



UNIVERSITY OF NORTH CAROLINA AT WILMINGTON

RADIATION PROTECTION MANUAL

*Prepared by UNCW Radiation Safety Committee
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Stan H. Harts
Radiation Safety Officer
910-962-3108 Office
910-962-4014 FAX
HartsS@uncwil.edu E-Mail

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SECTION 1 INTRODUCTION

It is the policy of the University of North Carolina at Wilmington (UNCW) to provide a safe and healthy environment for our students, faculty and staff.

In keeping with this policy, the University has established a Radiation Safety Committee to oversee the use of radioactive materials and radiation machines. The Committee or the Radiation Safety Officer is empowered to inspect all existing operations, make recommendations or note incidents of noncompliance with *North Carolina Regulations for Protection Against Radiation* and may accept or reject applications for use of radioactive materials and radiation machines on the UNCW campus.

All users of radioactive materials and radiation machines will be guided by the *North Carolina Regulations for Protection Against Radiation* latest edition.

SECTION 2 ADMINISTRATION

This Radiation Protection Manual provides guidance and direction for all users of radioisotopes, sealed sources and machines that generate x-rays.

This manual will provide users with a structured way to ensure operations meet the requirements of the *North Carolina Regulations for Protection Against Radiation*, and satisfy the Radiation Safety Committee that all practices and procedures are in accordance with accepted industry/research laboratory practice.

RESPONSIBILITIES OF USERS

It is the responsibility of each user to outline in detail, the use of the isotope or the equipment, beginning with purchase and ending with proper disposal, the description, and will include but is not limited to the following issues:

- Design of Workplace
- Personnel Monitoring
- Area Monitoring
- Shielding
- Storage of Sources
- Source Operations
- Transportation of Sources
- Waste Collection
- Decontamination
- Emergency Procedures
- Emergency Information
- Waste Disposal
- Training of Lab Assistants
- Training of Students

RESPONSIBILITIES OF THE RADIATION SAFETY COMMITTEE

The Radiation Safety Committee will review all aspects of each user's application and subsequent operations to ensure the requirements of all current and pertinent regulations are met, and that risk of exposure is minimized.

Compliance with North Carolina regulations, or UNCW procedures will be inspected periodically in the form of annual program audits and periodic laboratory surveys. Failure to comply with these regulations/procedures classified by the Radiation Safety Officer as Level A, Level B or Level C and enforcement action taken in accordance with the following schedule:

Level A: The highest level of severity. Resulting from a violation that causes an immediate or high risk to safety, health or the environment, and/or a potential action against UNCW's Radioactive Material License. In summary these violations include improper security, handling or release of radioactive materials. A researcher will be notified immediately in person and in writing if a level A infraction occurs. A level A infraction can result in immediate removal of all radioisotopes from the researchers laboratory and will result in immediate notification of all Radiation Safety Committee members. If the infraction is not corrected or an approved schedule of corrective action implemented in ten days, all radioactive materials will be removed from the laboratory until the researcher's privileges are reinstated by the Radiation Safety Committee.

Level B: A less serious infraction, that presents a non-immediate risk to health, safety and/or the environment, but may become more significant if not corrected. These violations include non-timely training of persons working with radioactive materials, not conducting surveys, not wearing dosimeters or performing procedures that do not practice ALARA. A researcher will be notified in person and in writing from the Radiation Safety Officer or his designee and the Radiation Safety Committee notified of the details of the infraction at its next meeting. If the infraction is not corrected or an approved schedule of corrective action implemented in fifteen days, the infraction will be elevated to a Level A.

Level C: A minor infraction, typically a record keeping issue, that presents a minimal risk to health, safety and/or the environment. These violations include incomplete survey records, inventory records, incomplete labeling or out of date survey instrument calibration. A researcher will be notified in person and in writing from the Radiation Safety Officer or his designee. If the infraction is not corrected or an approved schedule of corrective action implemented in fifteen days, the infraction will be elevated to a Level B.

