



**NOT MEASUREMENT  
SENSITIVE**

**DOE-HDBK-1106-97  
February 1997**

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**Reaffirmation  
August 2002**

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**Change Notice 1  
December 2004**

# **DOE HANDBOOK**

## **RADIOLOGICAL CONTAMINATION CONTROL TRAINING FOR LABORATORY RESEARCH**



**U.S. Department of Energy  
Washington, D.C. 20585**

**FSC 6910**

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<b>Page/Section</b>	<b>Change</b>
Throughout document	Revise Radcon Manual to RadCon Standard. Revise RCM to RCS. Revise RCM, Rev. 1 to RCS, Ch. 1.
iii, Forward, last para.	Revise bottom para to read (updated software used and web address):  This Handbook is available in Word 2002 and has been formatted for printing on an HP IV (or higher) LaserJet printer. Copies of this Handbook may be obtained from either the DOE Radiation Safety Training Home Page Internet site ( <a href="http://www.eh.doe.gov/radiation/RST/rstmater.htm">http://www.eh.doe.gov/radiation/RST/rstmater.htm</a> ) or the DOE Technical Standards Program Internet site ( <a href="http://www.eh.doe.gov/techstds/">http://www.eh.doe.gov/techstds/</a> ). Documents downloaded from the DOE Radiation Safety Training Home Page Internet site may be manipulated using the software noted above (current revision or higher).
Part 1 page 12	Revise: DOE-HDBK-1130-98, “Radiological Worker Training” and DOE-HDBK-1131-98, “General Employee Radiological Training”.  To read: DOE-HDBK-1130-98, Reaffirmation 2004, “Radiological Worker Training”, and DOE-HDBK-1131-98, Reaffirmation 2004, “General Employee Radiological Training”.
Part 1, page 13	Revise: DOE-HDBK-1130-98  To read: DOE-HDBK-1130-98, Reaffirmation 2004
Part 1, page 15	Revise; All materials are provided in WordPerfect® 9.0 format.  To read: All materials are provided in Word 2002 format.
Part 1, page 16	Revise: DOE (1990), U.S. Department of Energy, “Radiation Protection of the Public and the Environment,” DOE Order 5400.5. DOE (1999), U.S. Department of Energy, “Radiological Control Standard,” DOE-STD-1098-1999. DOE (1996), “Environment, Safety, and Health Reporting Requirements,” DOE Order 231.1. DOE (1998), U.S. Department of Energy, DOE-HDBK-1130-98, “Radiological Worker Training,” and DOE-HDBK-1131-98, “General Employee Radiological Training.”  To read: DOE (1993), U.S. Department of Energy, “Radiation Protection of the Public and the Environment,” DOE Order 5400.5, Ch. 2. DOE (2004), U.S. Department of Energy, “Radiological Control

