This chapter was last reviewed for currency 8/15/2023.
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ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: Radiological Safety

Quick Start Summary

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1 Who needs to know about these requirements

The requirements of Radiological Safety apply to workers, and their line management, supervisors, and points of contact, who are engaged in the design and operation of facilities, radiological work, or the use, storage, handling, and disposal of radioactive materials, including nuclear materials, or who access accelerator facilities and auxiliary support facilities that are controlled for radiological hazards.

2 Why

SLAC is committed to maintain personnel radiation doses below regulatory limits and as low as reasonably achievable (ALARA), to prevent unplanned or accidental exposure to ionizing radiation, and to prevent release of radioactive material into the environment.

3 What do I need to know

- Design and operation of facilities are subject to approval to ensure adequate radiation safety systems.
- All radiological work must be authorized by line management, approved by cognizant Radiation Protection (RP) Department personnel, and conducted by trained workers who are following written procedures and/or a radiological work permit (RWP).
- Entry into radiologically controlled areas requires the wearing of dosimeters and area-specific training.
- Radioactive materials, including sealed sources and radiation generating devices and nuclear materials, are subject to strict control and must be approved by RP before being brought on site.

4 When

These requirements take effect 15 September 2023.

5 Where do I find more information

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 9, “Radiological Safety”

Or contact the program manager.

ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9

Radiological Safety

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1 Purpose

The purpose of this program is to maintain personnel and environment radiation doses below regulatory limits and as low as reasonably achievable, to prevent unplanned or accidental exposure to ionizing radiation, and to prevent release of radioactive material into the environment.

It covers the design and operation of facilities, limiting exposure of personnel and environment to radiation (through access, radiological work, and dosimetry requirements), and the use, storage, handling, and disposal of radioactive materials, including nuclear materials. It applies to workers, and their line management, supervisors, and points of contact, who are engaged in those activities or access accelerator facilities and auxiliary support facilities that are controlled for radiological hazards, including machine shops, research laboratories, and service buildings.

1.1 Related Programs and Documents

The exposure of personnel to radiation and the use, storage, handling, and disposal of radioactive materials are strictly controlled in accordance with a comprehensive set of regulations, principally Title 10, *Code of Federal Regulations*, "Energy", Chapter 3, "Department of Energy", Part 835, "Occupational Radiation Protection" (10 CFR 835), and directives issued by the Department of Energy (DOE). These regulations and directives are implemented through an extensive set of programs, each with its own set of detailed requirements and documents. The main program, required by 10 CFR 835, is the SLAC Radiation Protection Program (RPP). This chapter summarizes the RPP and presents the requirements that apply generally at SLAC. For an overview of related programs and documents, see Radiological Safety: Related Programs and Documents.

1.2 As Low as Reasonably Achievable (ALARA)

As low as reasonably achievable (ALARA) is the conceptual foundation of 10 CFR 835 and this program. The current system of radiological protection is based on three general criteria: justification, optimization, and dose and risk limitation:

1. Justification is demonstrating the need for any activity that generates radiation exposure on the criteria that the expected benefits to society from the activity exceed the overall social detriments.
2. Optimization is ensuring the benefits of justified activities or practices are maximized and social detriments minimized, taking into account economic and social factors.
3. Dose and risk limitation is applying dose limits to ensure individuals or groups of individuals do not exceed acceptable levels of risk.

Consistent with these criteria, the RPP commits SLAC to maintaining radiological exposures within regulatory and administrative dose limits and to demonstrating these exposures are ALARA.

The SLAC management goal is to ensure commitment and participation at all management and workforce levels in the RPP. To accomplish this goal, SLAC has established programs in the following areas:

1. **Assignment of responsibilities.** Specific responsibilities have been assigned to line management and radiological workers involved in implementing the RPP.
2. **Administrative control levels for occupational workers.** SLAC has adopted an annual radiation dose levels for occupational workers that are lower than the regulatory limit of 5,000 mrem total effective dose (TED) per year. The SLAC administrative control level is 500 mrem TED for trained radiological worker workers (RWTs) and 100 mrem TED for trained general employee radiological workers (GERTs) per year.
3. Additionally, each individual radiological worker should have a dose-management ALARA level of a maximum of 360 mrem TED per year above natural background levels of radiation.
4. **ALARA goals**. Each directorate should adopt or set for occupational workers a value lower than the maximum value of 360 mrem TED per year.

2 Roles and Responsibilities

Functional roles and general responsibilities for each are listed below. More detailed responsibilities and when they apply are provided in the procedures and requirements.

The roles may be performed by one or more individuals and one individual may play more than one role, depending on the structure of the organizations involved. Responsibilities may be delegated.

2.1 Worker

- Through the work planning and control process (Chapter 2, "Work Planning and Control") understands the radiological risks involved in his or her job and completes on-the-job training
- Completes the appropriate radiological safety training and retraining at the required times
- Follows all radiological control precautions required by SLAC policy, as outlined here and in the Radiological Control Manual and by line management
- Follows all requirements for radioactive and nuclear material and waste
- Follows radiological safety training, applies the ALARA philosophy, and observes Radiation Protection (RP) Department instructions and guidance when working in areas where radiological hazards may exist
- Uses radiation dosimeters as prescribed in radiation safety training, the Radiological Control Manual, RP procedures, radiological work permits, and other appropriate policies and procedures
- Forwards dose reports of all occupational exposures incurred at other institutions, including exposures from past employment if available and while visiting other DOE and non-DOE institutions while employed by SLAC, to the Radiation Protection Department
- If pregnant, has option to declare pregnancy and/or request reassignment; workers who have declared pregnancy must meet additional dosimetry requirements

- Uses appropriate PPE to help prevent exposure to (or contribute to the spread of) radioactive contamination as required
- Notifies supervisor of any new or increased radiological hazards or concerns in the workplace
- Stops work and notifies supervisors when a radiological safety concern or violation is observed
- Discusses with coworkers proper radiological safety precautions

2.2 Line Management, Supervisor, and SLAC Point of Contact

- Determines safety training requirements through the work planning and control process (Chapter 2, "Work Planning and Control")
- Ensures all workers receive appropriate radiological safety training to recognize potential radiological hazards, to understand the radiological risks involved in their respective duties, and to adopt proper precautions for their personal radiological safety
- Ensures compliance with radiological safety program requirements
- Develops work procedures when required for activities such as any work in a high radiation area or high contamination area, and any radiological work in radiation or contamination areas
- Ensures all personnel wear appropriate dosimeters and personal protective equipment (PPE, such as shoe covers and gloves), as required
- Discontinues any activities within his or her area of operations that violate radiological safety rules

2.3 Radiation Safety Committee

- Evaluates, when called upon by the radiation safety officer (RSO), the hazards analysis, adequacy of planned hazard controls, and conformance to SLAC ESH policy and requirements for major and significant new activities (experiments, projects, test beams, construction, facility modifications)
- Provides support as stated in the Radiation Safety Committee Charter

2.4 ALARA Committee

- Provides expertise in ionizing-radiation radiological doses and releases from radioactive source material and radiation-generating devices
- Evaluates annual radiological dose records for various groups at SLAC and proposes changes in operating procedures or equipment design to further reduce radiological exposure as feasible
- Provides support as stated in the As Low as Reasonably Achievable (ALARA) Committee Charter

2.5 Radiation Protection Department

- Develops, implements, and manages the radiological safety program, following requirements established in this chapter and other implementing documents, especially the Radiological Control Manual
- Provides shielding design calculations and related radiological considerations

- Specifies required radiation safety measures
- Verifies shielding design with radiation measurements under various beam-loss scenarios
- Issues, jointly with the cognizant facility safety officer and line management, beam authorization sheets (BASs) and beam line authorizations (BLAs) for accelerator operations and experimental programs
- Evaluates material in *radioactive material management areas (RMMAs)* for radioactivity before releasing that material to uncontrolled areas , including wastes with a radiological character
- Develops, implements, and manages the radioactive waste management program
- Authorizes bringing radioactive materials, including radiation generating devices and sealed sources, on-site, and monitors quantities
- Develops, implements, and manages the nuclear material program
- Authorizes bringing nuclear materials on-site, monitors quantities, and makes the appropriate requests for authorization from facilities to which materials are being shipped
- Performs periodic radiation monitoring of various areas at SLAC using stationary or portable radiation detection instruments
- Measures and documents personnel radiation exposures and doses using appropriate dosimeters
- Identifies and posts various areas with the appropriate signs
- Maintains SLAC radiation detection instrumentation used in the radiological protection program
- Ensures compliance with the RPP by monitoring all appropriate locations
- Provides radiological safety training
- Performs internal audits of the radiological safety program, including examination of program content and implementation, through a process that ensures that all functional elements are reviewed no less frequently than every 36 months, in compliance with 10 CFR 835
- Develops and manages the radiological environmental protection program

2.6 Radiological Control Manager / Radiation Safety Officer

Note *The radiological control manager (RCM) serves as the SLAC radiation safety officer (RSO)*

- Advises the SLAC chief safety officer (CSO) on radiation safety policy and requirements
- Approves minor changes to the radiation safety system (shielding, personnel protection system and beam containment system)
- Ensures the Radiation Safety Committee (RSC) reviews major changes to the radiation safety system and provides the RSO advice and counsel before the RSO approves such work
- Approves significant and major new activities by signifying that an activity's proponent has completed an adequate radiation hazards analysis and has developed plans for sufficient mitigation measures (controls) and that the activity will conform to Environment, Safety, and Health (ESH) Division policy and requirements

3 Procedures, Processes, and Requirements

These documents describe the detailed requirements for this program and how to implement them:

- Radiological Safety: Facility Design and Operation Requirements (SLAC-I-760-0A05S-003). Describes requirements for the design, configuration management, and operational approval of radiation safety systems (RSSs)
- Radiological Safety: Radiological Work and Area Entry Requirements (SLAC-I-760-0A05S-002). Describes requirements for authorizing radiological work and posting of and access to areas
- Radiological Safety: Safety Briefing (SLAC-I-760-0A05S-004). Summarizes requirements for individuals without training being escorted in a controlled area or radiologically controlled area (RCA)
- Radiological Safety: Personnel Dosimeter Requirements (SLAC-I-760-0A07S-001). Describes requirements for dosimeter issuance and return and dose reporting for entry into areas with radiological postings, for special tasks, and for pregnant workers
- Radiological Safety: Radioactive and Nuclear Materials and Waste Requirements (SLAC-I-760-0A30S-001). Describes requirements for use, storage, handling, and disposal of radioactive and nuclear materials and waste, including sealed sources and radiation generating devices

These documents provide useful guidance; their use is not mandatory:

- Radiological Safety: Related Programs and Documents (SLAC-I-760-0A05T-001). Describes the various SLAC programs and documents that make up the SLAC Radiation Protection Program (RPP)

These are the forms and tools for this program:

- See individual exhibits above and additional documents below.

These are other program documents and resources:

- Radiation Protection Program Site (SharePoint)
- SLAC National Accelerator Laboratory Radiation Protection Program Plan for Implementing 10 CFR 835 (SLAC-I-720-IA05M-002)
- Radiological Control Manual (SLAC-I-720-0A05Z-001)
- Radiation Safety Systems Technical Basis Document (SLAC-I-720-0A05Z-002)
- Radioactive Waste Manual (SLAC-I-760-2A08Z-001)
- Nuclear Material Control and Accountability Plan (SLAC-I-760-2A30C-008, FO 021)
- Radiation Safety Committee (RSC)
- Radiation Safety Committee Charter
- As Low as Reasonably Achievable (ALARA) Committee
- As Low as Reasonably Achievable (ALARA) Committee Charter

4 Training

The radiation safety training provided by SLAC is a critical component of the radiological safety program. Managers, supervisors, and points of contact will ensure their subordinates are fully trained regarding all aspects of radiological hazards appropriate to their jobs and will consult with ESH to determine training requirements. Required training is determined by the worker's supervisor based on the area types the person will be working in, described below, and by the position the worker holds, for example, health physics technician, limited radiological controls assistant, radiation generating device operator, and sealed source custodian.

- For required training for specific area types, see Radiological Safety: Radiological Work and Area Entry Requirements.
- For additional information see the Radiological Control Manual.

Requalification is required every two years.

5 Definitions

accelerator. Defined in Department of Energy Order 420.2D, "Safety of Accelerator Facilities" (DOE O 420.2D) as

> A device and its components employing electrostatic or electromagnetic fields to impart kinetic energy to molecular, atomic, or sub-atomic particles and capable of creating a radiological area as defined by 10 CFR Part 835, Occupational Radiation Protection. Accelerator components include injectors, targets, beam dumps, detectors, experimental enclosures, accelerator enclosures, experimental areas, and experimental apparatus utilizing the accelerator. The accelerator also includes associated support and test facilities, equipment, systems, and utilities necessary to operate the accelerator or utilize the accelerated beam.

area, accelerator. Area defined by the physical fence around the SLAC main accelerator complex where access is controlled by SLAC Site Security

area, controlled. Area where access is managed to protect individuals from exposure to radiation and/or radioactive materials. Individuals who enter a controlled area (but not radiological areas) should not receive an occupational dose each year of more than 100 mrem total effective dose (TED).

area, personnel exclusion. Area secured by physical controls other than a personnel protection system (PPS) to restrict access during accelerator beam operations. Examples are the fenced areas on top of the SPEAR roof, around the Beam Dump East tunnel in the Research Yard.

area, radioactive material (RMA). Any area within a controlled area, accessible to individuals, in which items or containers of radioactive material exist and the total activity of radioactive material exceeds the applicable values provided in Appendix E of 10 CFR 835. Examples of RMAs are the Radioactive Material Storage Yard and areas where sealed sources are kept.

area, radioactive material management (RMMA). Area where the potential exists for radioactive contamination due to un-encapsulated or unconfined radioactive material, or an area with material exposed to accelerator beams capable of causing radioactivation. Examples of RMMAs are accelerator housings,

such as the linear accelerator (linac), Beam Switch Yard (BSY), Next Linear Collider Test Accelerator (NLCTA), and Stanford Positron Electron Accelerating Ring (SPEAR).

area, radiological. Area where distinct radiological conditions can be quantified and compared against established limits. Individual types of radiological areas are of the following six types:

1. *radiation area (RA).* Any area accessible to individuals in which radiation levels could result in an individual receiving an equivalent dose to the whole body in excess of 5 mrem in an hour at 30 cm from the source or from any surface that the radiation penetrates.
2. *high radiation area (HRA).* Any area accessible to individuals, in which radiation levels could result in an individual receiving an equivalent dose to the whole body in excess of 100 mrem in 1 hour at 30 cm from the radiation source or from any surface that the radiation penetrates. High radiation areas with radiation dose rates greater than 1,000 mrem per hour at 30 cm are locked or have physical controls to prevent personnel access.
3. *very high radiation area (VHRA).* Any area accessible to individuals in which radiation levels could result in an individual receiving an absorbed dose in excess of 500 rads in one hour at 1 meter from a radiation source or from any surface that the radiation penetrates. Very high radiation areas are locked at all times or have physical controls to prevent personnel access.
4. *contamination area.* Any area accessible to individuals where removable surface contamination levels (or the potential for radioactive contamination levels) exceed or are likely to exceed the removable surface contamination values specified in Appendix D of 10 CFR 835 but do not exceed 100 times those values.
5. *high contamination area.* Any area accessible to individuals where removable surface contamination levels exceed or are likely to exceed 100 times the removable surface contamination values specified in Appendix D of 10 CFR 835.
6. *airborne radioactivity area.* Any area accessible to individuals where
    1. The concentration of airborne radioactivity, above natural background, exceeds or is likely to exceed the derived air concentration (DAC) values listed in Appendix A or Appendix C of 10 CFR 835; or
    2. An individual present in the area without respiratory protection could receive an intake exceeding 12 DAC-hours in a week.