RESPONSIBILITIES OF THE RADIATION SAFETY OFFICER

Annually, the Radiation Safety Officer will submit an Annual Program Review as ordered in Section 11 to the Radiation Safety Committee. The Radiation Safety Officer will assist with purchase and disposal contracting and will negotiate other services with each user.

SECTION 3 APPLICATION PROCEDURES

Please provide information requested and answer all questions.

A. Persons

1. List person responsible for use of radioactive materials. Please list campus address and telephone number, home address and telephone number.
2. List all persons or groups of persons who will operate equipment or handle sources.
3. List all additional persons who will be exposed to these radioactive materials or radiation machinery as a result of their work in the laboratory area/environment.

B. Location

Provide detailed diagrams of the location of the radioactive material, or radiation machinery, specifically a diagram showing the room location within the building and the location of the radioactive materials within that room. Describe posting of areas where the material will be used in research, and where the material will be stored. Also provide location and posting of radioactive waste storage. Describe the security of these areas and list persons with access to the restricted areas. Describe the working surface, the storage container and the waste storage container.

C. Funding

1. Provide source of revenue that supports this teaching/research. List the vendors address, telephone number, contact person, contract number or purchase order number, frequency of shipment, and the external appearance of the material as it will be received by the UNCW Warehouse.
2. Provide cost of material, and the maximum amount of radioactive material to be held at one time including waste and the chemical and physical form of the radioactive material. Provide the storage requirements for the material. Include, for instance, refrigeration shielding, etc.

D. Process

Provide a detailed description of the use of the material from beginning to end, including the chemistry, physics and process.

E. Monitoring Equipment

Describe the monitoring equipment, the methods of monitoring, frequency of monitoring and calibration of monitoring equipment. A calibration should be performed at least annually. Calibration and monitoring information is available from the Radiation Safety Officer.

F. Protective Clothing

Describe protective clothing to be used.

G. Personnel Monitoring

Describe personnel monitoring procedures.

H. Training

Provide description of the training to be given to all users under your supervision. See Chapter 4 of this manual and Section .1000 of the *North Carolina Regulations for Protection Against Radiation*.

I. Disposal

Describe disposal of radioactive waste including storage of waste, contractors available to dispose of waste, cost of waste disposal and the period of time that wastes will be stored on campus.

J. Credentials

Provide a detailed description of your radioactive experience and training and your curriculum vitae.

SECTION 4 TRAINING REQUIREMENTS

All users of radioactive isotopes and radiation machines will provide instruction to persons exposed to the equipment or isotope.

Section .1003 of the *North Carolina Regulations for Protection Against Radiation* contains guidance in this area.

Each user, as a part of the application process, will provide the Radiation Safety Committee a detailed description of the training and instruction requirements. The basic criteria that this plan must meet is as follows:

- A. Does each person using the isotope/equipment deal with an emergency without the help of the researcher/Principal Investigator?
- B. Do all persons with access to the restricted area (housekeepers, clerical persons) understand the hazards and emergency procedures?
- C. Each "Authorized User" will complete the attached training form and forward a copy to the Safety Department. All persons who use isotopes/equipment under the user's supervision and all persons with access to the restricted area must be trained by the Authorized User prior to their entry into the restricted area or use of isotopes. A record of their training will be kept on file by the Authorized User and the Safety Department.
- D. The Safety Department will conduct performance audits to ensure that the training is effective and is provided to all personnel in the restricted area.

RADIATION SAFETY TRAINING RECORD

DATE: _____

INSTRUCTOR: _____

SUMMARY OF TRAINING:

COURSE CONTENTS:

ATTENDANCE:

NAME	DEPARTMENT	SOCIAL SECURITY #
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

NOTE: Upon completion forward a copy of this training record to the Safety Department

STORAGE REQUIREMENTS

Storage of radioisotopes will be in accordance with Section .1600 of the *North Carolina Regulations for Protection Against Radiation*.

In addition, the following conditions must be met:

- A. All sources will be stored under lock and key in an unmovable container. Persons with access to the locked container will be listed on the door, with telephone numbers.
- B. Sealed sources located in larger equipment will be kept in a locked room with limited access. Radiation equipment will be kept in a locked area with limited access.
- C. Materials that must be refrigerated will be kept in locked refrigerators.

