

**HAMILTON COLLEGE
RADIATION SAFETY MANUAL**

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FOREWORD

The Radiation Safety Manual represents one part of a commitment by the administration of Hamilton College to keep occupational radiation exposure as low as reasonably achievable (ALARA). It complements organizational units established within the university to provide direction and oversight to activities using radioactive materials and radiation-producing machines.

The pursuit of scholarly endeavors through use of all means available is encouraged, consistent with safe practices that minimize risk to humans and the environment. To this end, adoption of these policies and procedures in research and teaching is fundamental to achieving the goal of ALARA.

The Administration welcomes input from radiation workers about our radiation protection program. Modifications to operating procedures and equipment and facilities will be considered where they substantially reduce radiation exposure at reasonable cost.

President
Hamilton College

A. INTRODUCTION

Ionizing radiation arises from both natural and man-made sources. It's use in teaching and research provides a valuable tool to demonstrate principles and probe the unknown. Hamilton College must operate within the regulations established by the State of New York Department of Health (State Sanitary Code Chapter I - Part 16). This manual constitutes minimum acceptable requirements for use of radioactive materials at Hamilton College. It is the University's policy to keep radiation exposure as low as reasonably achievable (ALARA).

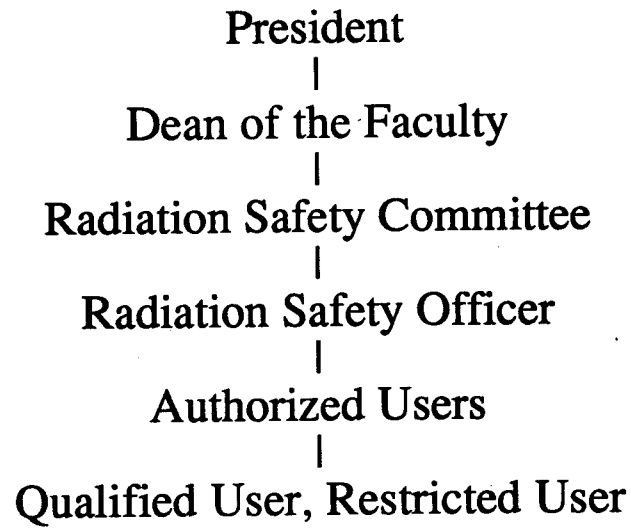
Adherence to the stated regulations, procedures, and protocols will ensure maximum radiation safety to those using radioactive materials. Failure to follow procedures in this manual may result in excessive personnel exposure and may put in jeopardy the authorization of Hamilton College to use radioactive materials.

All personnel using radiation sources are expected to be familiar with radiation safety requirements in this guide and to conduct their operations in accordance with them. The University is committed to a program which will minimize personnel exposure.

**Chairman, Radiation Safety Committee
Hamilton College**

B. ORGANIZATIONAL CHART

The administrative structure to supervise the possession of radiation sources and their use within the College is set forth in the chart below. For details concerning these relationships, consult Sections C, D, and E of this manual.



C. RADIATION SAFETY COMMITTEE

1. General Description

The Radiation Safety Committee shall be a standing College Committee.

The Radiation Safety Committee (RSC) shall consist of at least five members. It is recommended that the committee be composed of at least three faculty from the Science Departments, the Radiation Safety Officer (RSO), and an administrative representative. All members of the Committee, including the Chairperson, shall be appointed by the authority of the President of Hamilton College. The Radiation Safety Officer and the administrative representative will be permanent members of the Committee and will not be eligible to serve as Chairperson of the Committee. Other members than those designated above may be added as deemed appropriate by the President.

The responsibility of the Radiation Safety Committee shall be to establish and administer the radiation safety program for all licensed users of ionizing radiation sources. The Committee will ensure that all individuals who work with or in the vicinity of radioactive material have sufficient training and experience to enable them to perform their duties safely and in accordance with established regulations and license conditions.