	<p>Standard,” DOE-STD-1098-1999, Ch. 1.          DOE (2004), “Environment, Safety, and Health Reporting Requirements,” DOE Order 231.1A, Ch. 1.          DOE (1998), U.S. Department of Energy, DOE-HDBK-1130-98, Reaffirmation 2004, “Radiological Worker Training,” and DOE-HDBK-1131-98, Reaffirmation 2004, “General Employee Radiological Training.”</p>
<p>Part 2, page 4          Part 3, page 41</p>	<p>Revise:          DOE (1990), U.S. Department of Energy, “Radiation Protection of the Public and the Environment,” DOE Order 5400.5.          DOE (1999), U.S. Department of Energy, “Radiological Control Standard,” DOE-STD-1098-1999.          DOE (1995), “Environment, Safety, and Health Reporting Requirements,” DOE Order 231.1.          DOE (1998), U.S. Department of Energy, DOE-HDBK-1130-98, “Radiological Worker Training,” and DOE-HDBK-1131-98, “General Employee Radiological Training.”</p> <p>To read:          DOE (1993), U.S. Department of Energy, “Radiation Protection of the Public and the Environment,” DOE Order 5400.5, Ch. 2.          DOE (2004a), U.S. Department of Energy, “Radiological Control Standard,” (RCS) DOE-STD-1098-1999, Ch. 1.          DOE (2004b), “Environment, Safety, and Health Reporting Requirements,” DOE Order 231.1A, Ch. 1.          DOE (1998), U.S. Department of Energy, DOE-HDBK-1130-98, Reaffirmation 2004, “Radiological Worker Training,” and DOE-HDBK-1131-98, Reaffirmation 2004, “General Employee Radiological Training.”</p> <p>Delete:          DOE (1996), “Radiological Protection for DOE Activities,” DOE Notice 441.2.</p>
<p>Part 2, page 11</p>	<p>Replace - trainees with - trainees’</p>
<p>Part 2, page 23</p>	<p>Replace: Reference: DOE N 441.2          With: Reference: 10 CFR 835          Replace: “An area or structure where radioactive material is used, handled, or stored.”          With: “An area or structure where radioactive material, exceeding the values provided in 10 CFR 835 Appendix E, is used, handled, or stored.”</p>
<p>Part 2, page 24</p>	<p>Replace 10,000* with 10,000          Delete: “(This definition may change in an amendment to 10 CFR 835. Make appropriate revisions at that time).”          Replace: “Any area where contamination levels are greater than the values specified in Appendix D of 10 CFR 835, but less than or equal to 100 times those levels.”          With: “Any area where removable contamination levels are greater than</p>

	the values specified in Appendix D of 10 CFR 835, but less than or equal to 100 times those levels.”
Part 2, page 25	Delete: “(This definition may change in an amendment to 10 CFR 835. Make appropriate revisions at that time).” Replace: “Any area where contamination levels are greater than 100 times the values specified in Appendix D of 10 CFR 835.” With: “Any area where removable contamination levels are greater than 100 times the values specified in Appendix D of 10 CFR 835.” Replace: “Any area where the measured concentration of airborne radioactivity, above natural background, exceeds or is likely to exceed 10 percent of the derived air concentration (DAC) values listed in Appendix A or Appendix C of 10 CFR 835.” With: “Any area where the measured 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 where an individual in the area without respiratory protection could receive an intake exceeding 12 DAC-hours in a week.”
Part 2, page 26	Replace: Reference: DOE N 441.2 With: Reference: 10 CFR 835
Part 2, page 40	Replace: Reference: DOE (1990) With: Reference: DOE (1993) Replace: Order 5400.5, With: Order 5400.5, Ch. 2
Part 2, pages 50, 107, 112 and 113 Part 3, pages 89 and 90	Replace: 5400.5 With: 5400.5, Ch. 2
Part 2, Glossary Part 3, Glossary	Replace the following definitions: <u>Airborne radioactive material or airborne radioactivity</u> means radioactive material dispersed in the air in the form of dusts, fumes, particulates, mists, vapors, or gases. <u>Sealed radioactive source</u> means 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 do not include reactor fuel elements, nuclear explosive devices, and radioisotope thermoelectric generators.
Part 2, page 115 Part 3, page 91	Replace: “RESERVED                      RESERVED                      RESERVED” With: “500                      1500                      20”
Part 3, page 14	Replace: “An area or structure where radioactive material is used, handled, or stored.” With: “An area or structure where radioactive material, exceeding the values provided in 10 CFR 835 Appendix E, is used, handled, or

