruments and monitoring techniques, and radiation surveys
- Biological effects of radiation
- Transportation of radioactive materials
- Radioactive material ordering, inventory, forms and procedures, waste management, and emergency response

- Radiation Awareness Training. This is given to individuals who do not work with radioactive materials but may have to enter radiological labs for performing certain duties.

After any training an examination is conducted. Minimum passing marks are 80%.

Training certificates are issued to successful candidates and records are maintained. Records are also maintained during the employment of individuals or 5 years, whichever is greater.

XXI. Security, Theft, and Loss

The potential for harm from willful misuse or accidental loss of radioactive materials is a serious concern that each authorized users must address. Regulatory agencies pay particular attention to this issue during inspections. In the event of a theft or loss, the investigator's security measures and record keeping may come under intense regulatory and public scrutiny. Therefore, investigators should implement and maintain all reasonable precautions to control and secure their sources, even small ones such as check sources. Following are some guidelines that may be helpful:

- Sources of radiation shall be secured against unauthorized removal from the place of storage. Check integrity of physical barriers and security controls (e.g., locks, source safes, etc.). The sources must have a minimum of two independent locks between the device and the public when being transported or stored.
- Lock laboratory doors when the laboratory is unattended.
- Keep stock materials in a designated storage location, preferably locked.
- Access control procedures must be implemented when using large quantities of radioactive materials.
- Establish a checkout procedure whereby persons authorized to use them sign out stock materials, record the use on inventory forms or other written documents, and sign the remaining stock back in immediately at the conclusion of the experiment.
- Implement "line-of-site" rules for larger quantities or sources: if you are working where you can't see your stock material, put it away.

Response Procedures in Case of Lost or Stolen Materials

- Contact the Public Safety Department to report theft
- Contact the RSO regarding any lost or stolen materials and provide a written statement regarding theft or loss
- The RSO will conduct inquiry into the matter and will inform Bureau of Radiation Control if deemed necessary.

XXII. ADMINISTRATION OF RADIOACTIVE MATERIALS IN ANIMALS OR PLANTS

Appendix 21 gives general guidelines for the preparation of specific procedures for administration of radioactive materials in animals. The researcher incorporates the required information in the preparation of their protocols for administration of radioactive materials.

Appendix 22 gives a typical procedure for administration of radioactive materials in plants.

XXIII. POINT SYSTEM FOR NON-COMPLIANCES

Description:

To ensure that the University complies with the State Bureau of Radiation Control Regulations regarding the use of radioactive materials, all authorized users are required to comply with the University's radiation protection program. Appendix 24 (Revision 1) of this document lists 22 non-compliance issues for which an authorized user can accumulate points.

Consequence of the Points Accumulated:

- When an authorized user accumulates 5 points he/she will be notified of the points accumulated with a copy to the department chair. The authorized should post notice of violations in a visible location. Not posting notice of violation will be considered as violation.
- The authorized user will be given an opportunity to remove points by undergoing additional training.
- A maximum of 5 points accrued can be removed over a 3 year period from additional training. The remaining points stay on for 3 years. To remove any point written appeal must be submitted to the Vice President for Research or his/her designee (see section reinstating an authorized user).
- If an authorized user accumulates 10 points or more over an academic year (July 1 to June 30) and/or 20 points over 3 consecutive academic years his/her privilege to work with radioactive materials will be withdrawn within a week, via a memorandum with a copy to Department Chair, Director EH&S, and Chairperson, Radiation Control Committee.

Reinstating an Authorized User

An authorized user whose privileges to work with radioactive materials were withdrawn must:

- Acknowledge the receipt of notice from the Committee/ RSO on behalf of the Committee within 10 days of receipt.
- Post copy of the notice at a visible location in his/her laboratory.
- Suspend work with radioactive materials within the time specified in the notice.
- May request Director Environmental Health & Safety for extending the date of suspension of work with radioactive materials to enable him/her to complete the work in progress.
- Submit written Appeal to the Vice President for Research (or his/her designee) with copy to the Director EH&S and the RSO stating the corrective measures with dates of completion that he/she plans to implement to prevent recurrence of non-compliances and request for removing the points.
- The Vice President for Research (or his/her designee) in consultation with Director EH&S, decides whether to remove the points, if so how many for which years and responds to the authorized user with copy to the Director EH&S, the RSO and the department chair.

Custody of Radioactive Materials

If privileges to work with radioactive materials of an authorized user are withdrawn and an appeal to reinstate is rejected by the Vice President (or his/her designee), the RSO will do the following:

- Inform the authorized user, the department chair and the department Representative to the Committee of the decision.

- The department chair and Representative and the RSO will discuss appointment of an alternate authorized user in the department who will take custody of the radioactive materials. The Representative and the RSO will work together to assure expedited training or authorization for the alternate user, if required.
- The alternate user will take control of all radioactive materials and comply with the approved procedures.

The implementation date for the Point System - Revision 1 is September 01, 2010.

Acknowledgment Statement

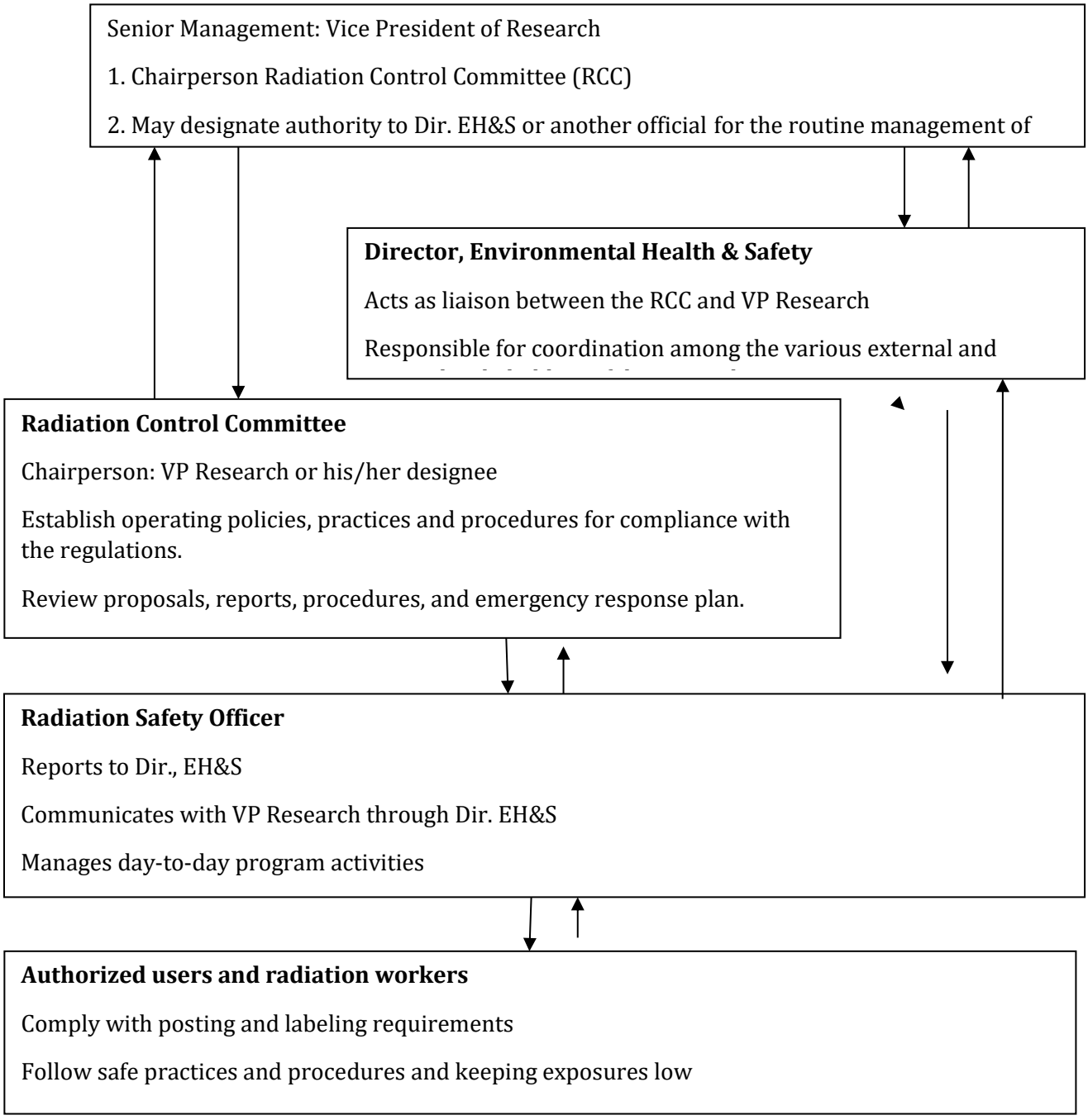
I hereby certify that I am an authorized user of radioactive materials on FIU radioactive material license # 3669-1. _____ the Radiation Control Committee member from our department _____ has explained to me the importance of the point system. I have received, read, and understood the significance of the point system. Failure to comply with the radiation program rules and regulations may result in my accumulating enough points and may result in withdrawal of my privileges to work with radioactive materials.

Name: _____ Signature _____ Date _____

Cc: Radiation Safety Officer

XXIV. APPENDICES

APPENDIX1: ORGANIZATION CHART FOR MANAGEMENT OF RADIATION PROGRAM



APPENDIX 2: RADIATION CONTROL COMMITTEE (RCC) FUNCTIONS

Policy

The Radiation Control Committee (RCC), a Standing Committee at Florida International University ("University") is the governing body for all aspects of radiation protection within the University, including all affiliated research, clinical, instructional and service units utilizing radiation sources in facilities owned or controlled by the University. The RCC shall ensure that all possession, use and disposition of radiation sources, including sealed sources in instruments and generally licensed radioactive materials, by University personnel at Florida International University comply with pertinent federal and state regulations and with the specific conditions of licenses issued to the University. The RCC shall ensure that all concomitant radiation exposures are maintained **A**s **L**ow **A**s **R**easonably **A**chievable (ALARA).

Responsibilities and Authority

The RCC develops and promulgates policies, rules and procedures for the safe use of radiation sources. The RCC has the authority to grant, deny, or withdraw permission for the use of radioactive materials or any other radiation sources within the University. It is the intent of the University that no use of radiation proceeds without the knowledge and approval of the Committee.

The Radiation Safety Officer (RSO) carries out the directives of the RCC. The RSO operates out of the Department of Environmental Health and Safety, which has broad responsibilities for all safety and occupational health programs on the Florida International University campuses.

The RCC reports to the University Vice President, Research, who is Chairperson of the RCC. The Vice President, Research may delegate administrative authority to Director, Environmental Health & Safety Department for matters related to the routine management of the Radiation Safety Program.

In its oversight role of the University Radiation Safety Program, the RCC is responsible for the following:

- Developing University policies, procedures, safety manuals, and criteria for training (and refresher training) and testing of each category of workers involved with the use of radioactive materials, including ancillary staff, to ensure that the radiation safety program is properly implemented according to accepted health physics practices. Ancillary staff refers to any support staff that provide service to areas where radioactive materials are used or stored, and includes housekeeping, maintenance, security, and receiving personnel.
- Reviewing emergency response plans, including agreements, if any, with offsite emergency response agencies.
- Reviewing all proposals for radionuclide use and conditions of use, plans for all new buildings and modifications of existing structures where radioactive materials or radiation producing devices are to be used, as proposed by the Radiation Safety Officer.
- Voting to approve, disapprove, or amend proposals.
- Ensuring that only qualified individuals are permitted to use radiation sources, or to supervise such use by others.
- Reviewing semi-annual reports from the RSO summarizing radiation surveys, lab inspections, occupational radiation dose for all personnel working with radioactive materials and other sources of ionizing radiation, any significant incidents, including spills, contamination, misadministration, etc.

- Conducting an annual audit of the radiation safety program that includes a review of documentation and performance required to comply with license conditions, Federal/State of Florida regulations, and Radiation Control Committee recommendations, and ALARA program.
- Enforcing compliance with the program, including imposition of sanctions for noncompliance.
- Reviewing proposals for vendor services as may be required by license regulations, or commercial requirements.
- Making recommendations on risk management issues related to radiation safety.
- Delegating to the Radiation Safety Officer the authority to act for the RCC between meetings. His/her actions will be reported to the RCC for review at appropriate intervals.
- Recommending and implementing procedures for radioactive waste disposal.
- Providing advice to research groups, departments and investigators.

Radiation Safety Officer (RSO)

- Ensures that all radiation related activities comply with the terms and conditions of the license and the applicable regulations specified in Chapter 64E-5 of the Florida Administrative Code (F.A.C.).
- Reviews and approve purchase of radioactive materials.
- Provides consultation services to potential authorized users regarding procedures and practices for the safe use of radiation machines or radioactive materials.
- Ensures that radioactive materials are used only by individuals who are authorized by the license and that all individuals wear required personnel monitoring devices
- Ensures that radioactive materials are properly secured against unauthorized access or removal.
- Serves as contact with the authorized users for events such as the loss, theft or damage of radioactive materials.
- Approves all procedures that might involve radiation exposures and all changes in such procedures.
- Ensures that all users read and understand the licensee's emergency operating and radiation safety procedures.
- Conducts inspections of location and facilities using radioactive materials on a periodic basis.
- Provides exposure information to the users including but not limited to an annual exposure report to each user.
- Provides training to individuals who wish to use radioactive materials under the University Licenses.
- Ensures that the sealed sources are leak tested timely and as prescribed by the University Licenses and that a complete inventory of regulated and generally licensed sources is maintained.
- Maintains a list of employees and students (and their contact information) who work with radioactive materials or radiation producing devices.
- Manage disposal of radioactive wastes.

