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# SUBJECT AREA CONTENT

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## ALARA, Dose Limits, and Administrative Controls

(ACLs) Subject Area

Effective Date: **Mar 28, 2016** ([Rev 1.3](#))

Periodic Review Due: **Mar 28, 2021**

Introduction

Dose Limits

ACLs and ALARA  
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## Introduction

The Department of Energy (DOE) radiological control regulations are codified in 10 CFR 835, Occupational Radiation Protection. The Radiological Dose Limits were established to protect the health and safety of workers.

To ensure that radiation doses at Brookhaven National Laboratory (BNL) do not meet or exceed the dose limits established in 10 CFR 835, BNL has committed to the "As Low As Reasonably Achievable (ALARA)" philosophy. To accomplish this goal, Administrative Control Levels (ACLs) are established below regulatory limits to ensure that the dose limits will not be exceeded. BNL has a multi-tiered ACL system that requires increasing levels of authority to receive higher doses. To further ensure that regulatory limits and BNL ACLs are not exceeded, departments establish their own ACLs. These controls along with reviews of radiological work, experiments, plans, modifications, procedures, etc., ensure regulatory radiation dose limits and ACLs for radiological workers, non-radiological workers, and members of the public will not be exceeded and will be ALARA.

This subject area addresses:

- Regulatory Dose Limits
- Administrative Control Levels (ACLs) and ALARA Responsibilities
- ALARA Reviews

## Standards of Performance

All staff and guests shall ensure that personnel radiation exposure is maintained As Low As Reasonably Achievable (ALARA).

All staff and guests shall comply with applicable Laboratory policies, standards, and procedures, unless a formal variance is obtained.

All staff and users shall identify, evaluate, and control hazards in order to ensure that work is conducted safely and in a manner that protects the environment and the public.

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This information applies to radiological workers and supervisors of personnel monitored for radiation exposure in addition to employees, guests, visitors, and minors without radiological training.

### Dose Limits

1. Department/Division line managers are responsible for establishing controls to ensure that the Regulatory Annual Dose Limits as stated below are not exceeded.
  - Radiological worker: 5 rem whole body (internal + external);
  - 15 rem lens of eye;
  - 50 rem extremity (hands and arms below the elbow, feet and legs below the knees, and skin);
  - 50 rem to any organ or tissue (other than lens of eye or skin);
  - Declared pregnant worker: 500 millirem embryo/fetus from the period of conception to birth (refer to the [Declaration of Pregnancy](#) Subject Area for additional information);
  - Minors and students (under age 18): 100 millirem whole body (internal + external);

Minors (under age 18) must not work in controlled areas or radiological areas without written consent of a parent or guardian. Contact your [Facility Support Representative](#) for access requirements and approvals.

- Visitors, guests and public (who have not completed BNL radiological training): 100 millirem.
2. Individuals without radiological training requiring access to areas controlled for radiological purposes must contact Radiological Control Division (RCD) [Facility Support Representatives](#) for access requirements.  
**Note:** For additional information, refer to the [Entry and Egress for Areas Controlled for Radiological Purposes](#) Subject Area for requirements for accessing areas without radiological training.
  3. Individuals must immediately report any exposure or suspected exposure exceeding the regulatory dose limits to their supervisor and the [Facility Support Representative](#).
  4. The supervisor and the Facility Support Representative must immediately report any exposure or suspected exposure exceeding the regulatory dose limits to the Manager, Radiological Control Division.  
**Note:** Radiation doses due to background radiation, therapeutic and diagnostic medical procedures, and

voluntary participation as a subject in medical research programs are not included in an individual's occupational radiation dose records.

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ALARA (As Low As Reasonably Achievable) is BNL's approach to occupational, public, and environmental protection by which radiation exposures and releases of radioactive material to the environment are managed and controlled to levels as low as reasonably achievable and below regulatory limits.

A successful ALARA program includes a commitment from management, GERT and Rad Workers and the Radiological Control Division (RCD). To maintain doses ALARA is everyone's responsibility.

