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DOE-HDBK-1143-2001
August 2001

DOE HANDBOOK

Radiological Control Training for Supervisors

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

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Radiological Control Training for Supervisors
DOE-HDBK-1143-2001

Foreword

This Handbook describes an implementation process for training as recommended in Implementation Guide G441.1-12, *Radiation Safety Training Guide,* and as outlined in DOE-STD-1098-99, *DOE Radiological Control* (the Radiological Control Standard - RCS). The Handbook is meant to assist those individuals within the Department of Energy, Managing and Operating contractors, and Managing and Integrating contractors identified as having responsibility for implementing training required by Title 10 Code of Federal Regulations Part 835 *Occupational Radiation Protection* (10 CFR 835) and training recommended by the RCS (Article 651). This training is intended for line managers who manage, supervise, or provide oversight of radiological workers and develop and implement measures necessary for ensuring compliance with 10 CFR 835. This training is not intended to be technical training for Radiological Control Supervisors (i.e. individuals responsible for supervising radiological control staff).

This Handbook replaces DOE/EH-0424, *Higher Level Training for Supervisors,* and DOE/EH-0423, *Radiological Control Manual Training for Managers.* While this Handbook addresses many requirements of 10 CFR 835 and recommendations of the RCS, it must be supplemented with facility-specific information to achieve full compliance.

This Handbook contains recommended training materials consistent with other DOE radiological safety training materials and is consistent with guidance provided in the National Council on Radiation Protection and Measurement Report Number 134*, Operational Radiation Safety Training* (Section 4.1.3). The training material consists of the following five parts:

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

Instructor's Guide - This part contains lesson plans for instructor use, including notation of key points for inclusion of facility-specific information.

Overheads - This part contains overheads for instructor use corresponding to the Instructor's Guide.

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

Handouts - This part contains several student handouts providing supporting information for various modules.

This training material is targeted for individuals with a basic knowledge of radiological control. At a minimum, trainees should have completed Radiological Worker II training.

This Handbook was produced in Microsoft Word 97 and has been formatted for printing on an HP 4M (or higher) LaserJet printer. Overheads were produced in Powerpoint. Copies of this Handbook may be obtained from either the DOE Radiation Safety Training Home Page Internet site (http://tis.eh.doe.gov/whs/rhmwp/rst/rst.htm) or in PDF format from the DOE Technical Standards Program Internet site (http://tis.eh.doe.gov/techstds/). Documents downloaded from the DOE Radiation Safety Training Home Page Internet site may be manipulated using the software noted above.

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Program Management Guide

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Introduction

Purpose and Scope

This handbook describes a Radiological Control Training for Supervisors program. It includes standards and policies as well as recommendations for material development and program administration. It is intended for use by DOE and DOE contractors for the development of facility-specific radiological control training for supervisors.

Compliance with 10 CFR 835-Subpart B

The DOE training materials for Radiological Control Training for Supervisors implement the radiological training requirements identified in 10 CFR 835-Subpart B, "Management and Administrative Requirements" and recommendations identified in the DOE Implementation Guide G441.12, *Radiation Safety Training,* and in the *DOE Radiological Control Standard.* When implemented in its entirety and supplemented as noted with appropriate facility-specific information, this handbook provides an acceptable method to meet the requirements of 10 CFR 835-Subpart B for training of individuals (supervisors) who are responsible for supervising radiological workers and developing and implementing measures necessary for ensuring compliance with 10 CFR 835 (10 CFR 835.103). However, it is incumbent on management of each facility to review the content of this handbook against the radiological hazards present to ensure that the training content is appropriate to each individual's prior training, work assignments, and degree of exposure to potential radiological hazards.

Training described in this handbook does not eliminate the need for additional training on facility-specific hazards. Notations throughout the program documents indicate the need for facility-specific information. If the noted section is not applicable to the facility, no information need be presented. The site Radiological Control Manager or designee should concur in facility-generated radiological training material.

Goal of Training Program

The goal of the training program is to provide a basic understanding of the skills required to supervise radiological workers in a safe and effective manner. Upon completion, trainees will be able to discuss DOE's radiation protection requirements and guidance and the manager's roles and responsibilities for implementing those requirements and guidance.

Organizational Relationships and Reporting Structure

DOE Office of Worker Protection Policy and Programs (DOE EH-52) is responsible for approving and maintaining the training materials.

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 may be performed by a separate training organization, but the responsibility for quality and effectiveness rests with line management.

Training Program Descriptions

Overview of Training Program	Radiological Control Training for Supervisors may be provided to individuals (supervisors) responsible for supervising radiological workers and developing and implementing measures necessary for ensuring compliance with 10 CFR 835 at a DOE site or facility.
Prerequisites	The material is targeted for individuals with a fundamental knowledge of radiation protection concepts, such as successful completion of Radiological Worker II Training.
Proficiency Requirements	An examination or performance demonstration is not required. Instructors are encouraged to evaluate the effectiveness of the training through use of classroom participation and/or a quiz at the end of the training.
Retraining	Sites are encouraged to develop periodic training and retraining for supervisors. Retraining should focus on lessons learned and site specific events as necessary. Materials developed in support of training should be documented in accordance with 10 CFR 835 Subpart H "Records”.

Instructor Training and Qualifications

All classroom instruction should be provided by instructors qualified in accordance with the contractor's site instructor qualification program. Training staff (contractor and subcontractor, if used) should possess both technical knowledge and experience, and the developmental and instructional skills required to fulfill their assigned duties.

1.Training staff responsible for program management, supervision, and development should have and maintain the education, experience, and technical qualifications required for their jobs.

2.Instructors should have the technical qualifications, including adequate theory, practical knowledge, and experience, for the subject matter that they are assigned to teach. It may be advisable to use more than one instructor for this material: an instructor with a technical radiological control background to cover modules one and two and an instructor with a management background (e.g., experience in teaching motivational techniques, communications, decision making, and leadership) to cover the remaining modules.

3.Methods should be in place at each contractor site to ensure that individual instructors meet and maintain position qualification requirements.

