



Department of Energy

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MEMORANDUM FOR DISTRIBUTION

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SUBJECT: Radiological Control Technical Positions Regarding *Use of Personal Nuclear Accident Dosimeters* and *Internal Audits*

The Office of Worker Safety and Health Policy issues Radiological Control Technical Positions in response to questions or issues associated with Department of Energy (DOE) occupational radiation protection programs.

The first technical position, *Use of Personal Nuclear Accident Dosimeters*, addresses provisions regarding who must wear a personnel nuclear accident dosimeter and the areas in which personnel nuclear accident dosimeters must be worn (attachment 1). It is acceptable to identify those discrete locations with sufficient quantities of fissile material where excessive exposure to individuals from a nuclear accident is possible and issue personal nuclear accident dosimeters only to individuals entering those locations.

The second technical position, *Internal Audits*, addresses the conduct of internal audits of a contractor's radiation protection program (attachment 2). It is acceptable for audits of all or part of a contractor's radiation protection plan to be performed by individuals and organizations that do not work for the contractor, if those individuals and organizations have the requisite knowledge to evaluate the radiological control functional area being audited.

These technical positions do not represent new policy or direction to the field. Rather, they provide clarification regarding use of personnel nuclear accident dosimeters and internal audits of radiation protection plans.

Please disseminate the attached documents to the applicable radiation protection organizations at your facilities.

Attachments



**Department of Energy
Office of Worker Safety and Health Policy
Radiological Control Technical Position
RCTP 2011-01**

Use of Personal Nuclear Accident Dosimeters

Issue:

Use of personal nuclear accident dosimeters (PNAD) is addressed in title 10, Code of Federal Regulations, part 835, *Occupational Radiation Protection* (10 C.F.R. 835). Title 10 C.F.R. 835, Subpart N, *Emergency Exposure Situations*, specifies requirements for installations possessing sufficient quantities of fissile material, such that excessive exposure of individuals from a nuclear accident is possible. One issue is whether any individual entering any location within the installation boundary must wear a PNAD or may specific locations, within the installation boundary, be designated where excessive exposure to individuals from a nuclear accident is possible. A second issue is whether all individuals entering designated locations, where excessive exposure to individuals from a nuclear accident is possible, must wear PNADs.

Discussion:

Applicable Provisions/Requirements

10 C.F.R. 835

§ 835.2 Definitions

(a) As used in this part:

Individual means any human being.

§ 835.1303 [Reserved]

§ 835.1304 Nuclear accident dosimetry.

- (a) Installations possessing sufficient quantities of fissile material to potentially constitute a critical mass, such that the excessive exposure of individuals to radiation from a nuclear accident is possible, shall provide nuclear accident dosimetry for those individuals.
- (b) Nuclear accident dosimetry shall include the following:
 - (1) A method to conduct initial screening of individuals involved in a nuclear accident to determine whether significant exposures to radiation occurred;
 - (2) Methods and equipment for analysis of biological materials;
 - (3) A system of fixed nuclear accident dosimeter units; and
 - (4) Personal nuclear accident dosimeters.

Facility Safety. Department of Energy (DOE) Order (O) 420.1A, chapter 2, October 24, 1996

(Note: This Order has since been replaced by DOE O 420.1A, chapter 3, and more recently DOE O 420.1B, December 22, 2005. The below criteria for an installed criticality alarm system (CAS) were the DOE requirements in effect when DOE revised its PNAD requirements.)

4.3.3 Specific Requirements

- e. (1) In those facilities where the mass of fissionable material exceeds the limits established in paragraph 4.2.1 of ANSI/ANS-8.3-1986 and the probability of a criticality accident is greater than 10^{-6} per year (as documented in a DOE-approved Safety Analysis Report (SAR) or in the supporting analysis for a SAR), a CAS conforming to ANSI/ANS-8.3-1986 shall be provided to cover occupied areas in which the expected dose exceeds 12 rads in free air, where a CAS is defined to include a criticality accident detection device and a personnel evacuation alarm.