This Committee has been designated by the State of New York as the responsible agent of the College. The RSC shall meet as often as necessary to conduct its business, but not less than once each calendar quarter and upon call of the Chairperson. A quorum shall consist of at least one-half of the Committee's membership, including the Chairperson, RSO and administrative representative.

The Radiation Safety Committee is the final authority in all matters pertaining to radiation safety.

2. Duties and Functions

The duties and functions of the RSC are to:

- a. Be familiar with all pertinent New York Health Department regulations (State Sanitary Code, Chapter I - Part 16) and the terms of the license.
- b. Establish rules, regulations, and policies regarding College radiation safety and radiation producing equipment.
- c. Ensure that the College's program to maintain individual and collective doses as low as reasonably achievable (ALARA) is properly maintained. This will be accomplished by the performance of a semi-annual review of occupational radiation exposure records of all personnel working with radioactive materials (if applicable).
- d. Review and act upon all applications for possession and use of sources of ionizing radiation. This will include a review of the individual's training and experience in working with radioactive materials and their ability to perform duties in accordance with specified regulations and license conditions.
- e. Prescribe special conditions that will be required during a proposed use of radioactive material such as requirements for bioassays, physical examinations of users, and/or special monitoring procedures.

f. Receive and review periodic reports from the Radiation Safety Officer.

g. Review the entire radiation safety program at least annually to determine that all activities are being conducted safely and in accordance with specified regulations and license conditions.

h. Review with the Radiation Safety Officer major instances of alleged infractions during the use of radionuclides or radiation, or of safety rules, and take necessary action to correct such infractions.

i. Maintain written records of all Committee meetings, actions, recommendations, and decisions.

j. Ensure the byproduct material license is amended, if required, prior to any change in facilities, equipment, personnel, policies and/or equipment.

3. **Responsibility of Chairperson**

It shall be the responsibility of the Chairperson to:

a. Report periodically the actions of the RSC to the President or his designate.

b. Call for meetings of the RSC.

c. Circulate minutes of the RSC meetings to other committees with responsibility in the area of radiation safety, and to establish coordination with other responsible radiation safety bodies.

d. Appoint sub-committees to deal with specific areas of radiation as necessary.

e. It is a prerogative of the Chairperson to vote in all Committee matters.

4. **Hamilton College Radiation Safety Committee:**

David A. Gapp, Radiation Safety Officer, Professor of Biology

Pearl Gapp, Chair RCS, Laboratory Coordinator in Biology

Patricia Ingalls, Director, Campus Safety

Brian Hansen, Director of Environmental Protection and Safety

David G. Bailey, Associate Professor of Geosciences

Brian Collett, Associate Professor of Physics

Camille Y. Jones, Assistant Professor of Chemistry

D. RADIATION SAFETY OFFICER

1. General Description

The Radiation Safety Officer (RSO) is that person, who is appointed by the authority of the President of the College, and who by reason of education, training, and experience, is qualified to advise others in the safe use of radiation. The primary mission of the RSO is to execute the policies established by the RSC and to ensure compliance with the State regulations. The RSO reports directly to the RSC for matters of radiation safety concern.

2. Radiation Safety Officer is Responsible For:

a. General surveillance over all activities involving radiation and radioactive material, including routine monitoring and special surveys of all areas in which radioactive material is used.

b. Determining compliance with rules and regulations, license conditions, and the conditions of project approval specified by the Radiation Safety Committee.

c. Monitoring and maintaining special ventilation filter systems (fume hoods) associated with the use and or storage of radioactive material.

d. Furnishing consulting services on all aspects of radiation protection to personnel at all levels of responsibility within the College or engaged in College activities.

e. Purchasing and transferring all radioactive materials in accordance with Sections S and T of this manual.

f. Receiving, delivering, and opening all shipments of radioactive material arriving at the institution and receiving, packaging, and shipping all radioactive material leaving the institution.