4.Subject matter experts without instructor qualification may provide training in their area of expertise. However, if these subject matter experts are to be permanent instructors, they should be trained as instructors in the next practical training cycle.

DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*, discusses qualification requirements for instructors.

DOE has also provided guidance on qualifications of radiological instructors in DOE STD-1107-*97 Knowledge, Skills, and Abilities for Key Radiation Protection Positions at DOE Facilities.*

Training Program Material Development

Training Material Presentation

Training materials consist of lesson plans, overheads, student guides, and handouts. To ensure appropriate training, facility-specific materials must be added to the materials when necessary to adequately train individuals for facility-specific radiological hazards.

It is estimated that this material could be presented in 12 hours.

Training Certificates

A training certificate that identifies the individual's current training status may be provided to qualified personnel. Each facility is responsible for determining the training status of employees. Facilities have the option of utilizing a certificate as proof of training.

Training Aids, References	Facility-specific training aids should be developed at the facility to suit individual training styles. Each facility may add information, activities, and/or view graphs to enhance the program.

Training Program Standards and Policies

Lectures, Seminars, Training Exercises, etc.	Radiological Control Training for Supervisors is designed to be delivered in a classroom setting. An alternate delivery method may be implemented with computer-based training (CBT) equipment or web-based training (WBT) equipment. The presentation of training should include DOE developed materials and facility-specific information.
Delinquent Training/Failure	Employees who are delinquent on initial training or retraining should lose their status of being qualified supervisors of radiological workers until successful completion of the delinquent training requirement.
Exceptions and Waivers	Successful completion of the Radiological Control Training for Supervisors at one DOE site may be recognized by other DOE sites. However, the determination as to the adequacy of training as required by 10 CFR 835-Subpart B is the responsibility of the facility where the individual will be supervising radiological workers.

Administration

Training Records	Training records and course documentation shall meet the requirements of 10 CFR 835 Subpart H "Records".
Training Program Development/Change Requests	All requests for program changes and revisions that are generic in nature may be submitted using DOE F 1300.3 *Document Improvement Proposal*. A copy of DOE F 1300.3 and instructions are included at the end of this document.
Internal Audits	Internal verification of training effectiveness may be accomplished through senior instructor or supervisor observation of practical applications and discussions of course material. Results should be documented and maintained by the organization responsible for Radiological Control Training. Results of this qualitative review indicating less than satisfactory comprehension and application of the training material should promptly be followed by a more extensive evaluation.
Evaluating Training Program Effectiveness	Verification of the effectiveness of Radiological Control Training for Supervisors should be accomplished by surveying a limited subset of former students in the workplace. This evaluation should include observation of practical applications and discussion of the course

material. DOE/EH has issued guidelines for evaluating the effectiveness of radiological training through the DOE Operations Offices and DOE Field Offices. These guidelines are available as an attachment to the Program Management Guide of DOE-HDBK-1122-99, "Radiological Control Technician Training."

For additional guidance, refer to DOE-STD-1070-94, "Guidelines for Evaluation of Nuclear Facility Training Programs." The guidelines contained in these documents are relevant for the establishment and implementation of post-training evaluation programs.

References and Supporting Documents

National Council on Radiation Protection and Measurement, Report Number 134, Operational Radiation Safety Training, October 2000.

U.S. Department of Energy, DOE Order 5480.20A, Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities, November 1994.

U.S. Department of Energy, DOE-STD-1070-94, Guidelines for Evaluation of Nuclear Facility Training Programs, June 1994.

U.S. Department of Energy, Occupational Radiation Protection, 10 CFR 835, November 1998.

U.S. Department of Energy, DOE-STD-1107-97, Knowledge, Skills, and Abilities for Key Radiation Protection Positions at DOE Facilities, January 1997.

U.S. Department of Energy, Implementation Guidance for Use with 10 CFR 835, "Occupational Radiation Protection." DOE G 441.1-12, Radiation Safety Training Guide, March 1999.

U.S. Department of Energy, DOE-STD-1098-99, Radiological Control, July 1999.

U.S. Department of Energy, DOE-HDBK-1122-99, Radiological Control Technician Training, July 1999.

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Instructor's Guide

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DEPARTMENT OF ENERGY	**LESSON PLAN**
Course Material	Topic: Occupational Radiation Protection Program Policy and Guidance Review

Objectives:

Upon completion of this training, the participant will be able to:

1. Identify the hierarchy of regulatory documents.
2. Define the purposes of 10 CFR Parts 820, 830 and 835.
3. Define the purpose of the DOE Radiological Control Standard.
4. Define the terms "shall" and "should" as used in the above documents.
5. Describe the role of the Defense Nuclear Facilities Safety Board (DNFSB) at DOE sites and facilities.

Training Aids:

Overhead Transparencies (OTs): OT 1.1 – OT 1.17 (may be supplemented or substituted with updated or site-specific information)

Equipment Needs:

Overhead projector

Screen

Flip chart

Markers

Masking tape

Student Materials:

Student's Guide

References:

U.S. Department of Energy, 10 CFR Part 820, *Procedural Rules for DOE Nuclear Facilities*, 1993.

U.S. Department of Energy, 10 CFR Part 830, *Nuclear Safety Management*, 2001.

U.S. Department of Energy, 10 CFR Part 835, *Occupational Radiation Protection*, 1998.

U.S. Department of Energy, 10 CFR 850*, Chronic Beryllium Disease Prevention Program*, 1999.

U.S. Department of Energy, *Radiological Control*, DOE-STD-1098-99, July 1999.

U.S. Department of Energy, *DOE Radiological Health and Safety Policy*, DOE P 441.1, April 26, 1996.

U.S. Department of Energy, DOE P 411.1, *Safety Management Functions, Responsibilities, and Authorities Policy,* 1997.

U.S. Department of Energy, DOE O 440.1A*, Worker Protection Management for DOE Federal and Contractor Employees*, 1998.

I. Introduction

Show OT 1.1 and OT 1.2.

State objectives.

II. DOE radiological health and safety

A. Policy (some key points in summary)

Discuss that this is from DOE P 441.1

Show OT 1.3.

- Conduct oversight to ensure Departmental requirements are being complied with and appropriate radiological work practices are being implemented.