area, radiological buffer. An area that may be established near a contamination area to help to facilitate contamination control, as deemed appropriate by the Radiation Protection Department

area, radiologically controlled (RCA). A *controlled area* that requires dosimetry for entry. The radiation level in certain localized areas within an RCA may vary, requiring limited occupancy. Individuals who enter only RCAs without entering radiological areas are not expected to receive a total effective dose (TED) of more than 100 mrem in a year.

beam containment system (BCS). A system of active and passive devices designed to contain the beam and/or limit the beam power and/or beam losses to prevent excessive radiation in occupied areas. The BCS confines a beam to an approved channel at an approved beam power level.

hutch protection system (HPS). The interlocked access control system that protects personnel from exposure to prompt ionizing radiation from synchrotron radiation beams in hutches

material, nuclear. Special nuclear material and other accountable nuclear material as listed in Department of Energy Order 474.2A, "Nuclear Material Control and Accountability" (DOE O 474.2A), Attachment 2 Chapters I and II, Tables I, II, IV, and X.

material, radioactive. Material with any radioactivity or radioactive contamination generated by SLAC (commonly referred to as "rad added") that is detectable above background level using the most practical and sensitive radiation detection instrument. Naturally occurring radioactive material (NORM) may be treated as radioactive material, depending on its physical character. NORM may not necessarily be considered radioactive material unless it has been processed as waste, or if machining operations changed the physical properties of the material.

personnel protection system (PPS). An interlocked access control system that protects personnel from exposure to prompt ionizing radiation from beams and interlocked electrical hazards in the accelerator housing. A PPS consists of access interlock logics, display of access states, key controls, and other controls.

radiation generating device (RGD). "Collective term for devices which produce ionizing radiation, including, certain sealed radioactive sources, small particle accelerators used for single purpose applications which produce ionizing radiation (e.g., radiography), and electron generating devices that produce x-rays incidentally." (DOE G 441.1-1C, Chg 1 [Admin Chg]) (See also *sealed source*.)

radiological facility. Facilities that do not meet or exceed the hazard Category 3 threshold quantity values published in Department of Energy Standard 1027-2018, Change Notice 1, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports" (DOE-STD-1027-2018, Chg Notice 1) but still contain some quantity of radioactive material (above those discussed in Appendix B to 40 CFR 302)

radiological work. Work involving any use of tools on beam lines or beam line components or beam line safety items such as shielding, PPS components, or BCS components where radiological hazards may be affected, or any work on radiation hot spots. Also, any work on radioactive low conductivity water (LCW) systems, that is, any LCW system with tritium in the water at a concentration greater than 2E+04 picoCuries/liter.

sealed radioactive source. A radioactive source manufactured, obtained, or retained for the purpose of utilizing the emitted radiation. The sealed radioactive source consists of a known or estimated quantity of radioactive material contained within a sealed capsule, sealed between layer(s) of non-radioactive material, or firmly fixed to a non-radioactive surface by electroplating or other means intended to prevent leakage or escape of the radioactive material. Sealed radioactive sources are categorized as either *accountable* or *exempt* (exempt sources are also known as *non-accountable sources*).

special individual. Defined in Department of Energy Order 231.1B, Change 1, "Environment, Safety, and Health Reporting" (DOE O 231.1B, Chg 1 [Admin Chg]), as "individuals employed by DOE Headquarters, a contractor supporting DOE Headquarters or Field Office activities, a Defense Nuclear Facilities Safety Board employee or contractor, or an International Atomic Energy Agency inspector who visits a DOE or DOE contractor site or facility to conduct Department-related business"

visitor. Individual accessing the site for purposes other than conducting work in support of the DOE mission or that otherwise involves access to DOE information or technologies, regardless of the duration of the visit. Visitors may include the following:

1. All individuals coming to SLAC to attend a meeting/conference/seminar and/or workshop that is held in the general access area of the laboratory and who are not performing any SLAC-related work or experiments or receiving payments or reimbursements from SLAC
2. Anyone on-site for the sole purpose of attending SLAC public tours or public lectures
3. Anyone attending special events at SLAC that do not require any training or work
4. Anyone staying at the Guest House who is not affiliated with SLAC experimenters or work
5. All delivery personal/vendors making deliveries to SLAC or to construction/special projects

waste, mixed. Waste that contains both a radiological component and a hazardous waste component, as defined by the Resource Conservation and Recovery Act (RCRA, codified in Title 40, *Code of Federal Regulations*), and/or Title 22, *California Code of Regulations,* Division 4.5, "Environmental Health Standards for the Management of Hazardous Waste"

waste, radioactive. Radioactive material for which the owner/generator has determined there is no further use for the material and has authorized disposal of the material

6 References

6.1 External Requirements

The following are the external requirements that apply to this program:

- Title 10, *Code of Federal Regulations*, "Energy"
  - Chapter 1, "Nuclear Regulatory Commission", Part 20, "Standards for Protection against Radiation", Subpart K, "Waste Disposal", Section 20.2003(a), "Disposal by Release into Sanitary Sewerage" (10 CFR 20.2003a)
  - Chapter 3, "Department of Energy", Part 835, "Occupational Radiation Protection" (10 CFR 835)
- Title 40, *Code of Federal Regulations*, "Protection of Environment", Chapter 1, "Environmental Protection Agency", Subchapter J, "Superfund, Emergency Planning, and Community Right-to-Know Programs", Part 302, "Designation, Reportable Quantities, and Notification", Appendix B to 302.4, "Radionuclides" (40 CFR 302, Appendix B to Table 302.4)
- Title 49, *Code of Federal Regulations*, "Transportation" (49 CFR)
- Title 17, *California Code of Regulations*, "Public Health" (17 CCR)
- Title 22, *California Code of Regulations*, "Social Security", Division 4.5, "Environmental Health Standards for the Management of Hazardous Waste" (22 CCR Division 4.5)
- Site Compliance Plan for Department of Energy Order 232.2A, Change 1, "Environment, Safety, and Health Reporting" (DOE O 232.2A, Chg 1 [MinChg] SCP)
- Site Compliance Plan for Department of Energy Order 420.2D, "Safety of Accelerator Facilities" (DOE O 420.2D SCP)
- Department of Energy Manual 435.1-1, "Radioactive Waste Management Manual", Change 2 (DOE M 435.1-1, Chg 2 [Admin Chg])

- Site Compliance Plan for Department of Energy Order 458.1, Change 4, "Radiation Protection of the Public and the Environment" (DOE O 458.1, Chg 4 [LtdChg] SCP)
- Department of Energy Order 474.2A, "Nuclear Material Control and Accountability" (DOE O 474.2A)

6.2 Related Documents

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 2, "Work Planning and Control"
- Chapter 50, "Non-ionizing Radiation"
- Chapter 51, "Control of Hazardous Energy"
- Chapter 55, "Site Access Control"

Other SLAC Documents

- Conduct of Accelerator Facility Operations (CACM-2019-059)
- Radiation Protection Department

Other Documents

- Department of Energy Standard 1027-2018, Change Notice 1, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports" (DOE-STD-1027-2018, Chg Notice 1)
- Department of Energy Guide 441.1-1C, Change 1, "Radiation Protection Programs Guide for Use with Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection" (DOE G 441.1-1C, Chg 1 [Admin Chg])

NATIONAL ACCELERATOR LABORATORY

ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: Radiological Safety

Facility Design and Operation Requirements

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1 Purpose

The purpose of these requirements is to ensure that facilities are designed and operated to protect workers from the prompt radiation produced. They cover the design, configuration management, and operational approval of *radiation safety systems (RSS)*. They apply to workers, supervisors, project managers, and Radiation Protection and any other group involved in these activities.

2 Requirements

2.1 Engineering Controls (Design)

Engineering controls are physical means designed to reduce, eliminate, or control hazards; they include passive controls (shielding and fences) and active controls (for example the *personnel protection system [PPS]* and *beam containment system [BCS]*).

2.1.1 Radiation Shielding

Radiation shielding and other physical barriers like fences are engineered safeguards designed to attenuate radiation or otherwise reduce the prompt dose rate to acceptable levels. Such passive engineering controls are preferred over active engineering controls, such as BCS, and administrative controls, such as ropes and signs. Administrative controls may be used to supplement the engineering controls and should be used only if adding shielding or other barriers is not practicable. All primary beams (original accelerator beams) and synchrotron radiation beams must be fully enclosed by shielding and barriers that cannot be circumvented in an unauthorized manner.

2.1.1.1 Shielding Design Criteria

During normal operations, all beam lines and experimental facilities must be shielded to control individual doses from external radiation to less than 1,000 mrem total effective dose (TED) per year and be kept as low as reasonably achievable (ALARA).

Shielding must also be designed to protect individuals under abnormal operating conditions (mis-steering and system-failure cases). See Radiation Safety Systems Technical Basis Document for details.

2.1.1.2 Shielding Design Protocol

The radiation safety officer (RSO) must approve shielding design specifications. The Radiation Physics Group (RPG) within RPD is responsible for determining the shielding required for a facility and must be consulted before the construction of a new facility or the modification of an existing facility. To obtain approval of a shielding design from the RSO, it is the responsibility of the line manager (or designee) to provide information in writing and work with a radiation physicist within the RPG who is tasked with oversight of facility construction or modification where shielding is required. The radiation physicist will then propose a shielding design and seek concurrence from the RSO on the design. The line manager (or designee) must keep the records on the design of new or modified shielding as well as on the verification of the material composition and make these records available to RPG for review.

2.1.2 Personnel Protection Systems

At SLAC, the interlocked access control system is called the *personnel protection system (PPS)*, which protects personnel from exposure to prompt ionizing radiation from beams and interlocked electrical hazards in the accelerator housing. A PPS consists of access interlock logics, display of access states, key controls, and other controls. The interlocked access control system that protects personnel from exposure to prompt ionizing radiation in synchrotron radiation beam line hutches is called the *hutch protection system (HPS)*. The general design requirements, review, and approval of the HPS are similar to those described for the PPS.

New and modified PPSs, as well as PPS bypasses, must be approved by the RSO before implementation.

Accessible beam lines must have a PPS to protect personnel from prompt radiation. The PPS prevents exposure through the use of beam stoppers (or beam inhibiting devices). The PPS also prevents entry to beam enclosures when beams are operating and turns off beams when a security violation is detected.

The PPS must be established and maintained to be fail-safe. To meet this goal, the PPS is scrutinized continuously via configuration control, periodic certification, and testing of its physical and electrical components.

Before a new PPS is used for routine operation, it must be reviewed and documented by drawings and a written function description. PPS modification must also be documented, reviewed, and approved.

In the case of an access violation, the PPS will automatically terminate the radiation hazard by removing or redirecting beam and/or inserting metal plugs into the beam line path.

Key controls at access doors are used to account for personnel in accelerator and beam line housings when access states are in the controlled access configuration (each person has a key). Qualified operators enforce these key controls as personnel enter and exit accelerator housings. When keys are removed, the system provides a safety interlock to ensure a beam cannot be directed into areas occupied by personnel.

Large, illuminated signs are generally located adjacent to each major beam line housing entrance. The signs display access-state information (such as NO ACCESS, RESTRICTED ACCESS, or CONTROLLED ACCESS) that alerts personnel to possible hazardous conditions in the beam line housing.

2.1.3 Beam Containment Systems

Radiation safety policy at SLAC requires that beams be transported within their designated channels to the designed termination point, such as a detector, beam dump, or injection into a storage ring.

If beams diverge from their proper channels, high radiation levels can occur in unprotected areas.

The *beam containment system (BCS)* prevents beams from diverging from the designated channel, and detects excessive beam power or beam losses that could cause radiation levels exceeding established radiation limits.

Containment of beams is usually accomplished by a combination of passive devices, such as collimators, that are designed to absorb errant beams, and active devices, such as electronic monitors, that shut off beams when out-of-tolerance conditions are detected.

Beam parameters such as energy and current, and/or beam losses in an area, may need to be monitored and limited by BCS devices to prevent excessive radiation levels outside the shielding enclosure. BCS devices are also used to turn off the beam if the beam power striking a device designated to contain it exceeds the power safety limit of that device.

The details of BCS design are described in Radiation Safety Systems Technical Basis Document.

2.2 Administrative Controls and Personal Protective Equipment (Operation)

Administrative controls are safety policies, rules, supervision, posting, and work procedures designed to reduce duration, frequency, and severity of exposure to hazards.

2.2.1 Authorization

2.2.1.1 Beam Authorization Sheet and Beam Line Authorization

A beam authorization sheet (BAS) is used to authorize the safety operations of accelerators.
A beam line authorization (BLA) is use to authorize the safety operation of photon beam lines. The BAS and BLA are jointly prepared, issued, and approved by the Radiation Protection Department, the facility safety officer, and operations manager representing the line organization. See the Conduct of Accelerator Facility Operations for details.

2.2.2 Configuration Control

Any facility that requires radiation shielding will have an appropriate configuration control program to ensure the shielding is properly in place before and during accelerator operation (see Conduct of Accelerator Facility Operations for details). Such processes will be described in written procedures. The configuration control program also applies to all radiation safety-significant systems such as the PPS and BCS.

2.2.2.1 Radiation Safety Work Control Form

A radiation safety work control form (RSWCF) is part of the configuration control program, which is used to control work performed on, or that may affect, all radiation safety systems such as PPSs, BCSs, BSOICs, and shielding. The facility safety officer issues the RSWCF with approval from the radiation physicist.

3 Forms

The following forms and systems are required by these requirements:

- See the Conduct of Accelerator Facility Operations

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- See the Conduct of Accelerator Facility Operations

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 9, "Radiological Safety"
  - Radiological Control Manual (SLAC-I-720-0A05Z-001)
  - Radiation Safety Systems Technical Basis Document (SLAC-I-720-0A05Z-002)
  - Radiation Protection Program Site (SharePoint)

Other SLAC Documents

- Conduct of Accelerator Facility Operations (CACM-2019-059)
- Radiation Protection Department

ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: Radiological Safety

Radiological Work and Area Entry Requirements

Product ID: 237 | Revision ID: 2543 | Date published: 20 December 2022 | Date effective: 20 December 2022
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radReqWorkEntry.pdf

1 Purpose

The purpose of these requirements is to maintain personnel radiation doses below regulatory limits and as low as reasonably achievable (ALARA) and to prevent unplanned or accidental exposure to ionizing radiation. They cover authorizing radiological work and posting of and access to areas. They apply to workers, supervisors, points of contact, and project managers, Radiation Protection and any other group involved in these activities.

2 Requirements

2.1 Radiological Work

Radiological work is any work involving the use of tools on beam lines, beam line components, beam line safety items, radiation hot spots; or *radioactive low conductivity water (LCW)* systems. All radiological work at SLAC must be authorized by line management and approved by cognizant Radiation Protection (RP) Department personnel. Radiological work must be conducted by trained personnel who are following written procedures and/or a radiological work permit (RWP). (See the Radiological Work Permits Procedure and the Radiological Work Permit site for further information.)

2.2 Area Entry

2.2.1 Area and Worker Classification

Workers at SLAC are classified according to the level of their training, which determines the areas they can enter without an escort (see Chapter 55, "Site Access Control").

- General Employee Radiological Training (GERT)-qualified personnel can enter controlled areas (no dosimeter is required) and RCAs (a dosimeter is required). (See Controlled Areas and Radiologically Controlled Areas (RCAs) for a map of these areas.) The dose for GERT-qualified personnel is limited to 100 mrem total effective dose (TED) in a year. If a worker is likely to receive a dose higher than 100 mrem TED in a year, he or she must first complete RWT I training or higher.
- Radiological Worker Training (RWT) I or higher training and a dosimeter are required to enter any radiological area or a radiological buffer area.

