

**Program for Maintaining Occupational Radiation Exposure  
at Medical Institutions ALARA  
ALARA Program**

**Virginia Commonwealth University  
Virginia Commonwealth University Health System  
May 6, 2009**

1. Management Commitment
  - a. We, the management of Virginia Commonwealth University and the Virginia Commonwealth University Health System are committed to the program described herein for keeping 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 will develop the necessary written policy, procedures, and instructions to foster the ALARA concept within our institution. The organization will include a Radiation Safety Committee (RSC) and a Radiation Safety Officer (RSO).
  - b. We will ensure that a formal annual review of the radiation safety program is performed, including ALARA considerations. This will include reviews of operating procedures and past dose records, inspections, etc., and consultations with the radiation safety staff or outside consultants.
  - 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 far below the limits as is reasonably achievable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.
2. Radiation Safety Committee (RSC)
  - a. Review of Proposed Users and Uses
    - (1) The RSC will thoroughly review the qualifications of each human-use applicant with respect to the types and quantities of materials and methods of use for which application has been made to ensure that the applicant will be able to take appropriate measures to maintain exposure ALARA.
    - (2) When considering a new use of byproduct material, the RSC will review the efforts of the applicant to maintain exposure ALARA.
    - (3) The RSC will ensure that the users justify their procedures and that individual and collective doses will be ALARA.
  - b. Delegation of Authority
    - (1) The RSC will delegate authority to the RSO for enforcement of the ALARA concept.
    - (2) The RSC will support the RSO when it is necessary for the RSO to assert authority. If the RSC has overruled the RSO, it will record the basis for its action in the minutes of the quarterly meeting.

## c. Review of ALARA Program

(1) The RSC will encourage all users to review current procedures and develop new procedures as appropriate to implement the ALARA concept.

(2) The RSC will perform a quarterly review of occupational radiation exposure with particular attention to instances in which the investigational levels in Table 1 are exceeded. The principal purpose of this review is to assess trends in occupational exposure as an index of the ALARA program quality and to decide if action is warranted when investigational levels are exceeded.

**Table 1**  
**Investigational Levels**  
(mRem per Calendar Quarter)

Area Exposed	Level I	Level II
1. Total effective dose equivalent, general	125	375
2. Total effective dose equivalent for physicians involved in angiography or cardiology (Webser calculation used)	125	800
3. Total effective dose equivalent for physicians involved in angiography or cardiology (no Webster calculation used)	125	1,000
4. Shallow-dose equivalent to skin or to any extremity	1,250	3,750
5. Eye dose equivalent	375	1,125
6. Deep-dose equivalent and committed dose equivalent to any individual organ or tissue other than the lens of the eye	1,250	3,750

The NRC has emphasized that the investigational levels in this program are not new dose limits but, as noted in ICRP Report 26, "Recommendations of the International Commission on Radiological Protection," serve as check points above which the results are considered sufficiently important to justify investigations.

(3.) The RSC will evaluate our institution's overall efforts for maintaining exposures ALARA on an annual basis. This review will include the efforts of the RSO, authorized users, and workers as well as those of management.

## 3. Radiation Safety Officer

## a. Annual and Quarterly Review

(1) **Annual review of the radiation safety program.** The RSO will perform an annual review of the radiation safety program for adherence to ALARA concepts. Reviews of specific methods of use may be conducted on a more frequent basis.

(2) **Quarterly review of occupational exposures.** The RSO will review at least quarterly the external radiation exposures of authorized users and workers to determine that their exposures are ALARA in accordance with the provisions of Section 6 of this program and will prepare a summary report for the RSC.

(3) **Quarterly review of records of radiation level surveys.** The RSO will review radiation levels in unrestricted and restricted areas to determine that they were at ALARA levels during the previous quarter and will prepare a summary report for the RSC.

## b. Education Responsibilities for ALARA Program

(1) The RSO will encourage briefings and educational sessions to inform workers of ALARA program efforts.