SECTION 6

PERSONNEL MONITORING/OCCUPATIONAL DOSE LIMITS

Occupational Dose Limits

Occupational dose limits for adults are established by the *North Carolina Regulations for Protection Against Radiation* and are found in Paragraph .1604 and quoted below.

.1604 OCCUPATIONAL DOSE LIMITS FOR ADULTS

- (a) The licensee or registrant shall control the occupational dose to individual adults, except for planned special exposures as provided in Rule .1608 of this Section, to the following dose limits:
 - (1) an annual limit, which is the more limiting of:
 - (A) the total effective dose equivalent being equal to five rems (0.05Sv); or
 - (B) the sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rem (0.5 Sv); and
 - (2) the annual limits to the lens of the eye, to the skin, and to the extremities that are:
 - (A) an eye dose equivalent of 15 rems (0.15 Sv), and
 - (B) a shallow-dose equivalent of 50 rems (0.50 Sv) to the skin or to each of the extremities.

It is our goal at UNCW to ensure that we do not in any way approach these limits. In order to do that, the following Personnel Monitoring Procedures are established:

External Exposures

Personnel monitoring devices (film badges, thermoluminescent dosimeters (TLD), pocket dosimeters, etc.), are provided by the UNCW Radiation Safety Officer (RSO) to measure an individual's radiation exposure from gamma, energetic beta and x-ray sources. The standard monitoring device is issued as a clip-on badge and/or ring badge bearing the individual assignee's name, date of the monitoring period and a unique identification number. The badges are provided, processed and reported through a commercial service company.

Requirements

Radiation protection regulation and UNCW policy require that appropriate personnel monitoring equipment be provided to individuals who:

1. Are likely to receive a radiation dose in any calendar year in excess of 10 percent of:
 - a) 5 rems, total effective dose equivalent, to the whole body;
 - b) 15 rems, eye dose equivalent, to the lens of the eyes;
 - c) 50 rems, shallow dose equivalent, to the skin or to each of the extremities.
2. Are under 18 years of age and are likely to receive a radiation dose in any calendar year in excess of 10 percent of:
 - a) 0.5 rems to the whole body;
 - b) 1.5 rems to the lens of the eyes;
 - c) 5 rems to the skin or to each of the extremities.
3. Have declared a pregnancy or planned pregnancy;
4. Operate analytical x-ray devices (ring and whole body badges);
5. Meet the issuance criteria as assessed by the Radiation Safety Officer and Authorized User.

Issuance Criteria

During the application procedure the Authorized User and the Radiation Safety Officer will propose personnel monitoring requirements to the Radiation Safety Committee for approval.

In general, personnel monitoring devices will be provided for individuals working with gamma x-ray or higher energy beta emitting radionuclides or with radiation machine sources.

Personnel monitoring devices will not normally be issued to individuals who work solely with low energy beta emitters such as H-3, C-14 and S-35.

Monitoring Protocol:

1. The Safety Department will request prior radiation dose histories from all past

employers.

2. Badges will be exchanged on a monthly basis depending on the anticipated exposure level as evaluated by the Radiation Safety Officer.
3. All personnel occupational radiation dose records shall be maintained by the Authorized User and Radiation Safety Officer.
4. It shall be the responsibility of each individual badge recipient to wear and use the badge(s) properly.
5. Authorized Users are responsible for assuring their radiation workers are wearing badges appropriately and that badges are returned on time for reading.

Recording Exposures

Measured personnel occupational radiation doses, including bioassay results, are to be recorded and maintained on file by the Radiation Safety Officer.

Use of Personnel Monitoring Devices

The whole body badge (or other device) is to be worn on the body where it will most likely approximate the radiation exposure to the head and torso of the wearer. A badge assigned for whole body monitoring is not to be used to monitor the extremities (hands, forearms, feet, ankles). Separate badges must be assigned for extremity monitoring.