- Review all proposals for authorization of new users of radioactive materials, new radioactive laboratories or radioactive materials and submit with recommendations to the RCC for approval.
- Acts as liaison for any inspections conducted by the regulatory agencies.
- Maintains radionuclide inventory to assure compliance with the license limits.
- Maintains all records required by the license and the regulations of chapter 64E-5 F.A.C. These records shall include personnel monitoring records, survey records, training records for users, radioactive material inventory (receipt, use, transfer and disposal) records, waste pick-up and disposal records, planned special exposures records, laboratory audit reports, generally licensed materials inventory records, sealed Source leak test records, instrument calibration records, and records of all communication with the State Bureau of Radiation Control.
- Serves as ex-officio member of the Radiation Control Committee.
- Submits Semi-annual report summarizing radiation surveys, lab inspections, occupational radiation dose for all personnel working with radioactive materials and other sources of ionizing radiation, any significant incidents, including spills, contamination, misadministration, etc.
- Performs annual ALARA review and submit to RCC for review.
- Arranges for RCC meetings, obtains approval of the RCC for changes in radiation program on use of radioactive materials and radiation producing devices, and prepares minutes of the RCC meetings and distributes among members.
- In absence of the Chairperson of RCC and Director Environmental Health and Safety acts on their behalf for all matters related to the Radiation Safety Program.
- Reports directly to Director, Environmental Health & Safety and communicate with the Vice President or his/her designee, Research through the Director.
- Prepares periodic reports for RCC review and to update the chair.

Record Keeping:

The RSO is responsible for maintaining the following records:

- Laboratory audit reports
- Sealed Source leak test records
- Instrument calibration records
- Radioactive material inventory
- Inventory of generally licensed materials
- Records of planned special exposures
- Records of individual monitoring results
- Dose records of authorized users
- Waste pick-up and disposal records
- Records of all communication with State Bureau of Radiation Control

Termination or Changes in Radiation Projects

The Radiation Safety Officer or Director of Environmental Health Safety have full authority to close or order evacuation from a laboratory or other facility where release, contamination, or other incident involving radioactive material is deemed to present a real hazard to persons who

occupy that space. Such actions shall be taken upon prior consultation with the Vice president, Research or his/her designee.

Appeals

- Any individual may submit a written appeal regarding action or decision of the RCC through the Vice President, Research or his/her designee. A copy of any appeal must be sent to the Director of Environmental Health & Safety Department simultaneously.

Membership

Each department actively using radioactive materials shall be represented by at least one member. Qualified members shall include principal investigators and/or experienced professionals, proficient in the use and handling of radioactive materials, who are knowledgeable about regulatory compliance and University policy related to radioactive material use. Representatives of other groups or functions that affect the effective management of the radiation safety program, e.g. Purchasing, Public Safety and Work Management may also be appointed as ex-officio members. The current members are from:

- Applied Research Center
- Biological Sciences Department
- Biomedical Engineering Department
- Chemistry & Biochemistry
- Civil & Environmental Engineering
- Earth & Environmental Sciences
- Environmental Health & Safety
- Herbert Wertheim College of Medicine
- Mechanical & Materials Engineering
- Physics and
- Southeast Environmental Research Center.

Appointment to the committee shall be as follows:

Regular Appointments

Nominations for appointment to Radiation Control Committee shall be directed to the Vice President for Research or his/her designee via the Radiation Safety Officer. The RCC will evaluate the nominations and will vote to approve/disapprove the members. The majority vote will prevail.

Unless a member is repeated violator of licensing requirements or leaves the University he/she shall continue to be a member of the RCC.

The Vice President for Research (or his/her designee or Director, EH&S) will chair the Radiation Control Committee.

Ex-officio members shall be appointed at the discretion of the Vice President for Research or his/her designee or Director EH&S. The Chief of the Police or one of his/her senior administrators, Director, Purchasing Department or one of her/his senior administrators and Director, Facilities Management or one of her/his senior administrators will serve as ex-officio of the RCC. They will be invited to attend one of the biannual meetings. The ex-officio members will have no voting rights.

Meetings, Agenda, and Quorum

The Committee meets semi-annually, or more frequently, at the discretion of the Chair. A quorum consists of fifty per cent of the membership, and must include the Chair (or his/her representative), and the RSO. In order to plan for temporary absences, each Committee member may designate an alternate. The designee may represent the absent Committee member in all aspects of Committee participation, and shall have the responsibility and authority to act on behalf of that member. The designated alternate member should be an active authorized user on one of the University licenses or an inactive user in good standing. All appointed members present are entitled to vote. Between meetings, interim decisions may be made by established subcommittees or by a majority of all voting members via mailed ballot or e-mail. Such decisions shall be ratified by confirmation from the Chairperson, RCC. The Chair may veto the decision of the committee, if it is determined in consultation with RSO/Director, EH&S that the decision reached by members is not in the interest of the Radiation Program or of the University.

The RCC conducts the following activities at its meetings:

- Reviews records and reports from the RSO, ALARA program, results of regulator inspections/audits by RSO and State Bureau of Radiation Control,
- Reviews and approves or disapproves authorizations as proposed by the Radiation Safety Office.
- Conducts reviews of compliance with regulations and University procedures, and authorizes enforcement, if deemed necessary.
- Recommends changes in policies and procedures, as appropriate.

Prior to each meeting the RSO will prepare an agenda for the meeting and distribute among the members. The RSO shall maintain minutes of the meetings. The minutes will include the date of the meeting, the members present and absent to demonstrate that quorum was present, a summary of the discussions, recommendations and the results of votes. The RSO will also document the RCC's review of new users, uses, and program changes. Minutes will be distributed to members of the Committee. Additional copies may be distributed to others within the University as determined by the chairperson or Director EH&S.

Subcommittees

The RCC may establish subcommittees to perform specific functions. Each subcommittee shall submit a written report of its activities and actions to the RCC in a timely manner. Any authority granted to a subcommittee is subject to approval for action by the full Committee. Each subcommittee report accepted by the RCC becomes part of the record filed in the University Archives.

Code of Conduct

All members of the Radiation Control Committee shall be expected to conduct themselves in a manner supportive of the policies, operations and initiatives of the committee, and in a manner that does not improperly interfere with the fulfillment of responsibilities of the RCC.

FIU ENVIRONMENTAL HEALTH & SAFETY
(305) 348-2621 (305) 348-3574 ehs.fiu.edu

APPENDIX 3: FORM RC-1, TRAINING AND EXPERIENCE OF AUTHORIZED USER OF RADIOACTIVE MATERIALS

Name: _____

Department: _____ **Date:** _____

Training and experience (Use supplemental sheets, if necessary)

	Type of Training	Where Trained	Duration of Training	On the Job (Circle answer)		Formal Course (Circle answer)	
A	Principles and practices of radiation protection …			Yes	No	Yes	No
B	Radioactivity measurement standardization, monitoring techniques & instruments…			Yes	No	Yes	No
C	Mathematics & calculations basic to measurement of radioactivity…			Yes	No	Yes	No
D	Biological effects of radiation…			Yes	No	Yes	No

Experience with Radiation (Actual use of radioactive materials or equivalent experience)

Radioactive Materials	Maximum Amounts	Where Experience was gained	Duration of Experience	Type of Use

Statement of Agreement: The below signed individual signifies that he/she has read and is willing to abide by the FIU Radiation Protection Manual and regulations, and State and Federal regulations governing the use of radioisotopes and other sources of ionizing radiation. The undersigned agrees to comply strictly with all such University, State and Federal regulations and hereby waive any right or recourse against FIU, its officers, agents and employees for any injury or damage whatsoever resulting from any failure of the undersigned to fully conform with the said regulations.

Name: _____ Signature: _____ Date: _____

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APPENDIX 4: FORM RC-2, APPLICATION FOR RADIONUCLIDE PROCUREMENT

To: Radiation Safety Officer

1. Material Requested: _____
   ISOTOPE: _____ACTIVITY (MILLI CI): _____

   Supplier:_____ Product No.: _____
   Date needed: _____

2. Name of Principal Investigator: _____
3. Department: _____
4. Telephone: _____Fax: _____Email: _____
5. Emergency Contact number: _____

6. Location of use: _____

7. Purpose: o Continuation of current study
   o New study (attach a detailed description of project)
8. Requisition # _____

9. Have P.I. and users received Radiation Safety Training? o YES o NO
   If Yes, When and Where: _____
   Is their training current? o YES o NO

If No, Have arrangements been made to complete training before start of use?
Scheduled training date: _____

_____ _____
Signature of Principal Investigator Date

Approved By: _____ Date: _____
RSO or Authorized Representative

Date Material Received: _____

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APPENDIX 5: FORM RC-2, APPLICATION FOR PURCHASE OF SEALED SOURCE

To: Radiation Safety Officer

1. Equipment

EQUIPMENT DESCRIPTION: _____

MODEL NUMBER: _____SERIAL NO: _____SUPPLIER: _____

ISOTOPE(S): _____ACTIVITY (MCI): _____

2 Name of Principal Investigator: _____
Department: _____
Telephone: _____Fax: _____Email: _____
Emergency Contact number: _____

3. Place of use
BUILDING: _____ ROOM: _____ CAMPUS: _____

10. Purpose: o Use in current research
o New research project (attach a detailed description of project)

11. Have P.I. and users received Radiation Safety Training? o YES o NO
If Yes, When and Where: _____
Is their training current? o YES o NO
If No, Have arrangements been made to complete training before start of use? Scheduled training date: _____

_____ _____
Signature of Principal Investigator Date

Approved By: _____ Date: _____
RSO or Authorized Representative

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APPENDIX 6: APPLICATION FOR PURCHASE OF RADIATION X-RAY MACHINE

To: Radiation Safety Officer

1. Equipment
   EQUIPMENT DESCRIPTION: _____

MODEL NUMBER: _____SERIAL NO: _____SUPPLIER: _____

MAXIMUM VOLTAGE: _____KV MAXIMUM CURRENT: _____ MA

X-ray Equipment when energized:
Leakage radiation at 1 meter from the target: _____
Maximum exposure rate in accessible area: _____

2. Name of Principal Investigator: _____
   Department: _____
   Telephone: _____ Fax: _____Email: _____
   Emergency Contact number: _____
3. Place of use
   BUILDING: _____ ROOM: _____ CAMPUS: _____
4. Purpose: o Use in current research
   o New research project (attach a detailed description of project)
5. Have P.I. and users received Radiation Safety Training? o YES o NO
   If Yes, When and Where: _____
   Is their training current? o YES o NO
   If No, Have arrangements been made to complete training before start of use? Scheduled training date: _____

_____ _____
Signature of Principal Investigator Date

Approved By: _____ Date: _____
RSO or Authorized Representative

APPENDIX 7: OPERATING PROCEDURES FOR REVIEW OF PROPOSALS

A. INTRODUCTION

This document identifies the procedures for the receipt of proposals and protocols by Environmental Health & Safety for review by the University Radiation Control Committee (RCC). All proposals/protocols for authorization for use of radioactive materials and/ or radiation producing machines for new Principal Investigators or for amendment of radionuclides or their radioactivity or of radiological facilities must by approved by the RCC and the Florida State Bureau, as provided in Florida Administrative Code 64E-5.

B. PROCEDURES

Proposal/Protocol Review

General

Principal Investigators (PIs) submit proposal/protocol to Environmental Health & Safety. EH&S forwards the proposal to the Radiation Safety Officer for review by the Florida International University RCC**.** To expedite review it is recommended that an electronic copy of the proposal/protocol should also be submitted. The Proposal/protocol should contain curriculum vitae including complete address, phone and fax number and e-mail address of the PI where he/she can be reached. The Radiation Safety Office assigns the protocol a sequential number. The number indicates the year, month, date and the order in which it was received for that year (example, 02-03-25-01). The first two digits represent the year, the second two digits the month, the next two digits the date, and the last two digits indicate the sequential number of the protocol received in that year. The year, month, date and number are separated by hyphens.

After the protocol has been assigned a number it is entered into the Radiation Safety Office computer database with pertinent information concerning the protocol and the PI.

The Radiation Safety Officer prescreens proposals/protocols for completeness (qualification, training and experience of PI, description of the work to be performed, location, lab layout, engineering and administrative controls, radionuclide, form, radioactivity, purpose for use of radioactive materials, regulatory content, format, number of copies, etc.). The Radiation Safety Office will acknowledge receipt of the proposal/protocol and inform the PI of any deviation or shortcomings in the information provided that may result in the proposal/protocol being returned or request for additional information from the PI. The proposal/protocol prescreen shall be completed prior to submitting the proposal/protocol to RCC members. The proposal will be sent to the RRC through e-mail. RCC members will review the proposals/protocols within a specified period and forward their response to the RSO by e-mail. All evaluations received within the specified period will be considered for approval/disapproval of the proposal/protocol, which will be decided by the majority vote.

Proposals involving use of biohazardous or infectious materials shall be submitted to Biosafety Officer at EH&S prior to submitting to RSO.

Proposal involving use of animals shall be submitted to the Institutional Animal Care and Use Committee (IACUC) prior to submitting to EH&S.

PROPOSAL/PROTOCOL REVIEW

All proposals for research involving use of radioactive materials shall be reviewed and approved by the RCC. The RCC shall evaluate all aspects of proposal including but not limited to activity used, procedures for use, procedures for safety and qualification of applicant. Approval from a minimum of 50% members, which include the Chairperson or his/her designee and RSO, must be received for all proposals/protocols.

RCC Members Authorized to Approve the Proposals/Protocols

All voting members of the committee may approve proposals/protocols. However, if a RCC member is the PI or Co-PI on the proposal/protocol, then their vote is not counted due to a conflict of interest.

Documentation

The PI will be notified in writing by the Chairperson, RCC or his/her designee or RSO committee's decision to approve/disapprove the proposal/protocol. The PI will also be informed about any restrictions, such as not to order the radionuclude unless final approval is received from the State.

Dissenting views will be documented.

Discussion and vote count shall be recorded as part of the minutes taken for each RCC meeting. Records of decisions shall be maintained by the Radiation Safety Office.

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APPENDIX 8: DoR PROPOSAL RECOMMENDATION FORM 133

DoR Proposal Title:	Date Received for Evaluation:
Name of Principal Investigator:	

Objectives:

CRITERIA	*RECOMMENDATIONS/COMMENTS
LOCATION(S)	
SECURITY CONTROLS	
HAZARDS	
ENGINEERING CONTROLS	
PROTECTIVE EQUIPMENT	
WASTE DISPOSAL	
SPILLS	
UNATTENDED RESEARCH	
TRAINING	
APPROVAL	

Comments:
Reviewed by:_____ Date: _____

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APPENDIX 9: RADIATION BADGE REQUEST FORM

Application Date: _____ Panther ID: _____ Date of Birth: ___/___/___

Name: _____ Laboratory Location: _____

Last First MI Building Room #

Home Address: _____

Street Address City State Zip Code

Work Phone: ( ) _____ Home Phone: ( ) _____ e-mail: _____

Type of Dosimeter Required: ☐ Body Badge ☐ Ring Badge (Ring Size: ☐ Small ☐ Medium ☐ Large)

1. Have you used radioactive materials before? ☐ Yes ☐ No

If Yes, Please attach copy of previous occupational exposure record or initial here if exposures were minimal* _____ (**annual occupational exposure levels less than those specified in F.A.C. 64E-5.304*).