g. Distributing and processing personnel monitoring equipment; determining the need for and evaluation of bioassays; keeping personnel exposure and bioassay records; and notifying individuals and their supervisors of exposures approaching any limits and recommending appropriate remedial action.

h. Conducting training programs and otherwise instructing personnel in the proper procedures for the use of radioactive materials and other radiation sources prior to use, at periodic intervals (refresher training), and as required by changes in procedures, equipment, regulations, etc.

i. Supervising and coordinating the radioactive waste disposal program, including keeping waste storage and disposal records and monitoring effluents.

j. Storing all radioactive materials not in current use, including wastes.

k. Performing leak tests on all sealed sources.

l. Maintaining an inventory of all radionuclides at the institution and limiting the quantity of radionuclides at the institution to the amounts authorized by the license.

- m. Maintaining other records not specifically designated above; for example, receipt, transfer, and survey records.
 - n. Investigating any and all accidents, spills, unplanned releases to the environment, and other abnormal occurrences regarding radiation or radioactive material.
 - o. Supervising decontamination in case of accident.
 - p. Coordinating and submitting licensing applications and amendments to the State of New York.
 - q. Screening grant applications for licensing feasibility, prior to submission of the grant application to the granting agency.
 - r. Maintaining a file of radiation-producing and -detecting equipment at Hamilton College.
3. **The Radiation Safety Officer will also perform certain functions for the RSC.**
- a. The RSO will serve as secretary of the RSC, and keep RSC records.
 - b. The RSO will furnish reports to the RSC as follows:
 - 1) The annual report on the status of the radiation safety program within the College.
 - 2) A semi-annual report of inventory of radioactive materials at Hamilton College.
 - 3) A report at every quarterly meeting of the RSC of unusual or abnormal incidents involving radiation and radioactive material.
4. **The Radiation Safety Officer has the authority to terminate immediately a project, activity, or use of radiation or radioactive material that is found to be a threat to health or property.** This would include the closing of a laboratory or the confiscation of radioactive material if such actions would remove or prevent the recurrence of a threat to health or property. Such a termination action shall be reported in writing to the Chairperson of the RSC within 48 hours after such termination action has been taken.

E. Definitions of Users of Radioactive Materials and Radiation Machines

The Radiation Safety Committee is empowered to authorize the possession and use of radioactive materials and radiation machines. Two categories of users have been established for which an individual may apply. These are “**Authorized User**” and “**Qualified User**”. A further discussion of each of these categories including the particular responsibilities and authorizations follows.

A chain of responsibility regarding the safe use of radioactive material and radiation machines exists from individual users to the RSC. This chain is independent of other administrative lines of control within Hamilton College. However, the RSC recognizes the right of any administrative entity within Hamilton College to impose additional restrictions, qualifications, and regulations regarding the use of radioactive material, radiation, or equipment by persons under its control.

Responsibilities of radionuclide users are outlined in Section G, and the procedures an individual must follow to become a user are presented in Section F of this manual.

1. **Authorized User.** A person designated by the RSC as an “Authorized User” may use and possess radioactive materials and/or radiation machines as specified by the RSC. An Authorized User bears the responsibility for the proper storage of materials under his/her control and for their proper use under his/her direction. Only an Authorized User may initiate the purchase or transfer of radioactive materials, as described in Sections S and T of this manual.

In general, Authorized Users should be permanent members of the Hamilton College faculty or staff and ideally would have a position that would allow them to administer naturally the use of the radioactive materials under their authorization. An Authorized User may sponsor the use of radioactive materials and radiation machines by Qualified Users and personally supervise the use by Restricted Users. Further discussion of these activities appears below.

