

APPENDIX R

ALARA Component of the Radiation Protection Program including Radiation Safety Committees

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. We, the management of the facility, are committed to keep individual and collective doses as low as is reasonably achievable (ALARA) as described herein. 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. The organization will include a radiation safety committee (RSC) and a radiation safety officer (RSO).
 - B. We will be an active member of the RSC and will consider 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. Radiation Safety Committee
 - A. Review of Proposed Authorized Users and Uses
 - (1) The RSC will thoroughly review the qualifications of each 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 radioactive material, the RSC will review the procedures to maintain exposure ALARA.
 - (3) The RSC will ensure that authorized 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 RSC meeting.
 - C. Review of the ALARA Component
 - (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 review of occupational radiation exposure every six months with particular attention to instances in which the investigational levels are exceeded. The principal purpose of this review is to assess trends in occupational exposure as an index of the ALARA program effectiveness and to decide if action is warranted when investigational levels are exceeded.
 - (3) The RSC will evaluate the annual review performed by the RSO regarding our institution's overall efforts for maintaining doses ALARA and will make any necessary recommendations. 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, Biannual 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 and will prepare and present this review to the RSC. This will include reviews of operating procedures and past dose records, inspections, etc., and consultations with the radiation safety staff or outside consultants. Reviews of specific methods of use may be conducted on a more frequent basis.
 - (2) Biannual review of occupational exposures and records of radiation surveys. Every six months the RSO will prepare a summary report for the RSC reviewing occupational exposures and survey results.
 - (3) Quarterly review of occupational exposures. The RSO will review and initial at least every three months the radiation doses of authorized users and workers to determine that their doses are ALARA in accordance with the Investigational Levels of this program.
 - (4) Quarterly review of records of radiation surveys. The RSO will review radiation surveys in unrestricted and restricted areas to determine that dose rates and amounts of contamination were at ALARA levels during the previous quarter.
 - B. Education Responsibilities for ALARA Program
 - (1) The RSO will coordinate briefings and educational sessions to inform workers of ALARA program efforts.
 - (2) The RSO will ensure that authorized users, workers, and ancillary 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.

3. 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 be in close contact 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
 - (1) The RSO will investigate all known instances of deviation from good ALARA practices and, if possible, will determine the causes. When the cause is known, the RSO will implement changes in the program to maintain doses ALARA.
 - (2). The RSO will be notified when there is a radioactive spill and will be responsible for decontamination of the area and any involved personnel. The RSO will be responsible for releasing the area to use when the area is at background levels of radiation.
4. Authorized Users
 - A. New Methods of Use Involving Potential Radiation Doses
 - (1) The authorized user will consult with the RSO and/or RSC during the planning stage before starting new radioactive material uses.
 - (2) The authorized user will review each planned use of radioactive materials to ensure that doses will be kept ALARA.
 - 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.
5. Individuals Who Receive Occupational Radiation Doses
 - A. Workers will be instructed in the ALARA concept and its relationship to work procedures and work conditions.
 - B. Workers will be instructed in recourses available if they feel that ALARA is not being promoted on the job.
6. Investigational Levels to Monitor Individual Occupational Radiation Doses

This institution hereby establishes investigational levels for occupational radiation doses which, when exceeded, will initiate review or investigation by the RSC and/or RSO. The investigational levels that we have adopted are listed in the following table. These levels apply to the exposure of individual workers.

Investigational Levels

The RSO will review and initial the results of personnel monitoring at least every three months. The following actions will be taken at the investigational levels as stated in the table of Investigational Levels.

- 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 values for the Investigational Level I.
- B. Personnel dose equal to or greater than Investigational Level I but less than Investigation 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 the causes of all personnel doses equaling or exceeding Investigational Level II and, if warranted, will take action. A report of the investigation and any actions taken 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. Establishment of new investigational levels above those listed in the table.
 In cases where a worker's or a group of worker's doses need to exceed an investigational level, a new, higher investigational level may be established for that individual or group on the basis that it is consistent with good ALARA practices. Justification for new investigational levels will be documented.
 The RSC will review the justification for and must approve or disapprove all revisions of investigational levels.

	Bimonthly(mrem)		Quarterly(mrem)	
	Level I 84	Level II 250	Level I 125	Level II 375
Total effective dose equivalent (sum of deep dose equivalent and committed effective dose equivalent)				
Lens of the eye(eye dose equivalent)	250	750	375	1125
Skin or any extremity (shallow dose equivalent)	840	2500	1250	3750
Individual organ or tissue(sum of deep dose equivalent and committed dose equivalent)	840	2500	1250	3750