This information applies to BNL staff, guests, visitors, and minors.

### Administrative Control Levels and ALARA Responsibilities

#### [2.1 Administrative Control Levels \(ACLs\)](#)

#### [2.2 ALARA Responsibilities](#)

##### 2.1 Administrative Control Levels (ACLs)

- ACLs are established annually by Department/Divisions below the BNL ACL and communicated to staff.

- Radiological Workers must NOT exceed the BNL ACL 1250 mrem/year, without prior written consent.
- Visitors, guests and minors (who have not completed BNL radiological training): 25 millirem per year.

Minors (under age 18): shall not work in controlled areas or radiological areas without written consent of a parent or guardian. Contact your Facility Support Representative for access requirements and approvals.

- Declared Pregnant Worker (DPW): 350 millirem embryo/fetus from the period of conception to birth.  
**Note:** Refer to the [Declaration of Pregnancy](#) Subject Area for Declared Pregnant Worker requirements.

## 2.2 ALARA Responsibilities

### Staff, Guests, Visitors, and Minors

- a. Staff, guests, visitors and minors shall ensure that personnel radiation exposure is maintained As Low As Reasonably Achievable (ALARA).
- b. Individuals must immediately report any exposure or suspected exposure, exceeding their ACL (or regulatory dose limits) to their supervisor and the Facility Support Representative.
- c. Supervisors and Facility Support personnel must immediately report any exposure or suspected exposure exceeding the individuals ACL (or regulatory dose limits) to the Manager, Radiological Control Division.

### Department/Divisions

- Department/Divisions are responsible for establishing controls to ensure that regulatory dose limits and ACLs are not exceeded.
- To ensure that radiation dose for the members of the general public are as low as reasonably achievable:
  - a. Department/Division line management shall ensure that the normal operation of any single BNL facility does not cause off-site radiation exposure >5 millirem in one year to members of the general public.
- Department/Division shall establish ACLs annually, if the prior year and/or expected current year collective dose is greater than 100 person-millirem and/or a collective extremity dose greater than 10 person-rem.
  - a. If the collective dose is greater 100 person-millirem but less than or equal to one (1) person-rem, the Department Chair/Division Manager appoints an ALARA Coordinator.
  - b. If the collective dose is greater than one (1) person-rem and/or 10 rem extremity dose the Department Chair/Division Manager establishes a formal ALARA Committee.
- Department/Divisions are not required to establish ACLs if their collective dose has not exceed 100 mrem in the prior year or expected to exceed 100 mrem in the current year.

### Department/Division ALARA Coordinator/Committee

- The Department/Division ALARA Committee should consist of managers, line workers, department ESH personnel and RCD staff.
- The Department/Division ALARA Coordinator performs functions similar to those of an ALARA Committee and reports findings to their Department Chair/Division Manager.  
**Note:** In lieu of an ALARA Coordinator or committee, the Department/Division Environment, Safety and Health (ESH) Representative or Coordinator performs the duties of the ALARA Committee.
- The ALARA committee should meet at least semi-annually.
- The ALARA Coordinator/Committee should:
  - a. Determine radiological performance dose goals (e.g., whole body and extremity ACLs) as required;
    - i. The goals should be measurable, achievable, and challenging.
  - b. Review Department/Division operational performance with respect to radiological performance goals;
  - c. Review radiological activities and propose methods to minimize exposures and releases;
  - d. Review design or modification of facilities, systems and work activities for ALARA purposes (e.g., exposure reduction, waste minimization, pollution prevention, etc.);
  - e. Review Lessons Learned related to ALARA practices and radiological work performance.
- To request authorization to exceed department/division ACLs, contact the [BNL ALARA Program](#)

[Coordinator](#), Facility Support Services Manager or Radiological Control Division Manager.