- (2) The RSO will ensure that authorized users, workers, and auxiliary personnel who may be exposed to radiation will be instructed in the ALARA philosophy and informed that management, the RSC, and the RSO are committed to implementing the ALARA concept
    - c. Cooperative Efforts for Development of ALARA Procedures  
Radiation workers will be given opportunities to participate in formulating the procedures that they will be required to follow.
      - (1) The RSO will maintain a liaison with all users and workers in order to develop ALARA procedures for working with radioactive materials.
      - (2) The RSO will establish procedures for receiving and evaluating the suggestions of individual workers for improving health physics practices and will encourage the use of those procedures.
    - d. Reviewing Instances of Deviation from Good ALARA Practices  
The RSO will ensure investigation of all known instances of deviation from good ALARA practices and, if possible, will determine the causes. When the cause is known, the RSO will require changes in the program to maintain exposures ALARA.
4. Authorized Users
  - a. New Methods of Use Involving Potential Radiation Exposures
    - (1) The authorized user will consult with, and receive the approval of, the RSO and/or RSC during the planning stage before using radioactive materials for a new method of use.
    - (2) The authorized user will evaluate all methods of use before using radioactive materials to ensure that exposures will be kept ALARA. This may be enhanced by using trial runs.
  - b. Authorized User's Responsibility to Supervised 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.
5. Individuals Who Receive Occupational Radiation Exposure
  - a. Workers will be instructed in the ALARA concept and its relationship to work procedures and work conditions.
  - b. Workers will know what recourse is available if they feel that ALARA is not being promoted on the job.
6. Establishment of Investigational Levels in Order to Monitor Individual Occupational External Radiation Exposures  
This institution hereby establishes investigational levels for occupational external radiation dose which, when exceeded, will initiate review or investigation by the RSC and/or the RSO. The investigational levels that we have adopted are listed in Table 1. These levels apply to the exposure of individual workers. The following actions will be taken at the investigational levels as stated in Table 1:
  - a. Personnel dose less than Investigational Level I.  
Except when deemed appropriate by the RSO, no further action will be taken in those cases where an individual's dose is less than Table 1 values for the Investigational Level I.
  - b. Personnel dose equal to or greater than Investigational Level I but less than Investigational Level II.  
The RSO will review the dose of each individual whose quarterly dose equals or exceeds Investigational Level I and will report the results of the reviews at the first RSC meeting

following the quarter when the dose was recorded. If the dose does not equal or exceed Investigational Level II, no action related specifically to the exposure is required unless deemed appropriate by the Committee. The Committee will, however, review each such dose in comparison with those of others performing similar tasks as an index of ALARA program quality and will record the review in the Committee minutes.

- c. Personnel dose equal to or greater than Investigational Level II.

The RSO will investigate in a timely manner the causes of all personnel doses equaling or exceeding Investigational Level II and, if warranted, will take action. A report of the investigation, any actions taken, and a copy of the individual's Form NRC-5 or its equivalent will be presented to the RSC at its first meeting following completion of the investigation. The details of these reports will be included in the RSC minutes.

- d. Reestablishment of Investigational Level II to a level above that listed in Table 1.

In cases where a worker's or a group of workers' doses need to exceed Investigational Level II, a new, higher Investigational Level II may be established on the basis that it is consistent with good ALARA practices for that individual or group. Justification for a new Investigational Level II will be documented.

The RSC will review the justification for and will approve all revisions of Investigational Level II. In such cases, when the exposure equals or exceeds the newly established Investigational Level II, those actions listed in paragraph 6.c above will be followed.

7. Signatures of Certifying Officials

We hereby certify that Virginia Commonwealth University and the Virginia Commonwealth University Health System has implemented the ALARA Program set forth above.

ORIGINAL SIGNED

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Brian J. Ohlinger, PE  
Associate Vice President  
for Facilities Management

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Sheldon M. Retchin, M.D., M.S.P.H.  
Chief Executive Officer  
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