Generally, whole body badges are to be worn between the waist and the neck. When a protective apron is worn, the badge is to be worn at the collar, outside the apron. In some circumstances, where exposure of the neck and lenses of the eyes is negligible, the monitoring badge may appropriately be worn under the apron. The Radiation Safety Officer should be consulted for advice in these circumstances.

Extremity monitoring badges (rings) are available in large or small size and for the right or left hand. Ring badges should be worn whenever working with applicable sources. When using radioactive materials, the ring monitoring element (label area) should be turned toward the palm. Gloves should be worn over the ring badge when contamination is possible.

The exposure of a personnel monitoring device to deceptively indicate a dose delivered to an individual is prohibited by North Carolina regulations.

UNCW Pregnant Employee - Fetal Dose Policy

The UNCW Fetal Dose Policy incorporates safety information and radiation dose guidelines

for ensuring safe radiation limits for the embryo/fetus of occupationally exposed employees. (See Sections 12 and 13.)

Investigational Levels: External Exposure

It is the goal of the Radiation Protection Program at UNCW reduce exposures to as low as reasonably achievable. The Radiation Safety Officer will investigate any monthly exposures that exceed 1.5 percent of the limits listed in the Occupational Dose Limits for Adults. This investigation will be aimed at improving procedures and work habits in an effort to maintain all doses as low as reasonably achievable.

Internal Exposure

Bioassay Personnel Monitoring

Bioassay is the determination of the kind, quantity or concentration, and location of radioactive material in the human body by direct (in vivo) measurement or by analysis (in vitro) of materials excreted from the body. Commonly employed bioassay techniques include urinalysis and thyroid monitoring. A bioassay program provides the necessary personnel monitoring to measure operational or accidental uptakes by radiation workers.

Radioactive material usage is approved only when the associated safety program, equipment, facilities and staff experience assures that safe use will be routinely maintained. The potential for radiation exposure due to inadvertent failures of procedures and equipment may increase, when certain combinations of radionuclides, chemical or physical forms and activities are involved.

Current health physics practices and safety survey results provide evidence that few, if any, radioactive material procedures currently in use allow routes for personnel uptakes. Some procedures do incorporate radionuclide form and activity combinations that warrant bioassay monitoring to assure that designated precautions remain effective.

A determination of bioassay personnel monitoring needs and frequency is made by the Radiation Safety Officer during the review of applications. The status of existing usage programs is periodically reviewed through inventory records and annual audits.

Routine bioassay monitoring will be conducted when any individual is working with radionuclide form/activity combinations exceeding established limits. "Working with" includes withdrawing an aliquot from a stock supply that itself exceeds a limit, even though the activity actually used is below the bioassay limit.

Bioassay Radionuclide, Form and Activity Limits

Tritium (H-3)

Urinalysis is required within 24 hours, if possible, but not later than 72 hours after working with 100 millicuries or more of tritium in any form.

Iodine (1-125, 1-131)

An external thyroid bioassay by external counting is required within 24 hours, if possible, but not later than 72 hours after working with the following limits or greater:

1. Processes in open room or bench with possible escape of iodine from process vessels:
1 mCi if volatile form
10 mCi if bound to nonvolatile agent
2. Processes with possible escape of iodine carried out within a fume hood of adequate design, face velocity, and performance reliability:
10 mCi if volatile form
100 mCi if bound to nonvolatile agent
3. Processes carried out within gloveboxes, ordinarily closed, but with possible release of iodine from process and occasional exposure to contaminated box and box leakage:
100 mCi if volatile form
1000 mCi if bound to nonvolatile agent

Other Radionuclides (C-14, P-32, S-35, Ca-45, Cr-51, etc.)

Urinalysis is required within 24 hours, if possible, but not later than 72 hours following potential ingestion, inhalation, or skin contamination of personnel. Additional urinalysis or external organ counting may be conducted, depending on the biological attributes of a specific radionuclide.

Analysis and Recordkeeping

Any employee request for a bioassay analysis will be honored.