2. **Qualified User.** The category of “Qualified User” has been established to allow qualified persons to use radioactive material or radiation machines under specific circumstances under the sponsorship of an Authorized User. The latter shall bear primary responsibility for the safe use of the material or equipment. However, in the handling of radioactive materials or radiation machines, the Qualified User category is intended for students or technical employees whose association with Hamilton College may not be permanent and whose backgrounds may not be extensive enough to warrant a broad authorization to use radioactive materials or radiation machines. Such persons, sponsored by and with the written permission of an Authorized User to whom they have demonstrated their competence, may be permitted to use radioactive material or radiation machines in a manner specified by his/her application to the Committee without direct supervision. A Qualified User may not supervise the use of radioactive materials or radiation machines by Restricted Users except as specifically authorized by the RSC in writing.
3. **Restricted User.** A “Restricted User” is one who has not received authorization by the RSC as either an Authorized or Qualified User. A Restricted User may not use radioactive materials or radiation machines, except under direct supervision of an Authorized User.

4. Visiting Faculty

a. **Visiting Faculty who are Leave Replacements:** The RSO will apply for Authorized User status for visiting faculty who plan to use radioactive materials in their teaching laboratories. This requires amendment to the Radioactive Materials License and must be initiated at least two months prior to their arrival on campus.

b. **Visiting Researchers and Scholars-in-Residence:**

- 1) Host faculty will apply for Qualified User status (at least one month in advance of a proposed visit) for any visiting researchers and Scholars-in-Residence working under their authorization.
- 2) Visiting researchers cannot apply for Authorized User status. They must work under a College Authorized User, preferably the faculty member hosting their visit.
- 3) Host facility will provide dosimetry monitoring, as necessary.
- 4) Visitors must be instructed on the policies and procedures for radioactive materials handling at the College.
- 5) Records of instruction and dosimetry will be maintained by the RSO.
- 6) Visitors may not bring new sources or material on campus without prior approval from the RSC. Transfers will be made as outlined in Section T of this manual.

5. Direct or Personal Supervision

a. Direct supervision requires that the operation in question has been planned by the Authorized User, and the Restricted Users have been told of any potential hazards and been instructed in procedures to be followed both in normal circumstances and in the event of an abnormality or accident.

b. When the operation involves unsealed sources of radioactive material, the Authorized User must remain in the room in which the nuclide use is underway.

c. When the operation involves a sealed source or sources in a setup which does not present dose rates at the accessible boundary of the setup exceeding 2.5 mrem/hr, the Authorized User need not remain in the room, but must be in the same general area of the building in which the radionuclide use is underway, and must be aware of the operation in progress.

F. APPLICATION PROCEDURES AND GENERAL CRITERIA FOR APPROVAL

1. Application for possession and use of sources of radiation, and for Authorized User or Qualified User Status, will be made on the appropriate forms.
2. The application procedure has been broken down into two parts to facilitate application and amendment, and to minimize paperwork. Conceptually, these two parts are a "user" application (Form RSO-1) and a "use" application (Form RSO-2). "Use" and "User" applications must be filed initially and whenever significant changes are made.
3. An application will be submitted to the RSO for preliminary review. The application will then be reviewed by each RSC member, signed, and returned to the Chairperson with the following comments: Approve, Disapprove, Request Meeting of RSC to Discuss, or Questions and Remarks. All questions must be resolved before final approval, and prior to procurement of sources of radiation. Between regularly scheduled meetings, review and approval will ordinarily be done by mail and telephone.
4. Applications will be approved if the RSC is satisfied that the applicant:
 - a. possesses adequate facilities and equipment, appropriate for the proposed use, which will ensure the safety of workers and public, and prevent or minimize environmental damage;
 - b. has established safe and effective operating, handling, and emergency procedures;
 - c. has adequate training and experience to safely carry out the proposed use;
 - d. will maintain radiation exposures to workers and the public "as low as reasonably achievable" (ALARA); and
 - e. will conform to all applicable regulations and procedures, such as recordkeeping, established by State and local authorities regarding all other aspects of possession and use of ionizing radiation.
5. On approval by the RSC, the user will be assigned a user number by the RSO. This number will be recorded on the user application and a copy of the completed application form will be provided to the user to serve as his/her AUTHORIZATION.