2. Are you currently using or have exposures to radioactive materials in non-academic related activities? ☐ Yes ☐ No

3. Are you a visiting Authorized User? ☐ Yes ☐ No

If yes, how long do you expect to be using radioactive materials/radiation devices here at FIU? _____

Please read the following and acknowledge responsibility to comply with the following:

Monitoring

- **I agree** to return dosimeters to the Radiation Safety Office (Environmental Health & Safety Department) at CSC 162 by the date established by the Radiation Safety Officer (RSO). _____ (Initial)
  Failure to return dosimeter will incur a cost charged to your PI/department.

Declared Pregnancy

- Florida Administrative Code 64E-5.311 requires implementation of necessary procedures to control occupational exposure of a **declared pregnant** woman. **I agree** that it is my individual responsibility to make such written declarations to the Radiation Safety Office in a timely manner. _____(Initial)

Training

- **I agree** it is my responsibility to comply with the conditions of the FIU Radiation Safety Manual and to keep this manual accessible. _____ (Initial)

Security in Laboratories with Special Hazards – Policy

- I agree to comply with the policy. _____ (Initial)

Point System Acknowledgment

- I have received, read, and understood the significance of the point system. _____ (Initial)

- **Termination**

Florida Administrative Code 64E-5.903 requires that at the time you terminate study/employment with the University, the RSO provides you with a written report summarizing exposures you may have received during the course of your study/work with radioactive materials at FIU. This report shall be provided within 30 days of the RSO's receipt of notification regarding your student/employment status or within 30 days after the exposure has been determined, whichever is later. I agree to provide timely notification to the RSO regarding my separation, and any change in my address and contact information.
I understand and accept responsibility for the consequences of knowingly violating the conditions of University's license agreement with the State of Florida as expressed in the FIU Radiation Safety Manual.

Applicant's Signature: _____ Date: _____

I approve use of TLD badge service for the above referenced individual. I have made budget provision for the service.

Principal Investigator: Name_____ Signature: _____ Date: _____

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APPENDIX 10: RADIOACTIVE MATERIAL USE RECORD

Department: _____ Authorized User: _____

I. Lab Location: _____ Date Received: _____Purchase Order #: _____

Isotope: _____ Activity: _____ Date Disposed: _____

Activity Disposed: _____ Disposal Method: _____

Date (1)	Activity Used (2)	Volume Used (3)	Activity Remaining (4)	Volume Remaining (5)	How Used (6)	Disposal Activity SINK (7)	Disposal Activity Liquid (9)	Disposal Activity Solid (9)	Decay Corrected Activity Remaining (10)

Instructions for using this form

(1) Date: each time material from this package is used.
(2) Activity used: the activity used on the date indicated (may be multiple entries for a given date).
(3) Volume used: the volume used to obtain the required activity.
(4) Activity remaining: the activity remaining in the container considering previous use.
(5) Volume remaining: the volume of the original material remaining.
(6) How used: e.g. IP rat, Sub cue mouse, In vitro, etc.
(7) **SINK** the total activity release into sewer system (water soluble only).
(8) **DRUM** liquids must be kept in secondary containment like vials, jugs, etc. within the drum. The drum must be lined with absorbent materials, enough to absorb twice the amount of liquid present.
(9) activity for disposal in solid state
(10) DECAY activity in column 4 corrected for decay.

Note: Failure to comply with Radiation Protection Program Regulations may result in accumulation of points as per the Point System. At the time of final disposal total up all liquid activity in Column 8 and solid activity in Column 9 and correct for decay. This is the total liquid or solid activity being disposed as radioactive waste.

When the radioactive material in the package has been completely used, please return this form to CSC 162. Maintain a copy for your records.

APPENDIX 11: SURVEY REQUIREMENTS IN RADIOLOGICAL LABORATORY

Item	Regulatory Requirement
Area Radiation Survey (Type and Frequency)	1. Survey with a **radiation survey instrument** at the end of **each day of use or receipt** of all areas where radioactive materials are used or received. 2. **Weekly survey with a radiation survey instrument** of all areas where **radioactive materials or radioactive wastes are stored**. 3. **Weekly wipe survey** for removable contamination during weeks of use of all areas where **radioactive materials or wastes are routinely used or stored**. 4. **Wipe survey** for removable contamination at the end of each day of use of all areas where radioactive materials are routinely used if the radioactive materials **are not detectable with survey instruments.** For example, collecting wipes and counting for tritium in a liquid scintillation counter. **In labs/areas where radioactive materials/wastes are stored a weekly survey, at a minimum, is required, even if the lab is kept locked, and there is only one authorized users/radiation worker whose absence from work place is documented.** An alternate AU for each lab is recommended who performs surveys during the absence of the AU.
Personal Monitoring	Monitoring for individuals for contamination prior to leaving the restricted area
Radiation Survey Report	The survey report shall be prepared and shall include: • The date of the survey • An annotated diagram of each area surveyed • Background levels • Measured dose rates (expressed in millirem per hour), and the removable contamination (expressed in cpm or dpm per 100 cm^2). The measured values shall be keyed to the diagram. • The action levels (500 dpm per 100 cm^2 for beta and 20 dpm per 100 cm^2 for alpha contamination). • The serial number, model number and manufacturer of the instrument. • The initials of the person who performed the survey. Records of personal and area surveys shall be retained for 3 years.
Air Flow Rate through Fume Hood	80 to 120 linear feet per minute; measured semi-annually.

APPENDIX 12: SURVEY AND MONITORING PROCEDURES

Meter Survey

The meter survey offers a direct measurement of external radiation dose rates enabling assessments for shielding needs and effectiveness. It is also the quickest and easiest (though not the most sensitive) method to assess surface contamination on objects such as lab coats, hands, floors, benches, etc. Compared to a wipe survey, a meter survey provides increased assurance that contamination "hot spots" will be detected and, unlike a wipe survey, it can detect total contamination (fixed + removable). A meter survey alone will not determine if contamination is removable.

PERFORMING THE METER SURVEY

1. Check the meter for proper operation

    a. Check the batteries using the self-check function of the meter.
    b. Check detector response by exposing the probe to a radiation source. An intermittent response indicates a damaged probe cable. If no response is observed, the meter is nonfunctional.
    c. With audio "on" determine that the background count rate is normal (20 - 50 cpm). Zero background indicates that the meter is nonfunctional. A high background indicates contamination of the probe or a meter malfunction.
    d. Background reading must be taken in each room to be surveyed.
    e. Preferably use open-end window count rate meter (cpm) than mR/h for survey for contamination check.

If found to be nonfunctional, immediately label with an "Out of Service" label and contact the Radiation Safety Officer (305-348-0489) or phone Environmental Health & Safety (305-348-2621) for further instruction.

2. Survey all authorized areas as per floor plan. For maximum sensitivity, hold the probe no more than 1 centimeter from the surface, move the probe slowly (not faster than one probe width per second), and check for increased count rates.

3. Background count rates will vary by perhaps a factor of 2. A reading exceeds background when the count rate exceeds twice the background count rate.

4. Mark areas of suspected contamination (use a grease pencil, a non-permanent marker, tape, etc.). Include the marked areas when performing the wipe survey.

5. Determine counting efficiency of the detection system for the type and energy of radiation being measured.

Tips:

- ^{3}H is the exception for which no ordinary survey meter probe will respond; reliance is placed on thorough wipe surveys and liquid scintillation counting.

- Choose the appropriate probe:

- For beta emitting radionuclides, except 3H, use a thin window GM probe. The lower detection limit is about 1000 dpm for ^{14}C and ^{35}S and about 200 dpm for ^{32}P.

- For low energy gamma (10 - 100 keV) emitters, use a thin crystal NaI (Tl) probe. The lower detection limit is about 200 dpm for ^{125}I. GM probes are inadequate, as the lower detection limit is higher by a factor of more than 10.

- For high-energy gamma (>100 keV) emitters, accompanied by beta radiation, use a thin window GM probe.

- For high-energy gamma (>100 keV) emitters without beta radiation, use a thick NaI probe.

- Minimum detection activity limit can be lower when the sample is counted for longer times in scaler mode (not rate mode).

- Meters must be calibrated for each authorized radioisotope.

  - Be sure not to move the probe too quickly over surfaces. This will obstruct finding contamination.

  - Determine the counting efficiency of the instrument by using a calibration standard.

- Convert cpm to dpm by dividing cpm by fractional counting efficiency of the instrument

- Convert dpm to dpm/ 100 cm^2 by dividing the obtained dpm by the area of the open-end window and multiplying it by 100.

Wipe Survey

The wipe survey is the most sensitive method for determining the amount of removable contamination. It is the only method for distinguishing removable contamination from fixed contamination. To perform the wipe survey, follow instructions below:

1. Collect wipe samples

   a. Use about 4 cm diameter paper filter disk. It may be moistened with distilled water, ethanol or "decontamination" solution. A dry filter is acceptable, but less sensitive.
   b. Wipe areas designated by lab's survey system and any area marked during the meter survey.
   c. Wipe some additional non-use areas, including areas of frequent contact, such as door knobs, sink handles, light switches, telephones, etc.
   d. Wipe an area of approximately 100 cm^2.
   e. Specify in the record any area(s) wiped which is/are not indicated on the floor plan.

2. Prepare samples

   a. Beta emitters
      1. Using tweezers, place filter disk wiped-side up on the bottom of a 20 ml counting vial.
      2. Add 20 ml of liquid scintillation counter (LSC) cocktail.

3. Mark cap with wipe identification.
4. Repeat steps (1) - (3) for each sample taken.
5. Prepare a control sample using a clean filter and following steps (1) - (3). The control provides the background count rate.

b. Gamma emitters

1. Using tweezers, place filter disk into a gamma counting vial.
2. Mark vial with wipe identification.
3. Repeat steps (1) - (2) for each sample taken.
4. Prepare a control sample using a clean filter and following steps (1) - (2). The control provides the background count rate.

3. Count samples

Wipes for surveys shall be counted with the most sensitive instrument available. This is usually a liquid scintillation counter (LSC) for beta radiation emitters and a gamma counter (GC) for gamma radiation emitters (with no associated betas).

When the survey is for both beta and gamma, count the filter first in the gamma counter and then in the LSC.

a. Liquid Scintillation Counter

ALL BETA EMITTERS

- Count the samples, a control and a standard(s) for at least two (2) minutes each.
- Results of less than two (2) times background are considered negative. Counts, which are greater than or equal to two (2) times background are considered positive.
- Recount the sample(s) with positive results for verification. Some positive results could be the result of extraneous luminescence.

Tips:

- Factors, such as chemiluminescence and static, can cause false positive results.
- A moist filter improves the survey sensitivity enabling more activity to be transferred. If a decontamination solution is used, allow any chemiluminescence to dissipate by storing samples in the dark for at least 2 hours before counting.
- Using a larger filter or a mini vial causes the filter to either fold in on itself or attach itself to the side of the vial. This reduces the counting efficiency, especially for the lower energy beta emitters.
- Dissolvable filters are acceptable.

LSC counting efficiency may be determined by counting filters spotted with a known activity of a radioisotope in use.

APPENDIX 13: SAMPLE RADIATION SURVEY USING RATE METER

Survey and Wipe records
For _____
Location

Principal Investigator: _____
Background Level: _____
Survey Meter – Serial # _____; Model #: _____
Meter Manufacturer: _____
Fractional Counting Efficiency: f
Probe Area (A cm^2)
Scintillation Counter # (If used): _____

A. Action Levels

20 DPM Alpha/100CM^2

500 DPM Beta &Gamma/100 CM^2

Daily Survey/Wipe on Days of Use:

Date	Location Surveyed	Count rate (C cpm)	Dpm/100	Name	Initials
			C*100/f/A		

Weekly Survey if Radioactive Materials Not Being Used:

Date	Location Surveyed	Count rate (C cpm)	Count rate (C cpm)	Name	Initials
			C*100/f/A		

Weekly Wipes: (Measured Using Survey Meter or Scintillation Counter) Areas Wiped 100 cm^2

Count rate (C cpm)	Count rate (C cpm)	Name	Initials
	C/f		

APPENDIX 14: SAMPLE RADIATION SURVEY USING SCALER

RADIATION SURVEY: OU 108

	ALPHA					BETA				GAMMA	
Sample Type and Location	**Count Time (min)**	**Gross Total Counts**	**Avg. (cpm)**	**Net (cpm)**	**Dpm/ 100 cm2**	**Gross Total Counts**	**Avg. (cpm)**	**Net (cpm)**	**dpm/ 100 cm2**	**Location**	**□R/h**
Bkg	10	72	7.2			477	47.7				
Wipe 1	6	36	6	0	0	241	41.7	0	0	4	6
2	6	47	7.83	0.63	1.86	270	45	0	0	5	8
3	6	43	7.17	0	0	304	50.6	2.97	5.98	6	10
Air Sample	10	73	7.3	0.1		500	50	2.3			

Air Activity						ALPHA	BETA
Pump Model	**Pump Sr. No.**	**Flow rate (lpm)**	**Sample Time (min)**		**Volume (mL)**	**μCi/mL**	**μCi/mL**
CF-901	8601	132	180		23760000	5.5 E-14	8.70E-13

	Counter model	**Counter Sr. No.**	**Meter Model**	**Sr. No.**	**% Efficiency**	**Action Level**
Alpha	43-10	PR 144969	2241-3	142291	34.05	20 dpm/ 100 cm2
Beta	43-10-4	PR 144761	2241-3	1E+05	49.59	500 dpm/ 100 cm2
Gamma	44-2	PR 172188	2241-3	2E+05		1000 □R/h

Surveyor Name: Signature: Date

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APPENDIX 15: REQUEST FOR RADIOACTIVE WASTE PICK-UP

Please note that pick-up will not be scheduled if the form is not properly completed.

