



WMD Definitions for Use in the DHS/FEMA Course Materials Developed by CTOS

March 2014 Version 2.1



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Department of Homeland Security

This program was supported by Memorandum of Agreement Number DE-GM58-11NA25492, between the U.S. Department of Homeland Security (DHS), Federal Emergency Management Agency, National Preparedness Directorate (FEMA/NPD), Training & Exercise Integration Secretariat and the U.S. Department of Energy (DOE), National Nuclear Security Administration, Nevada Field Office (NNSA/NFO). Points of view or opinions in this program are those of the author(s) and do not represent the position or policies of the United States Government or any agency thereof, or its contractors or subcontractors.

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National Nuclear Security Administration, Nevada Field Office (NNSA/NFO),
CTOS-Center for Radiological/Nuclear Training at the Nevada National Security Site

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Introduction

The *CTOS – Center for Radiological/Nuclear Training at the Nevada National Security Site* uses these definitions in the products produced for U.S. Department of Homeland Security (DHS), Federal Emergency Management Agency, National Preparedness Directorate (FEMA/NPD) and DHS Domestic Nuclear Detection Office (DHS/DNDO) under agreement with the U.S. Department of Energy (DOE), National Nuclear Security Administration, Nevada Field Office (NNSA/NFO).

Where possible, these definitions were based on DHS and DOE definitions and descriptions published in the Federal Register and other U.S. Government documents, with additions and clarification from other guidance documents.

Some of the following definitions are followed by an optional, short, explanatory comment, adapted from the comments in the original reference documents. These explanatory comments may be included as part of the definition if desired. In CTOS-developed course materials, the explanatory comments, when appropriate, follow the definitions. In this document, these optional explanatory comments are shown in **blue text** to make them easy to distinguish from the definition. (When used in training materials, these explanatory comments are *not* colored blue.)

Much of the original text from which the CTOS definitions were derived is provided in the last section of this document. In some cases, information from multiple documents was combined and/or the language was simplified for the target audience.



WMD Definitions

Note: these definitions are arranged by topic and are not in alphabetic order

Weapon of Mass Destruction (WMD)

Defined in U.S. law (18 USC §2332a) as a weapon meeting one or more of the following four categories:

- (1) any “destructive device” (such as explosives, incendiary material, or poison gas in a bomb, grenade, rocket, missile, or mine)
- (2) any weapon that is designed or intended to cause death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals, or their precursors
- (3) any weapon involving a biological agent, toxin, or vector
- (4) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.¹⁷

WMD is often referred to by the collection of categories that make up the set of weapons: chemical, biological, radiological, nuclear, and explosive (CBRNE). These are weapons that have a relatively large-scale impact on people, property, and/or infrastructure.²¹

For the exact wording of the federal, legal definition of WMD, see [United States Code \(USC\), Title 18, Section 2332a \(18 USC §2332a\(c\)\(2\), 18 USC §921\(a\)\(4\), and 18 USC §178\(1\)\).¹⁷](#)

Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE)

A Weapon of Mass Destruction (WMD) is often referred to by the collection of categories that make up the set of weapons: chemical, biological, radiological, nuclear, and explosive (CBRNE).²¹ Also abbreviated “CBRNe.” When not including the threat of explosives, the term is shortened to Chemical, Biological, Radiological, and Nuclear (CBRN).

[A WMD and/or the hazardous materials released by a WMD are also called CBRNE or CBRN threat, material, or agent \(e.g., “CBRN agent”\).](#)



Radiological/Nuclear Weapon of Mass Destruction (Rad/Nuc WMD or R/N WMD or RN WMD)

Radiological WMD and/or Nuclear WMD. Used as a general category for WMDs when it is not necessary to distinguish between (or not yet determined) whether the device is a radiological WMD or a nuclear WMD.

See *Radiological WMD* and *Nuclear WMD*.