Show OT 1.4.

- Ensure radiological measurements, analyses, worker monitoring results, and estimates of public exposures are accurate and appropriately made.

- Incorporate dose reduction, contamination reduction, and waste minimization features into the design of new facilities and significant modifications to existing facilities in the earliest planning stages.

- Establish and maintain, from the lowest to the highest levels, line management involvement and accountability for Departmental radiological performance.

- Establish and maintain a system of regulatory policy and guidance.

- Ensure appropriate training is developed and delivered and the technical competence of the DOE workforce and their technical competence.

- Conduct radiological operations in a manner that controls the spread of radioactive materials and reduces exposure to the work force and the general public and utilizes a process that seeks exposure level as low as reasonably achievable (ALARA).

B. History

Show OT 1.5.

DOE has provided numerous written standards for on-site radiological protection, the most recent regulation being 10 CFR Part 835, *Occupational Radiation Protection*. This regulation was preceded by:

- DOE Notice 5480.6 of June 17, 1992, *Radiological Control*, which specified that the *DOE Radiological Control Manual* (DOE/EH-0256T) would supersede DOE Order 5480.11.

- DOE Order 5480.11, *Radiation Protection for Occupational Workers* (effective December, 1988). The purpose was to establish radiation protection standards and program requirements for DOE and DOE contractors for the protection of workers from ionizing radiation.

The establishment of DOE radiological protection standards did not start with these documents. A chronology of dose limits of DOE and its predecessor agencies, the Atomic Energy Commission (1946-1975) and the Energy Research and Development Administration (1975-1977), demonstrate a lowering of whole body dose limits over the last 50 years.

Discuss that there are different limits, which will be discussed later (e.g., whole body, lens of the eye, and skin).

In the establishment of these dose limits, DOE has followed recommendations of national and international radiological protection groups, notably the International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP).

C. Hierarchy of requirements

Currently within DOE there are two parallel hierarchies of requirements:

Show OT 1.6.

Obj. 1
Identify the hierarchy of regulatory documents.

- Rules and/or regulations (these terms are used interchangeably in this training)
- DOE Orders

Show OT 1.7.

Rules are codified in the Code of Federal Regulations (CFR) and may be subject to enforcement action including civil and criminal penalties. DOE Orders are contractually implemented and enforced through an award/fee contractual arrangement between DOE and the contractor.

III. Rules and regulations

Obj. 2
Define the purposes of
10 CFR Parts 820, 830 and 835.

In response to the enforcement authority in the Price-Anderson Amendments Act (PAAA) of 1988, DOE is converting its contractual requirement in orders to enforceable rules to enhance contractor accountability for safety.

10 CFR 830 governs the conduct of DOE contractors, DOE personnel, and other persons conducting activities (including providing items and services) that affect, or may affect, the safety of DOE nuclear facilities. It includes quality assurance requirements and Technical Safety Requirements.

Obj. 2
Define the purposes of
10 CFR Parts 820, 830 and 835.

A. DOE enforcement of rules under PAAA

10 CFR Part 820 (effective on September 16, 1993) sets forth the procedures to implement the provisions of the PAAA. Part 820 requires contractors to comply with DOE Nuclear Safety Requirements.

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PAAA demands a "large stick" to enhance contractor accountability for safety. Rules provide authority for the assessment of civil and criminal penalties and thus provide the large stick

B. Penalties under Part 820

1. Civil penalties

   DOE may assess civil penalties against any person subject to Part 820, for violations of:

   - Codified rules in the CFR
   - Compliance orders
   - Any program or plan required by a rule or compliance order

   Note: Certain nonprofit educational institutions and other listed institutions are exempt from assessment of civil penalties.

2. Criminal penalties

   If a person subject to the Atomic Energy Act of 1954, as amended, or Nuclear Safety Requirements, has by action or omission knowingly and willfully violated, caused to be violated, attempted to violate, or conspired to violate any section of the Atomic Energy Act of 1954, as amended, or applicable DOE Nuclear Safety Requirements, the <u>person</u> shall be subject to criminal sanctions.

3. The "carrot and stick" approach

   DOE may provide monetary incentives in its management and operating (M&O) contracts for actions consistent with or exceeding requirements, and to penalize actions and activities that were not in compliance with requirements.

Discuss site-specific monetary incentives.

Noncompliance with the Radiation Protection Program can subject a contractor to PAAA enforcement. There are provisions to mitigate penalties for self-identifying and reporting violations.

C. DOE Nuclear Safety Requirements

DOE Nuclear Safety Requirements are the set of enforceable rules, regulations, or orders relating to nuclear safety that have been adopted by DOE (or by another agency if DOE specifically identifies it).

Compliance orders are issued by the Secretary. They identify a situation that violates, potentially violates, or otherwise is inconsistent with the:

- Atomic Energy Act of 1954, as amended
- Nuclear statutes
- Nuclear Safety Requirements

Compliance orders:

- Mandate a remedy or other action
- States the reason for the remedy or other action

D. 10 CFR Part 835

Show OT 1.8.

On December 14, 1993, DOE published a final rule in the *Federal Register* (58 FR 65458) Title 10 Code of Federal Regulations Part 835, *Occupational Radiation Protection* (10 CFR 835). On November 4, 1998 an amendment to 10 CFR 835 was published in the *Federal Register* (63 FR 59663).

Obj. 2
Define the purposes of
10 CFR Parts 820, 830 and 835.

The purpose of 10 CFR 835 is the codification of radiological protection requirements. It contains "shall" statements, which are legally binding. It also contains:

- Prescriptive language
- Added emphasis on ALARA
- Requirements for a Radiation Protection Program (RPP)
- Federal law
- Criminal and civil penalties for violations

Discuss what is meant by prescriptive language, i.e. clearly stated requirements (not vague).

Show OT 1.9.

E. Radiation Protection Program (10 CFR Part 835)

Each site, under Part 835, must submit to DOE a written Radiation Protection Program (RPP). The cognizant DOE program office reviews submitted RPPs for approval.

The RPP requires careful consideration because noncompliance may subject a contractor to PAAA enforcement

F. Guidance documents for 10 CFR Part 835

Show OT 1.10.