2.2.2 Posting

All areas containing radiation hazards or having the potential to contain radiation hazards will be posted with the appropriate signs. 10 CFR 835 defines the radiological posting requirements. Any posting must

- Be clear, legible, conspicuously posted, and may include radiological protection instructions
- Contain the standard radiation symbol colored magenta or black on a yellow background, with black or magenta lettering
- Be used to alert personnel to the presence of radiation and radioactive materials, and to aid them in minimizing exposures and preventing the spread of contamination
- Be kept up to date by RP

Postings and signs inform personnel of potential or actual radiation hazards and to indicate requirements to enter, such as level of training, dosimeter types, and controls such as a radiological work permit (RWP) or specialized equipment.

Note *Postings and signs indicate radiological area types, which are associated with particular occupational radiation dose limits, expressed in units of mrem. The indicated level of training is required so that visitors and workers are prepared to recognize hazards, use specialized equipment, and abide by specified controls.*

The postings and signs are organized by the required level of training that a person (or qualified escort) must complete before entering. Every radiological area type and the associated signage, dosimetry, training, and controls are listed below.

Note *Certain types of areas are included for completeness but may not be encountered at SLAC.*

Table 1 Training Courses

Minimum Required Training	Abbreviation	Notes
General Employee Radiological Training (ESH Course 115)	GERT	A GERT-qualified worker or escort must be present, and special permission may be required.
Radiological Worker I Training (ESH Course 116)	RWT I	
Radiological Worker II Training (ESH Course 250)	RWT II	

2.3 Areas Requiring GERT Training

The training listed below is the minimum required for unescorted access. If training is not complete, the person seeking access must be accompanied by a GERT-qualified escort at all times.

GERT-qualified personnel are permitted to enter these areas only if it will not result in an annual radiation dose greater than 100 mrem.

2.3.1 Controlled Area

Representative Signage	
Description	Area where access is managed by or for the DOE to protect individuals from exposure to radiation and/or radioactive material. A controlled area at SLAC is one where an individual is not expected to receive more than 100 mrem per year.
Dosimetry	None
Minimum Training	GERT

2.3.2 Radiologically Controlled Area (RCA)

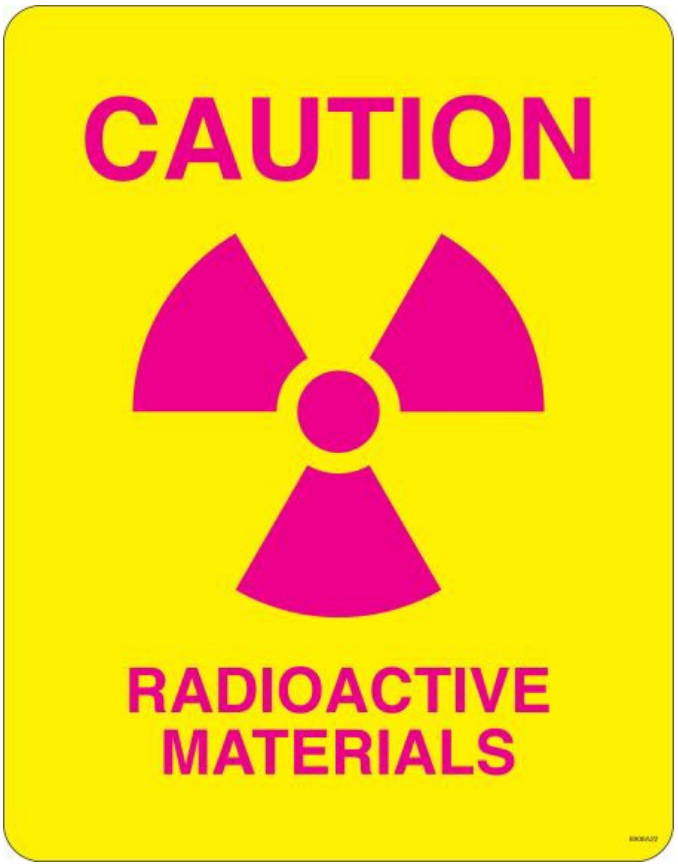
Representative Signage	
Description	A controlled area that requires dosimetry for entry due to the radiation levels in localized areas. The radiation level in certain localized areas within an RCA may vary, requiring limited occupancy. Individuals who enter only RCAs without entering radiological areas are not expected to receive a TED of more than 100 mrem in a year.
Dosimetry	Personnel dosimeter
Minimum Training	GERT

2.3.3 Controlled Area and Radioactive Material Area (Controlled Area + RMA)

Representative Signage

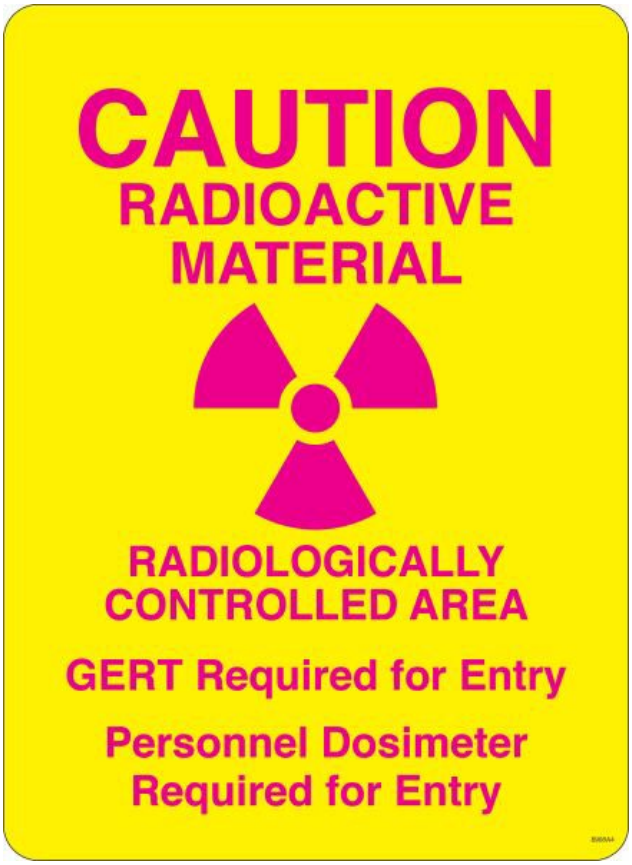
Description	A controlled area where items or containers of radioactive material exist and the total activity of radioactive material exceeds the applicable values provided in Appendix E of 10 CFR 835.
Dosimetry	None
Minimum Training	GERT

2.3.4 Radioactive Material Area (RMA)

Representative Signage	
Description	Any area within a controlled area accessible to individuals in which items or containers of radioactive material exist and the total activity of radioactive material exceeds the applicable values provided in Appendix E of 10 CFR 835.
Dosimetry	Personnel dosimeter required if the area is also posted as an RCA
Minimum Training	GERT

2.3.5 Radiologically Controlled Area and Radioactive Material Area (RCA+ RMA)

Representative Signage

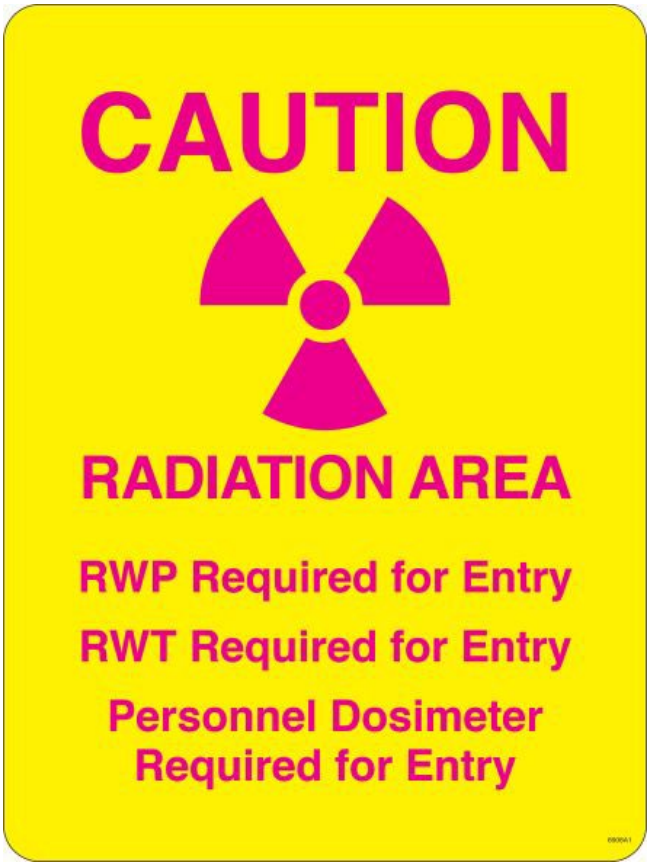


Description	A radiologically controlled area where items or containers of radioactive material exist and the total activity of radioactive material exceeds the applicable values provided in Appendix E of 10 CFR 835
Dosimetry	Personnel dosimeter
Minimum Training	GERT

2.4 Areas Requiring an RWT I Qualification (no untrained individuals allowed in these areas)

2.4.1 Radiation Area (RA)

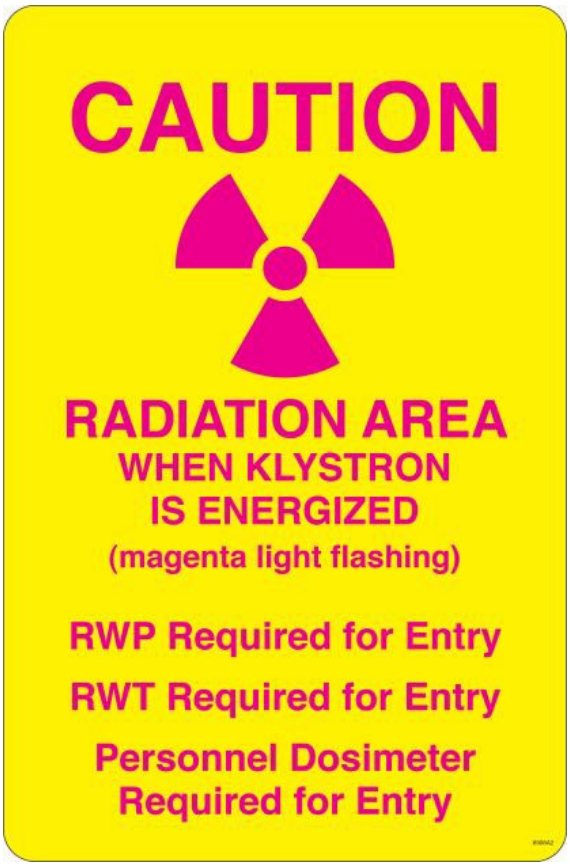
Representative Signage



Description	Area where radiation dose rates are greater than 5 mrem per hour @ 30 cm and less than or equal to 100 mrem per hour @ 30 cm
Dosimetry	Personnel dosimeter
Permit, Control, or Approval	Sign routine area radiological work permit (RWP) upon entry and exit Job type or routine task RWP for any radiological work to be performed
Minimum Training	RWT I

2.4.2 Radiation Area (RA) Intermittent Condition

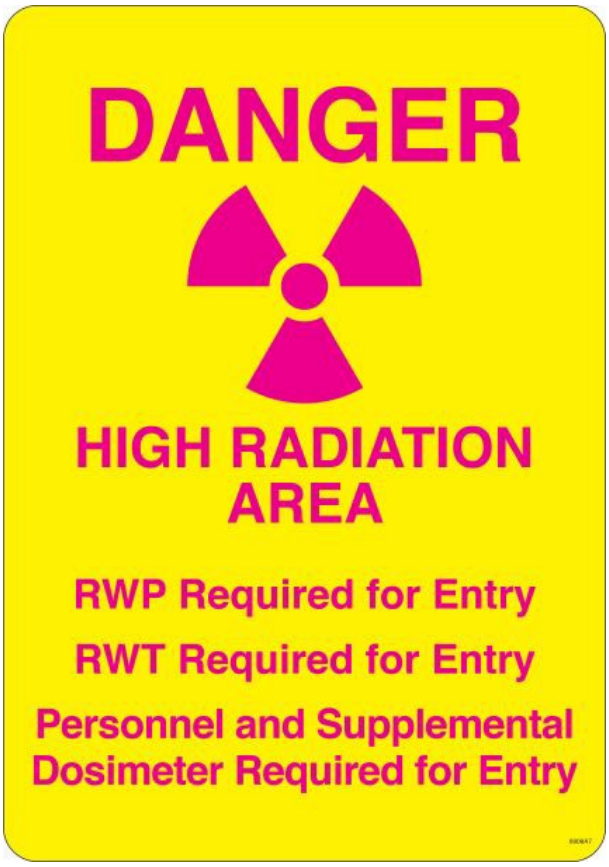
Representative Signage



Description	A radiation area only when the klystron is energized (prompt radiation)
Dosimetry	Personnel dosimeter
Permit, Control, or Approval	Sign routine area radiological work permit (RWP) upon entry and exit Job type or routine task RWP for any radiological work to be performed
Minimum Training	RWT I

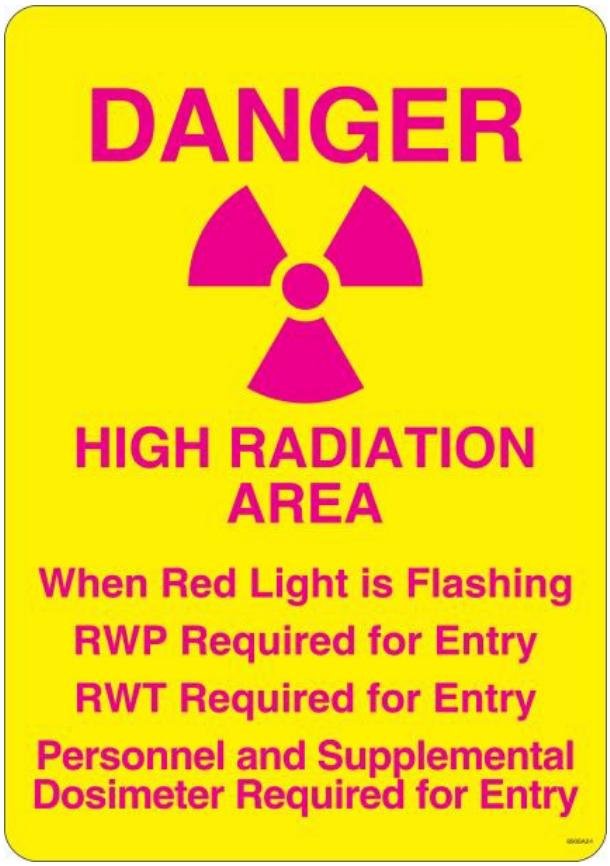
2.4.3 High Radiation Area (HRA

Representative Signage



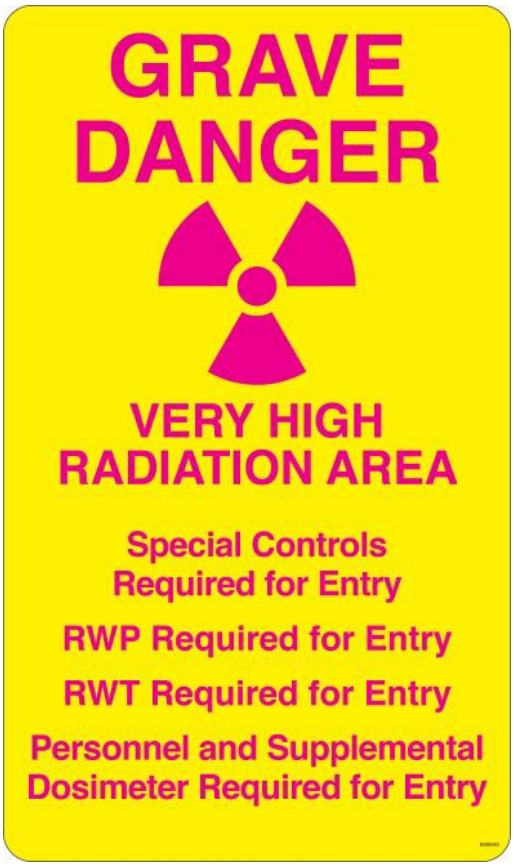
Description	Area where radiation dose rates are greater than 100 mrem per hour at 30 cm and less than 500 rad/hr at 100 cm
Dosimetry	Personnel and supplemental dosimeter
Permit, Control, or Approval	Sign routine area radiological work permit (RWP) upon entry and exit. Job type RWP for any work to be performed
Minimum Training	RWT I

