



# NCRP Report No. 179: Guidance for Emergency Response Dosimetry

## National Council on Radiation Protection and Measurements

### What is new?

- ◆ Explanation of how emergency workers differ from “conventional” occupational workers;
- ◆ Guidance to prioritize limited supplies of personal dosimetry and dose rate devices;
- ◆ Application of the concept of group (*i.e.*, representative) dose assignment for a given cohort or task;
- ◆ Strategies to employ or repurpose all available radiological instrumentation for prospective and retrospective dose determination;
- ◆ Guidance to ensure exposure control and optimization of doses is based on the best available measurements;
- ◆ Suggestions for alternative methods of dose assignment from the perspective of both protection and liability, and compensation;
- ◆ Considerations for minimum recordkeeping; and
- ◆ Planning considerations to address the needs for retrospective internal and external dose reconstruction, pre-event equipment selection and purchase, and minimum training elements.

### Overview

This Report bridges the dosimetry gaps between trained and equipped radiation workers and all other categories of responders who are considered emergency workers during a response to a radiological or nuclear incident.

It provides guidance on the control of radiation dose and focuses on answering the following key questions:

- ◆ With minimal dosimetry resources, how do responders make decisions to control the total dose and associated risk?
- ◆ How are doses assigned to responders when not every responder is issued a dosimeter before exposure occurs?
- ◆ What is the regulatory framework for responders who are not trained as radiation workers?

This Report discusses a scalable approach for optimizing and repurposing existing equipment and provides tools that help emergency managers and planners identify the best available equipment for a specific mission.

### Dose reconstruction: Information sources (excerpt from Table 8.1)

	Best	Good/Alternative	Minimum/Surrogate
<b>Source Characterization</b>	Radionuclide composition, exposure rates, activity concentrations, spatial distribution	Exposure rate and distance from source	Indication of radiation source
<b>Location</b>	Location (x, y coordinates) recorded automatically	Location/area known	Description of general area or zone
<b>Time</b>	Date and time recorded independently	Attendance/shift logs available	Personal recollection or correlation to another activity
<b>Duration</b>	Exact time spent at the location recorded automatically	Shift logs or similar available	Personal recollection or correlation to another activity
<b>Activity/Task</b>	Logged/recorded tasks or actions on-scene	General description of tasks or actions	Based on assumptions in absence of direct information

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## Mission-oriented detector selection (excerpt from Table 4.4)

Mission	Personal Dosimeter	Pocket Ionization Chamber	Alarming EPD	PRD	ER-PRD	PERD	Non-alarming PERD	Low Range Survey Meter	High Range Survey Meter	RIID	Large Mobile and Transportable	Aerial	Portal Monitor
<b>Hot zone [<math>&gt;10 \text{ mR h}^{-1}</math> (<math>\sim 0.1 \text{ mGy h}^{-1}</math>)]</b>													
Emergency worker exposure control	⊘ ○ <sup>E</sup>	○	○ ■ <sup>H</sup>	⊘	○ ■ <sup>H</sup>	■	○	⊘	○	⊘	⊘	⊘	⊘
Emergency worker dose monitoring	■	○	○ ■ <sup>H</sup>	⊘	⊘ ■ <sup>A,F</sup>	■	○	⊘	⊘ ○ <sup>A</sup>	⊘	⊘	⊘	⊘
Radiation survey (hot zone only)	⊘	⊘	○	⊘	○	■	⊘	⊘	■	⊘	⊘ ■ <sup>F</sup>	■	⊘

<sup>a</sup>Symbol key:

- = Useful; Appropriate for the mission
- = Marginal; meets minimum requirement
- ⊘ = Not useful; insufficient for the mission

- A = Provided instruments have the capability to track accumulated exposure or dose
- B = Provided instruments have the capability for low-range [down to  $0.1 \text{ mR h}^{-1}$  ( $\sim 1 \mu\text{Gy h}^{-1}$ )] exposure monitoring
- C = Provided instruments can readout in exposure or dose rate and do not automatically adjust for background
- D = Provided instruments have the capability for energy spectroscopic analysis

- E = Provided the dosimeter has the capability for readout in the field
- F = Provided instruments have the capability for high-range [up to  $10 \text{ R h}^{-1}$  ( $\sim 0.1 \text{ Gy h}^{-1}$ )] functionality
- G = Provided instruments have the capability for very high-range [up to  $1,000 \text{ R h}^{-1}$  ( $\sim 10 \text{ Gy h}^{-1}$ )] functionality
- H = Provided instruments have the loud audible and vibration alarm

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