Two types of regulatory guidance documents have been developed:

- Guidance for implementing the provisions of 10 CFR Part 835.
- Guidance providing technical positions.

The above are available through the DOE EH-52 website at:

http://tis.eh.doe.gov/whs/rhmwp/regs.html

Unlike the requirements specifically set forth in 10 CFR Part 835, the provisions in guidance documents are not mandatory. They are intended solely to describe the rationale for, and the objectives of, regulatory requirements and/or to identify acceptable methods for implementing regulatory requirements.

Failure to follow a guidance document does not in itself indicate noncompliance with a specific requirement of the rule. A finding of noncompliance is found for a failure to satisfy the regulatory requirement.

Following a guidance document in the prescribed manner will ordinarily create a presumption of compliance with a related regulatory requirement.

1. Technical guidance

   Technical guidance describes and disseminates technical methods and techniques for fulfilling implementation and, in turn, the requirements in 10 CFR Part 835. Examples of these guidance are DOE Technical Standards and DOE Radiological Control Technical Positions (RCTPs).

   Refer students to website for RCTPs: http://tis.eh.doe.gov/whs/rhmwp/tpp.html

   Review RCTPs and discuss as applicable to the site.

2. Implementation guides (IGs)

   Implementation guidance is intended to identify and make available to DOE contractors basic program elements and acceptable methods for implementing specific provisions of the final rule. Thirteen implementation guides have been developed for 10 CFR Part 835.

   Refer students to website for IGs: http://tis.eh.doe.gov/whs/rhmwp/ig.html

G. Relationship between 10 CFR Part 835 and 10 CFR Part 20

   Show OT 1.11.

   10 CFR Part 20 is the occupational radiological regulation issued by the Nuclear Regulatory Commission (NRC).

   The question of consistency among federal agencies in their occupational radiological protection regulations became a major point of discussion during the rule making process.

While agreeing with the goal of consistency, DOE believes that it must promulgate its own regulations because of the unique nature and diversity of radiological activities within the DOE complex. The final rule allows DOE to establish more rigorous requirements in areas of particular concern. Overall 10 CFR Part 835 has many similarities as 10 CFR Part 20.

IV. DOE STD *Radiological Control*

Show OT 1.12.

A. *Radiological Control*

In January 1992, a memorandum was sent to the heads of DOE elements involved in managing radiological control programs. In the memorandum, the Secretary directed a series of initiatives to enhance the conduct of radiological operations within the Department of Energy. Also in this memo, the Assistant Secretary of Environment, Safety and Health was directed to develop a comprehensive and definitive radiological control manual. The *DOE Radiological Control Manual* was developed to meet that directive and was approved by the Secretary and promulgated with DOE Notice 5480.6, *Radiological Control*, in July 1992.

Obj. 3
Define the purpose of the DOE Radiological Control Standard.

After the issuance of 10 CFR 835 as a final rule in December 1993, DOE Notice N441.1, *Radiological Protection for DOE Activities*, was issued on 9-30-95. This cancelled the notice which made the Radiological Control Manual a requirements document. However, the notice stated that "cancelled orders that are incorporated by reference in a contract shall remain in effect until the contract is modified to delete the reference.

N441.1 also retained some of the radiation protection requirements from the Radiological Control Manual that were not included in 10 CFR 835.

In July, 1999, the Radiological Control Manual was replaced by the standard, DOE-STD-1098-99, *Radiological Control*. Many DOE sites contractually must still adhere to the provisions of either the Radiological Control Manual or the Radiological Control Standard. Subsequent to the 1998 amendment to 10 CFR 835, the effective date of N441.1 has passed.

The DOE Radiological Control Standard is not regulatory in nature. It is a guidance document that describes DOE's policy and expectations for an excellent radiological control program**.**

1. Implementation

   If a site fully implements a provision of the DOE Radiological Control Standard, the user will have most likely complied with any related statutory, regulatory, or contractual requirements. Users are cautioned that they must review the source document (10 CFR 835) to ensure compliance.

2. Enforceability

   When incorporated into contracts, the provisions of the DOE Radiological Control Standard or Manual are binding requirements.

   If portions of the Site-Specific Radiological Control Manual are incorporated in the RPP under Part 835 and approved by DOE, they are also binding.

B. The Site-Specific Radiological Control Manual

- The DOE Radiological Control Standard states that a Site-Specific Radiological Control Manual should be written and followed.

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C. Relationship between 10 CFR Part 835 and the DOE Radiological Control Standard

Show OT 1.13.

1. Compliance

What is the relationship between Part 835 and the DOE Radiological Control Standard regarding compliance issues?

- The Office of Enforcement and Investigation (EH-10) will enforce 10 CFR Part 835. It can assess fines and penalties.

- The Program Offices will audit for both compliance with 10 CFR 835 and contractual agreements including the DOE Radiological Control Standard or Manual, Orders, etc. Results of these audits can affect the contractor's award fee.

2. What if there are conflicts?

Show OT 1.14.

10 CFR Part 835 takes precedence over the DOE Radiological Control Standard and DOE orders. It is unlikely that there will be a conflict between the two documents, although one document may contain provisions that are not addressed in the other.

It is planned that all requirements for nuclear safety will be incorporated into rules.

3. "Shall" and "should" statements

   - 10 CFR Part 835 contains "shall" statements. "Shall" statements in Part 835 are legally binding.

     Processes for exemption relief from Part 835 are set forth in Subpart E to Part 820. If relief is requested from provisions of Part 835, the exemption must be considered and granted, if appropriate, by the Assistant Secretary for Environment, Safety and Health (EH-1).

   - The use of "should" in the DOE Radiological Control Standard recognizes that there may be site- or facility-specific attributes that warrant special treatment. It also recognizes that literal compliance with the elements and requirements of the provision may not achieve the desired level of radiological control performance.

Obj. 4
Define the terms "shall" and "should" as used in the above documents.

Refer students to website for exemption decisions: http://tis.eh.doe.gov/whs/rhmwp/exemption.html

Review exemption decisions and discuss as applicable to the site.