Federal Register Discussion

December 23, 1996, Notice of Proposed Rulemaking

In a December 23, 1996, Notice of Proposed Rulemaking, DOE states "In sec. 835.1304, DOE proposes to substitute the defined term "individual" for the term "personnel" to eliminate confusion regarding the coverage of the personal nuclear accident dosimetry provisions. DOE also proposes to remove the reference to "all personnel" to provide flexibility in implementing the personal nuclear accident dosimetry provisions. The approach taken must be technically justifiable and documented accordingly."

November 4, 1998, Final Rule

In the final rule, November 4, 1998, DOE states "DOE clarified sec. 835.1304 by substituting the defined term "individual" for the term "personnel," which eliminates any confusion regarding the coverage of the personal nuclear accident dosimetry provisions. DOE also proposed to remove the reference to "all personnel" to provide flexibility in implementing the personal nuclear accident dosimetry provisions."

In the summary of the November 4, 1998, Final Rule, DOE states "To resolve issues related to requirements for personal nuclear accident dosimetry, DOE has revised the requirement to simply indicate that the nuclear accident dosimetry system must include personal nuclear accident dosimeters. This approach will allow for flexible implementation on a site- and facility-specific basis."

DOE Guidance Documents

Radiological Control Standard. DOE-STD-1098-2008, October 2008

In addition to repeating the requirements from 10 C.F.R. 835, DOE-STD-1098 states:

515 Nuclear Accident Dosimeters

4. Personnel nuclear accident dosimeters should be capable of measuring an absorbed dose in or on a phantom from 10 rads to approximately 1,000 rads with an accuracy of ± 25 percent.

Guide of Good Practices for Occupational Radiation Protection in Uranium Facilities. DOE-STD-1136-2009, July 2009

7.4.2.2 Fixed and Personnel Nuclear Accident Dosimeters

PNADs should be worn by all individuals who enter a controlled area, with locations requiring an installed criticality alarm system.

Guide of Good Practices for Occupational Radiation Protection in Plutonium Facilities. DOE-STD-1128-2008, December 2008

6.3.4 Criticality Accident Dosimetry

The requirements in 10 C.F.R. 835.1304 require that fixed nuclear accident dosimeters (NADs) and personnel nuclear accident dosimeters (PNADs) shall be worn by all individuals entering a controlled area that contains certain quantities of fissile materials, such as those required in DOE Order 420.1B (DOE, 2005a), which requires installed criticality alarms. The criticality accident dosimetry system should follow the provisions of ANSI/ANS 13.3-1988, *Dosimetry for Criticality Accidents* (ANSI, 1969b); this standard is currently being revised. Information on criticality accident dosimetry is also available from the International Atomic Energy Agency (IAEA, 1982).

Discussion

Background

On November 22, 1996, Lockheed Martin Energy Systems (LMES) requested, for the Y-12 facility, an exemption from 10 C.F.R. 835.1304(b)(4), which at the time required "Personal nuclear accident dosimeters worn by all personnel who enter locations in which installed criticality alarm systems are required." The requirement for installed criticality alarm systems was specified in DOE O 420.1A, chapter 2, October 24, 1996, which required installed criticality alarm systems "to cover occupied areas in which the expected dose exceeds 12 rads in free air." The exemption request listed eight locations at the Y-12 facility outside the security fence, which met the requirement for needing an installed criticality alarm system, and accordingly, PNADs for all individual entering those locations. On April 10, 1997, DOE granted an Exemption Decision to LMES to allow the site to establish PNAD zones based on criteria other than that specified in 10 C.F.R. 835.1304(b)(4) and to take advantage of existing physical boundaries and access points, such as security fences.

In recognition of this implementation difficulty, on December 23, 1996, DOE published a Notice of Proposed Rulemaking (NPR) in the Federal Register. The NPR explained DOE's intent to amend 10 C.F.R. 835. One of the purposes of the amendment was to revise 10 C.F.R. 835.1304

to eliminate confusion regarding the coverage of the personal nuclear accident dosimetry provisions and remove the reference to "all personnel" to provide flexibility in implementing the personal nuclear accident dosimetry provisions.