2.4.4 High Radiation Area (HRA) Intermittent Condition

Representative Signage	
Description	Area where radiation dose rates are greater than 100 mrem per hour at 30 cm and less than 500 rad/hr at 100 cm
Dosimetry	Personnel and supplemental dosimeter
Permit, Control, or Approval	Sign routine area radiological work permit (RWP) upon entry and exit. Job type RWP for any work to be performed
Minimum Training	RWT I

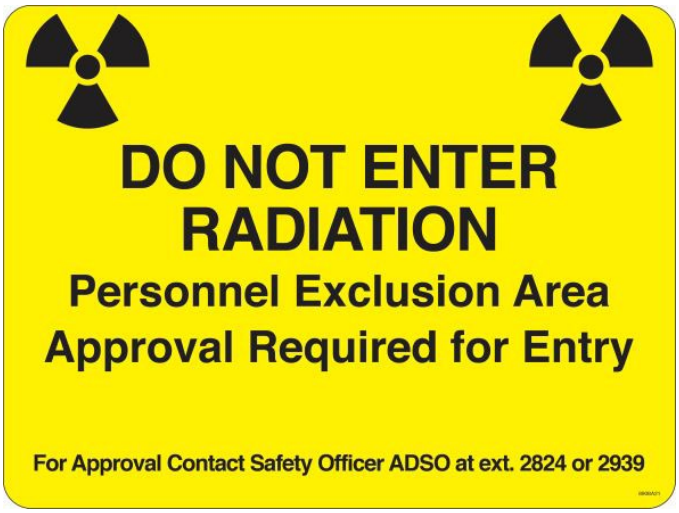
2.4.5 Very High Radiation Area

Representative Signage



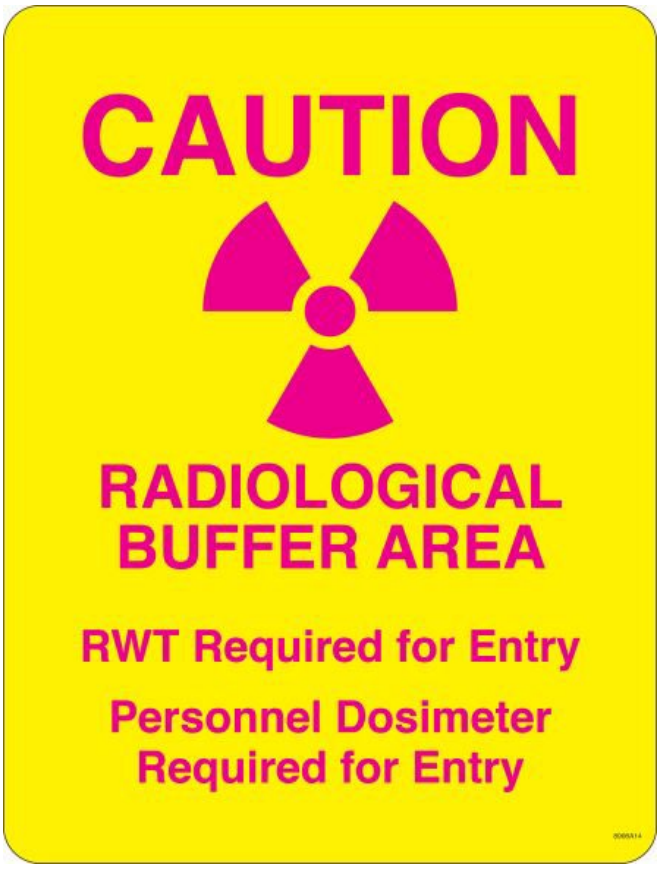
Description	Area where radiation levels could result in an individual receiving an absorbed dose in excess of 500 rads in one hour at 100 cm from a radiation source
Dosimetry	Personnel and supplemental dosimeter
Permit, Control, or Approval	Sign routine area radiological work permit (RWP) upon entry and exit. Job type RWP for any work to be performed Special controls
Minimum Training	RWT I

2.4.6 Personnel Exclusion Area

Representative Signage	
Description	Area secured during beam operations due to the potential for abnormal ionizing radiation dose rates, that are not controlled by engineered personnel protection systems (PPS)
Dosimetry	Personnel and supplemental dosimeter as directed by RP
Permit, Control, or Approval	For approval contact Accelerator Directorate Safety Officer (ADSO)
Minimum Training	RWT I

2.4.7 Radiological Buffer Area

Representative Signage

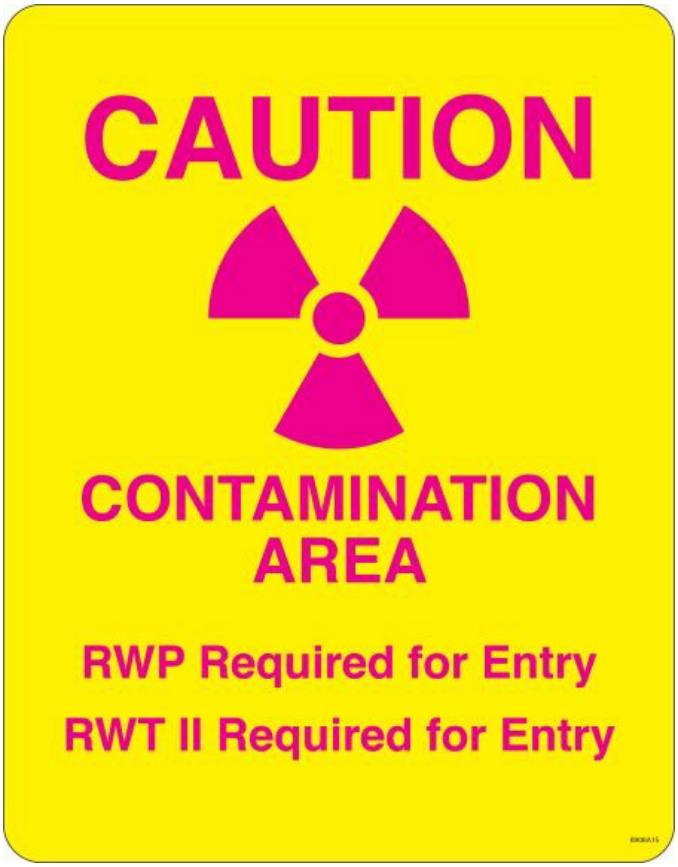


Description	Intermediate area established outside a contamination area to prevent the spread of radioactive contamination
Dosimetry	Personnel dosimeter
Permit, Control, or Approval	None
Minimum Training	RWT I

2.5 Areas Requiring an RWT II Qualification (no untrained individuals allowed in these areas)

2.5.1 Contamination Area

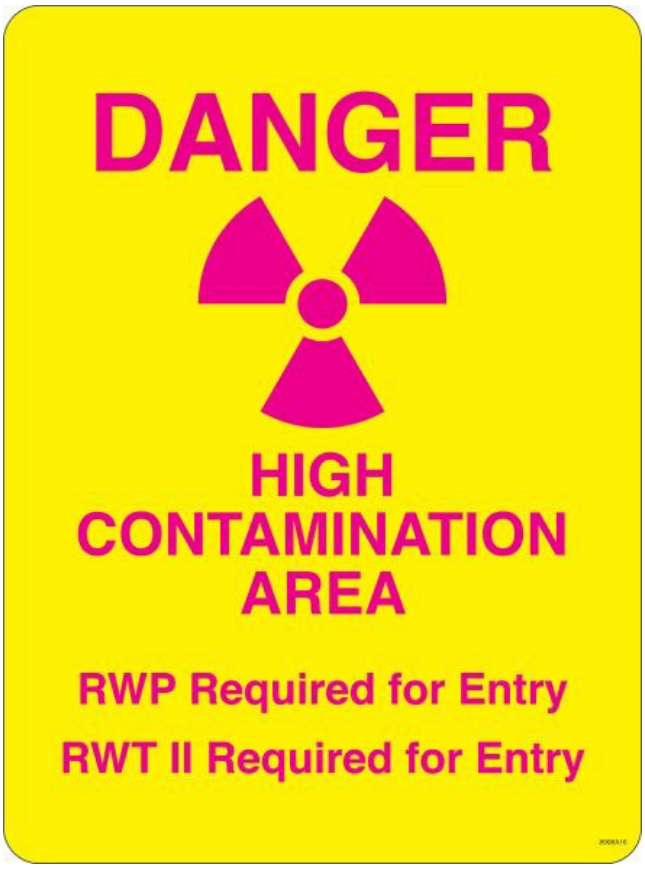
Representative Signage



Description	Area accessible to individuals where the removable contamination levels exceed or are likely to exceed the removable surface contamination values specified in Appendix D of 10 CFR 835, but do not exceed 100 times those values
Dosimetry	Personnel dosimeter
Permit, Control, or Approval	RWP upon entry and exit and to conduct work
Minimum Training	RWT II

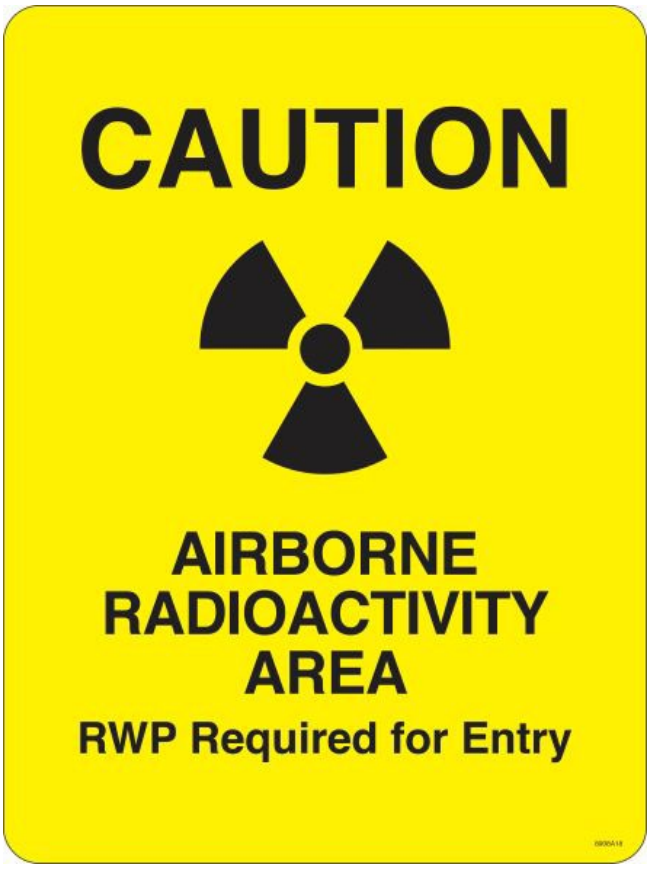
2.5.2 High Contamination Area

Representative Signage



Description	Area accessible to individuals where the removable surface contamination levels exceed or are likely to exceed 100 times the removable surface contamination values specified in Appendix D of 10 CFR 835
Dosimetry	Personnel dosimeter
Permit, Control, or Approval	RWP upon entry and exit and to conduct work
Minimum Training	RWT II

2.5.3 Airborne Radioactivity Area

Representative Signage	
Description	Any area accessible to individuals where 1) the concentration of airborne radioactivity above natural background, exceeds or is likely to exceed the DAC values listed in Appendix A or C of 10 CFR 835; or 2) an individual present in the area without respiratory protection could receive an intake exceeding 12 DAC-hrs in a week
Dosimetry	Personnel dosimeter
Permit, Control, or Approval	RWP upon entry and exit and to conduct work
Minimum Training	RWT II

2.5.4 Potential Internal Contamination

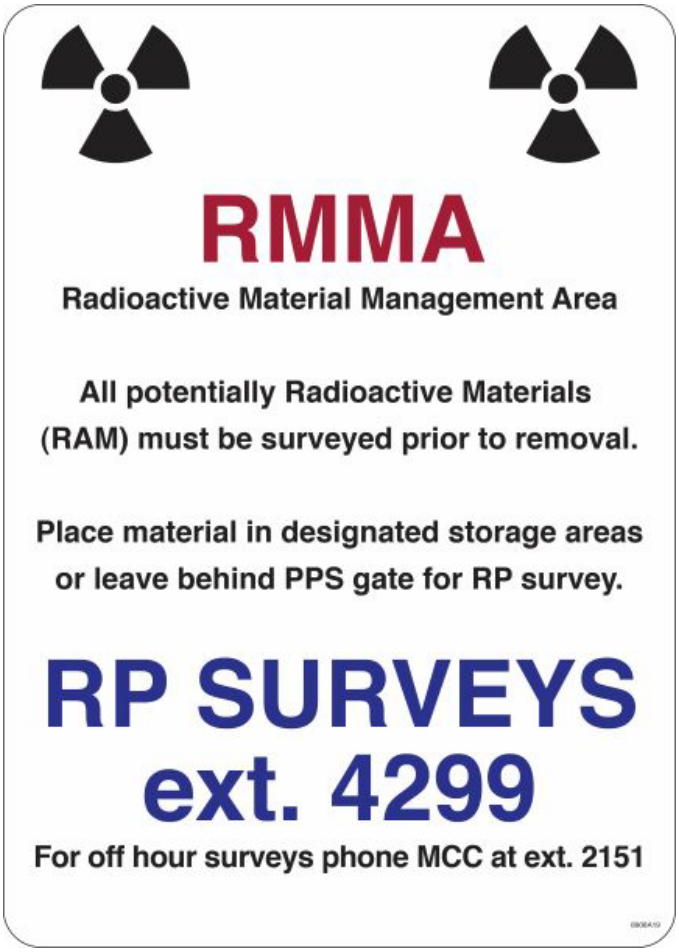
Representative Signage

Description	An LCW system where the low conductivity water or the resin bottle may be radioactive
Dosimetry	None
Permit, Control, or Approval	Contact RP prior to opening the system. Depending on the activity/concentration additional radiological controls may be needed.
Minimum Training	RWT II

2.6 Additional Signage (signs that may be encountered in any type of area)

2.6.1 Radioactive Material Management Area (RMMA)

Representative Signage



Description	Placed at the exits of accelerator housings. Indicates that materials that were in the RMMA while the beam was on could be radioactive. All potentially radioactive items must be surveyed by RPFO prior to removal.
Dosimetry	Personnel dosimeter
Permit, Control, or Approval	All potentially radioactive items must be surveyed by RPFO prior to removal
Minimum Training	GERT

2.6.2 Hot Spot

Representative Signage

Description	A localized area where the dose rate is > 100 mrem per hour on contact
Dosimetry	Hot spots are posted within RCAs and radiological areas. Follow all dosimetry requirements during entry.
Permit, Control, or Approval	Hot spots are posted within RCAs and radiological areas. Follow all radiological controls during entry.
Minimum Training	GERT

3 Forms

The following forms and systems are required by these requirements:

- Radiological Work Permit

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- The Radiation Protection Department maintains radiological work permits following the requirements of 10 CFR 835.