Principal Investigator: _____ Ext. _____
Department: _____ Location: _____
Number of Packages/Containers: _____. Do all Packages/Containers have the required labels
☐ Yes ☐ No *(If no, please assure that all labels are in place at the time of pick-up)*
Survey meter Serial No. _____ Model No. _____ Manufacturer _____
Background dose rate _____

Please complete all the details in the following table:

No.	Year, Location, Type, ID, Isotope, Activity[1]	Half-life of Isotope	Surface Dose Rate	Quantity (volume/ weight)	Date package sealed	Other hazard [3] (Chemical/ Bio/ None)	Name of Hazardous Subsatance[4]
1							
2							

Date Pick-up Required: _____ Pick-up Location: _____

Per requirements of the FAC 64E-5.1505 I certify that all information on this form is complete and factual and is an accurate representation of the waste to be disposed.

Authorized user: Name: _____ Signature: _____ Date: _____

To be completed by EH&S:

Date received by EH&S: _____ Reference #: _____ Actual Pick-up Date: _____

Picked-up by: _____ Date of Final Disposal: _____ Disposed By: _____

Surface Does Rate at time of final disposal: _____ Meter Model & Serial No.: _____

[1] If labels are not affixed pick-up will not be completed. Affix label only on the external surface of the packing. No labels inside the packing.
[2] Do not mix waste of different isotopes and types (solid or liquid). Enter year (I or II half), lab #; Solid or liquid, Distinctive # of each type of waste, Isotope and Activity. For example, 2002 (II)-ACII351-Solid-001-I125-0.05 mCi or 2002 (II)-ACII351-Liquid-001-I125-0.05 mCi. This information must appear legibly on each waste package/container.
[3] State the hazard (chemical or biomedical, or none, if there is no hazard).
[4] Different chemicals should not be packed in the same container.

APPENDIX 16: WASTE SHIPMENT

1. Shipping paper

The shipping paper shows:

Organization managing transportation and Emergency contact
Name and address/phone # of the consignee (Agency to whom the material is shipped)
Name, number of the carrier, vehicle number, route
The materials being shipped: radioactive
Hazard Classification 7 (radioactive)
Not otherwise specified or surface contaminated objects
Identification number (Applicable to waste, e.g., UN 2982, UN 2912, UN 2913)
Name of the radionulicide
Physical form: solid or liquid
Chemical form: oxide
Details of the contents of each package are to be on separate sheet
Radionuclides, Radioactivity in both SI and conventional units, volume weight
Radioactive labels: White-1 < 0.5 mR/h on contact
Radioactive label: Yellow- II ≤ 50 mR/h on contact, dose rate at 1 meter in mrem/hour (Transport index) ≤ 1.
Type of shipment: Exclusive use shipment (yes/No)
(All shipments may not be exclusive use)
Total number of pieces and weight
24-hour Emergency phone #
Remark: Applicable DOT Emergency Response Guides #

Name, address, signature of shipper and date of shipment
(Applicable name and address will be entered in the shipping paper)

Name, signature of carrier and date of shipment

2. Containers and Waste Description

This form gives details of each package-
Container identification (Box and #, or Drum and #, or Aq and #)
Container description
Volume/ Weight
Surface radiation level
Surface contamination
Physical description
Chemical description
Individual radionuclides and activity, total container activity
Waste classification Class A, B, or C, Stable/unstable.
Total: number of packages, volume, weight, activity, special nuclear materials (and activity), e.g., H-3, C-14, Tc-99, I-129, source materials and their activity

3. Emergency Response Information (Sample) in Shipping Paper

1. PROPER SHIPPING NAME AND HAZARD
   Radioactive materials, n.o.s., 7, Hazard Class UN 2982 (Emergency Response Guidebook Guide # 163).

Radioactive materials, Low Specific Activity, n.o.s., 7, Hazard Class UN 2912, LSA-II (Emergency Response Guidebook Guide # 162).

Radioactive materials, Surface contaminated object., 7, Hazard Class UN 2913, SCO-II (Emergency Response Guidebook Guide # 162).

2. IMMEDIATE HAZARD TO LIFE
   None. Low radiation exposure, low radioactivity. Radiation presents minimal risk to lives of persons during transportation.

3. RISK OF FIRE OR EXPLOSION:
   None. Radioactivity dose not change flammability or other properties of the materials. Some of the materials may burn, but none of them ignites readily.

4. IMMEDIATE PRECAUTIONS:
   Keep unnecessary people away; isolate hazard area and deny entry. Uninjured persons or equipment with suspected contamination should be detained or isolated; deny clean up unless instructions are received from Radiation Authority. Notify CHEMTREC of accident conditions shown below.

5. EMERGENCY FIRE MEASURES:
   Positive pressure self-contained breathing (SCBA) and structural firefighters' protective clothing provide adequate protection. Maintain surveillance until Radiation Authorities arrive.

6. HANDLING FIRE MEASURES:
   Do not touch damaged packages or spilled material. Small liquid spills: Cover with sand earth or non-combustible absorbent material. Do not attempt clean-up operations. Maintain area until Radiation Authorities arrive.

7. FIRST AID:
   The public emergency number 911 should be used as ordinarily prescribed. Ambulance and hospital personnel should be informed about possible low-level radioactive contamination or other radiological conditions. Use first aid treatment according to the nature of the injury.

Priority for rescue, life-saving, first aid, and control of fire are higher than the priority for measuring radiation fields.

8. EMERGENCY NUMBERS:
   Florida International University, Environmental Health & Safety, Radiation Safety Office
   1200 SW 8th Street CSC-162 Miami, FL 33199
   Phone: (305) 348-0489 (regular business hours 8:00 am to 5:00 pm)
   24 HOUR (305) 924-7892 (cell)
   CHEMTREC 24 HOUR: (800) 424-9300

The testing methods and results of each of Type A packages will be maintained on files at the FIU permanent facility.

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APPENDIX 17: PROCEDURES FOR A PREGNANT WOMAN TO DECLARE PREGNANCY

1. The pregnant woman worker completes the "pregnancy declaration by a pregnant woman worker" form (download from the EH&S website ehs.fiu.edu under radiation/laser safety) and submits to her supervisor. After the notification is signed by the stated officials it is recorded by both supervisor and RSO.

2. The RSO brings to the attention of the supervisor the dose limits of the embryo or fetus under section 64E-5.311 (500 mrem during the entire pregnancy from occupational exposure and 50 mrem in any month). The dose to the embryo or fetus is taken as sum of the deep dose equivalent to the declared pregnant woman and the dose to embryo or fetus from radionuclides in the embryo or fetus and radionuclides in the declared pregnant woman.

3. Each declared pregnant worker shall wear a radiation dose monitor at the waist level to estimate the fetal deep dose equivalent.

4. Each declared pregnant worker whose duties require protective clothing shall also wear a radiation dose monitor outside the protective clothing to estimate dose to the worker, and the standard occupational limits will apply.

5. The declaration remains in effect until the declared pregnant woman withdraws the declaration in writing, that is completes and submits "WITHDRAWING A PREGNANCY DECLARATION" form (download from the EH&S website ehs.fiu.edu under radiation/laser safety) or is no longer pregnant.

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PREGNANCY DECLARATION BY A PREGNANT WOMAN WORKER		
TO BE COMPLETED BY THE WORKER		
Worker Name	Badge Number	Panther ID Number
Date/Time	Work phone number	
Job Title	Employer/Supervisor's Name	
Work Place		
DECLARATION For the purpose of lowering the dose received by my embryo/fetus, I voluntarily declare that l am pregnant. I realize that my job assignment or responsibilities may change due to work restrictions imposed to ensure that the embryo/fetus radiological dose is maintained within limits specified in FAC 64E-5.311. I will cooperate with any supplemental radiological monitoring and dose evaluations that may be required to ensure compliance with FAC 64E-5. The work restrictions may also apply during the entire gestation time or until I make a formal withdrawal of my pregnancy declaration. I understand that submitting this pregnancy Declaration Form will in no way affect my pay, benefits, seniority, or potential for promotion.		
Estimated conception date	Estimated delivery date	
Worker Signature	Date	
TO BE COMPLETED BY FIU SUPERVISOR		
Receipt verified by:		Date:
Notification made:	Signature	Date
RSO		
Department Head/Program Manager		
Worker's Supervisor		

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APPENDIX 18: WITHDRAWING A PREGNANCY DECLARATION

TO BE COMPLETED BY THE WORKER		
Worker Name	Badge Number	Social Security Number
Date/Time	Work phone number	
Job Title	Employer/Supervisor's Name	
Work Place		
I am voluntarily withdrawing my previous declaration of pregnancy that was executed on date _____. I understand that, as a result of signing and submitting this form, any work restrictions that have been imposed as a result of the previously submitted Pregnancy Declaration Form will be lifted.		
Worker Signature		Date:
TO BE COMPLETED BY FIU SUPERVISOR		
Receipt verified by:	Signature:	Date:
Notification made:	Signature:	Date:
RSO	Signature:	Date:
Department Head/Program Manager	Signature:	Date:
Worker's Supervisor	Signature:	Date:

APPENDIX 19: ANNUAL LIMITS ON INTAKE (ALI) AND DERIVED AIR CONCENTRATIONS (DAC) OF RADIONUCLIDES FOR OCCUPATIONAL EXPOSURE; EFFLUENT CONCENTRATIONS; CONCENTRATIONS FOR RELEASE TO SANITARY SEWERAGE

"Annual limit on intake" (ALI) means the derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by Reference Man that would result in a committed effective dose equivalent of 5 rem (0.05 sievert) or a committed dose equivalent of 50 rem (0.5 sievert) to any individual organ or tissue. For each radionuclide, Table I (State of Florida Bureau of Radiation Control ALIs, DACs, and Effluent Concentrations, July 1993, (FAC 64E-5)) indicates the chemical form which is to be used for selecting the appropriate ALI or DAC value. The ALIs and DACs for inhalation are given for an aerosol with an activity medial aerodynamic diameter (AMAD) of 1 µm, micron, and for three classes (D,W,Y) of radioactive material, which refer to their retention (approximately days, weeks or years) in the pulmonary region of the lung. This classification applies to a range of clearance half-times for D of less than 10 days, for W from 10 to 100 days, and for Y greater than 100 days. Table II provides concentration limits for airborne and liquid effluents released to the general environment. Table III provides concentration limits for discharges to sanitary sewerage.

"Derived air concentration" (DAC) means the concentration of a given radionuclide in air which, if breathed by Reference Man for a working year of 2,000 hours under conditions of light work, results in an intake of one ALI. For purposes of these rules, the condition of light work is an inhalation rate of 1.2 cubic meters of air per hour for 2,000 hours in a year. DAC values are given in State of Florida Bureau of Radiation Control ALIs, DACs, and Effluent Concentrations, July 1993, Table I, Column 3.

Table II "Effluent Concentrations"

The columns in Table II captioned "Effluents," "Air" and "Water" are applicable to the assessment and control of dose to the public, particularly in the implementation of the provisions of 64E-5.312. The concentration values given in Columns 1 and 2 of Table
II are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 0.05 rem (0.5 millisievert). Consideration of non-stochastic limits has not been included in deriving the air and water effluent concentrations limits because non-stochastic effects are presumed not to occur at or below the dose levels established for individual members of the public

For radionuclides, where the non-stochastic limit was governing in deriving the occupational DAC, the stochastic ALI was used in deriving the corresponding airborne effluent limit in Table II. The air concentrations values listed in Table II, Column 1 were derived by one of two methods. For those radionuclides for which the stochastic limit is governing, the occupational stochastic inhalation ALI was divided by 2.4×10^9, relating the inhalation ALI to the DAC, as explained above, and then divided by a factor of 300. The factor 300 includes the following components: a factor of 50 to relate to the 5 rem (0.05 sievert) annual occupational dose limit of 0.1 rem limit for members of the public; and a factor of 3 to adjust for the difference in exposure time and the inhalation rate for a worker and that for members of the public; and a factor of 2 to adjust the occupational values, derived for adults, so that they are applicable to other age groups.

For those radionuclides for which submersion, that is external dose is limiting, the occupational DAC in Table I, Column 3 was divided by 219. The factor 219 is composed of a factor of 50, as described above,

and a factor of 4.38 relating occupational exposure for 2,000 hours per year to full-time exposure (8,760 hours per year). Note that an additional factor of 2 for age consideration is not warranted in the submersion case. The water concentrations were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^7. The factor of 7.3×10^7 (ml) includes the following components: the factor of 50 and 2 described above and a factor of 7.3 x 105 (ml) which is the annual water intake of "Reference Man". Note 2 provides groupings of radionuclides which are applicable to unknown mixtures of radionuclides. These groupings, including occupational inhalation ALIs and DACs, air and water effluent concentrations and releases to sewer, require demonstrating that the most limiting radionculedes in successive classes are absent. The limit for the unknown mixture is defined when the presence of one of the listed radionuclides cannot be definitely excluded as being present either from knowledge of the radionuclide composition of the source or from actual measurements.

Table III "Release to Sewers"

The monthly average concentrations for release to sanitary sewerage are applicable to the provisions in 64E-5.330. The concentration values were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^6 (ml).

The factor of 7.3×10^6 (ml) is composed of a factor of 7.3×10^5 (ml), the annual water intake by "Reference Man," and a factor of 10, such that the concentrations, if the sewage released by the licensee were the only source of water ingested by a "Reference Man" during a year, would result in a committed effective dose equivalent of 0.5 rem (5 millisievert).

Please see pages 1-62, 64E-5 Florida Administrative Code ATT. 1 -- ALIs, DACs & Effluent Concentration.

APPENDIX 20: RADIOLOGICAL EMERGENCY PLAN

Introduction

Florida Administrative Code (64E-5.219 Emergency Planning) requires each application to possess radioactive materials in unsealed form, on foils or plated sources, or sealed in glass in excess of the quantities in 64E-5.220, must contain either: (a) An evaluation showing that the maximum dose to a person off-site due to a release of radioactive materials would not exceed 1 rem (10 mSv) effective dose equivalent or 5 rem (50 mSv) to the thyroid; or (b) An emergency plan for responding to a release of radioactive material. Florida International University (FIU) does not possess nor intends to possess radioactive materials in quantities exceeding in 64E-5.220. FIU has established maximum exposure limits of its occupation workers lower than the State limits, the actual exposures being significantly lower. FIU has embarked up on a Radiological Emergency Plan in order to adequately protect its employees, students and public, and to keep their internal and external radiological exposures as low as reasonably achievable.