	<p>stored.”</p> <p>Replace: “Any area where contamination levels are greater than the values specified in Appendix D of 10 CFR 835, but less than or equal to 100 times those levels.”</p> <p>With: “Any area where removable contamination levels are greater than the values specified in Appendix D of 10 CFR 835, but less than or equal to 100 times those levels.”</p>
Part 3, page 15	<p>Replace 10,000* with 10,000</p> <p>Replace: “Any area where contamination levels are greater than 100 times the values specified in Appendix D of 10 CFR 835.”</p> <p>With: “Any area where removable contamination levels are greater than 100 times the values specified in Appendix D of 10 CFR 835.”</p> <p>Replace: “Any area where the measured concentration of airborne radioactivity, above natural background, exceeds or is likely to exceed 10 percent of the derived air concentration (DAC) values listed in Appendix A or Appendix C of 10 CFR 835.”</p> <p>With: “Any area where the measured 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 where an individual in the area without respiratory protection could receive an intake exceeding 12 DAC-hours in a week.”</p>

## Foreword

This Handbook describes a recommended implementation process for core training as outlined in the *DOE Radiological Control Standard (RCS)*. The Handbook is to assist those individuals, both within the Department of Energy (DOE) and Managing and Operating (M&O) contractors, identified as having responsibility for implementing the core training recommended by the *RCS*. This training may also be given to laboratory researchers to assist in meeting their job-specific training requirements of 10 CFR 835.

This Handbook contains recommended training materials consistent with other DOE standardized core radiological training material. The training material consists of the following documents:

**Program Management Guide** - This document contains detailed information on how to use the Handbook material.

**Instructor's Guide** - This document contains a lesson plan for instructor use, including notation of key points for inclusion of facility-specific information.

**Student's Guide** - This document contains student handout material and also should be augmented by facility-specific information.

This Handbook is available in Word 2002 and has been formatted for printing on an HP IV (or higher) LaserJet printer. Copies of this Handbook may be obtained from either the DOE Radiation Safety Training Home Page Internet site (<http://www.eh.doe.gov/radiation/RST/rstmater.htm>) or the DOE Technical Standards Program Internet site (<http://www.eh.doe.gov/techstds/>). Documents downloaded from the DOE Radiation Safety Training Home Page Internet site may be manipulated using the software noted above (current revision or higher).

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(Part 1 of 3)

# **Radiological Contamination Control Training for Laboratory Research**

## **Program Management Guide**



**Office of Environment, Safety & Health  
U.S. Department of Energy  
February 1997**

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**Introduction****Purpose and Scope**


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This program management guide describes the proper implementation standard for core training as outlined in the *DOE Radiological Control (RadCon) Standard*. The guide is to assist those individuals, both within the Department of Energy (DOE) and Managing and Operating (M&O) contractors, identified as having responsibility for implementing the core training recommended by the RadCon Standard.

**Management Guide Content**


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The management guide is divided into the following sections:

- Introduction
- Instructional Materials Development
- Training Program Standards and Policies
- Course-Specific Information

**Core Training Goal**


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The goal of the core training program is to provide a standardized, baseline knowledge for those individuals completing the core training. Standardization of the knowledge provides personnel with the information necessary to perform their assigned duties at a predetermined level of expertise. Implementing a core training program ensures consistent and appropriate training of personnel.

**Organizational Relationships and Reporting Structure**


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The DOE Office of Worker Protection Policy and Programs (EH-52) is responsible for approving and maintaining the standardized core training materials associated with the core training program. An oversight group consisting of representatives from the major contractors will review comments and recommend program changes to DOE EH.

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Continued on Next Page

**Introduction (continued)**

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**Organizational Relationships  
and Reporting Structure  
(continued)**

The establishment of a comprehensive and effective contractor site radiological control training program is the responsibility of line management and their subordinates. The training function can be performed by a separate training organization, but the responsibility for quality and effectiveness rests with the line management.

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Instructional Materials Development Next

**Instructional Materials Development (continued)**

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**Target Audience**

Course instructional materials were developed for specific employees who are responsible for knowing or using the knowledge or skills for each course. With this in mind, the participant should never ask the question, "Why do I need to learn this?" However, this question is often asked when the participant cannot apply the content of the program. It is the responsibility of management to select and send workers to training who need the content of the program. When workers can benefit from the course, they can be motivated to learn the content and apply it on their jobs. Care should be taken to read the course descriptions along with the information about who should attend. Participants and DOE facilities alike will not benefit from workers attending training programs unsuitable for their needs.