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 9, "Radiological Safety"
  - Radiological Safety: Personnel Dosimeter Requirements (SLAC-I-760-0A05S-001)
  - Radiological Safety: Safety Briefing (SLAC-I-760-0A05S-004)
- Chapter 55, "Site Access Control"

Other SLAC Documents

- Controlled Areas and Radiologically Controlled Areas (RCAs)
- Radiological Control Manual (SLAC-I-720-0A05Z-001)
- Radiological Work Permits Procedure (SLAC-I-760-0A05B-002, FO 005)
- Radiation Protection Department
- Radiation Protection (SharePoint)
- ESH Course 115, General Employee Radiological Training (ESH Course 115)
- ESH Course 116, Radiological Worker I Training (ESH Course 116)
- ESH Course 250, Radiological Worker II Training (ESH Course 250)

Other Documents

- Title 10, *Code of Federal Regulations*, "Energy", Chapter 3, "Department of Energy", Part 835, "Occupational Radiation Protection" (10 CFR 835)

ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: Radiological Safety

Safety Briefing

Product ID: 616 | Revision ID: 2146 | Date published: 19 July 2019 | Date effective: 19 July 2019
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radReqSafetyBriefing.pdf

This briefing is to be read in person by the SLAC escort to individuals without training being escorted in a *controlled area* or *radiologically controlled area (RCA)*, before entering the area, as part of the badging/dosimeter issuing process (see Radiological Safety: Personnel Dosimeter Requirements [SLAC-I-760-0A07S-001]).

1 Entry Restrictions

SLAC has many areas containing potentially hazardous equipment and materials that can pose a health risk. Therefore, access to certain areas at the laboratory is limited to those who have had the appropriate training, or are escorted by someone who has that training.

- Individuals without the required training are allowed to enter the *safety access area*, including the *accelerator area*, *controlled areas*, and *radiologically controlled areas (RCAs)* **only if escorted**.
- Individuals without the required training **are not** allowed to enter *radiological areas* (*radiation areas*, *high radiation areas*, and *contamination areas*). Escorting is not allowed.
- Entry into an RCA requires a dosimeter to monitor for radiation. For visitors entering an RCA on a tour the escort is required to wear a tour/group dosimeter in addition to his/her personnel dosimeter. For untrained individuals conducting non-radiological work in an RCA a personnel dosimeter is required and must be worn by the individual as directed by the escort and returned to the escort at the end of the visit.

Table 1 shows common signs indicating different areas at SLAC. Areas themselves are shown on Controlled Areas and Radiologically Controlled Areas (RCAs).

When individuals are under escort, the following responsibilities apply:

- **Individual being escorted:** understands there are unique hazards in certain areas; follows escort's instructions; and if a badge and/or dosimeter are issued, returns them at the end of the visit
- **Escort:** briefs the individuals being escorted on safety requirements, including reading this document to him or her; provides safety directions; and accepts responsibility for the individual's safety while acting as escort. Training is current and sufficient to provide escort to the listed areas. Maintains visual contact at all times and ensures that the individual being escorted does not engage in non-green work without proper work authorization and release. If entering an RCA, escort must wear dosimeter(s) at all times and ensure that the individual worker wears a dosimeter.

2 Regulatory Limits

The annual dose limit for visitors is 100 millirem per year. The average annual dose received from natural background sources is about 360 millirem per year.

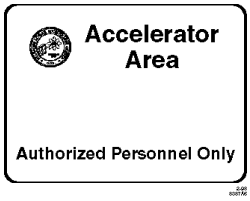
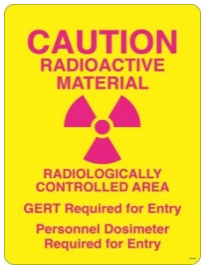
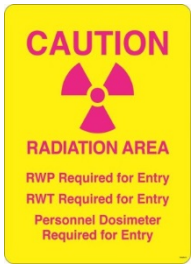
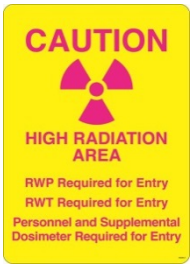
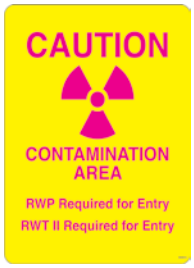
3 Risks Associated with Radiation Exposure

The increased risk of cancer from occupational radiation exposure is small when compared to the overall cancer rate in the United States. Factors that affect the level of risk include the radiation dose level and the area of the body that is exposed. Radiation-induced genetic disorders that are passed on to future generations are called heritable effects. Such effects have been found in plants and animals but not in humans. The risk of heritable effects from ionizing radiation is considered to be very small when compared to the normal rate of genetic disorder.

4 Prenatal Radiation Exposure

The embryo-fetus is known to be more sensitive to radiation than adults due to the rapid division rate of developing cells. Radiation doses can increase the chances that the child will experience slower growth or mental development, or develop childhood cancer. Women who are or may be pregnant, or who are planning a pregnancy, should consult with the Radiation Protection Department before the visit.

Table 1 Common Area Classification Signs to Be Observed at SLAC

Entry Restriction	Common Signs		
Untrained individuals are allowed only if escorted (accelerator areas and controlled areas)			
			
Untrained individuals are not allowed (radiological areas)			

NATIONAL ACCELERATOR LABORATORY

ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: Radiological Safety

Personnel Dosimeter Requirements

Product ID: 238 | Revision ID: 2657 | Date published: 6 December 2023 | Date effective: 6 December 2023
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radReqDosimeterPersonnel.pdf

1 Purpose

The purpose of these requirements is to ensure that occupational exposure to radiation is accurately measured, recorded, and provided to dosimeter wearers. These requirements cover dosimeter issuance and return and dose reporting for entry into areas with radiological postings, for special tasks, and for pregnant workers. They apply to workers, who enter a posted radiological area or perform radiological work, their supervisors, points of contact, and line management, and Radiation Protection and SLAC Site Security.

2 Requirements

2.1 Entry into Posted Areas

ESH training and dosimetry requirements for entry into areas with a radiological posting are specified on the posting as described and illustrated in Radiological Safety: Radiological Work and Area Entry Requirements. (See Controlled Areas and Radiologically Controlled Areas (RCAs) for a map.)

Note *Areas posted as a* controlled area *are the only type of radiological posting that does not require a dosimeter for entry.*

2.2 Personnel Dosimeters

Dosimeter requirements are summarized in Table 1 and detailed in the following sections.

Table 1 Dosimeter Requirements by Type of Access

Type of Access	Dosimeter Required?	Dosimeter Type	Form
Unescorted access	Yes	Personnel dosimeter	Form A
Escorted access	Yes	Personnel dosimeter	Form B
Tour	Yes	Tour/group dosimeter	Form C

2.2.1 Unescorted Access – SLAC Employees and Long-term Non-employees

A whole-body personnel dosimeter is required for

- Workers who enter *radiologically controlled areas (RCAs)* or *radiological areas* as part of their routine work
- Any worker who will handle radioactive materials if a potential of 100 mrem *total effective dose (TED)* in a year is likely

Such workers must have the required training and are allowed unescorted access to such areas. To obtain a dosimeter, submit SLAC Dosimeter / ID Request Form A to the SLAC Site Security Office or designated point of contact representatives (POC) authorized by the Radiation Protection (RP) Department. (See Site Access Control: Badging Procedures.)

Note *Work area and work type requirements determine the assigned dosimeter type.*

2.2.2 Escorted Access – Work Purposes

Individuals without the required training entering an RCA for work purposes will be issued a personnel dosimeter. Such individuals must be accompanied by a qualified escort; the escort submits SLAC Dosimeter / ID Request Form B. (See Site Access Control: Escorted Access Authorization Procedures.)

Important Such individuals may only perform *non-radiological work*; to conduct any *radiological work* in these areas, the individual must have GERT training.

2.2.3 Escorted Access – Tours

Tours will be issued a tour/group dosimeter if entering a radiologically controlled area (RCA). Tours must be accompanied by a qualified escort; the escort submits SLAC Dosimeter / ID Request Form C to obtain a group ID badge and tour/group dosimeter. The escort wears the tour/group dosimeter in addition to his or her own personnel dosimeter. A separate form and escort are required for every 20 tour members. (See Site Access Control: Escorted Access Authorization Procedures for escort requirements.)

2.3 Additional Dosimeters for Special Circumstances

2.3.1 Pregnant Workers

Additional dosimeters may be assigned to a pregnant worker if the employee formally declares a current or potential pregnancy using the Declaration of Pregnancy Form. The declaration is voluntary and does not affect benefits, seniority, or potential for promotion.

Making the declaration is solely the pregnant worker's responsibility. If she chooses to continue her current assignment and it includes working in an RCA or radiological area, additional dosimetry requirements will apply as specified by the dosimetry program manager. These additional requirements can be revoked by completing the Withdrawal of Pregnancy Declaration Form. (For more information on pregnancy and radiation exposure, see Health Physics Society Fact Sheet: Radiation Exposure and Pregnancy.)

2.3.2 Workers Who Perform Special Tasks

Supplemental dosimeters – that is, dosimeters that are to be worn in addition to a personnel dosimeter - may be required for particular tasks. Radiation Protection Department staff and supervisors make this determination and provide support as needed. Supplemental dosimeter requirements are documented on a radiological work permit (RWP). (Dose results from supplemental dosimeters are used for trending and real-time monitoring purposes and will not be entered into the Occupational Dose Tracking System as official dose records.)

2.4 Ensuring Accurate Dose Readings

The purpose of a dosimeter is to measure a worker's occupational exposure to radiation. Therefore, the dosimeter must be handled and worn correctly, must only be used by the person to whom it was issued, and must not be exposed to non-occupational sources of radiation.

2.4.1 Personnel Dosimeter Placement on the Body

To ensure the dosimeter accurately records the whole-body radiation dose, the dosimeter must be placed on the front of upper torso, between neck and waist (never clipped onto a pants pocket, belt, or shirtsleeve). It must be facing outward, with no covering of any kind (wear it on the topmost layer of clothing; if wearing personal protective clothing, wear it on that layer, facing outward).

Note *Personnel dosimeters are issued with a holder. The newest holders are fitted with an alligator clip that can be clipped to a pocket or lanyard. Additional installation tips include removing the dosimeter from the plastic bag and not removing the plastic shell that covers the dosimeter (the shell must remain intact, including the thin label on the front window).*

2.4.2 Supplemental Dosimeter Placement

Supplemental or additional dosimeters must be worn as directed by Radiation Protection Department staff or in the radiological work permit (RWP).

2.4.3 Storage When Not in Use

The best place to store a dosimeter is on the dosimeter storage rack if one is provided in the local work area. Alternatively, storing it in the wearer's on-site office prevents non-occupational radiation exposure such as that commonly encountered in medical facilities, airports, or off-site work places or laboratories with radiological equipment.

Important Do not store a dosimeter in a purse, wallet, or vehicle. Do not pass a dosimeter through any x-ray device such as those found at airports, and do not take it on an airplane.

2.4.4 Medical Treatment

Medical and dental treatment may cause radiation exposure. Because personnel dosimeters issued by SLAC are intended to measure only occupational exposure (that is, exposure at work), dosimeters must not be taken to medical or dental offices or worn immediately after any medical radiopharmaceutical procedure

(diagnostic or therapeutic) that involves radiation, such as heart stress tests, positron emission tomography (PET) scans, and treatments for hyperthyroidism.

An individual undergoing such procedures must do the following:

1. Before the procedure, he or she must leave his personnel dosimeter at SLAC. The dosimeter should be placed on the work area storage rack or turned in at the Dosimetry Office (Building 28, Room 134, ext. 4894).
2. After the procedure, when returning to work, he must go the Radiation Protection Field Operations Office (Building 28, Room 131, ext. 4299) and request an external radiation survey. (There is no need to describe the medical procedure, other than it involved nuclear medicine.)
3. If the survey indicates the individual's radiation level is at or near background, the individual may retrieve his dosimeter and resume wearing it.
4. If the survey indicates a radiation level above background, the individual must not retrieve or wear his dosimeter and must avoid others wearing dosimeters. (This means the individual may not enter areas that require dosimeters.) The individual must wait a day or two and then be surveyed again, until his radiation level is normal.

If a dosimeter may have been exposed to additional radiation due to a medical procedure, the individual must complete a SLAC Lost / Damaged Dosimeter Form, indicating a potential medical procedure exposure. (For more information on medical treatment and radiation exposure, see Health Physics Society Fact Sheet: Radiation Exposure from Medical Exams and Procedures.)

2.5 Dosimeter Return

Every dosimeter must be returned for processing within 15 days after the dosimeter's wear period ends. E-mail reminders will be sent to the wearer and their supervisor after the 15-day grace period.

Note *If the wearer will not be at SLAC when the wear period ends, they should return it before leaving SLAC.*

Dosimeters can be returned

- In person to SLAC Site Security or the assigned Dosimetry point of contact representative
- Through inter-departmental mail, RP Dosimeter Return, Mailstop 48
- If the dosimeter is off site, through a mailing procedure specified by the SLAC Dosimetry and Radiological Environmental Protection Group. (Do not send by regular mail.)

2.5.1 Wear Period

Wear periods depend on the type of dosimeter issued for specific worker categories. The beginning of the wear period is printed on the back of the dosimeter. The wear period for each dosimeter type follows:

- Temporary: one calendar month (exchanged at the end of the month; must be obtained from and returned to SLAC Site Security)
- GERT / RWT: three months (exchanged quarterly at the end of March, June, September, and December)

2.5.2 Return without Exchange

A dosimeter is returned with no provision for exchange when

- A temporary worker's assignment ends
- Anyone leaves SLAC permanently
- If the dosimeter will no longer be needed (notify POC)

2.5.3 Routine Dosimeter Exchange

Personnel whose work requires long-term dosimetry must return their dosimeter at the end of each wear period and pick up a new dosimeter for the new wear period.

Routine exchange occurs systematically as arranged by the Dosimetry Points of Contact Representatives (POCs). Some POCs handle the exchange seamlessly using the storage racks – everyone places the current dosimeter in the rack at the agreed on time and the POC exchanges it by the next work day. If no POC is assigned, the exchange can be handled through SLAC Site Security.

Note *GERT-qualified personnel are issued a dosimeter only if their work assignment includes entering an RCA or upon request.*

2.5.4 Changing Dosimeter Type

If additional training is completed or a work assignment changes and a different type of dosimeter is needed, submit a new SLAC Dosimeter / ID Request Form A to the SLAC Site Security Office.

2.6 Replacing a Lost, Damaged, or Compromised Dosimeter

Dosimeters that are lost, damaged, or exposed to non-occupational or non-SLAC radiation must be declared as such by submitting a completed SLAC Lost / Damaged Dosimeter Form to SLAC Site Security or to the Radiation Protection (RP) Dosimetry Group (Mailstop 48 or esh-drep@slac.stanford.edu). A new dosimeter will be issued.

A compromised dosimeter is one that was exposed to a non-occupational or non-SLAC radiation source such as medical diagnostic procedure or treatment such as x-rays, dental x-rays, nuclear medicine. It also includes situations where the dosimeter is exposed but the wearer is not, such as when a dosimeter passes through a security device such as x-ray machine at an airport, or it is inadvertently left in the accelerator housing while the beam is on or next to activated beam line components.

2.7 Dose Records

The Dosimetry and Radiological Environmental Protection Group provides radiation dose monitoring services and dose information to the dosimeter user to whom the dosimeter is assigned.