D. DOE Standards

DOE has developed several technical standards for occupational radiation protection. Depending on the site-specific application, some standards are required to be followed. For example, sites which need to monitor individual external exposures to ionizing radiation need to follow the DOE Laboratory Accreditation Program (DOELAP) standards. Other standards may be incorporated by reference in the site RPP.

Other standards provide technical guidance on specific applications, but adherence to the standard may not be required.

Show OT 1.15.
Refer students to website for technical standards: http://tis.eh.doe.gov/techstds/

Radiation protection standards are also on: http://tis.eh.doe.gov/whs/rhmwp/ts.html

Review standards and discuss as applicable to the site.

E. Other Safety Policy and Orders

In addition to the occupational radiation protection requirements and recommendations previously discussed, DOE has established requirements for worker protection from other hazards. Some of these include:

- DOE P 411.1 Safety Management Functions, Responsibilities, and Authorities Policy
- DOE O 440.1A Worker Protection Management for DOE Federal and Contractor Employees
- 10 CFR 850 Chronic Beryllium Disease Prevention Program

V. Defense Nuclear Facilities Safety Board

A. Establishment

The Atomic Energy Act of 1954 was amended by adding Chapter 21, Defense Nuclear Facilities Safety Board (DNFSB). This amendment established an independent board in the executive branch to provide oversight of some DOE operations at DOE facilities and sites.

Obj. 7
Describe the role of the Defense Nuclear Facilities Safety Board (DNFSB) at DOE sites and facilities.

Show OT 1.16.

B. Members

The DNFSB consists of five members appointed by the President with consent of the Senate.

The Board shall:

- Review and evaluate standards
- Investigate any event or practice at a DOE defense nuclear facility that the Board determines has adversely affected or may adversely affect public health and safety.

The Board may:

- Establish reporting requirements for the Secretary of Energy

By evaluating how well DOE meets its objectives, the DNFSB helps DOE achieve and maintain excellence in radiological protection.

C. Secretary of Energy

The Secretary of Energy shall fully cooperate with the Board.

D. DNFSB Recommendations

DNFSB provides DOE with recommendations for improving safety at DOE defense nuclear facilities. Examples include:

Show OT 1.17.

DNFSB Recommendation 91-6 dealt with radiological protection concerns throughout the DOE defense nuclear facilities complex, and identified several actions to be taken by the Department to improve radiological protection performance.

DNFSB Recommendation 92-7 dealt with training and qualification at DOE sites and facilities.

DNFSB Recommendation 98-1 dealt with resolution of internal audit findings.

DNFSB Recommendation 99-1 dealt with safe storage of fissionable materials.

Summarize lesson.

Implementation of DOE and site commitments made in response to DNFSB recommendations are areas to review during an assessment.

Review objectives.

Ask for questions.

DEPARTMENT OF ENERGY	**LESSON PLAN**
Course Material	Topic: 10 CFR Part 835, Background and Focus

Objectives:

Upon completion of this training, the participant will be able to:

1. Describe the contents of 10 CFR Part 835.
2. Identify the site requirements of 10 CFR Part 835.

Training Aids:

Overhead Transparencies (OTs): OT 2.1 – OT 2.32 (may be supplemented or substituted with updated or site-specific information)

Equipment Needs:

Overhead projector

Screen

Student Materials:

Student's Guide

10 CFR 835

References:

U.S. Department of Energy, 10 CFR Part 820*, Procedural Rules for DOE Nuclear Facilities*, 1993.

U.S. Department of Energy, 10 CFR Part 835, *Occupational Radiation Protection*, 1998.

U.S. Department of Energy, Order 5400.5, *Radiation Protection of the Public and the Environment,* 1990.

U.S. Department of Energy, DOE-STD-1107-97 *Knowledge, Skills, and Abilities for Key Radiation Protection Positions at DOE Facilities,* 1997.

U.S. Department of Energy, DOE G 441.1, *Management and Administration of Radiation Protection Programs Guide*, 1999.

U.S. Department of Energy, DOE G 441.1-11, *Occupational Radiation Protection Record-Keeping and Reporting Guide*, 1999.

U.S. Department of Energy, DOE G 441.1-12, *Radiation Safety Training Guide,* 1999.

U.S. Department of Energy, DOE O 231.1, Change 2, *Environment, Safety and Health Reporting,* 2000.

U.S. Department of Energy, DOE M 231.1-1, Change 2, *Environment, Safety and Health Reporting Manual*, 2000.

U.S. Department of Energy, Radiological Control Technical Position, *Questions and Answers Concerning Acceptable Approaches to Implementing Bioassay Program Requirements*, DOE RCTP 01-01, 2001.

I. Introduction

This module provides an overview of many of the provisions of 10 CFR 835. For completeness, individuals should always reference back to 10 CFR 835 for the complete text.

Show OT 2.1.

Emphasize that this lesson is an overview of major areas of 10 CFR Part 835. Not every provision is addressed in this module 10 CFR 835 should be reviewed in its entirety to ensure compliance.

Provide copies of 10 CFR 835 for reference.

State objectives.

II. Outline of 10 CFR Part 835

Show OT 2.2.

Part 835 is the codification of radiological protection requirements. Part 835 contains 14 subparts and five appendices. The outline consists of the following subparts:

Obj. 1
Describe the contents of 10 CFR Part 835.

A — General Provisions
B — Management and Administrative Requirements
C — Standards for Internal and External Exposure
D — Reserved
E — Monitoring of Individuals and Areas
F — Entry Control Program
G — Posting and Labeling
H — Records
I — Reports to Individuals
J — Radiation Safety Training
K — Design and Control
L — Radioactive Contamination Control
M — Sealed Radioactive Source Control
N — Emergency Exposure Situations

Show OT 2.3.

Under 10 CFR Part 835, each site must submit a Radiation Protection Program (RPP).

Obj. 2
Identify the site requirements of 10 CFR Part 835.

Part 835 helps to ensure that DOE facilities are operated in a manner such that occupational radiological exposure of workers is maintained within acceptable limits and as low as is reasonably achievable (ALARA).

