



American National Standard Training for Radiological/Nuclear Detection for Initial Response

STANDARDS

National Committee on Radiation Instrumentation, N42

Accredited by the
American National Standards Institute

ANSI N42.60-2019

American National Standard Training for Radiological/Nuclear Detection for Initial Response

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National Committee on Radiation Instrumentation, N42

Accredited by the
American National Standards Institute

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Abstract: The training requirements for radiological/nuclear detection for Initial Response are covered in this standard.

Keywords: ANSI N42.60, Initial Response, Preventive Radiological/Nuclear Detection, PRND, radiation detection instrumentation, training

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Introduction

This introduction is not part of ANSI N42.60-2019, American National Standard Training for Radiological/Nuclear Detection for Initial Response.

This standard is the responsibility of the Accredited Standards Committee on Radiation Instrumentation, N42. The standard was approved by N42 letter ballot.

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American National Standard Training for Radiological/Nuclear Detection for Initial Response

1. Overview

This standard provides training requirements for the use of *preventive radiological/nuclear detection* (PRND) instrumentation for radiological/nuclear Initial Response missions. IEEE and ANSI N42 have published ANSI N42.37 outlining training requirements for detecting and locating radioactive materials out of regulatory control.¹ This is a companion standard with training requirements for the use of PRND instrumentation during and following a response to a radiological or nuclear event.

1.1 Scope

This standard provides training requirements on the use of PRND instrumentation for the Response mission areas from Presidential Policy Directive 8 (PPD-8) that describes five preparedness capabilities: Response, Recovery, Mitigation, Prevention, and Protection. The PRND instrumentation addressed in this standard are described in the normative references in Clause 2. Training to use the same instrumentation for the Prevention and Protection mission areas is described in ANSI N42.37. Having ANSI N42.37 training before ANSI N42.60 training may be helpful, but is not required. For non-PRND instrumentation, organizations may apply training requirements from this standard as needed and considered appropriate for their Response missions.

1.2 Purpose

This standard establishes minimum requirements and provides recommendations and guidelines for organizations to develop individual courses and training programs, deliver training courses, and administer training in the Response mission area as described in the scope and discussed in Annex B. The standard describes knowledge and skills specific to the Initial Response phase following a nuclear or radiological event, accident, or emergency.

1.3 Background

With the support of the U.S. Department of Homeland Security (DHS), PRND instrumentation has been placed into service at federal, state, and local agencies throughout the nation. This large inventory and capability can be repurposed to support Initial Response actions following a radiological or nuclear event.

These Initial Response actions can generally be considered as those taken during the first few hours. Beyond that more appropriate radiation detection instrumentation should be available.

¹ Information on references can be found in Clause 2.

The use of the referenced PRND instrumentation in the Initial Response following a radiological or nuclear event can provide decision makers with indicators to support initial and time-sensitive decisions. The following are the types of radiation detection actions needed early in response that PRND instrumentation can support:

- Recognition that radiation is present and indicating the areas impacted by radiological contamination including the initial Hot Zone boundaries
- Providing radiological hazard information to support immediate lifesaving rescue operations
- Evacuation and monitoring support to the impacted areas through identification of contamination exceeding levels associated with Cold Zones
- Determination of Hot Zones boundaries
- Initial screening of people and packages to assess for the presence of high contamination levels

See Annex B for a description of the instrumentation types for this standard and for more information on the Initial Response capabilities and functions that PRND instrumentation can or may support.

1.4 Special word usage

In this document, the word *shall* is used to indicate a mandatory requirement.² The word *should* is used to indicate a recommendation. The word *may* is used to indicate a permissible action. The word *can* is used for statements of possibility and capability.