**Prerequisites**

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A background and foundation of knowledge facilitates the trainee in learning new knowledge or skills. It is much easier to learn new material if it can be connected or associated to what was previously learned or experienced. Curriculum developers who have been involved in preparing instructional materials for the core training know this and have established what is referred to as "prerequisites" for each course.

Certain competencies or experiences of participants were also identified as necessary prior to participants attending a course. Without these competencies or experiences, the participants would be at a great disadvantage and could be easily discouraged and possibly fail the course. It is not fair to the other participants, the unprepared participant, and the instructor to have this misunderstanding.

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**Instructional Materials Development (continued)**

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**Training Materials**

Training materials for the core program consists of lesson plans, study guides, training aids, handouts, and in some cases, video. Overhead transparencies are sometimes provided in support of the core training content and may be substituted with updated, facility specific, or other information or material.

Supplemental material and training aids may be developed to address facility-specific radiological concerns and to suit individual training styles. References are cited in each lesson plan and may be used as a resource in preparing facility-specific information and training aids.

Each site is responsible for establishing a method to differentiate the facility-specific information from the standardized core lesson plan material. When additional or facility-specific information is added to the text of the core lesson plan material, a method should be used to differentiate site information from core material.

**Training Delivery**

Sites are encouraged to expand per provisions in the RadCon Standard and enhance the training materials through advanced training technologies. Computer-based training and multimedia are just a sample of such technologies.

**Exemptions**

Qualified personnel can be exempted from training if they have satisfactorily completed training programs (e.g., facility, college or university, military, or vendor programs) comparable in instructional objectives, content, and performance criteria, and have demonstrated this by the successful completion of an exam. The individual making the determination of comparability should be a subject matter expert in the course topic. Documentation of the applicable and exempted portions of training should be maintained.

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Training Program Standards and Policies Next



## **Training Program Standards and Policies**

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**Qualification of Instructors** The technical instructor plays a key role in the safe and efficient operation of DOE facilities. Workers must be well qualified and have a thorough understanding of the facility's operation, such as processing, handling, and storage of materials, and maintenance of equipment. Workers must know how to correctly perform their duties and why they are doing them. They must know how their actions influence other worker's responsibilities. Because workers' actions are so critical to their own safety and the safety of others, their trainers must be of the highest caliber. The technical instructor must understand thoroughly all aspects of the subjects being taught and the relationship of the subject content to the total facility. Additionally, the instructor must have the skills and knowledge to employ the instructional methods and techniques that will enhance learning and successful job performance. While the required technical and instructional qualifications are listed separately, it is the combination of these two factors that produces a qualified technical instructor.

The qualifications are based on the best industry practices that employ performance-based instruction and quality assurances. These qualifications are not intended to be restrictive, but to help ensure that workers receive the highest quality training possible. This is only possible when technical instructors possess the technical competence and instructional skills to perform assigned instructional duties in a manner that promotes safe and reliable DOE facility operations.

**Technical Qualifications** Instructors must possess technical competence (theoretical and practical knowledge along with work experience) in the subject

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**Training Program Standards and Policies (continued)**

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**Technical Qualifications  
(continued)**

areas in which they conduct training. The foundation for determining the instructor's technical qualifications are based on two factors:

- The trainees being instructed.
- The subject being presented.

The following is an example of a target audience, subject to be taught, and instructor technical qualifications.

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<b>TARGET AUDIENCE</b>	<b>SUBJECT BEING TAUGHT</b>	<b>TECHNICAL QUALIFICATION</b>
Laboratory Researchers	Contamination Control	Demonstrated knowledge and skills in radiation protection, above the level to be achieved by the trainees, as evidenced by previous training/education and through job performance,  AND  Completion of all qualification requirements for the senior-level radiation protection technician position at the trainees' facility or a similar facility

Methods for verifying the appropriate level of technical competence may include the review of prior training and education, observation, and evaluation of recent related job performance, and oral or written examination. Other factors that may be appropriate consideration include DOE, NRC, or other government license or certification, vendor or facility certification, and most importantly job experience.

