



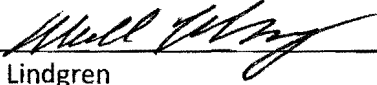
PARTICLE PHYSICS DIVISION ES&H MANUAL

ALARA PROGRAM

Review and Approval Record

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Revision History

Version	Date	Section No.	Specifics
1.0			Initial release of electronic document
1.1	7.31.09	All Sections	Add document control disclaimer and revision history page
1.2	12.1.11	All Sections	Revised format and wording

1.0 INTRODUCTION

ALARA means "As Low As is Reasonably Achievable," which is the approach to radiation protection to manage and control exposures (both individual and collective) to the work force and to the general public to as low as is reasonable, taking into account social, technical, economic, practical and public policy considerations. ALARA is not a dose limit, but a process which has the objective of attaining doses as far below the applicable limits as is reasonably achievable.

The Fermilab ALARA program is established to minimize radiation exposures from laboratory operations. The PPD ALARA program shall be implemented by line management to assure that all requirements of the Fermilab ALARA program are met.

2.0 SCOPE

This procedure pertains to all work within PPD which involves radioactive materials or exposure to ionizing radiation.

3.0 DEFINITIONS

Ionizing Radiation – Particles or waves which travel through space or a medium at an energy sufficient to remove an electron from its atomic orbit.

Radioactive Material – Any material containing unstable nuclei which spontaneously emit energetic particles or waves in order to achieve stability.

Radiological Area – As defined by 10CFR835, any area which is posted as a "Radiation Area", "High Radiation Area", "Very High Radiation Area", "Contamination Area", "High Contamination Area" or "Airborne Radioactivity Area". Posted areas which are not considered Radiological Areas include "Controlled Areas" and "Radioactive Materials Areas".

Radiological Work Permit (RWP) – A written authorization to utilize radioactive materials or radiation generating devices under prescribed safety standards.

4.0 POLICY

PPD conducts work activities in such a manner that worker and public safety, as well as protection of the environment, are given the highest priorities. PPD management is committed to maintaining any risks associated with ionizing radiation or radioactive materials at levels that are consistent with the ALARA concept.

5.0 RESPONSIBILITIES

5.1 The **Division Head** is responsible for:

- Implementation of a program which reviews plans, procedures, equipment, facilities, and experiments for the purpose of maintaining radiation exposures, the spread of radioactive contamination, and the release of radioactive effluents at levels that are ALARA.

5.2 The **PPD Radiation Safety Officer (RSO)** is responsible for:

- Review of the dosimetry results for PPD personnel. Any unusual or above normal results shall be investigated and reported as outlined in Articles 572 and 573 of the FRCM.
- Service on the Radiation Safety Subcommittee.
- Providing assistance to PPD personnel in the implementation of the ALARA program.
- Reviewing selected procedures involving radiological work, high dose/contamination jobs, and facility design changes for the purpose of recommending improvements to maintain exposures, the spread of radioactive contamination, and the release of radioactive effluents at levels that are ALARA.
- Providing technical support for the installation and use of shielding and containment.
- Consulting with the Laboratory ALARA Coordinator or other members of the radiological control organization as necessary to ensure that ALARA objectives are met.
- Composing a Radiological Work Permit (RWP) when appropriate.

5.3 The **Radiological Control Technicians (RCTs)** are responsible for:

- As directed, conducting radiological surveillance; establishing exposure and contamination controls; and prescribing protective requirements during radiological work to maintain exposures, the spread of radioactive contamination, and the release of radioactive effluents at levels that are ALARA.
- Stopping work when conditions and/or practices are deemed unsafe or would violate Laboratory requirements or policies; immediately reporting work stoppage to the appropriate level of management.
- Reporting any radiological problems and concerns, along with any corrective actions, to the PPD RSO.

5.4 The **Design Engineers, Schedulers and Planners** are responsible for:

- Based on input from the PPD RSO and ES&H Section Radiation Protection Group members, incorporating radiological design considerations into new facilities, modifications to existing facilities, and construction projects in order to maintain exposures, the spread of radioactive contamination, and the release of radioactive effluents at levels that are ALARA.
- Seeking input from Fermilab's radiation protection professionals as early in the design process as possible.

5.5 The **Supervisors** are responsible for:

- Conducting pre-job and post-job briefings, attending pre-job planning meetings and Radiation Safety Subcommittee meetings, and ensuring approval of an RWP when appropriate.
- Ensuring employees are aware of all relevant radiological hazards and have received all required training.
- Carrying out operations in such a manner that exposure to workers, researchers, and the general public and releases to the environment are maintained ALARA.

- Reporting radiological accidents, incidents, unsafe radiological conditions or workers' radiological concerns as necessary, along with any associated corrective actions to the PPD RSO.
- Reviewing operating procedures to determine if controls have been established to maintain exposures ALARA.
- Ensuring employees use proper techniques to maintain exposures ALARA.

5.6 The **Individual Worker** is responsible for

- Maintaining personal radiation exposure at levels that are ALARA.
- Maintaining, to the extent possible, coworker radiation exposures at levels that are ALARA.
- Minimizing the spread of radioactive contamination and release of radioactive effluents.
- Observing requirements of all radiological signs, postings, RWPs and radiological procedures. Follow instructions given by radiological control personnel.
- Attending pre-job and post-job briefings.
- Reporting any radiological problems and concerns, along with any associated corrective actions, to a supervisor.

6.0 PROCEDURE

6.1 Participation in Fermilab's Radiation Safety Subcommittee

The PPD RSO shall represent PPD on the Radiation Safety Subcommittee. This subcommittee, commissioned by the Laboratory Director, is responsible for coordinating the implementation and improvement of the Fermilab radiation safety program. It is charged with meeting regularly to discuss radiation protection issues and develop solutions which will promote compliance and uniform implementation lab-wide in a cost effective manner. The subcommittee reports to the Laboratory Director through the ES&H Section Associate Head for Radiation Protection and the Fermilab Senior Radiation Safety Officer.

6.2 Training

All PPD employees shall complete the relevant Fermilab radiological training, including those for general employees, Radiological Workers and Radiological Control Technicians. The training is offered by the ES&H Section and incorporates ALARA concepts to heighten individual awareness of ALARA and inform employees of responsibilities with respect to the program's implementation.

6.3 Assessments

The PPD/ES&H Group shall assess the ALARA program using the following methods:

- Conduct Snoop surveys per the PPD ES&H Snoop Survey Program
- Conduct a formal ALARA review, per the procedures outlined in the FRCM Article 353, for those jobs which may exceed FRCM ALARA trigger levels.
- Investigate unusual dosimetry results.

- Investigate radiation exposure of individuals placed on the ALERT list by the ES&H Section Dosimetry Program Manager.

6.4 Radiological Design Review

Plans, procedures, equipment, facilities, experiments and programs shall be reviewed for purposes of assuring that radiation exposures, the spread of radioactive contamination, and the release of radioactive effluents at levels that are ALARA.

ALARA design review phases include dose assessment, review of radiological conditions, identification of the applicable radiological design criteria, and consideration of optimum alternatives using ALARA optimization methods. A design review package should incorporate and document features to maintain exposures, the spread of radioactive contamination and the release of radioactive effluents at ALARA levels. These design review elements are contained in Chapter 3 of the FRCM.

6.5 Radiological Areas

Written authorization is needed for entry into any Radiological Area. RWPs, as described in the FRCM, or alternative means approved by either the PPD RSO or ES&H Section, shall be used for this purpose.

7.0 REFERENCES

Fermilab Radiological Control Manual (FRCM)
Code of Federal Regulations, Title 10, Part 835