A. Subpart A - General Provisions

Subpart A contains the scope of the rule. The rule in this part establishes radiological protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities.

It also includes activities excluded from the provisions of the rule. Activities that are excluded include the following (summarized):

Show OT 2.4.

- Activities regulated through a license by the Nuclear Regulatory Commission (NRC) or a state under an agreement with the NRC.
- Activities conducted under the authority of the Director, Naval Nuclear Propulsion Program.
- Specified activities conducted under the Nuclear Explosives and Weapons Surety Program.
- Radioactive material transportation.
- DOE activities in other countries with acceptable radiation protection program.
- Background radiation.

Discuss radioactive material transportation definition.

Occupational doses received as a result of excluded activities and radioactive material transportation, as listed above, shall be considered when determining compliance with the occupational dose limits (835.202 and 835.207), and with the limits for the embryo/fetus (835.206).

Show OT 2.5.

Subpart A also addresses:

- Definitions
- Radiological units (Curie, rad, roentgen, rem, and multiples)

B. Subpart B - Management and Administrative Requirements

Show OT 2.6.

The RPP shall:

- Include formal plans and measures for applying the ALARA process to occupational exposures.
- Specify the existing and/or anticipated operational task.
- Address, but not be limited to, each requirement in Part 835.
- Include plans, schedules, and other measures for achieving compliance.

DOE may direct or make modifications to an RPP. An initial RPP or update shall be considered approved 180 days after its submission unless rejected by DOE at an earlier date.

Compliance with 835.402(d) for radiobioassay program accreditation shall be achieved no later than January 1, 2002.

Internal Audits (10 CFR 835.102)

Internal audits of the radiation protection program, including examination of program content and implementation, shall be conducted through a process that ensures that all functional elements are reviewed no less frequently than every 36 months. This training material and DOE G 441.1, *Management and Administration of Radiation Protection Programs Guide*, provide guidance on DOE's expectations.

Discuss again DOE's series of Implementation Guides and their purpose.

Education, Training and Skills (10 CFR 835.103)

Individuals responsible for developing and implementing measures necessary for ensuring compliance with the requirements of this part shall have the appropriate education, training, and skills to discharge these responsibilities. DOE STD-1107-97 *Knowledge, Skills, and Abilities for Key Radiation Protection Positions at DOE Facilities,* provides guidance on DOE's expectations.

Written Procedures (10 CFR 835.104)

Written procedures are required, as necessary, to ensure compliance with 835, commensurate with radiological hazards and education, training and skills of exposed individuals.

C. Subpart C - Standards for Internal and External Exposure

Show OT 2.7.

This subpart addresses limits for:

- General employees (occupational)
- Embryos/fetus of declared pregnant worker (i.e., A woman who has voluntarily declared to her employer, in writing, her pregnancy for the purpose of being subject to the occupational dose limits to the embryo/fetus. This declaration may be revoked, in writing, at any time by the declared pregnant worker.)
- Occupationally exposed minors
- General public in a controlled area

It also addresses:

- Planned special exposures
- Nonuniform exposures of the skin
- Concentrations of radioactive material in air

1. Summary of dose limits

   10 CFR Part 835 employs the rem unit for several different physical quantities (i.e. absorbed dose, effective dose equivalent, total effective dose equivalent, dose equivalent, committed dose equivalent, committed effective dose equivalent). For information about these quantities refer to 10 CFR Part 835 definitions. This training will use the term "dose" as a general term for all the above terms.

   These are the Federal limits. DOE encourages sites to adopt more restrictive Administrative Control Levels (ACLs). For most facilities an ACL of 500 mrem or less will be challenging for radiological workers.

Show OT 2.8 and OT 2.9.

Exposed Individual	Annual Limit
General Employee: Whole Body (internal and external) (TEDE)	5.0 rem
General Employee: Lens of Eye (DE)	15.0 rem
General Employee: Extremity (below elbow and knees) and skin (SDE)	50.0 rem
General Employee: Any Organ or Tissue (other than lens of eye) (DDE + CDE)	50.0 rem
Declared Pregnant Worker: Embryo/Fetus (gestation period) (DE)	0.5 rem
Occupationally Exposed Minors (under age 18): ((TEDE)	0.1 rem *
Members of the Public in Controlled Areas: (TEDE)	0.1 rem

* And 10% of other general employee limit

2. Planned special exposures (PSEs)

   It is acknowledged that unusual conditions can arise in which well documented higher-than-normal doses can be justified. In these well-planned, well-controlled, and highly infrequent and unusual conditions operating management would be permitted to allow specified individual exposures exceeding the occupational limit.

The term "unusual conditions" is made clear by specifying that alternatives which would preclude exposures higher than the prescribed dose limits must be either unavailable or impractical.

Show OT 2.10.

10 CFR 835.204 specifies requirements for annual and lifetime dose from PSEs. It also specifies requirements for determining previous individual exposures prior to allowing a PSE.

Every PSE must be approved in advance by DOE and requires the informed consent of the employee involved.

3. Concentration of radioactive material in air

Appendices A and C contain the derived air concentration (DAC) values used in the control of occupational exposure to airborne radioactive material.

Show OT 2.11.

DACs are listed in appendices A and C of 10 CFR 835. For intakes (appendix A), they are the airborne concentration that equals the annual limit on intake (ALI) divided by the volume of air breathed by an average worker for a working year of 2000 hours (assuming a breathing volume of 2400 m^3).

Define DAC in terms of dose equivalent.

The ALI is the smaller value of intake of a given radionuclide in a year by a standardized man that would result in a CEDE of 5 rems or a CDE of 50 rems to any individual organ or tissue.

Appendix C contains DACs for controlling external dose from being immersed in a cloud of airborne radioactive material.

Estimation of internal dose shall be based on bioassay data rather than air concentration values unless bioassay data are:

- Unavailable (e.g., radon or very short lived radioisotopes)
- Less accurate than internal dose estimates based on representative air concentration values
- Inadequate

D. Subpart D - Reserved

E. Subpart E - Monitoring of Individuals and Areas

Show OT 2.12.