DOE issued a final rule on November 4, 1998, revising the requirement to simply indicate that the nuclear accident dosimetry system must include personal nuclear accident dosimeters. This approach was to allow for flexible implementation on a site- and facility-specific basis. On March 7, 2000, DOE sent LMES a letter cancelling its exemption because 10 C.F.R. 835 was amended such that the exemption was no longer needed. Since that time, DOE has issued guidance on use of PNADs in:

- Radiological Control Standard. DOE-STD-1098-2008, October 2008
- Guide of Good Practices for Occupational radiation Protection in Plutonium Facilities. DOE-STD-1128-2008, December 2008
- Guide of Good Practices for Occupational Radiation Protection in Uranium Facilities. DOE-STD-1136-2009, July 2009

Evaluation

During recent site visits, Office of Worker Safety and Health Policy staff was informed that there are questions concerning DOE's expectations for implementing the requirements of 10 C.F.R. 835.1304(b)(4). One issue is whether any individual entering any location within the installation must wear a PNAD or can specific locations within the installation be identified where excessive exposure to individuals from a nuclear accident is possible.

DOE-STD-1128-2008 states, in part, that the requirements in 10 C.F.R. 835.1304 require that PNADs be worn by all individuals entering a controlled area that contains certain quantities of fissile materials. Some sites have implemented a program where PNADs are issued to all individuals who enter a controlled area, within which there are locations with sufficient quantities of fissile material where excessive exposure to individuals from a nuclear accident is possible. While this is an acceptable approach, it is also acceptable to identify those discrete locations where the fissile material exists and only issue PNADs to individuals entering those locations.

A second issue is whether a PNAD must be issued to all individuals entering locations where excessive exposure to individuals from a nuclear accident is possible. As stated above, when DOE issued a final amended 10 C.F.R. 835 on November 4, 1998, DOE stated that DOE was removing the reference to "all personnel" to provide flexibility in implementing the personal nuclear accident dosimetry provisions. Based on their understanding of this statement, some sites have implemented programs where not all individuals entering locations where excessive exposure to individuals from a nuclear accident is possible are issued PNADs. Examples are tour groups where only the tour leader is provided a PNAD or work groups where not all workers are provided PNADs. This approach is not consistent with the requirements of 10 C.F.R. 835.1304. Once a DOE site has identified the individuals (defined in 835.2(a) as any human being) who may possibly be exposed to excessive exposure from a nuclear accident, then 10 C.F.R. 835.1304(a) requires that those individuals be provided nuclear accident dosimetry.

Per 10 C.F.R. 835.1304(b), nuclear dosimetry includes PNADs. Although the explanatory text that accompanies a rulemaking may provide some insight underlying the basis for the provisions of the rulemaking, it cannot change the meaning of the provision.

Technical Position:

It is acceptable to identify those discrete locations with sufficient quantities of fissile material where excessive exposure to individuals from a nuclear accident is possible and only issue PNADs to individuals entering those locations. It is not necessary to issue PNADs to all personnel entering a controlled area within which these locations exist.

For individuals who enter a location where they may possibly be exposed to excessive exposure from a nuclear accident, 10 C.F.R. 835.1304(a) and (b) require that those individuals be provided PNADs.

References:

Facility Safety. DOE O 420.1A, chapter 2, October 24, 1996

Federal Register, 10 C.F.R. 835, *Occupational Radiation Protection*, U.S. Department of Energy, December 23, 1996, Notice of Proposed Rulemaking

Federal Register, 10 C.F.R. 835, *Occupational Radiation Protection*, U.S. Department of Energy, November 4, 1998, Final Rule

Radiological Control Standard. DOE-STD-1098-2008, October 2008

Guide of Good Practices for Occupational Radiation Protection in Uranium Facilities. DOE-STD-1136-2009, July 2009

Guide of Good Practices for Occupational Radiation Protection in Plutonium Facilities. DOE-STD-1128-2008, December 2008