Purpose

The purpose of this Radiation Emergency Plan is to identify the potential conditions that may result in release of radioactive materials, and to plan for actions that must be initiated to protect FIU community and the public from exposures to radiation.

Types of Radiological Emergencies:

Radiation emergency can be on-site affecting personnel and property of the facility where emergency conditions may exist or off-site affecting public outside the campus. Since FIU is licensed to possess only extremely small quantity of source and special nuclear materials, a nuclear criticality accident cannot occur in FIU. Further, because FIU is authorized to possess limited quantity of radioactive materials, release of significant quantities of radioactive materials affecting public is not envisioned. Given below are conditions that may result in radiological emergency:

1. Spills of radioactive materials during transfer of solutions from containers, malfunction of equipment, loss of integrity of a containment, such as glove box or fume hood.
2. Incidents Involving Radioactive Dusts, Mists, Fumes, Organic Vapors, and Gases.
3. Radioactive Material Escape to Public Domain.
4. Accident during Transportation of Radioactive Materials or Wastes.
5. Fires, Explosions, or Major Emergencies in Radiological Laboratories
6. Fatal or critical accidents or injuries occurring on University premises accompanied by personal radiological contamination of employees, students or visitors.
7. Natural disasters, including storms, floods, hurricanes, or tornadoes affecting radiological laboratories, and hence impeaching barrier and containment integrity.

Responsibilities of the Head of the Department

- Establish written procedures to handle emergencies ranging from a minor spill to a major accident that may require intervention by University emergency response personnel. These procedures should include provisions for immediate response, after-hours notification, handling of each type of emergency, equipment, and the appropriate roles of users of radioactive materials and the staff. Except for minor spills or releases of radioactivity that can be controlled and cleaned up by the user, individual users should have a clear understanding of their limitations in an emergency, with step-by-step instructions and clear direction of whom to contact.

- Provide radiation safety training to workers and training to respond in radiation emergencies. Ensure only authorized persons enter the radioactive use laboratories.
- Designate lead persons, such as principal investigators, departmental safety persons who maintain liaison with department of Environmental Health & Safety.
- Conspicuously post name and telephone number of persons to be contacted in emergency, including those of radiation safety officer (RSO) or an alternate person(s) in areas of use, so that it is readily available to workers in case of emergencies.
- Provide copies of emergency procedures to all users. Post a current copy in each laboratory or other area where radioactive material is used.
- Make emergency response kit available.
- Place emergency spill kits strategically placed in well-marked locations for use by all authorized users and the radiation safety staff.
- Designate persons responsible for inspecting all equipment periodically for proper operation and replenish, as necessary.
- Provide the spill kit and appropriate survey instruments, including batteries (for survey meters).

Responsibilities of the Principal Investigator

- Ensure that you and persons working with you are trained to respond in radiation emergencies.
- Make sure you and persons working with you know where emergency response kit is.
- Ensure name and telephone number of persons to be contacted in emergency, including those of radiation safety officer (RSO) or an alternate person(s) are conspicuously posted at the entrance to the laboratory, so that it is readily available to workers in case of emergencies.
- Ensure radioactive laboratories are kept locked.
- Ensure security of all radioactive materials, including those in instruments.
- Maintain inventory of all radioactive materials.

Responsibilities of the Public Safety Department (MMC: 305 348 5911; BBC: 305 919 5911)

- Make assessments of the nature and extent of emergency situation or threats of the emergency to the University and alert the Director of Emergency Management, and the departments with the capability to respond.
- Coordinate with the various service agencies- EH&S, Fire Department Facilities Operations, Health Care & Wellness Center, EMC etc.
- Collect and transmit relevant information throughout the various phases of an emergency to emergency-response agencies.
- Control access on University premises, preservation of law and order and campus security.
- Perform building lock-down procedures as scheduled.
- Provide intelligence information on campus conditions to the Director of Emergency Management.

Types of Emergencies and Response

1. **Spills of radioactive materials during transfer of solutions from containers, malfunction of equipment, loss of integrity of a containment, such as glove box or fume hood**.

The decision to implement a major spill procedure instead of a minor spill procedure depends on many incident specific variables, such as the number of individuals affected; other hazards present; the

likelihood of spread of contamination; and types of surfaces contaminated as well as the radiotoxicity of the spilled material.

1.1 Minor Spills of Liquids (< 100 microcurie of short-half (<120 days) radionuclides, volume < 1 liter) and Solids (< 1 microcurie)

- Instructions to Workers
  - Notify persons in the immediate area that a spill has occurred.
  - Ask someone to promptly report the incident to the Radiation Safety Officer (RSO).
  - Do not allow anyone to leave contaminated area without first being monitored to be sure he/she is not contaminated.
  - Wash hands first if they are contaminated as a result of the accident.
  - Put on disposable gloves to prevent contamination of the hands.
  - Prevent the spread of contamination by covering the spill with absorbent paper. (Paper should be dampened if solids are spilled).
  - Carefully fold the absorbent paper with the clean side out and place in a plastic bag for transfer to a radioactive waste container. Put contaminated gloves and any other contaminated disposable material in the bag.
  - Clean the spill from the periphery and work inward.
  - Be careful not to track contamination out of the spill area
  - Survey the area with an appropriate low-range radiation detector survey meter or other appropriate technique. Check the area around the spill for contamination.
  - Mark off contaminated area with chalk, marker, rope, etc., and restrict traffic to that area.
  - After cleaning the spill start decontamination. Start at the periphery of the contaminated area and work inward, reducing systematically the contaminated area.
  - Use survey meter or wipe tests to monitor effectiveness of decontamination procedure.
  - Check hands, clothing, and shoes for contamination. Check persons in the lab for contamination.
  - Allow no one to return to work in the area unless approved by the RSO.
  - Follow the instructions of the RSO and/or the RSO's staff (e.g., investigation of root cause, decontamination techniques, surveys, provision of bioassay samples, requested documentation).
- Responsibility of RSO
  - Follow up on the decontamination activities and document the results.
  - Survey and clear the area if the contamination is within the limits, otherwise advise further decontamination.
  - As appropriate, determine cause and corrective actions needed. Document the incident along with contacts of the persons involved. Consider bioassays, if there is a potential for internal contamination.

1.2 Major Spills of Liquids and Solids

- Instructions to Workers
  - Notify persons in the immediate area that a spill has occurred.
  - Ask someone to promptly report the incident to the Radiation Safety Officer (RSO).
  - Do not allow anyone to leave contaminated area without first being monitored to be sure he/she is not contaminated.
  - Wash hands first if they are contaminated as a result of the accident.

- Put on disposable gloves to prevent contamination of the hands.
- Cover your nose and mouth with kerchief or dust mask, to prevent inhalation exposures if the material can potentially become airborne.
- Prevent the spread of contamination by covering the spill with absorbent paper (paper should be dampened, if solids are spilled), but do not attempt to clean it up. To prevent the spread of contamination, limit the movement of all personnel who may be contaminated.
- Shield the source only if it can be done without further contamination or significant increase in radiation exposure.
- Request facility management/facility operations to turn off fans, ventilators or air conditioners that supply air to other areas. Direct exhaust ventilation should be left on.
- If appropriate, survey all persons not involved in the spill and vacate the room.
- Close the room and lock or otherwise secure the area to prevent entry. Post the room with a sign to warn anyone trying to enter that a spill of radioactive material has occurred.
- Allow no one to return to work in the area unless approved by the RSO.
- Decontaminate contaminated personnel by removing contaminated clothing and flushing contaminated skin with lukewarm water and then washing with a mild soap.
- Check Personal Monitoring devices (TLDs) are free from contamination. Seal in contaminated TLDs in plastic bag.
- Follow instructions of the RSO and/or the RSO's staff for spill clean-up and area decontamination, surveys, bioassay samples, etc.
- Cooperate with the RSO and/or the RSO's staff for investigation of root cause, and needed documentation and data.

- Responsibility of RSO
  - Provide guidance for decontamination. If decontamination of personnel was not fully successful, consider inducing perspiration by covering the area with plastic. Then wash the affected area again to remove any contamination that was released by the perspiration.
  - Provide guidance regarding spill control and decontamination so that normal activities can resume in the area as soon as possible.
  - Take charge of contaminated TLDs. Note down their IDs. These will record high doses. Decontaminate TLDs if possible. Send these for urgent processing.
  - Document the information about contamination and location, and results of personal, equipment and area decontamination, and radiation surveys.
  - Collect nasal swabs and count to check for potential inhalation exposures.
  - Determine cause and needed corrective actions; consider need for bioassays, if licensed material is suspected ingested, inhaled, or absorbed through or injected under the skin.
  - Notify the Director EH&S and Radiation Control Committee.
  - Notify the State Bureau of Radiation Control, if necessary.

2. Incidents Involving Radioactive Dusts, Mists, Fumes, Organic Vapors, and Gases

- Instructions to Workers
  - Notify all personnel to vacate the room immediately. Vacate the room. Seal the area, if possible.
  - Request facility management/facility operations to turn off fans, ventilators or air conditioners that supply air to other areas. Direct exhaust ventilation should be left on.
  - Notify the RSO immediately.
  - Survey all persons who could have possibly been contaminated.
  - Decontaminate as directed by the RSO.

- Isolate the adjacent corridor against traffic and spectators.
- Promptly report suspected inhalations and ingestions of licensed material to the RSO.
- Decontaminate the area only when advised and/or supervised by the RSO.
- Allow no one to return to work in the area unless approved by the RSO.
- Cooperate with the RSO and/or the RSO's staff (e.g., investigation of root cause, provision of requested bioassay samples).
- Follow the instructions of the RSO and/or the RSO's staff (e.g., decontamination techniques, surveys, provision and collection of bioassay samples, requested documentation).

- Responsibility of RSO
  - Familiarize with the incident, and assess the likely consequence, such as contamination of personnel, equipment and areas.
  - Perform air sample surveys in the area. These are needed to determine the magnitude of the airborne releases and potential inhalation by workers. These are also needed before permitting resumption of work with licensed materials.
  - Supervise decontamination activities.
  - Collect nasal swabs and count to check for potential inhalation exposures.
  - Document the information about the incident. Determine cause.
  - Determine corrective actions needed. Consider need for bioassays/whole body count if licensed material is suspected ingested, inhaled, or absorbed through or injected under the skin. Document incident.
  - Notify the Director EH&S and Radiation Control Committee.
  - Notify the State Bureau of Radiation Control, if necessary.

3. Radioactive Material Escape to Public Domain

All persons (including FIU personnel) who are not occupationally employed to work with radioactive materials or equipment producing radiation are considered members of the public. Such persons are regulated by radiation dose limits applicable to the members of the public. All areas outside the radiological laboratories are considered public domain.
Radioactive material may find its way to the public domain under following conditions:
3.1 Major breach of the integrity of the container of radioactive materials and that of containment structure or of process piping and spreading of spill to areas outside the radiological laboratory.
3.2 Falling of radioactive waste container or radioisotope from vehicle while being transported from one building to another.
3.3 Theft of a radioactive material from a facility or from an instrument and intentionally left in a strategic place exposing personnel to radiation.

3.1 Major breach of the integrity of the container of radioactive materials and that of containment structure or of process piping and spreading of spill to areas outside the radiological laboratory

- Instructions to Workers
  - Notify persons in the immediate area that a spill has occurred.
  - Ask someone to promptly report the incident to the Radiation Safety Officer (RSO).
  - Do not allow anyone to leave contaminated area without first being monitored to be sure he/she is not contaminated.
  - Wash hands first if they are contaminated as a result of the accident.

- Put on disposable gloves to prevent contamination of the hands.
- Cordon off the area and label cordon "Radioactive Material Stay Away".
- Use dust mask/respirator, if the spill is major or has dry powder.
- Prevent the spread of contamination by covering the spill with absorbent paper.
- Carefully fold the absorbent paper with the clean side out and place in a plastic bag for transfer to a radioactive waste container. Put contaminated gloves and any other contaminated disposable material in the bag.
- Scoop the contaminated soil and collect in a bag.
- After cleaning the spill start decontamination. Start at the periphery of the contaminated area and work inward, reducing systematically the contaminated area. Remove more soil, if needed.
- Use survey meter or wipe tests to monitor effectiveness of decontamination procedure.
- Check hands, clothing, and shoes for contamination.
- Follow the instructions of the RSO and/or the RSO's staff (e.g., investigation of root cause, decontamination techniques, surveys, provision of bioassay samples, requested documentation).

- Responsibility of RSO
  - Follow up on the decontamination activities and document the results. Ensure that the area is free from contamination.
  - Survey and clear the area if the area is free from contamination, otherwise advise further decontamination.
  - As appropriate, determine cause and corrective actions needed.
  - Consider bioassays, if there is a potential for internal contamination.

3.2 Falling of radioactive waste container or radioisotope from vehicle while being transported from one building to another

According to radiation safety procedures for transportation of radioactive materials, all radioactive materials will be carried out in the University vehicle and that these materials will be secured in the vehicle so that they do not move or fall off from the vehicle. Further, they will be placed in a secondary container. If the radioactive material container happens to fall from the vehicle, and breaks so that its contents are spilled out, follow the instructions in section 3.1. The RSO assumes duties of both worker and the RSO.

3.3 Theft of a radioactive material from a facility or from an instrument and intentionally left in a strategic place exposing personnel to radiation

The best way to prevent loss of materials is by 1) keeping the radiological laboratories locked all times, 2) issuing laboratories keys only to the authorized users, 3) maintaining access control record (name, time in, time out, purpose) of the persons, 4) installing sensitive radiation monitoring instruments at the laboratory exit, keeping 'on' and hooking the radiation alarm to the department's office, and 5) installing surveillance cameras. Because the quantities of radioactive materials in use or likely to be used in near foreseeable future are small steps 4) and 5) are not warranted. Stealing of radioactive material may be prevented if steps 1 to 3 are followed. It is also important to perform periodic surveys and leak tests.