2. Normative references

The following referenced documents are important for the application of this document (i.e., these documents provide insight into the development of the standard requirements and may assist in implementation). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

ANSI N42.17A, American National Standard, Performance Specifications for Health Physics Instrumentation-Portable Instrumentation for Use in Normal Environmental Conditions.^{3, 4}

ANSI N42.17C, American National Standard, Performance Specifications for Health Physics Instrumentation-Portable Instrumentation for Use in Extreme Environmental Conditions.⁵

ANSI N42.20, American National Standard, Performance Criteria for Active Personnel Radiation Monitors.

ANSI N42.32, American National Standard, Performance Criteria for Alarming Personal Radiation Detectors for Homeland Security.

ANSI N42.33, American National Standard, Portable Exposure Rate Meters for Homeland Security.

ANSI N42.34, American National Standard, Performance Criteria for Hand-Held Instruments for the Detection and Identification of Radionuclides.

² The use of the word *must* is deprecated and cannot be used when stating mandatory requirements; *must* is used only to describe unavoidable situations. The use of *will* is deprecated and cannot be used when stating mandatory requirements; *will* is only used in statements of fact.

³ The ANSI N42 publications included in this clause are available from the Institute of Electrical and Electronics Engineers (<http://standards.ieee.org/>).

⁴ ANSI N42.17A and ANSI N42.17C are under revision as ANSI N42.17AC [B2].

⁵ See footnote 4.

ANSI N42.35, American National Standard, Evaluation and Performance of Radiation Detection Portal Monitors for Use in Homeland Security.

ANSI N42.37, American National Standard, Training for the Radiological/Nuclear Detection Mission.

ANSI N42.38, American National Standard, Performance Criteria for Spectroscopy-based Portal Monitors used for Homeland Security.

ANSI N42.43, American National Standard, Performance Criteria for Mobile and Transportable Radiation Monitors used for Homeland Security.

ANSI N42.48, American National Standard, Performance Requirements for Spectroscopic Personal Detectors for Homeland Security.

ANSI N42.49A, American National Standard for Performance Criteria for Alarming Electronic Personal Emergency Radiation Detectors (PERDs) for Exposure Control.

ANSI N42.49B, American National Standard for Performance Criteria for Non-alarming Personal Emergency Radiation Detectors (PERDs) for Exposure Control.

ANSI N42.53, American National Standard, Performance Criteria for Backpack-Based Radiation Detection Systems used for Homeland Security.

Homeland Security Exercise and Evaluation Program (HSEEP), 2013.

NCRP Commentary No. 19, Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism, December 31, 2005.⁶

NCRP Report No. 165, Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers, Reprint June 17, 2011.

NCRP Report No. 179, Guidance for Emergency Response Dosimetry, 2017.

NFPA 472, Standard for Professional Competence of Responders to Hazardous Materials Incidents.⁷

NFPA 473, Standard for Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents.

Presidential Policy Directive 8: National Preparedness (PPD-8), 2011.⁸

Training Requirements in OSHA Standards, OSHA 2254-09R 2015.

⁶ NCRP documents are available from the National Council on Radiation Protection and Measurements (<http://www.ncrponline.org/>).

⁷ NFPA publications are published by the National Fire Protection Association (<http://www.nfpa.org/>).

⁸ USDHS publications and PPD-8 are available from the U.S. Department of Homeland Security (<http://www.dhs.gov> and <http://www.fema.gov>).

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.⁹

Refer to ANSI N42.37 for a comprehensive list of definitions for training applications for Prevention and Protection mission areas. Additional definitions are added specifically for this standard or are included from ANSI N42.37 if they are emphasized in this standard.

authority having jurisdiction (AHJ): An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, installation, or a procedure.

NOTE—The AHJ may be a federal, state, tribal, territorial, or local level department or individual.¹⁰

capability categories: PRND instrumentation capable of exposure rate monitoring, integrated exposure tracking, and contamination screening applicable during the early stages of a Response mission.

Cold Zone: A Radiation Control Zone outside the perimeter of the outer perimeter of a Hot Zone where the exposure rate is less than 10 mR/h and where the command post and other support functions are located as needed. *See also:* **Hot Zone, Dangerous-Radiation Zone, Radiation Control Zones.**

contraband: In this standard, contraband is defined as radioactive material that is out of regulatory control.