Anyone with a SLAC computer account can access dose information any time by logging in to the Occupational Dose Tracking System.

Dose reporting frequency is based on dosimeter type:

- GERT / RWT (quarterly exchange) dosimeter users are provided an annual report of their doses
- Visitors, users, and subcontractors holding visitor/temporary dosimeters receive reports of non-zero radiation doses no later than 90 days after the end of the visit. Dose reports are provided upon request to individual wearers.

2.7.1 Dose History Reporting

Dose history reports contain all radiation dose information from the dosimeter during the user's stay at SLAC. Dosimetry program staff will issue dose history reports to departing SLAC employees upon written request.

2.7.2 Dosimeter User Request to Release Records

Current and former dosimeter users may authorize the release of radiation dose information by submitting a completed Authorization to Release Occupational Exposure Information form.

2.7.3 Exposure Reports from Other Radiological Facilities

To ensure accurate and complete dose reporting, dose reports of all occupational exposures incurred at other institutions, including exposures from past employment if available and while visiting other institutions while employed by SLAC, must be forwarded to the Radiation Protection Department.

SLAC employees and *special individuals*, as defined in Department of Energy Order 231.1B, Change 1, "Environment, Safety, and Health Reporting" (DOE O 231.1B, Chg 1 [Admin Chg]), acting in a SLAC official capacity at a non-DOE facility and monitored for occupational radiation exposure must provide the monitoring results to SLAC within 30 days of receipt. To facilitate tracking, the employee or special individual must submit a Non-DOE Assignment Notification Form and obtain concurrence from Radiation Protection Department staff before going on assignment. (For details see the SLAC External Personnel Dosimetry Program Manual.)

3 Forms

The following forms and systems are required by these requirements:

- SLAC Dosimeter / ID Request Form A (SLAC-I-760-0A07J-006). Form for requesting a SLAC ID badge and personnel dosimeter for individuals with required training
- SLAC Dosimeter / ID Request Form B (SLAC-I-760-0A07J-007). Form for authorizing escorted access to the safety access area and requesting a temporary escort-required badge (and personnel dosimeter if required) for individuals without required training to conduct non-radiological work
- SLAC Dosimeter / ID Request Form C (SLAC-I-760-0A07J-008). Form for authorizing escorted access and requesting temporary escort-required badges (and a tour/group dosimeter if required) for tours entering the safety access area. A separate form and escort are required for every 20 tour members.
- SLAC Lost / Damaged Dosimeter Form (SLAC-I-760-0A07J-003). Form for requesting a replacement dosimeter

- Radiological Safety: Declaration of Pregnancy Form (SLAC-I-760-0A02J-001). Form for documenting declaration of pregnancy and decision to remain in current assignment
- Radiological Safety: Withdrawal of Pregnancy Declaration Form (SLAC-I-760-0A02J-002). Form for withdrawing declaration of pregnancy
- Radiological Safety: Authorization to Release Occupational Exposure Information (SLAC-I-760-0A07J-005). Form for authorizing release of occupational exposure information
- Radiological Safety: Non-DOE Assignment Notification Form (SLAC-I-760-0A07J-009). Form for notifying the Radiation Protection Department of proposed assignment to a non-DOE facility
- Occupational Dose Tracking System
- Radiological Work Permit

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- The Dosimetry and Radiological Environmental Protection Group must follow their established recordkeeping practices to ensure that dosimeters are issued and processed and that results are recorded and reported as required by applicable regulations.

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 9, "Radiological Safety"
  - Radiological Safety: Radiological Work and Area Entry Requirements (SLAC-I-760-0A05S-002)
  - Radiological Safety: Safety Briefing (SLAC-I-760-0A05S-004)
  - Radiation Protection Program Site (SharePoint)
  - Dosimetry and Radiological Environmental Protection (DREP)
  - SLAC External Personnel Dosimetry Program Manual (SLAC-I-760-2A07F-001, DG-101)
  - Dosimetry Points of Contact Representatives (POCs)
- Chapter 55, "Site Access Control"
  - Site Access Control: Badging Procedures (SLAC-I-720-0A00C-001)
  - Site Access Control: Escorted Access Authorization Procedures (SLAC-I-720-0A00C-002)

Other SLAC Documents

- Controlled Areas and Radiologically Controlled Areas (RCAs)
- Radiation Protection Department

Other Documents

- Site Compliance Plan for Department of Energy Order 231.1B, Change 1, "Environment, Safety, and Health Reporting" (DOE O 231.1B, Chg 1 [Admin Chg] SCP)
- Health Physics Society Fact Sheet: Radiation Exposure and Pregnancy
- Health Physics Society Fact Sheet: Radiation Exposure from Medical Exams and Procedures

This hardcopy version may only be used by personnel (users, subcontractors) without a SLAC computer account. Everyone else must use the web-based version of this form.

NATIONAL ACCELERATOR LABORATORY

ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: Radiological Safety

SLAC Dosimeter / ID Request Form A

Product ID: 231 | Revision ID: 2642 | Date Published: 25 August 2023 | Date Effective: 25 August 2023
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radFormDosimeterRequestA.pdf

For applicants who have completed SLAC Environment, Safety, and Health Training

Section 1: Contact Information ***(Sections 1-5 completed by applicant)***

Last name:	First name:		MI:
☐ Male ☐ Female ☐ Non-binary ☐ Decline to identify	Birth year (*yyyy*):	Job title:	
Contact information/mailing address			
City:	State:	Zip code:	Country:
Dept/group:	Phone number:	E-mail:	Mail stop:
Users or non-SLAC employees only: List employer, company, or university:			
☐ I have successfully completed the following ESH training *(check all that apply):* ☐ CSO (375) ☐ ESHO (219) ☐ GERT (115) ☐ RWT I (116) ☐ RWT II (250)			
I am requesting: ☐ ID Badge ☐ Dosimeter			

Section 2: Identification Badge Request

☐ I am applying for my first SLAC identification badge. I have successfully completed the ESH training listed above.
☐ I am applying for a replacement badge because: ☐ My badge was lost/damaged ☐ I forgot my badge ☐ Retraining has been completed ☐ Rehire ☐ Expired ☐ Other *(please explain)*

Section 3: Dosimeter Request

☐ This is my initial dosimeter; I have successfully completed the ESH training listed above. I need a dosimeter because I work in a radiologically controlled area (RCA) or I am an RWT. *(Current RCA map – also available from SLAC Site Security)*
☐ I need a replacement dosimeter because my dosimeter: ☐ Is lost* ☐ Was damaged/compromised* ☐ Was forgotten ☐ Was turned in on request of RP ☐ Expired ☐ Other *(please explain)*
**Submit a SLAC Lost/Damaged Dosimeter Form (SLAC-I-760-0A07J-003) to the Dosimetry and Radiological Environmental Protection (DREP) Group (MS 48)*

Section 4: Previous Occupational Radiation Exposure (Non-SLAC Exposure Only)

If this is your initial SLAC dosimeter, have you ever been monitored for radiation exposure at a facility other than SLAC? ☐ Yes ☐ No *If yes, please complete this entire section.*			
Current year-to-date dose estimate *(if known)*: mrem			
Employment period *(mm/dd/yyyy)*	From:	To:	
Employer name:			
Address:			
City:	State:	Zip code:	Country:

Section 5: Requirements Acknowledgement

I agree to follow all SLAC ESH requirements. I agree to return the badge when it expires and to return the dosimeter at the end of the wear period or upon request. If my work at SLAC is completed before these dates, I agree to return the badge and/or dosimeter before I depart.	
Signature:	Date:

Section 6: Issuance Approval *(Completed by SLAC personnel with the authority to approve an ID badge and/or dosimeter request. Required only for initial issue or if an applicant's work assignment changes with resulting changes in required training or dosimeter issuance.)*

SLAC Approver
☐ Applicant's supervisor ☐ Field Construction Manager (FCM) ☐ Service Manager (SM) ☐ Point of contact (POC)
☐ Other *(describe):*

I have reviewed the applicable work planning and control requirements and have communicated work group expectations with this applicant. (See ESH Manual Chapter 2, Work Planning and Control.) I approve request for: ☐ ID Badge ☐ Dosimeter
The applicant *(check one)* ☐ Is an RWT ☐ Will be entering an RCA

Name:	Signature:		Date:
Dept / group:	Extension:	E-mail:	Mail stop:

Section 7: ESH Training Verification *(Completed by proctor, trainer, or person issuing the badge and dosimeter.)*

Course	Verifying/certification signature (if applicable)	Exam date (if applicable)
☐ CSO (375)		
☐ ESHO (219)		
☐ GERT (115))		
☐ RWT I (116)		
☐ RWT II (250)		
☐ RWT I Practical (116PRA)		
☐ RWT II Practical (250PRA)		
Training transferred from *(list institution)*	Institution	
☐ GERT		
☐ RWT I		
☐ RWT II		

Section 8: ID Badge and Dosimeter Issuance *(Completed by person issuing the badge and/or dosimeter.)*

Applicant's SLAC System ID:	Badge issued on *(mm/dd/yyyy)*:	Badge expiration *(mm/dd/yyyy)*:

ID badge type: ☐ SLAC employee ☐ Subcontractor ☐ SSRL user ☐ LCLS user ☐ User ☐ Visitor

Badge issue ☐ Initial badge ☐ Reissue for rehire ☐ Reissue for updated training ☐ Reissue for work in RCA ☐ Reissue for expired
☐ Other *(Please explain.):*

Dosimeter issue: ☐ Initial ☐ Replace lost ☐ Replace damaged ☐ Replace forgotten ☐ Replaced returned on request of RP
☐ Other *(please explain):*

Dosimeter type change *(if applicable):* ☐ Other *(please explain):*

Dosimeter #:	Type: ☐ Temporary ☐ GERT / RWT	Issue date *(mm/dd/yyyy)*:	Expiration date *(mm/dd/yyyy)*:

As authorized in Section 6 and verified in Section 7, I issued the appropriate ID badge and/or dosimeter to the applicant.

Name:	Signature:	Date:	Time:

Privacy Act Notice

Collection of the information requested is authorized by Public Law 930-438 (42 USC 5814); Public Law 83-703, as amended (42 USC 2201); Public Law 93-409 (42 USC 5501, et seq.); Public Law 93-473 (42 USC 5551, et seq.); Public Law 93-410 (30 USC 1101, et seq.); Public Law 93-557 (42 USC 5901, et seq.); Public Law 86-599 (30 USC 661, et seq.). Compliance with this request is voluntary.

This information is intended to be used to identify individuals who have received an ID badge and/or personnel dosimeter for the purpose of identifying specific training levels and individual monitoring of radiation exposure.

All or part of the information collected may be disclosed to the Department of Energy and its contractors and consultants, other contractors and organizations where radiation exposure exceeds established levels, and to various State departments that monitor radiation exposure to personnel.

The effect of failure to provide this information may be the inability to issue a badge and/or dosimeter and denial of access to certain SLAC areas.

This hardcopy version may only be used by personnel (users, subcontractors) without a SLAC computer account. Everyone else must use the web-based version of this form.

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ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: Radiological Safety

SLAC Dosimeter / ID Request Form B

Product ID: 232 | Revision ID: 2643 | Date Published: 25 August 2023 | Date Effective: 25 August 2023

URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radFormDosimeterRequestB.pdf

This form is for requesting an escort, SLAC temporary badge, and dosimeter for individuals without SLAC environment, safety, and health training to conduct *non-radiological work* in the safety access area, including the accelerator area and any controlled area (CA) or radiologically controlled area (RCA). (See Controlled Areas and Radiologically Controlled Areas (RCAs) for a map.) (To conduct any radiological work in these areas, the applicant must have GERT training and fill out Form A. See Radiological Safety: Personnel Dosimeter Requirements [SLAC-I-760-0A07S-001].)

Sections 1–4 completed by applicant

Section 1: Contact Information

Last name:		First name:	MI:
☐ Male ☐ Female ☐ Non-binary ☐ Decline to identify	Birth year (*yyyy*):	Job title:	
Contact/mailing address:			
City:	State:	Zip code:	Country:
Employer, company or university name:		Phone number:	

Section 2: Identification Badge Type Determination

Have you completed SLAC environment, safety, and health (ESH) training?

☐ Yes, complete Form A instead ☐ No, a qualified escort and SLAC temporary badge required

Section 3: Dosimeter Requirement Determination

Will you access an RCA during this visit?

☐ Yes, personnel dosimeter required ☐ No

Section 4: Requirements Acknowledgement

☐ I will work at SLAC for 7 days or less during this calendar year without being trained. I will not perform any radiological work. I understand there are unique hazards in certain areas, and I agree to observe all signs and follow my escort's instructions. I will return the SLAC temporary badge and personnel dosimeter (if issued) at the end of my SLAC visit

Signature:	Date:

Section 5: Approval *(completed by the qualified escort)*

During this visit, I will be escorting the applicant to (list all areas or building numbers):

I will be escorting this person into

☐ Accelerator area only: dosimeter and radiological safety briefing not required

☐ Controlled area: **radiological safety briefing** required

☐ RCA: **dosimeter** and **radiological safety briefing** required

I will provide the escorted person safety directions and accept responsibility for his safety while I am his SLAC escort. My training is current and sufficient to provide escort to the listed areas. I will maintain visual contact at all times and will ensure that the escorted person does not engage in non-green work without proper work authorization and release. (See ESH Manual Chapter 2, Work Planning and Control.) I understand that I must wear my dosimeter at all times and that the escorted person must wear a dosimeter if they will be entering an RCA. If entering a controlled area, including an RCA, I will brief the escorted person on radiological safety requirements (Radiological Safety: Safety Briefing [SLAC-I-760-0A07S-004]).

☐ No radiological works will be performed during this visit.

Name:	Signature:	Date:
Phone number:		E-mail:

Section 6: ID Badge and Dosimeter Issuance *(completed by person issuing the badge and/or dosimeter)*

Dosimeter required?

☐ No, the escorted person will not enter an RCA

☐ Yes, the escorted person will enter an RCA: a personnel dosimeter will be issued

Temporary dosimeter (if issued) #	Issue date:	Expiration date:

Name:	Signature:	Date:	Time:

Privacy Act Notice

Collection of the information requested is authorized by Public Law 930-438 (42 USC 5814); Public Law 83-703, as amended (42 USC 2201); Public Law 93-409 (42 USC 5501, et seq.); Public Law 93-473 (42 USC 5551, et seq.); Public Law 93-410 (30 USC 1101, et seq.); Public Law 93-557 (42 USC 5901, et seq.); Public Law 86-599 (30 USC 661, et seq.). Compliance with this request is voluntary.

This information is intended to be used to identify individuals who have received an ID badge and/or personnel dosimeter for the purpose of identifying specific training levels and individual monitoring of radiation exposure.

All or part of the information collected may be disclosed to the Department of Energy and its contractors and consultants, other contractors and organizations where radiation exposure exceeds established levels, and to various State departments that monitor radiation exposure to personnel.

The effect of failure to provide this information may be the inability to issue a badge and/or dosimeter and denial of access to certain SLAC areas.

Definitions

Radiological work. Work involving any use of tools on beamlines, beamline components, beamline safety items such as shielding, PPS components, and BCS components where a change in radiological conditions might occur. This also includes any work on radiation hot spots and work on radioactive LCW systems.

Non-radiological work. Work not involving breaching a known radioactive water system or handling radioactive contaminated components. This includes tours, observations, and recording of data.