4. Accident during Transportation of Radioactive Materials or Wastes

Radioactive materials purchased by various authorized users are first received in the Radiation Safety Office. The University Radiation Safety Officer (RSO) delivers these materials to the authorized users in

the University vehicle. The RSO also picks up radioactive wastes from different facilities and brings to the University Radioactive Waste Storage Facility (AHC-4/123A). During the transportation an accident may take place resulting in integrity breach of the container of radioactive material or of the waste resulting in spill of the radioactive waste material, contamination of the university vehicle, university or public road and contamination of vehicles/personnel involved in the accident, if precautions are not taken. The accident may also cause body injury to the RSO or other persons. The quantity of radioactive materials transported in FIU is very small. Radioisotopes are delivered in their original packing after placing them in secondary containment with vermiculites to absorb any standing liquid. The quantity of waste generated and shipped is negligible and will be contained in the vermiculite if spill occurs in an accident. In case of physical injury, medical attention and hospitalization shall take precedence over decontamination concerns. The RSO shall provide guidance to prevent spread of contamination without sacrificing medical needed attention.

5. Fires, Explosions, or Major Emergencies in Radiological Laboratories

5.1 Minor Fires

Instructions to Workers

- Notify all persons present to vacate the area and have one individual immediately call the Public Safety department 75911 and RSO (x 70489).
- Immediately attempt to put out the fire by approved methods (e.g., fire extinguisher) if other fire hazards or radiation hazards are not present. If you attempt to fight a minor fire, do not do so alone, get help and never allow the fire to block your path of exit from the area or the building. Never compromise your safety in order to control a fire.
- To use a Fire Extinguisher
  - **P**ull the pin
  - **A**im the extinguisher nozzle at the base of the flames
  - **S**queeze the handle while holding the fire extinguisher upright
  - **S**weep the extinguisher nozzle from side to side, covering the fuel with the extinguishing agent.

- Once the fire is out, isolate the area to prevent the spread of possible contamination.
- Survey all persons involved in combating the fire for possible contamination.
- Decontaminate personnel by removing contaminated clothing and flushing contaminated skin with lukewarm water, then washing with a mild soap.
- In consultation with the RSO, determine a plan of decontamination and the types of protective devices and survey equipment that will be necessary to decontaminate the area.
- Allow no one to return to work in the area unless approved by the RSO.
- Follow the instructions of the RSO and/or the RSO's staff (e.g., investigation of root cause decontamination techniques, surveys, provision of bioassay samples, requested documentation).

- Responsibility of RSO
- Supervise decontamination activities.
- If decontamination of personnel was not fully successful, consider inducing perspiration by covering the area with plastic. Then wash the affected area again to remove any contamination that was released by the perspiration.
- Consult with fire safety officials to assure that there are no other possibilities of another fire starting.

- Determine cause and needed corrective actions; consider need for bioassays if licensed material is suspected ingested, inhaled, or absorbed through or injected under the skin.
- Document incident.
- Notify the Director EH&S and Radiation Control Committee.
- Notify the State Bureau of Radiation Control, if necessary

5.2 Major Fires, Explosions, or Major Emergencies

- Instructions to Workers
  - Notify all persons in the area to leave immediately.
  - Notify the Public Safety department 75911.
  - Notify the RSO and other facility safety personnel and EH&S safety personnel (x2621, x76971), if hazardous materials are handled in the area.
  - Provide information about the radioactive materials to public safety personnel, where the radioactive materials are currently being stored or being used, and the best possible entrance route to the radiation area, as well as any precautions to avoid exposure or risk of creating radioactive contamination by use of high pressure water, etc. Also provide information whether the materials involved in the fire could be radioactive and/or hazardous, and the precaution to be taken.
  - Cooperate with the RSO and/or the RSO's staff (e.g., investigation of root cause, provision of requested bioassay samples).
  - Allow no one to return to work in the area unless approved by the RSO.
  - Follow the instructions of the RSO and/or the RSO's staff (e.g., decontamination techniques, surveys, provision of bioassay samples, requested documentation).
- Responsibility of RSO
  - Coordinate activities with facility's safety personnel and with public safety personnel.
  - Consult with the firefighting personnel and set up a controlled area where the firefighters can be surveyed for contamination of their protective clothing and equipment after the fire is extinguished.
  - Once the fire is extinguished, advise that no body should enter potentially contaminated areas or areas where radioactive and/hazardous materials may be present until a thorough evaluation and survey are performed by RSO and Haz Mat Unit to determine the extent of the damage to the materials and areas.
  - Perform thorough contamination surveys of the firefighters and their equipment, and supervise decontamination, if there is contamination on persons or equipment.
  - Collect air samples and count for radioactivity.
  - Collect nasal swabs of persons and count the samples to check for potential inhalation exposures.
  - Consider bioassays if licensed material is suspected ingested, inhaled, or absorbed through or injected under the skin. Document incident.
  - Collect names and phone numbers of all persons who are involved in the incident or helped in fire incident.
  - Document incident.
  - Notify the Director EH&S and Radiation Control Committee.
  - Notify the State Bureau of Radiation Control, if necessary.

Fatal or critical accidents or injuries occurring on University premises accompanied by personal radiological contamination of employees, students or visitors

- Instructions to Workers

- Contact Public Safety at x75911 (305-348-5911) to request medical assistance. In all cases of physical injury medical attention and hospitalization take precedence over contamination concerns.
- Evacuate personnel and if possible segregate them. Determine medical status of involved personnel.
- Remove all personnel dosimeters and/or TLD badges from exposed personnel. Read dosimeters and record the reading. Send dosimeters and TLDs badges immediately to safe area.
- Notify Emergency Director who will then activate emergency plan.
- Notify Radiation Safety Officer.

- Responsibilities RSO
  - Evaluate situation and personnel (or provide assistance, as applicable) in regard to:
    - Personnel medical status
    - Current environs status
    - Extent of contamination
    - Nature and level of radiation exposure (external, internal)
  - Close off radiation area.
  - Request facility management/facility operations to turn off fans, ventilators or air conditioners that supply air to other areas. Direct exhaust ventilation should be left on.
  - Save all samples of clothing, blood, urine, stool, vomitus. Label with name, date, time.
  - Send TLDs for emergency processing.
  - If medical condition permits, perform preliminary decontamination before releasing patients to hospitals.
  - Use portable battery operated tape recorders for collecting and storing information and for obtaining complete history of the accident, if possible. It is often difficult to record all of the events, opinions and statements in an emergency situation. The taped records can be typed later, thus providing a more complete history of the accident.
  - Use a video camera, if available. It will be an excellent method of showing what happened. If a video camera is not available, suitable still photographs will be useful.
  - Collect names and phone numbers of all persons who are involved in the incident or helped in fire incident.
  - Notify the Director EH&S and Radiation Control Committee.
  - Notify the State Bureau of Radiation Control, if necessary.

Natural disasters, including storms, floods, hurricanes, or tornadoes, affecting radiological laboratories, and hence impeaching barrier and containment integrity

Storms, foods, hurricane and tornados can cause extensive damage to property. Damage to the structure (ceiling, walls, etc.), accompanied by damage to containment (fume hood, glove box) and radioactive material container may expose the radioactive material. This may lead to spillage of the material into the fume hood or glove box. The spill may spread to lab floor and other areas. It may also be mixed with rain water, if the lab is flooded.

- Instructions to Workers
  - Secure the radioactive material prior to occurrence of an event. Provide soft packing surrounded by shield around so that when a heavy structure falls on the source vial or the source container, the container is not breached.

- If the spill does occur, notify persons in the area, if any one is around. It is important to retrieve the material in as short time as possible and comply with instructions regarding natural disaster emergency.
- Notify the public safety.
- Report the incident to the Radiation Safety Officer (RSO) and Director of Emergency Management (DEM) promptly. Follow the instructions of the DEM.
- Request facility management to shut off fans, ventilators, or air conditioners that circulate air to other areas. Direct exhaust ventilation should be left on
- Put on disposable gloves to prevent contamination of the hands.
- Survey the area with an appropriate low-range radiation detector survey meter or other appropriate technique. Also check the area around the spill for contamination.
- Try to retrieve the source with mechanical tools, such as long tongs, small pumps without exposing hands to radiation.
- Follow the spill procedures, if the situation permits.
- Prevent the spread of contamination by covering the spill with absorbent paper.
- Carefully fold the absorbent paper with the clean side out and place in a plastic bag for transfer to a radioactive waste container. Put contaminated gloves and any other contaminated disposable material in the bag.
- Clean the spill from the periphery and work inward.
- Check the persons for contamination.
- Decontaminate the area, only if the situation permits
- Use survey meter or wipe tests to monitor effectiveness of decontamination procedure.
- Check hands, clothing, and shoes for contamination.
- Allow no one to return to work in the area unless approved by the RSO.

- Responsibilities of RSO
  - Follow up on the decontamination activities and document the results.
  - Document the incident along with contacts of the persons involved.
  - If the situation permits: survey and clear the area if the contamination is within the limits, otherwise advise further decontamination.
  - As appropriate, determine cause and corrective actions needed. Consider bioassays, if there is a potential for internal contamination.

APPENDIX 21: ADMINISTRATION OF RADIOACTIVE MATERIALS IN ANIMALS

Procedures for the Use of Radioactive Materials in Animals

General:

Any area to be used for radioactive materials used must first be approved by the University Radiation Control Committee.

1. To use radioactive materials in animals, authorized users must submit to the Radiation Safety Officer the precautions and procedures to be used in handling and care of animals for approval by the Radiation Control Committee. Approval is coordinated with the Institutional Animal Care and Use Committee (IACUC). The following information must be included:

    - A description of the area in which the animal is to be housed during the procedure.
    - Procedures for injecting radioactive material into animals: Describe procedures for restraining animals during injection and the method for containing any radioactive material lost during injection. For small animals, a tray lined with absorbent material should be used. For large animals, some other method may be required.
    - Cage: What type of cage will be used? Disposable polystyrene cage is recommended to avoid spread of contamination.
    - Describe the number of animals that will be studied at any one time. The radionuclide and the maximum activity to be injected into each animal, the maximum activity used in any single day, and the maximum activity in the lab at one time. After each experiment the room must be carefully surveyed for radioactive contamination.
    - Labeling of cages: The label must include the type of radionuclide, quantity of material injected per animal, date of injection, and the name of the Authorized User. Cage labeling is especially important for animals that are not euthanized within a few minutes after injection.
    - Monitoring and decontamination of cages: Describe how the monitoring/decontamination of the animals, cages, and lab will be performed. If animal cages are to be returned to the Animal Care Facility after use, describe procedures for decontaminating and monitoring cages. Records of radiation levels and wipe tests must be maintained by the Authorized User. Disposable cages are recommended. These can be packed, and disposed. There will be no need for decontamination.
    - Segregation of the animals injected with radioactive materials from other animals: Are long-term retention studies being conducted? If so, detailed labeling of cages and animals is especially important.
    - Disposal of animal excreta: Describe the methods to be used for disposal.
      Surgical Instrument Decontamination: Describe how surgical instruments and other non-disposable devices or materials used during the experiment will be decontaminated. They must be surveyed for residualcontamination prior to storage. They must be clearly labeled with the isotope, date, estimated activity, and Authorized User.

2. Instructions of animal handlers: Describe the indoctrination that will be provided by the Authorized User of handlers that may come into contact with animals injected with radioactive materials. This should include dose levels, time limitation and special handling requirements that you specify for your animals and/or their excreta. In general, once injected with radioactive material, animals should be housed in the experimental laboratory properly designated for both

animal and radioactive material use. They are not to be returned to the central animal care facilities without specific approval of the Radiation Safety Officer and the Director of the Animal Care Center.

a. All hands-on care of animals containing radioactive material must be provided by the laboratory research personnel performing the research. The researchers must have training in the general use of radioactive materials by the Environmental Health and Safety Department (EH&S) and specific training related to radioactive animal care by the laboratory's radioactive materials supervisor. This training must include specific instructions requiring the laboratory staff to:

    i. Perform all feeding and cleaning of animals;
    ii. Perform regular contamination surveys to prevent the spread of contamination, and to ensure that radiation levels are maintained as low as reasonably achievable;
    iii. Clean and decontaminate cages and facilities;
    iv. Packaging and handling of all animal, animal wastes, and carcasses, and other wastes;
    v. Contact EH&S to perform free-release surveys to allow reuse of equipment;
    vi. Contact EH&S prior to disposal of waste;
    vii. Any bite or scratch from animals injected with radioactive materials must be immediately reported to EH&S due to the potential for internal contamination.
    viii. Animal Disposal: After euthanasia animals that have been injected with radioactive materials must be stored in a freezer that is clearly designated and marked for radioactive material use. Animals must be double bagged and labeled with the isotope, date, estimated activity, and name of Authorized User. Animals should be stored until radioactivity decays to background level prior to disposal with biological waste, or disposed of under the direction of the Radiation Safety Officer.

APPENDIX 22: ADMINISTRATION OF RADIOACTIVE MATERIALS IN PLANTS

Plant Uptake Studies

General:

- All plant studies will be carried out in accordance with procedures approved by the FIU Green House Use Committee.
- All procedures requiring the use of radioactive materials will be carried out in accordance with procedures approved by the Radiation Safety Committee.
- All areas where radioactive materials are handled will first be approved by the University Radiation Control Committee.
- Adequate provisions will be made for safety and security in areas where radioactive materials are used.

Procedure:

- Plants will be grown in either laboratory growth chamber or in FIU's green house facility.
- Soil will be inoculated with appropriate radioactive chemical at desired concentrations.
- Seeds or seedlings will be planted in potted soil and watering will be carried out regularly.
- Plants will be harvested; roots and shoots will be separated and transported to the laboratory. Soil also will be transported to the laboratory. The labs to be used are restricted access and approved for the use of radioactive materials.
- Both shoots and roots will be dried in an oven at 80 C for three days. Samples will be ground for solvent extractions for parent and metabolic products and analyzed by thin layer chromatography, followed by autoradiography.
- Soil samples will be extracted for radioactive parent compounds as well as metabolites by using selective solvents. The extracts will be rotary-evaporated to 0.5 mL. The concentrated extracts will be spotted on thin-layer chromatography, followed by autoradiography.
- All surfaces on which work will be done and all surfaces on which the soil and plants will be placed will be covered with absorbent pads to minimize the risk of contamination. All personnel will wear disposable gloves, lab coats and shoe coverings. All personnel will wear applicable whole body personal radiation dosimetry badges.
- Following the analysis, the waste will be picked up by radiation safety officer, and will be stored in radioactive waste storage area prior to disposal through a contractor.
  The maximum activity to be used on any single day is 5 mCi. After each experiment the room will be carefully surveyed for radioactive contamination. If contamination is detected, established decontamination procedures will apply.