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**Training Program Standards and Policies (continued)**


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**Technical Qualifications  
(continued)**

To maintain technical competence, a technical instructor should continue to perform satisfactorily on the job and participate in continuing technical training.

**Instructional Capability and  
Qualifications**


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Qualifications of instructional capability should be based on demonstrated performance of the instructional tasks for the specific course requirements and the instructor's position. Successful completion of instructor training and education programs, as well as an evaluation of on-the-job performance, is necessary for verification of instructional capability. Instructional capability qualification should be granted as the successful completion of an approved professional development program for training instructors. The program should contain theory and practice of instructional skills and techniques; adult learning; and planning, conducting, and evaluating classroom, simulator, laboratory, and on-the-job training activities.

Illustrated talks, demonstrations, discussions, role playing, case studies, coaching, and individual projects and presentations should be used as the principal instructional methods for presenting the instructional training program. Each instructional method should incorporate the applicable performance-based principles and practices. Every effort should be made to apply the content to actual on-the-job experience or to simulate the content in the classroom/laboratory. The appropriate methodology required to present the instructional content will indicate a required level of instructional qualification and skill.

Current instructors' training, education, and job performance should be reviewed to determine their training needs for particular courses.

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**Training Program Standards and Policies (continued)**

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**Instructional Capability and Qualifications (continued)**

Based on this review, management may provide exemptions based on demonstrated proficiency in performing technical instructor's tasks

Through training or experience, technical instructors should be able to: \*

- Review instructional materials and modify to fully meet the needs of the training group.
- Arrange the training facility (classroom/laboratory or other instructional setting) to meet the requirements for the training sessions.
- Effectively communicate, verbally and non-verbally, lessons to enhance learning.
- Invoke student interaction through questions and student activity.
- Respond to students' questions.
- Provide positive feedback to students.
- Use appropriate instructional materials and visual aids to meet the lesson objectives.
- Administer performance and written tests.
- Ensure evaluation materials and class rosters are maintained and forwarded to the appropriate administrative personnel.
- Evaluate training program effectiveness.
- Modify training materials based on evaluation of training program.

\*Stein, F. *Instructor Competencies: The Standards*. International Board of Standards for Training, Performance and Instruction; 1992.

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**Training Program Standards and Policies (continued)**

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**Selection of Instructors**

Selection of instructors should be based on the technical and instructional qualifications specified in the “Course-Specific Information” section of this guide. In addition to technical and instructional qualifications, oral and written communication skills, and interpersonal skills, should be included in the process of selecting and approving instructors.

Since selection of instructors is an important task, those who share in the responsibility for ensuring program effectiveness should:

- Interview possible instructors to ensure they understand the importance of the roles and responsibilities of technical instructors and are willing to accept and fulfill their responsibilities in a professional manner.
- Maintain records of previous training, education, and work experience.

Procedures for program evaluation will include documentation of providing qualified instructors for generic and facility-specific training programs.

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**Training Program Standards and Policies (continued)**

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**Test Administration** A test bank of questions for each course that has an exam should be developed and content validated. As the test banks are used, statistical validation of the test bank should be performed to fully refine the questions and make the tests as effective as possible. The questions contained in the test bank are linked directly to the objectives for each course. In this way, trainee weaknesses can be readily identified and remedial procedures can be put into place. The test outcomes can also be used to document competence and the acquisition of knowledge.

The test banks should also be used by the instructors to identify possible weaknesses in the instruction. If numerous trainees fail to correctly answer a valid set of questions for an objective, the instruction for that objective needs to be reviewed for deficiencies.