This subpart addresses:

- General requirements
- Instrumentation
- Individual monitoring - external
- Individual monitoring - internal
- Air monitoring
- Receipt of packages containing radioactive material

1. General requirements (10 CFR 835.401)

   Monitoring of individuals and areas shall be performed to:

   - Demonstrate compliance with Part 835.
   - Document radiological conditions.
   - Detect changes in the radiological conditions.
   - Detect the gradual buildup of radioactive material.
   - Verify the effectiveness of engineering and process controls in containing radioactive material and reducing radiation exposure.
   - Identify and control potential sources of individual exposure to radiation and/or radioactive material.

2. Instrumentation

   Instruments and equipment used for monitoring and contamination control shall be:

   - Periodically maintained and calibrated on an established frequency.
   - Appropriate for the type(s), levels, and energies of the radiation(s) encountered.
   - Appropriate for existing environmental conditions.
   - Routinely tested for operability.

Show OT 2.13.

3. Individual monitoring - external (10 CFR 835.402)

   For the purpose of monitoring individual exposure to external radiation, personnel dosimetry shall be provided to and used by:

   - Radiological Workers likely to receive:
     - An effective dose equivalent to the whole body of 0.1 rem (100 mrem) or more in a year
     - A shallow dose equivalent to the skin or to any extremity of 5 rem or more in a year
     - A lens of the eye dose equivalent of 1.5 rem or more in a year
   - Declared Pregnant Workers who are likely to receive from external sources a dose equivalent to the embryo/fetus in excess of 10 percent of the applicable limit in 10 CFR 835.206(a).

Show OT 2.14.

- Members of the public in a controlled area and occupationally exposed minors likely to receive, in one year, from external sources, a dose in excess of 50 percent of the applicable limit in 10 CFR 835 Subpart C.

- Individuals entering a High or Very High Radiation Area.

DOE Laboratory Accreditation for Personnel Dosimetry is required for external dose monitoring programs implemented to demonstrate compliance with 10 CFR 835.

4. Individual monitoring - internal (10 CFR 835.402)

Show OT 2.15.

Internal dose evaluation programs (including routine bioassay programs) shall be conducted for:

- Radiological Workers who, under typical conditions, are likely to receive 0.1 rem or more committed effective dose equivalent from all occupational radionuclide intakes in a year.

Emphasize how it is important to integrate several aspects of the radiological control program into an effective internal dose monitoring program. These include: bioassay (selection of participants and isotopes to be monitored), air monitoring, and contamination monitoring (both personnel and area). RCTP 2001-01 describes an acceptable approach for implementing an internal dose monitoring program.

- Declared Pregnant Workers likely to receive an intake or intakes resulting in a dose equivalent to the embryo/fetus in excess of 10 percent of the limit stated in 10 CFR 835.206(a).

- Members of the public in a controlled area and occupationally exposed minors who are likely to receive a committed effective dose equivalent in excess of 50 percent of the applicable limit in 10 CFR 835 Subpart C from all intakes in a year.

DOE Laboratory Accreditation for Radiobioassay is required for internal dose monitoring programs implemented to demonstrate compliance with 10 CFR 835.

Compliance due date 1-1-02.

5. Air monitoring (10 CFR 835.403)

   Measurements of radioactivity concentrations in the ambient air of the workplace shall be performed as follows:

   - Air sampling shall be performed in occupied areas where an individual is likely to receive an exposure of 40 DAC-hrs or more in a year (i.e. an annual intake of 2 percent or more of the specific ALI value) for the mixture of isotopes.

   - Samples shall be taken as necessary to characterize the levels or concentration of airborne radioactive material when respirators are worn for radiation protection purposes.

   - Real-time air monitoring shall be performed when there is a need to alert potentially exposed individuals to unexpected increases in airborne radioactivity levels such that immediate action is necessary in order to minimize or stop inhalation exposures.

6. Receipt of Packages Containing Radioactive Material (10 CFR 835.405)

   Establishes requirements to monitor certain types of packages and sets a time limit of not later than 8 hours after the beginning of the working day following receipt of the package.

Show OT 2.16.

F. Subpart F - Entry Control Program (10 CFR 835.501)

Show OT 2.17.

Subpart F addresses entry into:

Discuss different types of radiological areas.

- Radiological Areas
- High Radiation Areas
- Very High Radiation Areas

1. Radiological Areas

   The degree of control shall be commensurate with existing and potential radiological hazards within the area.

One or more of the following methods shall be used to ensure control:

Show OT 2.18.

- Signs and barricades
- Control devices on entrances
- Conspicuous visual and/or audible alarms
- Locked entrance ways
- Administrative controls

"No control(s) shall be installed at any radiological area exit that would prevent rapid evacuation of personnel under emergency conditions."

Show OT 2.19.

2. High Radiation Areas

Show OT 2.20.

A High Radiation Area is an area where radiation levels exist such that an individual could exceed a deep dose equivalent to the whole body of 0.1 rem in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates.

If an individual could receive a deep dose equivalent exceeding 1.0 rem in an hour (at 30 cm), a High Radiation Area shall have one or more of the following:

- A control device that prevents entry to the area when high radiation levels exist or that, upon entry, causes the radiation level to be reduced below that level that defines a High Radiation Area.
- A device that functions automatically to prevent use or operation of the radiation source or field while individuals are in the area.

- A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the High Radiation Area and the supervisor of the activity are made aware of the entry.

- Entryways that are locked. During periods when access to the area is required, positive control over each entry is maintained.

- Continuous direct or electronic surveillance that is capable of preventing unauthorized entry.

- A control device generating audible and visual alarm signals to alert personnel in the area before use or operation of the radiation source and in sufficient time to permit evacuation of the are or activation of a secondary control device that will prevent use or operation of the source.

3. Very High Radiation Areas

Show OT 2.21.

A Very High Radiation Area is an area in which an individual could receive a dose in excess of 500 rad in one hour at 1 meter from the radiation source or from any surface that the radiation penetrates.

In addition to the requirements for a High Radiation Area, additional measures shall be implemented to ensure individuals are not able to gain unauthorized access to Very High Radiation Areas.

Show OT 2.22.