Chapter 9: Radiological Safety

SLAC Dosimeter / ID Request Form C

Product ID: 70 | Revision ID: 1957 | Date Published: 28 August 2017 | Date Effective: 28 August 2017
URL: http://www-group.slac.stanford.edu/esh/eshmanual/references/radFormDosimeterRequestC.pdf

This form must be completed for *tours* that will enter the safety access area, including the accelerator area and any controlled area (CA) or radiologically controlled area (RCA). (See Controlled Areas and Radiologically Controlled Areas (RCAs) for a map.) Such tours require a qualified escort. A separate form and escort are required for every 20 tour members. (See Radiological Safety: Personnel Dosimeter Requirements [SLAC-I-760-0A07S-001].)

Section 1: Escort Information *(completed by the qualified escort)*

Last name:	First name:	MI:
Department/group:	Phone number:	Mail stop:
If non-SLAC, employer, company or university name:		
This tour includes the following locations *(list all areas and buildings)*:		

I will be escorting this tour into

- ☐ Accelerator area only: dosimeter and radiological safety briefing not required
- ☐ Controlled area: **radiological safety briefing** required
- ☐ RCA*:* **tour dosimeter** and **radiological safety briefing** required

I will provide safety directions to these persons and accept responsibility for their safety while I am their SLAC escort. I am current in all required SLAC environment, safety, and health (ESH) training for the areas listed above and I have obtained all required releases, including one from the area or building manager. (Using the Term Release Tool is recommended.) I will ensure that everyone remains within my field of vision at all times, no one enters any area other than those listed above, and no one engages in any work. I will wear both the group/tour dosimeter and my personnel dosimeter while performing my escort duties in an RCA (and will return the group/tour dosimeter after the tour). If entering a controlled area, including an RCA, I will brief tour members on radiological safety requirements (Radiological Safety: Safety Briefing [SLAC-I-760-0A07S-004]).

☐ No work of any kind will be performed during this tour.

Signature: Date:

Section 2: Tour Badge and Dosimeter Issuance *(completed by person issuing the badge and/or dosimeter)*

Dosimeter required?

- ☐ No, the tour will not enter an RCA
- ☐ Yes, the tour will enter an RCA: a tour/group dosimeter will be issued to the escort (escort must return after tour)

Temporary tour dosimeter (if issued) #:	Issue date:	Expiration date:

Name:	Signature:	Date:	Time:

Privacy Act Notice

Collection of the information requested is authorized by Public Law 930-438 (42 USC 5814); Public Law 83-703, as amended (42 USC 2201); Public Law 93-409 (42 USC 5501, et seq.); Public Law 93-473 (42 USC 5551, et seq.); Public Law 93-410 (30 USC 1101, et seq.); Public Law 93-557 (42 USC 5901, et seq.); Public Law 86-599 (30 USC 661, et seq.). Compliance with this request is voluntary.

This information is intended to be used to identify individuals who have received an ID badge and/or personnel dosimeter for the purpose of identifying specific training levels and individual monitoring of radiation exposure.

All or part of the information collected may be disclosed to the Department of Energy and its contractors and consultants, other contractors and organizations where radiation exposure exceeds established levels, and to various state departments that monitor radiation exposure to personnel.

The effect of failure to provide this information may be the inability to issue a badge and/or dosimeter and denial of access to certain SLAC areas.

Section 3: Tour Members *(completed by each tour member)*

By initialing here I attest that I understand that I must stay within visual contact of the escort at all times and follow all safety and emergency instructions.

No.	Name *(Printed, last, first)*	Initials	Organization
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

(A separate form and escort are required for every 20 tour members.)

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Chapter 9: Radiological Safety

SLAC Lost / Damaged Dosimeter Form

Product ID: 239 | Revision ID: 2536 | Date Published: 20 December 2022 | Date Effective: 20 December 2022
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radFormDosimeterLost.pdf

To ensure accurate and complete dose reporting, dosimeters that are lost, damaged, or exposed to non-occupational or non-SLAC radiation must be declared as such by completing and submitting this form to SLAC Site Security (Building 53) or to the Radiation Protection (RP) Dosimetry Group (Mailstop 48 or esh-drep@slac.stanford.edu). A new dosimeter will be issued. (See Radiological Safety: Personnel Dosimeter Requirements [SLAC-I-760-0A07S-001].)

1. Reason for Reporting or Requesting Replacement *(check one)*	
☐ Lost dosimeter	☐ Non-SLAC exposure event *(x-ray, airport, medical treatment)*
☐ Damaged dosimeter	☐ Other
Today's date	Loss / damage date

2. Your Contact Information		
Name	Phone	SLAC ID
Personnel type *(check one)*		
☐ SLAC employee	☐ Visitor or subcontractor	
SLAC group	SLAC point of contact	
Supervisor	Employer	
Phone	Phone	

3. Dosimeter Information	
Dosimeter number *(back of dosimeter)*	
Monitoring begin date *(back of dosimeter)*	Monitoring end date
Monitoring category *(check one)* ☐ GERT / RWT (quarterly) ☐ TEMP (monthly)	

4. Lost Dosimeter / Dose Investigation Questionnaire *(for damaged or compromised dosimeter, go to Section 5)*		
A. Where were you the last time you knew you still had your dosimeter?		
B. When were you first aware that it was gone?		
C. Did you enter any of the following posted areas during this monitoring period? *(check all that apply)* ☐ Radiologically Controlled Area (RCA) ☐ Radiation Area ☐ High Radiation Area ☐ Very High Radiation Area ☐ Contamination Area ☐ Radioactive Material Area		
If any above are checked:	Location	Length of stay (hours)
If you were wearing a supplemental dosimeter, such as electronic dosimeter or pocket ion chamber (PIC), what was the reading when you exited?		
D. List any co-workers that were with you in the area listed in C above.		
Name	Phone	
Name	Phone	

Name	Phone
Name	Phone
If no one was with you, list co-workers you generally worked with during the indicated monitoring period.	
Name	Name
Name	Name
Name	Name
Name	Name

5. Damaged or Compromised Dosimeter Questionnaire	
Do you suspect that your dosimeter could have received non-occupational radiological exposure? *(check yes or no)*	☐ Yes ☐ No
If yes, please provide detail: ☐ X-rays (medical x-rays or security system, such as an airport x-ray machine) ☐ Medical radionuclides (diagnostic or therapeutic) ☐ Exposure to activated materials or exposure to beam in an accelerator housing	
Additional information	

6. Reported by The reported information is true to the best of my knowledge.	
Name	
Signature	Date

Send completed form to Radiation Protection (RP) Dosimetry Group, Mailstop 48 or esh-drep@slac.stanford.edu, or drop off at SLAC Site Security, Building 53.

Chapter 9: Radiological Safety

Authorization to Release Occupational Exposure Information

Product ID: 235 | Revision ID: 1809 | Date Published: 3 March 2016 | Date Effective: 3 March 2016
URL: http://www-group.slac.stanford.edu/esh/eshmanual/references/radFormExpRelease.pdf

To obtain this authorization, print this form, fill it in, sign it, and either:
1. Fax it to: Dosimetry Office, Fax # (650) 926-2837, or
2. Mail it to: Dosimetry Office, SLAC National Accelerator Laboratory, MS 48, P.O. Box 20450, Stanford, CA 94309

I hereby authorize the SLAC National Accelerator Laboratory (SLAC) to send to the person/institution shown below any and all information concerning the internal and external occupational radiation dose I received while at SLAC.

(Please print all requested information.)

Requester's name: _____

Release information to: _____
Person/institution

I prefer that SLAC use the following method to convey the information (check one and provide the relevant information):

☐ POSTAL SERVICE (slowest method, but most private)
Mailing address: _____

_____ Sample form, see URL at top of page

_____

☐ FAX (faster, but not as private)
Fax number: _____

☐ ELECTRONIC MAIL (fastest method, but the least private)
Email address: _____

_____ _____
Signature of Requester Date

NATIONAL ACCELERATOR LABORATORY

ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: *Radiological Safety*

Declaration of Pregnancy Form

Product ID: 234 | Revision ID: 2658 | Date Published: 6 December 2023 | Date Effective: 6 December 2023
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radFormPregnancyDeclare.pdf

This form applies to women who work in a controlled area, radiologically controlled area (RCA), or radiological area (radiation area, high radiation area, very high radiation area, or contamination area) and who become pregnant. They are not required to declare their pregnancy to SLAC, but if they choose to declare they must use this form, indicating whether they want to remain in their current assignments (in which case additional dosimetry requirements apply) or be temporarily reassigned. All information on this form will be kept privileged and confidential. Signing this form does not affect the worker's benefits, seniority, or potential for promotion.

Worker rights statement. In accordance with Section 206 of 10 CFR 835, I am voluntarily declaring in writing that I am pregnant. I recognize that I am now subject to a dose-limit restriction to ensure that my occupational prenatal radiation exposure does not exceed 500 mrem for the duration of the pregnancy, in addition to my SLAC yearly occupational dose limit. If I choose to continue working in a radiologically controlled area (RCA) or radiological area (radiation area, high radiation area, very high radiation area, or contamination area), I agree to wear a fetal monitoring dosimeter, as requested by Radiation Protection Department (RPD) staff, and I will be sent a monthly radiation exposure report. I am aware that I can choose to request a mutually agreeable reassignment to work in a workplace environment that involves no occupational radiation exposure without loss of pay or promotional opportunity. I understand that I may terminate these restrictions voluntarily at any time by submitting a signed copy of the Withdrawal of Declaration of Pregnancy Form to SLAC Occupational Health Center. (For more information on pregnancy and radiation exposure, see Health Physics Society Fact Sheet: Radiation Exposure and Pregnancy.)

WORKER'S PREGNANCY DECLARATION

Name (please print) | SLAC system ID | Mailstop

Department | Phone

Estimated date of conception: _____ or estimated due date: _____

I have read the worker rights statement above. For the remainder of my pregnancy (check one)

☐ I choose to continue my current assignment, which includes working in ☐ controlled area ☐ RCA ☐ radiological area.

☐ I choose to be reassigned to an uncontrolled area (no additional dosimeter will be required)

Worker's signature | Date

SUPERVISOR'S ACKNOWLEDGEMENT *Supervisor forwards this form to SLAC Occupational Health Center (MS 25)*

Supervisor's name (please print) | Department | Phone | Mailstop

In concordance with the worker's choice:

☐ Worker will continue with her present assignment and will follow additional RPD dosimetry requirements

☐ Worker will be reassigned: _____

Supervisor's signature: | Date

SLAC OCCUPATIONAL HEALTH CENTER

Copy sent to dosimetry program manager.

☐ Mail (MS 48) on (date):

☐ E-mail on (date):

Copy sent to

☐ Worker on (date):

☐ Supervisor on (date):

☐ Original form filed in worker's medical record on (date):

SLAC Occupational Health Center representative (please print)

Signature | Date

RADIATION PROTECTION DEPARTMENT DOSIMETRY RECORD

Worker's name (please print) Department Phone Mailstop

Prenatal radiation dose limit for full duration of pregnancy 500 mrem

Occupational radiation exposure history from date of conception to date of declaration _____ mrem

Remaining allowable prenatal radiation dose for duration of pregnancy _____ mrem

PRENATAL DOSIMETRY ASSIGNMENT ACKNOWLEDGEMENT

The dosimetry program manager has described the monthly fetal monitoring requirements for the duration of my pregnancy. If I work in a controlled area, I may request a fetal monitoring dosimeter, even it is not required. If my pregnancy ends before the expected due date I will inform the program manager in order to end the monthly monitoring requirements.
I will abide by all the requirements, which include wearing dosimeter(s) as assigned and returning them promptly for processing. The dosimeter will be worn in the area of my abdomen, in order to obtain an accurate dose to the embryo/fetus. The monthly dose report will be forwarded to me as soon as it is available. I will report any non-occupational exposure to the dosimetry program manager immediately.

Worker (please print)

Signature Date

Dosimetry program manager (please print)

Signature Date

PRENATAL RADIATION OCCUPATIONAL RADIATION DOSE MEASUREMENT RECORD

Begin Wear Date	End Wear Date	Issue Date	Return Date	Read Date	Dosimeter Number	Dose During Period (mrem)	Cumulative Dose (mrem)	Worker was notified (name of RPD staff responsible for notification) monthly dose report by e-mail

Total SLAC occupational dose during gestation _____ mrem

Comments :

DOSIMETRY FINAL REPORT

I have reviewed the dosimetry record and it is correct to the best of my knowledge.

Dosimetry program manager signature Date

Chapter 9: Radiological Safety

Withdrawal of Declaration of Pregnancy Form

Product ID: 233 | Revision ID: 1808 | Date Published: 3 March 2016 | Date Effective: 3 March 2016
URL: http://www-group.slac.stanford.edu/esh/eshmanual/references/radFormPregnancyWithdrawal.pdf

All information on this form will be kept privileged and confidential. Signing this form does not affect an employee's benefits, seniority, or potential for promotion.

Part 1 *(to be completed by worker)*

I am withdrawing my previous declaration of pregnancy in writing. I understand that by submitting this form I agree to the lifting of any previous work restrictions imposed on me as a result of my pregnancy, and to the removal of additional dosimeters.

I also understand that it is my sole responsibility to give this written notification to Occupational Health Center staff and to also separately notify the Dosimetry program staff of my decision to withdraw my declaration of pregnancy.

Worker's name *(print)*	System ID#	
Department	Phone ext.	Mailstop
Worker's signature *(sign)*	Date	
Supervisor's name *(print)*		
Department	Phone ext.	Mailstop

Part 2 *(to be completed by Occupational Health Center staff)*

Date dosimetry program manager notified	☐ Email ☐ Phone
Date copy sent to dosimetry program manager (MS 48)	
Date supervisor notified	☐ Mail ☐ Phone
Date copy sent to worker	
Date original form entered into worker's medical record	
Authorized OHC representative name *(print)*	Date
Authorized medical representative signature *(sign)*	

Chapter 9: Radiological Safety

Non-DOE Assignment Notification Form

Product ID: 685 | Revision ID: 2634 | Date Published: 15 August 2023 | Date Effective: 15 August 2023

URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radFormNonDOEAssignment.pdf

To ensure accurate and complete dose reporting, SLAC employees and *special individuals*, as defined in Department of Energy Order 231.1B, Change 1, "Environment, Safety, and Health Reporting" (DOE O 231.1B, Chg 1 [Admin Chg]), acting in an official capacity at a non-DOE facility and monitored for occupational radiation exposure must provide the monitoring results to SLAC within 30 days of receipt. To facilitate tracking, the employee or special individual must submit this form and obtain concurrence from the Radiation Protection (RP) Department before going on assignment. Completed forms and resulting reports will be maintained by RP. (See Radiological Safety: Personnel Dosimeter Requirements [SLAC-I-760-0A07S-001].)

Worker's name *(print)*		
SLAC ID number	Date of birth	Department
Assignment location/facility/organization		
Assignment address		
Assignment duration (expected)		
Occupational exposure range on assignment (expected, mrem/yr) ☐ 0–100 ☐ 100–350 ☐ 350–500* ☐ >500** *Occupational exposures greater than 360 mrem/yr total effective dose must be approved by the SLAC ALARA Committee		
Worker's signature *(sign)*		Date
Supervisor's name *(print)*		
Supervisor's signature *(sign)*		Date

**Occupational exposures greater than 360 mrem/year total effective dose must be approved by the Radiation Protection Department head, associate laboratory director, and radiological control manager (see Radiological Control Manual [SLAC-I-720-0A05Z-001], Section 212.2).*

***No person shall be allowed to go above the administrative control level of 500 mrem TED per year without the prior approval of the SLAC laboratory director or designee.*

ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: Radiological Safety

Radioactive and Nuclear Material and Waste Requirements

Product ID: 495 | Revision ID: 2650 | Date published: 15 September 2023 | Date effective: 15 September 2023
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radReqMaterials.pdf

1 Purpose

The purpose of these requirements is to ensure radioactive and nuclear materials (special nuclear materials and other accountable nuclear materials) and devices are handled safely. They cover use, storage, handling, and disposal of radioactive and nuclear materials and waste, including sealed sources and radiation generating devices. They apply to workers, and their line management, supervisors, and points of contact, who work with radioactive and nuclear materials or waste, and Radiation Protection.