Written examinations may be used to demonstrate satisfactory completion of theoretical classroom instruction. The following are some recommended minimal requirements for the test banks and tests:

- Tests are randomly generated from the test bank.
- Tests items represent all objectives in the course.
- All test bank items are content validated by a subject matter expert.
- Test banks are secured and are not released either before or after the test is administered.
- Trainees should receive feedback on their test performance.
- For the first administrations of tests, a minimum of 80% should be required for a passing score. As statistical analysis of test results is performed, a more accurate percentage for a passing score may be identified.

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**Training Program Standards and Policies (continued)**

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**Test Administration  
(continued)**

Test administration is critical in accurately assessing the trainee's acquisition of knowledge being tested. The following rules should be adhered to:

- Tests should be announced at the beginning of the training sessions.
- Instructors should monitor trainees during completion of tests.
- All tests and answers should be collected at the conclusion of each test.
- No notes can be made by trainees concerning the test items.
- Effort should be made to eliminate all noise during the test
- No talking (aside from questions) should be allowed.
- Answers to questions during a test should be provided, but answers to test items should not be provided or alluded to.
- Where possible, multiple versions of each test should be produced from the test bank for each test administration.
- After test completion, trainees may turn in their materials and leave the room while other trainees complete their tests.
- Trainee scores on the tests should be held as confidential. No other person should have access to results other than the trainee and test administrator.

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**Training Program Standards and Policies (continued)**

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<b>Program Records and Administration</b>	Training records and documentation shall meet the requirements of 10 CFR 835.704.
<b>Training Program Development/Change Requests</b>	All requests for program changes and revisions should be submitted using the form DOE 1300.3, Document Improvement Proposal, found at the end of this document.
<b>Audits (Internal and External)</b>	<p>Internal verification of training effectiveness should be accomplished through senior instructor or supervisor observation of practical applications and discussions of course material. All results should be documented and maintained by the organization responsible for Radiological Control training.</p> <p>The core training program materials and processes should be evaluated on a periodic basis by DOE-HQ. The evaluation should include a comparison of program elements with applicable industry standards and requirements.</p>
<b>Evaluating Training Program Effectiveness</b>	Verification of the effectiveness of Radiological Control training should be accomplished per DOE-HDBK-1130-98, Reaffirmation 2004, “Radiological Worker Training” and DOE-HDBK-1131-98, Reaffirmation 2004, “General Employee Radiological Training.” In addition, DOE/EH has issued guidelines for evaluating the effectiveness of radiological training through the DOE Operations Office and DOE Field Offices.

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Course-Specific Information Next



**Course-Specific Information**

<b>Purpose</b>	This section of the program management guide is to assist those individuals assigned responsibility for implementing the <i>Radiological Contamination Control Training for Laboratory Research</i> . Standardized implementation of this training ensures consistent and appropriate training for all personnel.
<b>Course Goal</b>	Upon completion of this training, the participant will understand the basic radiological contamination control measures for working in a laboratory, such as a biomedical research laboratory.
<b>Target Audience</b>	Individuals who have assigned duties as laboratory researchers.
<b>Course Description</b>	This course illustrates and reinforces the skills and knowledge needed to assist personnel with radiological controls for laboratory research facilities.
<b>Prerequisites</b>	None.
<b>Length</b>	2 - 8 hours (depending on facility-specific information and incorporation of practical exercises.)
<b>Test Bank</b>	Radiological Worker (DOE-HDBK-1130-98, Reaffirmation 2004).
<b>Retraining</b>	Requalification same as radiological worker.

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**Course-Specific Information (continued)**

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**Instructor Qualifications**

Instructors of this course have a major role in making it successful and meeting the specified objectives. Instructors must have related experience and be technically competent. In this course it is imperative that the instructor have the background and experience of working in biomedical research facilities. Instructors must be able to relate their own work experience to the workers in biomedical research facilities. Instructors must be able to answer specific questions and use a variety of instructional material to meet the objectives.