Standard methods for bioassay evaluations are normally sufficient to measure body or organ uptakes of radionuclides to a small fraction of a Maximum Permissible Body Burden. An outside laboratory specializing in bioassay services will be used for any analysis. Bioassay results will be recorded and maintained as part of the radiation worker's overall personnel monitoring history.

Summation of Internal and External Occupational Exposures

It is the policy of UNCW to sum internal and external occupational exposures when the radiation worker requires both internal and external radiation exposure monitoring and when

the worker's intake of the radioactive material(s) yields a total committed effective dose equivalent that exceeds 10% of the prorated yearly limit for that monitoring period. ALI values as given in Appendix B to 10 CFR 20.1001 - 20.2401 are used to determine whether the intake limits have been exceeded. When the need to sum internal and external occupational exposures arises, a written request is made to the badge provider to update the radiation worker's dose history accordingly.

Example: Monthly urinalysis reveals that a radiation worker has had a 20 microcurie intake of Carbon 14 in a given month. A total committed effective dose equivalent of 50 mrem is calculated based on this intake. Because the monthly prorated dose limit to this worker is 400 mrem (5000 mrem/12 months) and 50 mrem exceeds 10% of 400 mrem, it would be necessary to add this calculated exposure to the worker's permanent dose history.

Dose Limits From Individual Members of the Public

Paragraph .1611 and .1612 of the *North Carolina Regulations for Protection Against Radiation* delineate dose limits for members of the public. In order to ensure that these dose limits are kept as low as reasonably achievable, the Radiation Safety Committee evaluates each application for use to ensure that dose limits to the public are minimized. Secondly, the Radiation Safety Officer will periodically survey areas open to the public that are adjacent to radiation areas to ensure that the public is not being exposed to radiation.

SECTION 7 RECEIVING

Pick-up, receiving and opening of packages will be executed in accordance with Section .1600 of the *North Carolina Regulations for Protection Against Radiation*. Prior to ordering radioactive materials, the researcher will issue a request to the Radiation Safety Officer describing the form, activity and vendor information, so that the Radiation Safety Officer may evaluate whether the order will violate any current licence requirements or radioactive material limits. Each request should be evaluated within three days of receipt, at the Safety Department. A request form is attached to further simplify this process. When inputting a requisition for a radioactive material (Screen 251), the operator must specify in the area entitled "Deliver To (If Different From Ordering Dept) Dept: Safety, Name: Safety Director, Bldg: Safety Trailer, Ext.: 7017." The Radiation Safety Officer, or designee must be notified in advance of an anticipated arrival time of radioactive material at UNCW. Each user should give the Safety Department at least 72 hours notice of the anticipated arrival date or dates.

The Safety Department is responsible for picking up the package and monitoring as specified in Section .1600 of the regulations. The package will be delivered to the user as expeditiously as possible and within the time limits prescribed by Section .1600 *North Carolina Regulations for Protection Against Radiation*.

A control number shall be assigned by the Safety Department to each radioisotope. Each control number is an eight digit number. The first six numbers representing the date and the last two being the number of the radioisotopes received on that day in ascending order. For example, the first radioisotope received on January 1, 1992 would be 010192-01 and the second one received on that date would be 010192-02 and so on.

The radioisotope shall be delivered to the user, along with the UNCW Radioisotope Inventory Control Sheet with the first line filled in by the Safety Department. The Safety Department will then enter the shipment into its Radiation Inventory ledger book along with the results of monitoring.

MEMORANDUM

TO: Stan H. Harts
Radiation Safety Officer

FROM: _____
Principal Investigator

DATE: _____

SUBJECT: Request for Purchase of Radioactive Materials

I would like to place an order for _____ ? Ci of _____ (radioisotope) from _____ (vendor). This radioisotope will be in the form of _____ (quantity and chemical). I would like to place the order on _____ (date). The radioactive material will be received, used stored and disposed of in accordance with the conditions of my application and the UNCW Radioactive Materials License. The shipment is expected to arrive on _____ (date) by _____ (courier). Please notify me as soon as possible following your review to see if it may be ordered in accordance with our license.