APPENDIX 23: PROCEDURE FOR EXCHANGE OF CONTAMINATED AIR FILTER

Purpose

To provide direction and guidelines for the replacement of H.E.P.A. filters in radioactive material use fume hoods.

Policy

H.E.P.A. filters serving the radiation safety flow hoods, in labs such as EC 2371, will be replaced as per manufacturers' recommendations and in conformance with industry, radiation and other safety requirements.

Definitions

- H.E.P.A.: an acronym: High Efficiency Particulate Air (the filter in use includes, in addition, an activated char-coal filter)
- Radioactive Material: an element or an isotope spontaneously emitting energetic particles and/or rays by the transformation of their unstable atomic nuclei.
- Lab Manager: A person responsible for the day to day operation of the lab
- Survey meter: Instrument used to evaluate radioactivity/radiological conditions.
- Radioactive Waste: Waste that includes radioactive material(s).
- Radiation Safety Hood: Draws air in from the room for filtration; provides protection from radioactive materials
- H.E.P.A. filter: Part Number: FF560GXF5/EU5 076M
- Pre-filter: Tri pleat brand, 12"x12"x2" (113/4"x113/4"x13/4"), Part Number: ES40LE

Authority and Responsibility:

- Lab Manager: Maintains service records for the H.E.P.A. filter. Assures appropriate and timely replacement of the filter.

General

- This filter exchange procedure is specific for the CVEC filtration assembly. At present CVEC uses short half-life (less than 90 days) materials only. Other departments may use long-lived radioactive materials or different filtration housing/ exchange arrangement such as bag-in bag-out filter disposal system for safely removing and replacing the filter without detaching the hose. Their filter exchange procedures will differ slightly but .the basic safety rules will be applicable to all. Filters are to be treated and disposed of as radioactive materials. Filter replacement is to be performed by personnel with radiation-safety certification in effect. Whenever a component of the filter assembly is removed/disassembled it shall be placed on/wrapped in a plastic sheet/bagged to prevent spread of contamination.

Procedure

- Write the following information on removed filter:
  - ❖ Date and time of removal

- ❖ Name of the individual who removed the filter
- ❖ Survey meter reading at the time of removal on contact and at 1 meter from the filter
- ❖ Surveyor
- ❖ Enter survey information (surveyor, signature, date, survey meter manufacturer, model and serial number) in log book

- Write the following information on new filter:
  - ❖ Date and time of installation
  - ❖ Name of installer

1. Before you begin:
   - ❖ Dress in personal protective equipment- Tyvek suit, gloves and dust mask
   - ❖ Spread plastic sheet under and around the filter assembly to collect dust falling from the filter assembly
   - ❖ Turn off power switch of fan housing
   - ❖ Unplug fan power cord
2. In compliance with appropriate safety requirements and standing on a safe ladder/stool take the following steps:
   - ❖ Detach safety strap from wall
   - ❖ Remove four rubber straps from clits on lower housing
   - ❖ Holding the two handles on the upper housing, remove the housing and set aside (leave the exhaust tubing connected)
   - ❖ Remove pre-filter assembly and set aside
   - ❖ With both hands, lift the H.E.P.A. filter out of the lower housing, put in a plastic bag and set aside. Write the information mentioned above on the removed H.E.P.A. filter with a permanent marker
   - ❖ Write the information mentioned above on the new H.E.P.A. filter
   - ❖ Install the new H.E.P.A. filter in the lower housing with the arrows pointing in the air flow direction
3. In the compliance with appropriate safety requirements and working on an appropriate working surface, take the following steps:
   - ❖ Place the pre-filter assembly with the round surface down

     With a wrench, release the four nuts fastening the pre-filter bracket (leave the flow straighter assembly intact)
   - ❖ Remove the pre-filter bracket and remove the pre-filter
   - ❖ Label the removed pre-filter as above and place in the bag with the H.E.P.A. filter
   - ❖ Label the new pre-filter as above
   - ❖ Place the new pre-filter in position on the flow straightened with the arrow pointing to the flow straightened (with the metal support mesh against the flow straightened)
   - ❖ Reinstall the pre-filter bracket; secure in place with washers and nuts; fasten with a wrench
   - ❖ Place the pre-filter assembly on the lower housing with the round surface facing the H.E.P.A. filter
   - ❖ Replace the cover over the pre-filter assembly; fasten to the lower housing with the rubber

clits

- ❖ Reposition the filter assembly on the shelf so that the safety strap could be reinstalled; orient such that the switch and speed control are easily accessible for the operator
- ❖ Reconnect power cord
- ❖ Do flow test as necessary

4. Disposition of removed filters:
   - ❖ Seal bag and place in box
   - ❖ Dispose of in accordance with radioactive material disposal procedures
5. Radiation survey
   - ❖ Check PPE and plastic sheet for contamination. Place in plastic bag and label.
   - ❖ Check tools for contamination. Decontaminate, if they show detectable contamination.
   - ❖ Check body parts for contamination. Decontaminate, if the contamination is detected.
   - ❖ Perform survey and record in the log book.

- Emergency:
  - ❖ Contact lab manager (x71409) and FIU RSO (x70489) in case of emergency

References:

- University Radiation Protection Manual.
- CE Radiation Safety Compliance Plan, Rev. 1.
- FIU Lab Safety Manual.

APPENDIX 24: (REVISION 1), POINTS FOR NON-COMPLIANCES AND RECURRENCE OF NON-COMPLIANCES (VIOLATIONS)

Points for Noncompliance / *Recurrence* / • Cause of Non-compliance*	On Due Date	30 Days After Due Date	90 Days After Due Date	1 Time Violation	2 Times Violation	3 Times Violation	Total Points for the Violation Category
1. Radiation training not attended				5	8	10	
2. Refresher training not attended		1	2				
3. Failure to wear appropriate protective dress (lab coat, shoes covering feet, etc.)				1	3	5	
4. Not wearing TLD while working with radioactive materials				1	3	5	
5. TLD/(exposure acknowledgment receipt) not returned	1	2	4				
6. Survey meter not calibrated/repaired	1		2				
7. Signage/posting missing/inadequate/misused				1	2	3	
8. Unauthorized persons working with radioactive materials (RAM)				5	8	10	
9. Radiation survey not performed/incomplete				2	4	6	
10. Incomplete inventory of RAM				2	4	6	
11. Incomplete inventory of generally licensed materials				2	4	6	
12. Evidence of eating/drinking, including candy wrapper in garbage container				3	6	10	
13. RAM procurement procedure not followed				1	5	8	
14. Radioactive waste not stored/labeled properly				2	3	4	
15. Incident (e.g., > 10 μCi contamination on surface other than work areas like table top, hood. Example – contamination on floor) not reported RSO				3	6	10	
16. Rad lab relocation to unauthorized area				Automatic suspension			

17. Rad lab relocation to authorized area without RSO consent				5	Automatic suspension		
18. Rad lab relocation to authorized area without decontaminating previous lab				5	Automatic suspension		
19. Lab security inadequate/lab left unlocked and unattended				5	8		
20. Warning letter not posted (for a minimum of 5 working days, or until action correcting the violation has been completed, whichever is later).	1						
21. An authorized user must designate an alternate who will perform his/her duties in his/her absence	1	3	5				
22. Schedule inspection of the lab	2	4	6 **				

* List not exhaustive. Other instances of non-compliance can exist.

** Automatic suspension if radioactive materials/ wastes are used/ stored and inspection is not performed in 6 months

Point System Revision 1 Acknowledgment Statement

- I hereby certify that I have submitted my request to become an authorized user of radioactive materials on FIU radioactive material license # 3669-1. I hereby certify that _____, the Radiation Safety Officer has explained to me importance of the point system.

- I hereby certify that I am an authorized user of radioactive materials on FIU radioactive material license # 3669-1. _____, the Radiation Control Committee member from our department / _____, the Radiation Safety Officer has explained to me importance of the point system.

I have received, read, and understood the significance of the point system Revision 1. Failure to comply with the radiation program rules and regulations may result in my accumulating enough points and may result in withdrawal of my privileges to work with radioactive materials.

Name: _____ Signature _____ Date _____

Department: _____

- Please complete as applicable

Forward to: Radiation Safety Officer, EH&S

APPENDIX 25: THE RESPIRATORY PROTECTION PROGRAM STANDARD 29 CFR 1910.134

Occupational exposure to diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors (called contaminants) can be controlled by adhering to work procedures established by your department and the Respiratory Protection Standard (The Standard).

The brochure describes how the responsibilities for the various aspects of compliance are distributed among various units within the University community and your role as an employee who may be potentially exposed to airborne contaminants.

The program outlines below has been developed in accordance with 29 CFR 1910.134, and has been customized to FIU operations. Should you have questions, after reading this brochure, please contact Environment Health & Safety at 305 348 2621, we will be happy to assist you.

YOUR RESPONSIBILITY

Exposure Control Plan for Airborne Contaminants

- As needed, request copy of the University's *Respiratory Protection Program*.
- Comply with the provisions of the University's *Respiratory Protection Program*.
- See clarification regarding the requirements of The Standard, whenever instructions or procedures may be unclear.

Exposure Determination

- Notify your department and /or EH&S if job tasks and responsibilities present occupational exposures/concerns which may have not been addressed under the University's *Exposure Control Plan.*

Engineering and Work Practice Controls

- Be knowledgeable of engineering controls in your department and proper use of these controls. Do not circumvent these controls.
- Follow established work practice controls to eliminate or minimize occupational exposures.

Personal Protective Equipment (PPE)

- Use appropriate PPE to eliminate or minimize occupational exposures. In addition to a suitable respirator a suitable PPE (e.g., plastic suit) is required in some cases, e.g., to prevent absorption of triated water vapor through intact skin.
- Learn the proper use, maintenance, limitations and locations of available PPE.

Housekeeping

- Maintain work area in a clean and sanitary condition. Clean the assigned respirator at the end of each work shift when used and disinfect assigned respirators at least weekly.
- Store respirators in convenient, clean and sanitary locations.

Medical Examination

- Ensure that you are medically evaluated prior to fit-testing and initial use of respirator. Medical evaluation is also required prior to wearing a dust mask.

Medical Records

- Advise your supervisor and/or EH&S of any medical condition, which may compromise with your ability to wear a respirator.

Labels and Signs

- Assure that correct signs and labels are located where required.
- Assure that the respiratory equipment retains proper company supplied labels.
- Check that respiratory equipment that you use is compatible with respiratory area posting.
- Notify your supervisor or EH&S of any concerns regarding appropriate labeling and signage.

Regulatory Compliance

- Comply with all applicable requirements established under the University's *Respiratory Protection Program and your* Department's *Respiratory Protection Program.*

Post Exposure Evaluation and Follow-up

- Immediately report all exposure incidents or any symptoms of illness or health concerns related to potential over exposure to a hazardous substance to your immediate supervisor and the Human Resources Department (305 348-2181) at University Park and 305 919-5545 at Biscayne Bay Campus) in order to obtain approval for immediate medical/inhalation evaluation.

Information and Training

Attend initial and annual refresher training programs. Training should cover proper use of respirators and their limitations. You should have knowledge in at least the following items:

- Why the respirator is necessary and how improper fit, use, or maintenance can prevent proper use?
- Types of respirators- purifying air or supplied air respirators - and their uses
- Capabilities and limits of the respirators.
- Effective use in emergency situations
- How to inspect, put on and remove, check and use the seals?
- Proper maintenance and storage.
- Medical reasons that may limit or prevent effective use.
- General requirements of this standard.

Training Records

- Sign-in when attending training sessions.
- Request proofs of attendance, as needed.

Use of Respirators

- Based on the medical report and respirator fit test you may be authorized to wear a suitable respirator.
- Use respiratory protection in accordance with the instructions and training provided.
- Be clean shaven in all facial areas that seal to the respirator face piece. You may use half face respirator, if the there are no facial hair between face and the respirator seal, and if the protection it provides is adequate for the contaminants in air. For example, a fit-tested half face air-purifying respirator used in negative pressure mode provides a protection factor of 10 for particulates and can be used when the ambient concentration is up to10-times the permissible concentration.
- Allow no headpieces, eyeglass frames, band-aids or other items beneath a respirator seal or head strap assemble. Persons needing corrective lenses can use contact lenses.
- Inspect the respirator before use to check that the correct cartridges are in place, adjustable straps are not broken, the exhalation value is present and intact, the inhalation valves are present and intact and the plastic lens is not badly scratched or cracked.
- Perform a user seal, negative and positive pressure respirator fit check each time a respirator is donned.
- Inform your departmental supervisor if the respirator no longer fits well, and request a new one that fits properly.

- Inform your supervisor or the Program Administrator of any respiratory hazards that are not adequately addressed in workplace.
- Never use respirator cartridges when contaminants in the air exceed the rating of the cartridges or in atmosphere containing less than 19.5% oxygen. Self-Contained Breathing Apparatus (SCBA), which are not covered here, are required when concentration of oxygen is not adequate.
- Never work alone while wearing a respirator. When Self Contained Breathing Apparatus (SCBA) is worn, at least one standby person, located outside of the hazardous atmosphere and equipped with an SCBA, shall be in constant attendance, ready to provide immediate assistance and to call for emergency help, if needed.

Use of Dust Masks

- You may choose to use a dust masks when a respirator is not required. Dust masks are used primarily as protection against nuisance levels of particulates such as dusts, mists and metal fumes produced when welding, brazing, cutting or other operation involving heating of metals. Although qualitative fit-test can be performed it is not required. Dust mask users may elect to take respirator training course.
- If you elect to wear dust mask, first of all get approval from the program administrator and authorization from physician or other licensed health care professional (PLCHP).
- Do not use dust masks:
    - As protection against harmful gases or vapors.
    - As protection against toxic contaminants.
    - As protection against high concentration of contaminants (such as those released during sandblasting).
    - In oxygen deficient atmospheres.