## Education:

Minimum of B.S. degree in Health Physics or related discipline is preferred.

## Certification:

Certification by American Board of Health Physics (ABHP) or National Registry of Radiation Protection Technologists (NRRPT) preferred.

## Experience:

At least five years of applied radiological protection experience in an operating radiological facility including experience in radiological protection at biomedical research facility or equivalent is preferred. The area of experience should include:

- Radiological controls associated with biomedical research facilities.
- Conducting surveys and monitoring at biomedical research facilities.

Intimate knowledge of Federal regulations and guidance, and best nuclear industry practices, pertaining to radiological protection.

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**Materials Checklist**

The following checklist should be used to ensure all training materials are available. All materials are provided in Word 2002 format.

- Program Management Guide.
- Instructor's Guide.
- Student's Guide.

**Equipment Checklist**

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The following checklist should be used before training is provided to ensure equipment is available and working.

- Overhead projector.
- Screen.
- Flip chart.
- Markers.
- Facility-specific monitoring equipment (as appropriate).

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Bibliography Next

**Bibliography:**

**DOE standards, handbooks, and technical standards lists (TSLs). The following DOE standards, handbooks, and TSLs form a part of this document to the extent specified herein.**

---

DOE (1993), U.S. Department of Energy, "Radiation Protection of the Public and the Environment," DOE Order 5400.5, Ch. 2.

DOE (1998), U.S. Department of Energy, 10 CFR Part 835, "Occupational Radiation Protection."

DOE/CH-9401 (1993), "Performance of Surveys for Unrestricted Release Facility Guidance," R&D Laboratory Working Group (RADWG), Health Physics Procedures (HP) Committee.

DOE (2004), U.S. Department of Energy, "Radiological Control Standard," DOE-STD-1098-1999, Ch. 1.

DOE (2004), "Environment, Safety, and Health Reporting Requirements," DOE Order 231.1A, Ch. 1.

DOE (1995), EH-412 memorandum (R. Pelletier, Director, Office of Environmental Policy and Assistance) to the field, "Application of DOE Order 5400.5 Requirements for Release and Control of Property Containing Radioactive Material."

DOE (1998), U.S. Department of Energy, DOE-HDBK-1130-98, Reaffirmation 2004, "Radiological Worker Training," and DOE-HDBK-1131-98, Reaffirmation 2004, "General Employee Radiological Training."

**Other government documents, drawings, and publications.**  
**The following government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise indicated, the issues of these documents are those cited in the contracting document.**

**Bibliography (continued)**

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NRC (1982), U.S. Nuclear Regulatory Commission, Regulatory Guide 8.18, "Information Relevant to Ensuring that Occupational Radiation Exposures at Medical Institutions will be ALARA."

NRC (1982), U.S. Nuclear Regulatory Commission, Regulatory Guide 8.23, "Radiation Safety Surveys at Medical Institutions."

NRC (1991), U.S. Nuclear Regulatory Commission, 10 CFR Part 20, "Standards for Protection Against Radiation."

Federal Guidance Report No. 11 (1988), "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion" (based on the 1987 Federal Radiation Protection Guidance), Oak Ridge National Laboratory, 1988.

**Non-Government documents**

ANSI 13.12 (1999), "Surface Radioactivity Guides for Materials, Equipment, and Facilities to be Released for Uncontrolled Use," HPS Standards Committee.

LA-4400 (1970), LA-4400, Los Alamos Handbook of Radiation Monitoring.

Lorenzen (1994), W.A., Ring J.P., "The Management and Operation of a Large Scale Decay-In-Storage Program," paper presented at 27th Mid-Year Topical Meeting of the Health Physics Society, Albany, NY.

National Council on Radiation Protection and Measurement (NCRP), NCRP No. 106 (1989), "Radiation Protection for Medical and Allied Health Personnel."

Stein (1992), F., "Instructor Competencies: The Standards," International Board of Standards for Training, Performance and Instruction.

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