License Review by RSO:

Reviewed on : _____ (date)

Reviewed by: _____ (person)

Licensed material: Yes? No?

Within licensed quantity: Yes? No?

Used by licensed investigator: Yes? No?

Investigator status current: Yes? No?

SECTION 8 DISPOSAL

Section .1200 and .1600 of the *North Carolina Regulations for Protection Against Radiation* contains guidance in the area of waste disposal. Each waste disposal plan shall include the approximate length of time that a waste container will be used. The user shall notify the Safety Department when the container is two-thirds full. In addition, please consider the following in developing a waste disposal plan:

- A. "Mixed waste" will not be generated. Mixed wastes are EPA hazardous, or toxic chemical/solvents that contain radioactivity. There is no acceptable way to dispose of these wastes. The EPA has banned many chemicals/solvents from landfill disposal and we cannot incinerate solvents that contain radioactive material.
- B. Clear and precise records must be kept on solid waste generated and stored for disposal. Solid wastes are generally papers, gloves, and nonliquid items for disposal.
- C. To the maximum extent possible, all sealed sources installed in equipment will be purchased with an agreement with the vendor that the sealed source can be returned to the vendor at the end of the useful life of the equipment.
- D. Disposal to the sanitary sewer is a function of total effluent discharged by the building and of the concentration of the radioisotope used in scintillation cocktail. Each Authorized User must coordinate with the Radiation Safety Officer to establish monthly/annual disposal limits.

SECTION 9 RECORDKEEPING

Section .1600 of the *North Carolina Regulations for Protection Against Radiation* contains guidance for records to be maintained by each licensee. To ensure that we have adequate redundancy in recordkeeping each user will maintain a three-ring ? Radiation Safety Information? binder containing the following:

1. A current copy of applicable sections of the North Carolina Regulations for Protection Against Radiation..
2. A current copy of the UNCW Radiation Protection Manual.
3. A current copy of the UNCW Radioactive Materials License.
4. A copy of the most up to date Notice to Employees.
5. A list of currently certified laboratory workers, authorized to use radioactive materials and their training certificates.
6. A UNCW Radioisotope Inventory Control form for each container of radioactive materials currently in the possession of the researcher, or in the possession of the researcher in the previous 12 months.
7. Summaries of wipe test conducted following each use of radioactive materials.

These binders will be provided by the Radiation Safety Officer when a researcher is placed on the Radioactive Materials License and updated copies of regulations and procedures will be provided by the Radiation Safety Officer. If a researcher wishes to utilize another system of recordkeeping, it must be demonstrated to the Radiation Safety Officer to maintain all records in a readily accessible format to all workers and inspectors.

The Safety Department will maintain a duplicate file of these records. The Radiation Safety Officer shall inspect the user's records at any time. Failure to provide inventory/leak tests within ten (10) days of due date will put the user on probation. No license changes will be made or shipments delivered while on probation. Failure to submit inventories/leak tests for thirty (30) days will result in a license termination review by the Radiation Safety Committee.

A UNCW Radioisotope Inventory Control form shall be used with all isotopes. Each time an isotope is ordered it will be delivered to the user by the Safety Department, and will be assigned a control number. This number will be used until the isotope is disposed of.

All use, disposals and wipe tests of isotopes shall be entered on the Radioisotope Inventory Control Form. After **each use a wipe test shall be performed** and the results maintained with the inventory and available for audit. An Inventory Control Form shall be used with sealed sources. Upon receipt of a machine which uses a sealed source, the UNCW Safety Department shall assign a control form to the user which will keep track of leak tests and inspection which are conducted on a six-month basis. All sealed sources shall be tested for leakage and/or contamination at intervals not to exceed six months. If the leak test reveals the presence of 0.005 microcuries or more of removable contamination, the user shall immediately notify the Radiation Safety Officer. In addition to logging waste on the Inventory Control Form, each waste container

shall have a form used to annotate all disposals (clip board) attached to it. This form shall include the date that the waste was deposited, the isotope, and a description of the waste, (pipettes, gloves, paper towels, etc.).