Dangerous-Radiation Zone: A radiation control zone established within the Hot Zone where and if the exposure rate reaches or exceeds 10 R/h. *See also:* **Cold Zone, Hot Zone, Radiation Control Zones.**

exposure: For the purposes of this standard, the capability to measure integrated exposure or dose and to alarm when predetermined levels are exceeded.

NOTE—Use of the terms *exposure* or *exposure rate* are considered interchangeable with dose and dose rates for training purposes unless a distinction is noted.

exposure control: For the purposes of this standard, for photon energies most likely to be encountered in an emergency, the capability to warn the user he/she is approaching or has entered the Hot Zone or the Dangerous-Radiation Zone.

first responder: The first members of an emergency service for response at the scene of an emergency.

graded approach: A process for training development and delivery that provides a level of rigor commensurate with the hazard levels of the functions considered for training.

Hot Zone: A radiation control zone established where an exposure rate of 10 mR/h is exceeded or surface contamination levels of 60 000 dpm-cm² for beta-gamma are exceeded. *See also:* **Cold Zone, Dangerous-Radiation Zone, Radiation Control Zones.**

NOTE—Surface contamination levels for alpha surface contamination are defined in NCRP Report No. 165.

⁹ *IEEE Standards Dictionary Online* is available at: <http://dictionary.ieee.org>. An IEEE Account is required for access to the dictionary, and one can be created at no charge on the dictionary sign-in page.

¹⁰ Notes in text, tables, and figures of a standard are given for information only and do not contain requirements needed to implement this standard.

Incident Command System (ICS): A standardized on-scene emergency management construct specifically designed to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents without being hindered by jurisdictional boundaries.

Initial Response: Those actions taken during the first few minutes or hours following a radiological or nuclear event requiring first responder support as part of the Recovery mission. See *also*: **Mitigation, Recovery, Response.**

NOTE—For the purposes of this standard, *Initial Response* is considered the time frame when PRND instrumentation is most apt to be available for use in the early minutes or hours before more appropriate instrumentation becomes available.

job aid: Checklist or other visual aid intended to ensure that specific steps of completing a task or assignment are accomplished.

Just-in-Time (JIT) Training: Adaptable and available training materials instructing students “just in time” to provide focus on the performance needs for tasks at or near the time of task assignment so that the required knowledge and skills are provided for immediate application to avoid loss of retention due to a time gap.

Mitigation: The capabilities necessary to reduce loss of life and property by lessening the impact of disasters. See *also*: **Recovery, Response.**

National Incident Management System (NIMS): A set of principles that provides a systematic, proactive approach guiding government agencies at all levels, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, to reduce the loss of life or property and harm to the environment.

National Response Framework (NRF): A guide to how the nation conducts all-hazards response.

over-range response: The response of an instrument when exposed to radiation intensities greater than the detection limit or range.

person/object external contamination detection: For the purposes of this standard, the capability to determine if the contamination on a person or object exceeds predetermined criteria.

post event: This includes the homeland security missions of “respond” and “recover” as defined in the U.S. Department of Homeland Security (USDHS) Prevention Framework and Core Capabilities.

NOTE—For purposes of this standard, *post-event* response is relevant radiation measuring activities following the release and/or spread of radioactive materials, and/or detonation of a nuclear/radiological weapon of mass destruction.

preventive radiological nuclear detection (PRND) equipment or instrumentation: Equipment used to detect and localize radioactive material out of regulatory control.

NOTE 1—Material out of regulatory control includes illicit radioactive material that may be a radiological threat.

NOTE 2—*Instrumentation* and *equipment* are used interchangeably in this standard with instrumentation being preferred when either are appropriate.

qualifications: The minimum requirements necessary to perform work successfully and safely that may include specific job-related work experience, education, medical or physical standards, training, security, and/or licensure.