

University of Maryland Baltimore

Radiation Safety Procedure

Procedure Number: 1.6

Title: ALARA Program

Revision Number: 0

Effective Date: June 22, 2010

Technical Review and Approval:

_____ **Date:** _____
Radiation Safety Officer

Radiation Safety Committee Approval:

_____ **Date:** _____
Chair, Radiation Safety Committee

PROCEDURE 1.6, ALARA PROGRAM

1.0 Purpose

This procedure establishes requirements for implementing a program for maintaining individual and collective ionizing radiation doses as low as is reasonably achievable (ALARA).

2.0 Scope

The requirements of this procedure apply to all ionizing radiation exposures resulting from the operation of UMB and other facilities that operate under UMB's Radiation Safety Program.

3.0 Procedure

3.1. *Management Commitment*

The management of the University of Maryland Baltimore is committed to the program described herein for keeping individual and collective doses as low as reasonably achievable (ALARA). This commitment is fully described in the ALARA Policy Statement established in *UMB Radiation Safety Program*.

3.2 *Program Audits*

UMB will perform a formal annual review of the radiation safety program, including ALARA considerations. This will include reviews of operating procedures, past dose records, inspections, etc., and consultations with the radiation safety staff and/or outside consultants.

3.3 *Modifications to Procedures, Facilities, and Equipment*

UMB will make modifications to operating and maintenance procedures and to equipment and facilities unless the cost is considered to be unjustified.

3.4 *Collective Doses*

In addition to maintaining doses to individuals as far below the limits as is reasonably achievable, UMB will strive to maintain the sum of the doses received by all exposed individuals (collective dose) 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 required exposing additional people and significantly increasing the collective radiation doses.

3.5 Radiation Safety Committee

- 3.5.1 The Radiation Safety Committee 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.
- 3.5.2 When considering a new use of byproduct material, the RSC will review the efforts of the applicant to maintain exposure ALARA.
- 3.5.3 The RSC will ensure that the users justify their procedures and that individual and collective doses will be ALARA.
- 3.5.4 The RSC will delegate authority to the RSO for enforcement of the ALARA concept.
- 3.5.5 The RSC will support the RSO as necessary for the RSO to assert the appropriate authority. If the RSC has overruled the RSO, it will record the basis for its action in the minutes of the quarterly meeting.
- 3.5.6 The RSC will perform a quarterly review of occupational radiation exposure with particular attention to instances in which the investigational levels in Table 1 and Table 2 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.
- 3.5.7 The RSC will evaluate UMB's overall efforts for maintaining doses ALARA on an annual basis. This review will include the efforts of the RSO, authorized users, workers, and management.

3.6 Radiation Safety Officer

- 3.6.1 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.
- 3.6.2 The RSO will perform a quarterly review of the external radiation doses of authorized users and workers to determine that their doses are ALARA and will prepare a summary report for the RSC.

- 3.6.3 The RSO will perform a quarterly review of radiation surveys in unrestricted areas to determine that radiation and contamination levels are ALARA and will prepare a summary report for the RSC.
- 3.6.4 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.
- 3.6.5 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.

3.7 Authorized Users

- 3.7.1 The authorized user will consult with the RSO and/or RSC during the planning stage before using radioactive materials for new purposes.
- 3.7.2 The authorized user will review each planned use of radioactive materials to ensure that doses will be kept ALARA. Trial runs may be helpful.
- 3.7.3 The authorized user will ensure that supervised individuals who are subject to occupational radiation exposure are trained and educated in good radiation safety practices and in maintaining exposures ALARA.

3.8 Individuals Who Receive Occupational Radiation Doses

- 3.8.1 Individual occupationally-exposed workers will be instructed in the ALARA concept and its relationship to work procedures and work conditions.
- 3.8.2 Individual occupationally-exposed workers will be instructed in recourses available if they feel that ALARA is not being promoted on the job.

3.9 Establishment of Investigational Levels

- 3.9.1 UMB shall establish investigational levels for occupational external radiation doses which, when exceeded, will initiate review or investigation by the RSC and/or the RSO. The investigational levels adopted to permit direct comparison with the limits in COMAR

Section D are listed in Table 1 and Table 2. These levels apply to the exposure of individual workers.

- 3.9.2 The RSC will perform a quarterly review of occupational radiation exposure with particular attention to instances in which the investigational levels in Table 3-1 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
Dosimetry Investigational Levels (mrem/calendar quarter):

Dose Equivalent	Level 1	Level 2
Total Effective Dose Equivalent	> 125	> 375
Eye Dose Equivalent	> 375	> 1125
Skin or Extremity, Shallow Dose Equivalent	> 1250	> 3750

Table 2
Dosimetry Investigational Levels (mrem/month)

Dose Equivalent	Level 1	Level 2
Total Effective Dose Equivalent (Declared Pregnant Worker)	> 10	> 50

3.10 Actions Based on Investigational Levels

- 3.10.1 If the individual dose is less than Investigational Level I, no further action is required.
- 3.10.2 If the individual dose is equal to or greater than Investigational Level I but less than Investigational Level II, the RSO will:
- Ensure a notice is sent to the individual informing him/her of the exposure;
 - Conduct a review of the circumstances surrounding the exposure; and
 - Report the results at the first RSC meeting following the quarter when the dose was recorded.

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.

3.10.3 If the individual dose is equal to or greater than Investigational Level II, the RSO will:

- Investigate in a timely manner;
- If warranted, take action to prevent or reduce ongoing exposures;
- Present to the RSC at its first meeting following completion of the investigation a report of the investigation, any actions taken, and a copy of the individual's ND 216 or its equivalent;
- Ensure the details of these reports are included in the RSC minutes.

3.10.4 In cases where a worker's or a group of workers' 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.

4.0 Records and Reports

4.1. *Radiation Records*

4.1.1 Radiation safety records generated as a result of implementing this procedure may include:

- Reviews of ALARA Program content and implementation;
- Reviews of investigations of incidences of individuals exceeding stipulated investigation levels;
- Records of RSC meetings;
- Records of reviews of proposed changes to procedures, facilities and equipment; and

- Other records as necessary to ensure proper review and implementation of the ALARA Program.

4.1.2 Radiation safety records shall be created and maintained consistent with the requirements of Procedure 1.2, *Radiation Safety Records*.

4.2 Reports

None.

5.0 References:

COMAR 26.12.01.01

Maryland License MD-07-014-01

UMB Radiation Safety Program

USNRC NUREG 1556, volume 11, "Consolidated Guidance About Material Licenses-Specific Guidance About Licenses of Broad Scope", Volume 9, revision 2, "Consolidated Guidance About Material Licenses-Program Specific Guidance About Medical Use Licenses", and Volume 5, "Consolidated Guidance About Material Licenses-Specific Guidance About Self-Shielded Irradiator Licenses."