SECTION 10 EMERGENCY PROCEDURES

Each user's application for use of an isotope or equipment will include a pre-accident plan. This documentation will at a minimum, cover:

A. Immediate response to:

1. Fire
2. Spill on the floor/on person
3. Over exposure
4. Power failure
5. Evacuation of building
6. Medical emergency in the work area
7. Theft or loss

B. Notification procedures, incidents, accidents, encounters with the press.

C. Safety equipment required and location for accidents, incidents, spills, clean-up and monitoring.

SECTION 11 ANNUAL PROGRAM REVIEW

The Radiation Safety Officer will conduct periodic reviews of the radiation protection program at UNCW. This review process consists of annual program review, audits of each user using the "Radiation Safety Audit Report? , and annual review of the Radiation Protection Manual to ensure compliance with all changes to the *North Carolina Regulations for Protection Against Radiation*. The results of this review will be provided to the Radiation Safety Committee for review. The results of each audit and the annual review will be kept in the Safety Department in accordance with the recordkeeping requirements of the *North Carolina Regulations for Protection Against Radiation*.

In addition, this process will include a less through but more frequent, periodic laboratory survey conducted throughout the year to ensure continual compliance with regulations and procedures.

RADIATION SAFETY AUDIT REPORT

DATE: _____ AUTH. USER: _____

SECTION 12 PREGNANT EMPLOYEE/STUDENT-CONCEPTUS DOSE

A. INTRODUCTION

The National Council of Radiation Protection and Measurements (NRC) has recommended a radiation dose limit of 500 millirems for the conceptus during the entire gestation period. This recommendation is adopted as policy by the University of North Carolina at Wilmington.

This action is taken to provide additional protection for the more radiosensitive conceptus, and to establish specific procedures for providing this extra safety measure.

It is the responsibility of the Radiation Safety Officer (RSO) to provide a copy of this policy to all declared pregnant radiation employees/students, and other interested individuals.

B. SPECIFICATIONS

Assuring an additional level of radiation protection for the conceptus of radiation employee/student requires close cooperation with the Radiation Safety Officer. A radiation employee/student should contact the Radiation Safety Officer as early as possible for the associated radiation safety information. Early contact will maximize the benefits provided by the safety information.

Conceptus dose safety conferences will be scheduled with each radiation employee/student who declares her actual, suspected or planned pregnancy. Such safety conferences are also available to any other employee/student upon request. The conferences will be with the Radiation Safety Officer or designee, and the employee's/student's supervisor/Principal Investigator, or designee. The employee/student will be provided a copy of this policy and the Special Considerations For The Pregnant Radiation Employee/Student information booklet. Safety aspects of the employee's/student's work will be discussed and an opportunity for questions provided. Her radiation monitoring program, including any past dose records, and the current occupational potential for radiation exposure will be reviewed.

1. Confidentiality Regarding Pregnancy

- a. It is realized that individual radiation employees/students may choose to maintain their pregnancy status as personally confidential for a time. Any employee/student may still obtain conceptus dose and related radiation safety information at any time through the Radiation Safety Officer without declaring her pregnancy status.

When a radiation employee/student does declare her pregnancy status to the Radiation Safety Officer, the employee's/student's supervisor/Principal

Investigator must also be informed. The involvement of supervisors is an essential part of the University's safety management.

- b. Every potentially pregnant radiation employee/student is urged to consider her supervisor's safety responsibilities and freely involve the supervisor in all work-related situations.

The University has no responsibility for providing specific fetal radiation dose precautions until a radiation employee/student openly declares her pregnancy status to the Radiation Safety Officer.

2. **Declared Pregnancy**

When an employee/student wishes the University to be involved in protecting her fetus under the 500 millirems dose guidelines, she must declare her actual, suspected or planned pregnancy to her supervisor and the Radiation Safety Officer. A safety conference will be scheduled with the employee/student, her supervisor and the Radiation Safety Officer or designee.

During the conference, the employee/student and her supervisor will be asked to sign a statement confirming that the Special Considerations For The Pregnant Radiation Employee/Student information booklet has been received, personnel monitoring has been established and that the supervision is involved.