- The following authorizations apply to established Department/Division radiation exposure ACL extensions:
  - a. Radiation exposures in excess of the Department/Division ACL but less than 1250 millirem/year require Department Chair/Division Manager approval;
  - b. Greater than 1250 millirem/year but less than 2000 millirem/year require Laboratory Director and Radiological Control Division Manager approval;
  - c. Greater than 2000 millirem/year require Laboratory Director, Radiological Control Division Manager and DOE Secretarial Officer approvals.
- The Department/Division ALARA Committee Chair is responsible to forward the following to the [BNL ALARA Program Coordinator](#):
  - a. Department/Division Administrative Control Levels and Collective Dose goals (no later than January 31 of the current year);
  - b. Meeting Meetings (semi-annual).

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This information applies to all employees and guests who propose radiological facilities, system modifications, and/or changes to plans and procedures that govern radiological work.

## ALARA Reviews of Designs, Plans, and Procedures

### [3.1 ALARA Review of Radiological and Experimental Work](#)

### [3.2 ALARA Review of Designs, Plans, and Procedures](#)

#### 3.1 ALARA Review of Radiological and Experimental Work

- Work inside a radiological area, involving radioactive materials and/or radiation generating devices, or affecting radiological systems and operations shall be reviewed, planned and conducted in accordance with the [Work Planning and Control for Experiments and Operations](#) Subject Area.
- Contact the Facility Support Representative to determine the radiological requirements for the activity and/or work site.
- Review work plans and procedures to ensure that radiological control measures and ALARA principles are incorporated.  
**Note:** Consider how new personnel or process changes may impact the Administrative Control Levels and Collective Dose goals.
- The Facility Support Representative will determine if a Radiological Work Permit and additional ALARA reviews are required.
- Perform radiological work efficiently to ensure that radiation exposures will be ALARA.

#### 3.2 ALARA Review of Designs, Plans, and Procedures

- The line management for the proposed radiological facility or system modification contacts the [Radiological Control Division \(RCD\) Manager](#), [RCD Facility Support Service Manager](#), or [RCD Health Physics Technical Services Manager](#) to review the proposed work and design using the ALARA Engineering Design Guide in the [Radiological Control Manual](#).
- For plans and procedures governing radiological operations, contact the RCD [Facility Support Representatives](#) or radiological engineers for reviews and to ensure incorporation of radiological control measures, including ALARA principles into plans and procedures.

## Guidelines

### Radiological and Experimental Work

Line Management and Radiological Workers should take the following approaches to maintain exposure to radiation ALARA when performing radiological work activities:

- Plan and discuss the job before entering the area;
- Become familiar with the Radiological Work Permits (RWPs), operating procedures, work permits, experimental safety reviews or technical work documents for the planned work activities;
- Obtain the necessary equipment and materials prior to the start of the job;
- Use mock ups and practice runs that duplicate work conditions;
- Use permanent or temporary shielding when practicable;
- Avoid loitering in radiological areas;
- Stay as far away from the source of radiation as possible, use remote handling devices whenever practicable.

### Designs, Plans, and Procedures

This information applies to all employees and guests who propose radiological facilities, system modifications, and/or changes to plans and procedures that govern radiological work.

ALARA controls should be incorporated into the design of new facilities and/or equipment and in the modification of existing facilities and equipment to ensure appropriate radiological controls are in place for maintaining exposures ALARA. Contact the [RCD Health Physics Technical Services Manager](#) for additional information and assistance.

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# CHANGES CONTENT



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### Revision History

<a href="#">Revision Number</a>	<a href="#">Revision Type</a>	<a href="#">Revision Date</a>	Revision Description
1.3	Minor	03/28/2016	The subject area (formerly ALARA and Radiological Work) was renamed the ALARA, Dose Limits, and Administrative Controls (ACLs) Subject Area. It was completely reviewed and revised to incorporate content from the Radiological Dose Limits Subject Area into the new format.
1.2	Minor	02/24/2015	The subject area was completely reviewed and published in the new SBMS layout with minor editorial changes.
1.1	Minor	08/16/2012	This was a minor revision and the following changes were made: <ul style="list-style-type: none"><li>• In the section ALARA Responsibilities, step 2, clarifying current and proposed radiological performance goals by adding examples (e.g., extremities, whole body, lens of eyes exposure goals);</li><li>• In the section ALARA Review of Radiological/Experimental Work, step 2, adding "<b>Note:</b> Consider new personnel or process changes impact on calendar year Administrative Control Levels and Collective Dose goals".</li></ul>