Voluntary use of Dust Masks/Respirators

Voluntary use of dust mask, i.e. filtering face pieces, which are provided for comfort when working outdoors in dusty environments may be allowed. There are no medical limitations on their use. However, if a tight-fitting negative pressure respirator is used, PLCHP shall determine that an employee is able to use it. Complete training is not required for employees using respirators voluntarily.

- Follow all instructions for voluntary use of respirators (Appendix D to the Standard (non-mandatory). These are:
    - Read and follow manufacturer's instructions for use, maintenance and care, and warning regarding the respirator limitations.
    - Choose NIOSH certified respirator against contaminant of concern. A respirator designed to filter dust particles will not protect you against gases, vapors or fumes.
    - Keep track of your respirator so that you do not mistakenly use someone else's respirator.

YOUR DEPARTMENT'S RESPONSIBILTIES

Exposure Control Plan for Airborne Contaminants

- Formerly designate an individual to be responsible for departmental compliance with the respiratory protection program standards.
- Develop the *Department's Respiratory Protection Program* and update at least annually.
- Comply with provisions of the Respiratory Protection Program Standard.

- Assure employees are aware of the safe procedures appropriate to unique exposures that may exist in your department.
- As required, assure *Department's Respiratory Protection Program* addresses student exposures to airborne contaminants.
- Develop respirator maintenance procedures and schedule.
- Provide or coordinate to provide full employee training including why the protection is needed, limitations of respirator, proper fitting, proper maintenance and storage, emergency procedures, and medical symptoms, which may limit or prevent effective use of the protection.
- Coordinate with the University Program Administrator on how to address hazards or other concerns regarding the program.
- Provide EH&S with a copy of your *Department's Respiratory Protection Program* developed for your department's unique research and academic activities.

Exposure Determination

- Identify and document job classifications with occupational exposures.
- Inform EH&S of employees with occupational exposures.

Engineering Controls

- Design and implement all feasible engineering controls. This means that wherever possible, the hazard should be removed. Removing a potential respiratory hazard could mean installing or modifying the ventilation system, the substitution of less toxic materials, and confinement of operations.
- Institute work practice administrative controls that eliminate or minimize employee exposure to airborne contaminants.

Industrial Hygiene Testing

- Arrange for formal industrial hygiene evaluations of the facilities to determine whether there is any occupational health exposure in excess of current permissible exposure limits. For exposures being controlled by use of respirators, produce a written respiratory protection program, which is worksite specific.
- Update the program, as necessary to reflect changes in workplace conditions that may affect respirator use. Chemical or process change would require additional industrial hygiene testing to determine new exposure levels.

Personal Protective Equipment (PPE)

- Provide appropriate respirators and other PPE for employees with occupational exposures at no cost to the employees.
- Assure employees use PPE devices as required. Take disciplinary actions where required.
- Assure proper maintenance, use and storage of PPE.
- Assure students are protected appropriately.
- Provide respirators at employees' request or permit employees to use their own respirators, if it is determined that such use, in itself, will not create a hazard.
- Provide the user with information contained in Appendix D of The Standard (29 CFR1910.134), if voluntary use of a respirator is permitted. Ensure that the employee is medically able to use the respirator and that it is cleaned, stored, and maintained so it does not present a health hazard to the user. A medical evaluation of all employees voluntary use tight-fitting negative pressure respirator is necessary, as a provision of the revised standard.
- Provide a powered air purifying respirator or atmosphere-supplying respirator to any employee found medically unable to wear a negative pressure respirator but otherwise able to perform

the tasks to be done. The physician or other licensed health care professional (PLHCP) should inform the employer/department that the employee has a medical condition that may place the employee's health at an increased risk of material impairment if the employee uses a negative pressure respirator.

Medical Evaluation

- Provide a medical evaluation at no cost to employee to determine an employee's ability to use a respirator, before fit testing and use.
- Consult University Program Administrator (EH&S Department) for employees' medical evaluation.
- Annual review of medical status is not required
- Must provide additional medical evaluations if:
    - Employee reports medical signs or symptoms related to the ability to use a respirator
    - Physician, supervisor or program administrator informs the employer that an employee needs to be reevaluated.
    - Observations made during fit testing and program evaluation indicate a need
    - Changes occur in the workplace, which may substantially increase the physiological burden on an employee.

Labels and Signs

- Post signs at the entrance to work area where respiratory protection is required.
- Label the PPE appropriately.

Regulatory Compliance

- Cooperate with the Department of EH&S to achieve compliance.
- Carry out responsibilities as required by the University's *Respiratory Protection Program* and Federal Occupational Safety and Health Administration (OSHA) Regulations.
- ***Written Program***

  The written program must be worksite specific and developed in consultation with University Program Administrator. The program must contain the following:
    - Appointment of program administrator or a person responsible in your department for the program.
    - Specific procedures for respirator selection.
    - Medical questionnaires (in consultation with University Respiratory Program Administrator), worker evaluations, and associated record keeping.
    - Fit testing for tight fitting respirators.
    - Respirator maintenance procedures and schedule.
    - Full employee training including why the protection is needed, limitations of respirator, proper fitting, proper maintenance and storage, emergency procedures, and medical symptoms which may limit or prevent effective use of the protection.
    - Periodic evaluation of the program.

Selection of Respirators

- Select and provide an appropriate respirator based on the respiratory hazards to which the worker is exposed. This is determined by appropriate industrial hygiene testing in areas where respirator use is required. Select a NIOSH-certified respirator that shall be used in compliance with the conditions of its certification.
- Identify and evaluate the respiratory hazards in the workplace. This should include a reasonable estimate of employee exposures and identification of the contaminant's chemical makeup and physical form (gases, vapor, dust, etc.).

- The atmosphere shall be considered Immediately Dangerous to Life and Health (IDLH) wherever an exposure cannot be identified or reasonably estimated.
- Select respirators from a sufficient number of models and sizes so that the respirator is acceptable to, and correctly fits, the user.
- Respirator should allow the wearer to communicate with other workers to warn them of the dangers. He/she should be able to do so without yelling or tempting them to remove the respirator. The speaking should not interfere with the fit of the negative pressure elastomeric respirator selected.

House keeping

- Ensure that the respirators are cleaned according to mandatory procedures or their equivalents.

Fit Testing

- Fit-test all employees before any respirator with a negative or positive pressure tight-fitting face piece can be used.
- Fit-test the employee with the same make, model, style, and size of respirator that will be used.
- A qualified individual or organization should conduct fit testing. Consult University Respiratory Program Administrator (EH&S) for fit-test. Requirements for fit test are:
    - Employees using a tight-fitting face piece respirator must pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT): prior to initial use; whenever a different respirator face piece (size, style, make or model) is used; and at least annually thereafter.
    - Additional fit testing must be conducted whenever the employee reports, or the employer or physician observes changes in the employee's physical condition (facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight).

Maintenance and Care

Provide each user with a respirator that is clean, sanitary and in good working order. Manufacturer's recommendations should be followed. Clean and disinfect at the following intervals:

- As often as necessary when issued for exclusive use. Before being worn by different individuals when issued to more than one employee.
- After each use for emergency respirators and those used in fit testing and training.

Cleaning and Disinfecting

- Disassemble respirator, removing any filters, canisters, or cartridges.
- Wash the face piece and associated parts in mild detergent and warm (43° C or 110° F) water.
- Immerse for two minutes in hypochlorite solution (50 ppm of chlorine) in water at 43° C.
- Rinse completely in clean water.
- Air dry in clean area.
- Reassemble the respirator and replace any defective parts.
- Place in a clean, dry plastic bag or other airtight container.

Storage

- Store respirators in a manner that protects them from damage, contamination, harmful environmental conditions and damaging chemicals, prevents deformation of the face piece and exhalation valve.
- Respirators maintained for emergency use must be kept accessible to work area, be stored in compartments or covers that are properly marked as containers for emergency respirators and stored according to manufacturer's instructions.

Identification of Filters, Cartridges and Canisters

- All filters, cartridges and canisters used in the workplace must be labeled and color-coded with the National Institute of Occupational Safety and Health (NIOSH) approval label. The label must not be removed and must remain legible.

Immediately Dangerous to Life and Health (IDLH) procedures

Contact the University Program Administrator about activities where potential for IDLH conditions could be present. The respirators used in such conditions shall be:

- A full face piece pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes, or
- A combination of full face piece pressure demand supplied air respirator (SAR) with auxiliary self-contained air supply.
- Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they are used.

Air Quality

For supplied-air respirators and Self-Contained Breathing Apparatus (SCBA), compressed Gas Association requirements for Grade D breathing air are described in ANSI/Compressed Gas Association Commodity Specifications for air, G-7.1-1989. This specification includes the following:

- Oxygen content (v/v) of 19.5-23.5%
- Hydrocarbon (condensed) content of 5 mg/m3 of air or less
- Carbon monoxide content of 10 ppm or less
- Lack of noticeable odor

Recordkeeping

- Records of medical evaluations must be retained and made available per OSHA 1910.1020 "Access to employee exposure and medical records."
- Records of fit tests must be retained until the next fit test is given.
- A written copy of the current program must be maintained. Written materials required must be made available upon request to all affected employees and OSHA.
- Assure confidentiality of all information pertaining to employee exposure or health status.
- Retain the records for a period of 30 years after the employee's employment termination.

Post Exposure and Follow-up

- Evaluate *University's/Department's Respiratory Protection Program* to identify "procedural weakness" that may have caused or contributed to the exposure.
- Complete and submit investigation report to proper authorities (internal and external).
- Implement corrective and required action.

Information and Training

- Facilitate/coordinate training to employees who are required to use respirators.
- Arrange for training prior to use, unless another employer has provided acceptable training within the past twelve months.
- Arrange for retraining annually and when there is a change in the workplace or type of respirator.
- Periodically assess adequacy of employees' knowledge or use of respirators and arrange for adequate training.
- Contact EH&S to provide and/or assist in facilitating training programs.

Voluntary use of Dust Masks/Respirators

You may provide respirators to employees who request them or may allow them to provide their own respirators for voluntary use. You may also limit or prohibit their use.
There are no medical limitations on the use dust mask, i.e. filtering face pieces.

- If a tight-fitting negative pressure respirator is used, provide some medical evaluation to determine that a employee is able to use
- Ensure that masks are not dirty or contaminated and their use does not interfere with employees' ability to work safely.
- Provide or coordinate to provide general instructions for respirator use. Complete training is not required for employees using respirators voluntarily.
- Provide employees with the information contained in Appendix D to the Standard.

RESPONSIBILITIES OF THE ENVIRONMENTAL HEALTH & SAFETY DEPARTMENT

Exposure Control Plan for Airborne Contaminants

- Develop and implement the *University's Respiratory Protection Program*.
- Comply with the provisions of The Standard.
- Serve as custodian of the *departmental Respiratory Protection Program* submitted by various departments.
- Consult with departments regarding inhalation exposure control procedures.
- Assure annual updates of *department Respiratory Protection Program*
- Formerly designate an individual (called administrator) to be responsible for University's compliance with the respiratory protection program standard.

Program Administrator

- Oversee the program.
- Be responsible for overall operation of the program.
- Qualify by training and experience to be responsible for the overall management and administration of the program.
- Maintain integrity of the program through continuous oversight.
- Provide oversight and coordination role between subunits or departments.
- Take assistance of industrial hygienists, safety professionals or respirator experts to help run the respiratory protection program.
- Promote coordination of all facets of the program.
- Approve training program and provide training.
- Approve fit-test procedures. Conduct qualitative fit-test. Provides guidance in respirator selection.
- Establish written standard operating procedures (SOP) governing the selection and use of respirators.
- Update written program.
- Administrate the medical surveillance program
- Assess IDLH conditions and issue respiratory protection requirements and operating conditions as per 29 CFR 1910.134, The Standard.

Exposure Determination

- Compile and maintain data on employees with occupational exposures.

Engineering Controls

- Provide guidance and technical assistance for deapartments in the design and selection of appropriate engineering and work practice controls.

Personal Protective Equipment (PPE)

- Provide guidance and technical assistance for departments in the selection, use, maintenance and storage of PPE.

Housekeeping

- Provide guidance and technical assistance for departments in the development and implementation of appropriate sanitation and housekeeping procedures so as to reduce exposures

Medical Evaluation

- Identify a physician or other licensed health care professional (PLCHP) to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information.
- The medical evaluation must obtain the information requested by the questionnaire in Sections 1 and 2, Part A of Appendix C. Follow up medical examination is required for any employee who gives a positive response to questions 1 through 8 in Section 2, Part A of Appendix C or whose initial medical examination demonstrates the need for a follow up medical examinations.

Medical Records

- Maintain confidentiality of all information pertaining to employee inhalation exposures and medical evaluation.

Fit Testing

- Perform fit-test on employee through the respiratory administrator. All employees must be fit tested before any respirator with a negative or positive pressure tight-fitting face piece can be used.
- Perform fit-test on employees with the same make, model, style, and size of respirator that will be used.

Labels and Signs

- Monitor use of appropriate signs and labels.
- Coordinate for appropriate disposal of hazardous materials generated by the departments University-wide.

Regulatory Compliance

- Serve as University liaison with regulatory authorities.
- Promote University compliance with The Standard.
- Provide mechanism through which employees may direct suggestions, complaints, and concerns regarding the university's compliance with the respiratory protection plan.

Post Exposure Evaluation and Follow-up

- Conduct post-exposure investigation and document findings.
- Review investigation findings and make appropriate recommendations for corrective action

Training Records

- Maintain a written copy of the Respiratory Protection Program and the OSHA Respiratory Protection Standard 1910.134.
- Compile and maintain training and fit test records for all University departments. Update the records as new employees and students are trained, as existing employees and students receive refresher training, and as new fit tests are conducted.
- Maintain copies of medical certificates for all employees under the Respiratory Protection Program.

RESPONSIBILITIES OF THE OFFICE OF HUMAN RESOURCES

Regulatory Compliance

- Assure updates to employee position description; include specific reference to requirements for medical evaluation.
- Assure that personnel recruitment procedures include consideration for compliance with The Standard.

Medical Records

- Assure confidentiality of all information pertaining to employee medical records.

The FIU Respiratory Protection Program may be found in the University Safety Guide. If you do not have a copy of the University Safety Guide, please request one by calling (305) 348-2621/6849 or e-mail us at: ehs@fiu.edu.