3. **Conceptus Dose Control Procedures**

- a. The radiation employee/student will be assigned a monthly radiation monitoring badge and placed on a monthly bioassay program when radioactive materials use is involved.

The personnel radiation monitoring is provided exclusively by the UNCW Safety Department through the Radiation Safety Officer.

- b. The University's responsibility to protect the conceptus under the 500 millirems dose guideline begins only when the employee/student declares her pregnancy or intended pregnancy to her supervisor and the Radiation Safety Officer in writing. Control of the conceptus dose will be carried out with full cooperation of the employee/student and without economic penalty or loss of job opportunity, including, if necessary, consideration for work assignment changes, consistent with University personnel policy, that may be useful for controlling radiation exposure.

- c. When the occupational radiation dose of a declared radiation employee/student exceeds 50 millirems in a month since declaration:
 - 1) The employee may request:
 - (a) Maternity leave (for those employees actually pregnant)
 - (b) Other paid leave
 - (c) Leave without pay
 - (d) Reassignment within their work unit, or
 - (e) Transfer
 - 2) The student may request:
 - (a) Reassignment within their work unit, or
 - (b) Reassignment to research not using radioactive sources
 - 3) The supervisor should respond to requests in accordance with personnel policy.
- d. In conjunction with the 500 millirems conceptus dose limit, the As Low As Reasonably Achievable (ALARA) radiation protection philosophy will be applied to maintain any dose to as low as practicable levels.
- e. All radiation employees/students have the individual responsibility of adhering to University radiation safety procedures contained in the UNCW Radiation Protection Manual and specific Authorized User's approved applications.

C. ACTION LEVELS

The Radiation Safety Officer will investigate all reported doses in excess of 30 millirems.

Personnel monitoring badge doses reported will normally be accepted as an uncorrected guide to any conceptus dose. If personnel monitoring results indicate the possibility of a conceptus dose in excess of the 500 millirems limit, a special investigation will be conducted. The investigation will take into full consideration the type of energy of radiation involved, protective shielding that might have mitigated conceptus dose, and shielding afforded by the mother's body. The investigation results will be discussed with the

employee/student and a written report provided.

CERTIFICATION

I hereby certify that I am pregnant or am planning pregnancy. I have received a copy of Special Considerations For The Pregnant Radiation Employee/Student, a personnel monitoring program has been established for me and I have been given an opportunity to ask questions concerning the safety aspects of radiation dose to the conceptus.

Signed: _____

Date: _____

Supervisor: _____

Date: _____

RSO or Designee: _____

Date: _____

Return to: University of North Carolina at Wilmington
Radiation Safety Officer, Safety Department
601 S. College Road
Wilmington, NC 28403-3297

(910-962-3108)

Nuclear Regulatory Commission
Regulatory Guide 8.13
Instruction Concerning Prenatal Radiation Exposure

This is included as:

UNCW SPECIAL CONSIDERATIONS FOR THE
PREGNANT RADIATION EMPLOYEE/STUDENT

**NOTE SECTION 13 SHOULD BE CONSIDERED DRAFT PENDING APPROVAL BY
RADIATION SAFETY COMMITTEE ON OCT 26, 2004**

**SECTION 13
DECOMMISSIONING**

When a licensed user changes laboratory locations, discontinues radioactive materials use for greater than 12 months or longer or is no longer affiliated with the university, the principle investigator or department chair shall notify the RSO of their intentions.

The RSO will then complete the attached UNCW Radioactive Materials Decommissioning Form. This form documents removal of the radioactive materials, wastes, any contaminated equipment, and confirms removal by a decommissioning survey. Additionally, it makes provisions for removing markings, labels and notices from the laboratory, prior to release to unrestricted use. The RSO shall notify the principle investigator or department chair when completed.

**NOTE SECTION 13 SHOULD BE CONSIDERED DRAFT PENDING
APPROVAL BY RADIATION SAFETY COMMITTEE ON OCT 26, 2004**