1.0	Major	07/29/2010	The Radiological Control Division (RCD) ALARA Program (HP-SOP-020) standard operating procedure was previously used as the SBMS procedure for the BNL complex. The new (reissued) ALARA and Radiological Work Subject Area presents BNL's approach to occupational, public, and environmental protection by which radiation exposures and releases of radioactive material are managed and controlled to levels as low as reasonably achievable and below regulatory limits.
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**NOTE:** The dates for "Major Revisions" match the Subject Area Effective Date. Major and/or Minor revisions may not always match with the "Last Modified Date", since this date could reflect changes to links or spelling. Records of changes are maintained in the SBMS documentation for each subject area.

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# DEFINITION CONTENT

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### Definitions

Term	Definition
ALARA Committee	The multi-disciplined forum that reviews and advises management on improving progress towards minimizing radiation exposure and radiological releases.
ALARA Design Review	A systematic review of the design and construction of equipment/facilities to ensure that ALARA considerations are evaluated, incorporated if reasonable, and documented for modifications to existing and new facilities that involve the potential for exposure to ionizing radiation.
ALARA Job/Experiment Review	A systematic pre- and post-job review of high-dose activities to ensure that ALARA controls are planned, evaluated, implemented where reasonable, and documented.
ALARA Program Coordinator	An individual who is responsible, as a minimum, for coordinating, promoting, and documenting activities to reduce occupational doses and the spread of radioactive materials to levels that are as low as reasonably achievable.
As Low As Reasonably Achievable (ALARA)	The approach to radiation protection to manage and control exposures (both individual and collective) to the work force and to the general public to as low as is reasonable, taking into account social, technical, economic, practical and public policy considerations. As used in 10 CFR 835, ALARA is not a dose limit, but a process that has the objective of attaining doses as far below the applicable limits of 10 CFR 835 as is reasonably achievable.

radiological engineer	An individual who is responsible for providing technical support and assistance to supervisors, planners, schedulers, principal investigators, and design engineers to reduce occupational doses and the spread of radioactive materials.
radiological facility	Any facility using radioactive materials having the potential to cause radiological harm. There is no possession minimum for such a hazard.
radiological performance goal	An administrative objective that focuses efforts on improving radiological performance.
Radiological Work Permit (RWP)	The work document that identifies radiological conditions, establishes worker protection and monitoring requirements, and contains specific approvals for radiological work activities. The RWP serves as an administrative process for planning and controlling radiological work and informing the worker of the radiological conditions.

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# LESSONS LEARNED CONTENT

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## ALARA, Dose Limits, and Administrative Controls

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## Lessons Learned

BNL's Lessons Learned Program supports ongoing learning by collecting and sharing work experiences and good practices. This allows us to better understand risks and hazards and develop strategies to control them. Many managers share selected Lessons Learned with their staff at daily briefings and morning meetings to update everyone's knowledge and skills. The Program draws information from BNL, the DOE complex, and private industry. For more, [see the BNL Lessons Learned Program website](#).

Here is a selection of recent Lessons Learned related to this particular Subject Area:

Title	Date
<a href="#">Appropriate Response to Unexpected Radiation Levels</a>	Oct 04 2001
<a href="#">Exposure to unexpected dose rate on entry to hot box #3</a>	Jan 26 2017
<a href="#">Improve D&amp;D Activities Through Use of Remote Cameras and Radiological Monitoring</a>	Dec 31 2011
<a href="#">Remote Monitoring Enhances Effectiveness of BGRR Radiological Protection</a>	Jul 19 2013

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