"No control(s) shall be established in a High or Very High Radiation Area that would prevent rapid evacuation of personnel."

G. Subpart G - Posting and Labeling

Show OT 2.23.

Subpart G addresses the general requirements for signs:

- Yellow background
- Black or magenta radiation symbol
- Clear and conspicuous signs

In addition, Subpart G addresses specific posting requirements for:

- Controlled Areas
- Radiation Areas
- High Radiation Areas
- Very High Radiation Areas
- Airborne Radioactivity Areas
- Contamination Areas
- High Contamination Areas
- Radioactive Material Areas

Discuss posting and labeling exceptions.

This subpart also addresses exceptions to posting and labeling.

H. Subpart H - Records

Show OT 2.24.

Subpart H addresses requirements for records documenting compliance with Part 835 and with the Radiation Protection Program.

Records that are specifically required include those necessary to demonstrate compliance with the ALARA provisions of the rule.

10 CFR 835 also requires that certain records be maintained, including records of:

- Individual monitoring
- Sealed source inventory and control
- Results of surveys for the release of material and equipment
- Results of specified monitoring for radiation and radioactive material
- Maintenance and calibration of radiation monitoring instruments
- Internal audits

Each individual's training as a general employee and as a Radiological Worker must be recorded. Where appropriate, demonstration and documentation of proficiency is required.

Refer to 10 CFR 835 Subpart H for a complete listing of required records.

DOE G 441.1-11, *Occupational Radiation Protection Record-Keeping and Reporting Guide*, provides additional guidance on record-keeping requirements, including reference to DOE O 231.1, Change 2, *Environment, Safety and Health Reporting*, and DOE M 231.1-1, Change 2, *Environment, Safety and Health Reporting Manual*. This order and manual specify radiation protection reporting requirements that may be applicable to the site or facility being assessed.

Discuss applicability of O 231.1 to the site or facility.

Show OT 2.25.

I. Subpart I - Reports to Individuals (10 CFR 835.801)

Subpart I addresses reports to individuals and their accessibility to reports, including:

On an annual basis, each DOE or DOE contractor-operated site or facility must provide each individual monitored for occupational exposure a radiation dose report of his/her occupational exposure at that site or facility.

Upon the request from an individual terminating employment, records of exposure shall be provided to that individual as soon as the data are available, but not later than 90 days after termination. A written estimate of the radiation dose received by that employee based on available information shall be provided at the time of termination, if requested.

J. Subpart J - Radiation Safety Training

Show OT 2.26.

This subpart addresses radiation safety training. The tailored approach to training requirements are based on:

- Unescorted access to or receiving occupational dose in controlled areas (e.g., General Employees)
- Unescorted access to radiological areas or unescorted assignment as Radiological Workers

Requirements of Part 835 include:

- Verification by examination for certain training (e.g., Radiological Worker Training)
- Intervals of training not to exceed twenty four months
- List of topics which must be included in training
- Provisions for limited use of escorts in lieu of training

DOE G 441.1-12, *Radiation Safety Training Guide*, provides additional guidance on DOE's expectations on radiation safety training.

K. Subpart K - Design and Control

Show OT 2.27.

Subpart K addresses added emphasis on facility and equipment design and administrative controls to maintain radiological exposures ALARA.

1. Facility design and modifications (10 CFR 835.1001)

   During the design of new facilities or modification of old facilities, the following objectives shall be adopted:

   - Optimal methods shall be used to assure ALARA
   - Maintain exposure levels below an average of 0.5 mrem/hr
   - Avoid release of radioactivity to the workplace atmosphere
   - The design or modification of a facility and the selection of materials shall include features that facilitate operations, maintenance, decontamination, and decommissioning

2. Workplace controls (10 CFR 835.1003)

   During routine operations, the combination of physical design features and administrative control shall provide that:

   - The anticipated occupational dose to general employees shall not exceed the limits
   - The ALARA process is utilized for personnel exposures to ionizing radiation

Show OT 2.28.

L. Subpart L - Radioactive Contamination Control

1. Control of material and equipment

   This section addresses the requirements for release of materials and equipment from radiological areas to controlled areas. Releases to uncontrolled areas are addressed in DOE O 5400.5 and are not addressed in this training. Some of the provisions of 10 CFR 835 Subpart L:

   - Specifies conditions for material and equipment in contamination areas (CAs), high contamination areas (HCAs), and airborne radioactivity areas (ARAs) to be released to a controlled area
   - Addresses movement of material and equipment with removable surface contamination, on-site from one radiological area for immediate placement in another radiological area
   - Specifies conditions for material and equipment with fixed contamination to be released for use in controlled areas outside of radiological areas

Show OT 2.29.

Control of Areas (10 CFR 835.1102) addresses

- Prevention of inadvertent transfer or removal of contamination to locations outside radiological areas under normal conditions
- Where contamination levels exceed values in Appendix D, the area is controlled commensurate with hazards
- Areas with fixed contamination exceeding radioactivity values may be located outside radiological areas, provided certain controls, conditions, or provisions are met
- Personnel monitoring for contamination upon exiting CAs, HCAs, or ARAs
- Use of protective clothing in CAs and HCAs

M. Subpart M - Sealed Radioactive Source Control

Show OT 2.30.

Sealed radioactive sources shall be used, handled and stored in a manner commensurate with the hazard.

Specifies values (Appendix E) for sources by isotope and Curie content which must be inventoried and leak tested at intervals not to exceed six months.

N. Subpart N - Emergency Exposure Situations

Show OT 2.31.

This subpart addresses:

- Employees who have exceeded dose limits as result of authorized emergency exposure
- Nuclear accident dosimetry

Individuals whose occupational exposures have exceeded any limits as a result of an authorized emergency exposure may be permitted to return to work provided that certain conditions are met.

Nuclear accident dosimetry involves installations possessing sufficient quantities of fissile material to constitute a critical mass, and shall include;

- Method to conduct initial screening of personnel involved
- Method and equipment for analysis of biological materials
- A system of fixed nuclear accident dosimeter units
- Personal nuclear accident dosimeters

Show OT 2.32.

Summarize lesson.

Review objectives.

Ask for questions.

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