2 Requirements

2.1 SLAC's Radiological Facility Classification

SLAC is a *radiological facility* as defined in the Department of Energy Standard 1027-2018, Change Notice 1, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports" (DOE-STD-1027-2018, Chg Notice 1). This classification restricts the quantity of radioactive material that may be stored on site.

Because the radiological facility classification is based on the quantity of radioactive material and how it is stored, RPD controls on-site quantities of radionuclides. RPD must be contacted before any radioactive material (including radioactive sources) is brought to SLAC to ensure quantities will not cause SLAC to exceed the allowance for a radiological facility.

2.1.1 Areas under Classification

The four SLAC areas under this classification are: the 2-mile accelerator and the complex that houses the beam line experimental facilities; the Stanford Synchrotron Radiation Lightsource (SSRL), including the linac, booster, SPEAR, and experimental halls; the Radioactive Waste Management Storage Yard (RAMSY); and the campus area outside the accelerator area fence.

2.1.2 Radioactive Materials Quantity Restrictions

It is SLAC policy that radionuclides in non-certified containers be restricted to the lowest quantity that is consistent with operational or experimental requirements. The total amount of any radionuclide in a non-certified container at each of these facilities must not exceed the fraction with a numerical value of one

half[1] of the Category 3 threshold quantity for that radionuclide.[2] When more than one radionuclide is at a facility, the quantities must be limited so that the sum of the fractions of the materials will not exceed one half.

2.1.3 Special Nuclear Materials and Other Accountable Nuclear Materials

Nuclear material, including *special nuclear material* and *other accountable nuclear material* (such as deuterium and enriched lithium), is subject to the requirements in the Nuclear Material Control and Accountability Plan. (For lists of such materials, see Tables I, II, IV, and X of the plan.)

Before such material is acquired or shipped to SLAC, the nuclear material representative must evaluate the amount before shipment to ensure that SLAC will not exceed the SLAC administrative limit for nuclear material inventory. SLAC also makes the appropriate requests for authorization from facilities to which material is being shipped.

2.2 Radioactive Sealed Source and Radiation Generating Device (RGD) Management

2.2.1 Radioactive Sealed Sources

Radioactive sealed sources typically are used at SLAC to calibrate instruments and for experimental work. A *sealed source* consists of radioactive material that is either fixed between layers of non-radioactive material or fixed to a non-radioactive surface and contained in a closed capsule. Sealed sources are categorized as either *accountable* or *exempt* (exempt sources are also known as *non-accountable sources*).

Pre-authorization is required from the RP Department before any sealed source can be brought on site.

To obtain a sealed source at SLAC, individuals can borrow one from the Radiation Protection Field Operations Group (RPFO) or from a source custodian. If a source must be acquired from a vendor, a Radiological Safety: Sealed Radioactive Source Acquisition Authorization Form must be completed, approved by RP, and included with the requisition.

Personnel using a sealed source are identified as either a custodian or a user. In many cases, the custodian and user is the same individual. A custodian is an individual directly responsible for the safe and positive controls of one or more sealed sources. A custodian may temporarily issue a sealed source to another user as long as all requirements stipulated in the RP Department Radioactive Sealed Source Procedure are met. Custodians will be trained in these policies prior to receiving custody of sealed sources and must be retrained on these policies every two years.

Users typically have sealed sources in their possession for no more than a few days. Users are prohibited from transferring sealed sources to other personnel. Only custodians can issue sealed sources. Users will be briefed on the sealed source policies by custodians prior to taking possession of any sealed source.

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1 The fraction is defined as the mass of each radionuclide divided by its Category 3 threshold quantity.

2 For the Category 3 threshold value, see DOE-STD-1027-2018, Chg Notice 1, Attachment 1

See the RP Department Radioactive Sealed Source Procedure and the Radiological Control Manual for further discussion on control requirements for sealed sources and the Sealed Source Acquisition Process for instructions on obtaining a sealed source.

2.2.2 Radiation Generating Devices (RGDs)

Radiation generating devices (RGDs) are "devices which produce ionizing radiation, including, certain sealed radioactive sources, small particle accelerators used for single purpose applications which produce ionizing radiation (e.g., radiography), and electron generating devices that produce x-rays incidentally." (DOE G 441.1-1C, Chg 1 [Admin Chg])

Pre-authorization is required from the RP Department before any RGD can be brought on site.

See the Radiation Generating Devices Program Manual for more information about RGDs at SLAC.

2.3 Transporting Radioactive Material within SLAC

Use of personal vehicles to transport radioactive material is prohibited. When needed, transport of radioactive materials must be conducted using SLAC vehicles and appropriate containers and equipment. Prior to transport, the individual who has ownership or responsibility for the radioactive material is responsible for contacting the RPD to ensure the radioactive materials are properly identified, packaged, and labeled.

Containers must be secured to prevent sliding or shifting of contents or the packages themselves during transport. Transporters of radioactive materials must ensure the recipient of the radioactive material is properly notified to receive the radioactive material.

For more detailed information on transporting radioactive material at SLAC or off-site, see the Radiological Control Manual and the Radioactive Waste Manual.

2.4 Storage of Radioactive Material

The storage of radioactive materials within SLAC is subject to controls and will be coordinated with RPD.

Material determined to be radioactive must be stored within a *radiologically controlled area (RCA)* and a *radioactive material area (RMA)*. In most cases, all radioactive material is identified with a radioactive label except if located in accelerator housings or a RMA, where all material is considered radioactive and must be surveyed upon removal.

2.5 Managing Radioactive Waste

The Radioactive Waste Management Group provides radioactive waste processing services for radioactive waste generators. RPD accepts, stores, processes, and prepares radioactive waste and/or mixed waste for shipment off-site to licensed/permitted treatment and disposal facilities.

Radioactive waste and mixed waste generators are responsible for the following tasks:

- Waste minimization

- Waste segregation, according to waste type (mixed versus radioactive only), and by material composition (concrete, metal, wire/cable). Segregation in this manner reduces both disposal and handling costs.
- Waste characterization, including chemical composition and physical state and composition.
- Packaging, marking, and labeling the waste in accordance with the requirements of Chapter 5 of the Radioactive Waste Manual.
- Completing a Radioactive Material Declaration Form, which certifies the waste meets the waste acceptance criteria of Chapter 5 of the Radioactive Waste Manual

For more detailed information on managing radioactive waste, consult the Radioactive Waste Manual.

2.6 Decommissioning Activities

Decommissioning activities that may involve potentially radioactive materials are subject to case-by-case evaluation by RPD.

3 Forms

The following forms and systems are required by these requirements:

- Radiological Safety: Sealed Radioactive Source Acquisition Authorization Form (SLAC-I-760-0A30J-005). Form for authorizing the acquisition of sealed radioactive sources
- Radioactive Material Declaration Form (contained in Radioactive Waste Manual, [SLAC-I-760-2A08Z-001])
- See the program manuals and procedures referenced under each topic above for other forms.

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- See the program manuals and procedures referenced under each topic above.

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 9, “Radiological Safety”
  - Radiological Control Manual (SLAC-I-720-0A05Z-001)
  - Radioactive Sealed Source Procedure (SLAC-I-760-2A30C-005, FO 008)
  - Sealed Source Acquisition Process (SLAC-I-760-2A30S-001)
  - Radiation Generating Devices Program Manual (SLAC-I-760-2A30C-015, FO 035)
  - Shipping and Receiving of Radioactive Materials (SLAC-I-760-0A30C-002, FO 010)

- Nuclear Material Control and Accountability Plan (SLAC-I-760-2A30C-008, FO 021)
- Radioactive Waste Manual (SLAC-I-760-2A08Z-001)
- Radiation Protection Program Site (SharePoint)

Other SLAC Documents

- Radiation Protection Department

Other Documents

- Department of Energy Standard 1027-2018, Change Notice 1, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports" (DOE-STD-1027-2018, Chg Notice 1)
- Department of Energy Guide 441.1-1C, Change 1, "Radiation Protection Programs Guide for Use with Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection" (DOE G 441.1-1C, Chg 1 [Admin Chg])
- Department of Energy Order 474.2A, "Nuclear Material Control and Accountability" (DOE O 474.2A)

ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: Radiological Safety

Sealed Radioactive Source Acquisition Authorization Form

Product ID: 708 | Revision ID: 2102 | Date Published: 19 July 2019 | Date Effective: 19 July 2019
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radFormSRSRequest.pdf

This form is used to authorize the acquisition of sealed radioactive sources. It is to be submitted by the requester and approved by the Sealed Radioactive Source Program Manager (SRSPM). Approved forms are to be attached to the requisition and maintained by SRSPM. (See Radiological Safety: Radioactive and Nuclear Material and Waste Requirements [SLAC-I-760-0A30S-001] and the Sealed Source Acquisition Process [SLAC-I-760-2A30S-001].)

A. Source Information *(to be filled out by requester)*

Source type: ☐ sealed ☐ open	Radionuclide:	
Chemical composition (e.g., cesium source has a chemical makeup of cesium chloride):		
Date you need the source at SLAC to start work:	How long will the source remain at SLAC (e.g., 1 month of use but 6 months of storage):	
Can the source be returned to the manufacturer at the end of the experiment (typically for an additional disposal fee): ☐yes ☐ no		
Activity expected *(mCi or equivalent)*:		
Use of source (e.g., provide a calibration signal for a detector):		
Is the source to be used in a vacuum: ☐yes ☐ no; in low / high temperatures ☐yes ☐ no If yes, SLAC will require that the source be certified by the manufacturer for the desired operating conditions.		
Area of use (building/room):		
Users (list all):		
Requester name (print):	Signature:	Date:

B. Additional Requisition Information *(include items 2, 4, and 5 on requisition)*

1. Make sure to mark the item as "radioactive material" in requisition.
2. The vendor will provide both 7-day and 1-day notices prior to shipping the sources. The vendor will also provide a tracking number once the sources have been shipped. The 7 and 1-day notices and the tracking number notification will be made through e-mail (RPradmat@slac.stanford.edu). Upon arrival, Shipping and Receiving will notify RPFO and hold the package for RP pickup.
3. If the source cannot be returned to vendor at end of the experiment, the requester must finance the disposal of legacy sources in kind.
4. The source must be returned to vendor if the source is found leaking upon receipt.
5. The vendor must provide a certificate with the assay date, original activity, and serial number which will be affixed in the source.
6. The custodian must attach this authorization to the requisition.

C. Radiological Controls *(specified by RP per 10 CFR 835, SLAC RCM, Radioactive Sealed Source Procedure, and RP procedures)*

1. Custodian and users are to have GERT (ESH Course 115), RWT I (ESH Course 116), and Radiation Source Custodian training (ESH Course 118). For low-level sources only GERT is required for users.
2. Source cannot be modified at SLAC: all modifications are to be done by the manufacturer.
3. Posting and required procedures: to be determined by RPFO upon deployment of source.
4. RPFO will deliver the source to the location specified, label, and post the area as appropriate.
5. The custodian must 1) verify radiological controls/procedures are in place prior to operation; 2) restrict use to the custodian and users; and 3) call RPFO at ext. 4299 if any concern arises.

D. Approval

Sealed Radioactive Source Program Manager (SRSPM) name (print):	Signature:	Date:

NATIONAL ACCELERATOR LABORATORY

ENVIRONMENT, SAFETY & HEALTH DIVISION

Chapter 9: Radiological Safety

Related Programs and Documents

Product ID: 496 | Revision ID: 2633 | Date published: 15 August 2023 | Date effective: 15 August 2023
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/radGuideDocument.pdf

1 Purpose

The purpose of this document is to provide an overview of the various SLAC programs and documents that make up the SLAC Radiation Protection Program (RPP) and how they relate to Chapter 9, "Radiological Safety". The intended audience is SLAC staff responsible for the RPP and external auditors.

2 Programs and Documents

The exposure of personnel to radiation and the use, storage, handling, and disposal of radioactive materials at the SLAC National Accelerator Laboratory (SLAC) are strictly controlled in accordance with a comprehensive set of regulations, principally Title 10, *Code of Federal Regulations*, "Energy", Chapter 3, "Department of Energy", Part 835, "Occupational Radiation Protection" (10 CFR 835), and directives issued by the Department of Energy (DOE). These regulations and directives are implemented through an extensive set of programs, each with its own set of detailed requirements and documents.

The main program, required by 10 CFR 835, is the SLAC Radiation Protection Program (RPP). The goal of the RPP is to maintain personnel radiation doses below regulatory limits and as low as reasonably achievable (ALARA). RPP requirements apply to all radiological activities, facilities, and operations at SLAC and strictly control any activities that can expose personnel to radiation. Additionally, SLAC policy stemming from DOE directives is to minimize release of radioactive material into the environment and minimize the impacts to the environment from radiological operations.

The implementation hierarchy for the programs that collectively comprise the SLAC radiological safety program is as follows:

- The top-level document is the SLAC National Accelerator Laboratory Radiation Protection Program Plan for Implementing 10 CFR 835, which describes how SLAC meets the requirements of 10 CFR 835. The RPP plan (called the *RPP*) is primarily a regulatory compliance tool rather than an operations-oriented document. It is intended for use by SLAC management and the DOE.
- The SLAC Radiological Control Manual (referred to as the *RadCon Manual*) and Chapter 9, "Radiological Safety", are second-level documents that summarize the RPP and general requirements for third-level documents and the entire program in general. The chapter describes the radiological safety program requirements that apply globally at SLAC and is intended for line management and personnel to meet general program requirements.
- The third-level documents are radiation safety program manuals which, combined with supporting materials such as technical basis documents, procedures, specifications, and memos, provide detailed implementation requirements and guidelines for each of the programs that comprise the radiological safety program. These manuals and supporting materials are intended for SLAC Radiation Protection

Department (RPD) personnel and SLAC personnel who may need to know more details of the radiological safety program. Key examples follow:

- The Radioactive Waste Manual documents a supplementary radiological safety program required by DOE Order 435.1, "Radioactive Waste Management" (DOE O 435.1).
- The Radiation Safety Systems Technical Basis Document specifies the criteria for radiation safety systems and describes the design of systems used at SLAC.
- The Conduct of Accelerator Facility Operations describes how all accelerator operations at SLAC are carried out in a safe and effective manner in compliance with DOE Order 420.2D, "Safety of Accelerator Facilities" (DOE O 420.2D SCP).

3 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 9, "Radiological Safety"
  - SLAC National Accelerator Laboratory Radiation Protection Program Plan for Implementing 10 CFR 835 (SLAC-I-720-IA05M-002)
  - Radiological Control Manual (SLAC-I-720-0A05Z-001)
  - Radiation Safety Systems Technical Basis Document (SLAC-I-720-0A05Z-002)
  - Radioactive Waste Manual (SLAC-I-760-2A08Z-001)
  - Radiation Protection Program Site (SharePoint)

Other SLAC Documents

- Conduct of Accelerator Facility Operations (CACM-2019-059)

Other Documents

- Title 10, *Code of Federal Regulations*, "Energy", Chapter 3, "Department of Energy", Part 835, "Occupational Radiation Protection" (10 CFR 835)
- Site Compliance Plan for Department of Energy Order 420.2D, "Safety of Accelerator Facilities" (DOE O 420.2D SCP)
- Department of Energy Manual 435.1-1, "Radioactive Waste Management Manual", Change 2 (DOE M 435.1-1, Chg 2 [Admin Chg])