Radiological WMD

Any weapon or device designed to release radiation or radioactivity at a level dangerous to human life *without* a nuclear explosion.^{14, 17} Examples include Radiological Dispersal Device (RDD); Radiation Exposure Device (RED); deliberate radiological contamination of food, water, or consumables; deliberate damage to radioactive material in use, storage or transport or to an associated facility (such as a nuclear power plant).^{8, 14, 18, 19}

See *Radiological Dispersal Device (RDD)*, *Radiation Exposure Device (RED)*, and *Weapon of Mass Destruction (WMD)*.

Nuclear WMD

A weapon or device designed to create a nuclear explosion and release radiation or radioactivity at a level dangerous to human life. An Improvised Nuclear Device (IND) is a nuclear WMD.^{14, 17} See *Improvised Nuclear Device (IND)* and *Weapon of Mass Destruction (WMD)*

Improvised Nuclear Device (IND)

An illicit nuclear weapon that is bought, stolen, or otherwise obtained from a country with nuclear weapons, or a weapon fabricated by a terrorist group from illegally obtained nuclear weapons material that can produce a nuclear explosion.^{1, 8}

The nuclear explosion from an IND produces extreme heat, powerful shockwaves, and prompt radiation that would be acutely lethal for a significant distance. It also produces potentially large amounts of lethal, radioactive fallout, which may spread and deposit over very large areas.¹ A nuclear detonation in an urban area could result in over 100,000 fatalities (and many more injured), massive infrastructure damage, and thousands of square miles of contaminated land.¹⁶ If the IND fails to create a nuclear explosion, then the result would likely resemble an explosive Radiological Dispersal Device (RDD).¹



Fallout

The radioactive material falling from the atmosphere to the Earth's surface after a nuclear explosion such as the detonation of an Improvised Nuclear Device (IND).⁸

Yield

The amount energy released when a nuclear weapon or Improvised Nuclear Device (IND) is detonated, usually expressed in terms of the amount of TNT (Trinitrotoluene) which would release the same amount of energy. The yield is expressed as tons, kilotons (KT, thousands of tons), or megatons (MT, millions of tons) of TNT. The energy in a nuclear detonation is released as blast and shock, heat, and radiation.⁸

See *Improvised Nuclear Device (IND)*, *Kiloton (KT)*, and *Megaton (MT)*

Kiloton (KT)

The energy of an explosion that is equivalent to an explosion of 1,000 tons (or 2 million pounds) of TNT (trinitrotoluene). Used as measurement of the yield of nuclear weapons and Improvised Nuclear Devices (IND). Also abbreviated as “kT” or “Kt.”

See *Megaton (MT)*, *Improvised Nuclear Device (IND)*, and *Yield*

Megaton (MT)

The energy of an explosion that is equivalent to an explosion of 1 million tons of TNT (trinitrotoluene). One megaton is equal to 1 thousand kilotons (or 2 billion pounds) of TNT. Used as measurement of the yield of nuclear weapons. Also abbreviated as “Mt.”

See *Kiloton (KT)* and *Yield*

Radiological Dispersal Device (RDD)

Any device that intentionally spreads radioactive material across an area with the intent to cause harm, without a nuclear explosion occurring.^{1,8,16} An RDD that uses explosives for spreading or dispersing radioactive material is called an “explosive RDD.”³ The term “dirty bomb” is used by media, government, and others as a well-known, non-technical term for an explosive RDD.⁸ Non-explosive RDDs could spread radioactive material using common items such as pressurized containers, fans, building air-handling systems, sprayers, crop dusters, or even spreading by hand.^{1, 3, 5, 6, 10, 11}

The harm caused by an RDD is principally radioactive contamination, the public's fear of radioactive contamination,¹⁴ and denial of use of the contaminated area, perhaps for many years.¹⁶ Few deaths would occur due to the radiation and radioactive contamination from an RDD.⁷ For an explosive RDD, the explosion adds an immediate threat to human life and property.¹



Dirty Bomb

The term “dirty bomb” is used by media, government, and others as a well-known, non-technical term for an explosive RDD.⁸ The preferred, technically correct term is “RDD” or “explosive RDD.”

See *Radiological Dispersal Device (RDD)*

Radiation Exposure Device (RED)

A device intended to cause harm by exposing people to radiation without spreading radioactive material.^{2,3} An example of a RED is unshielded or partially shielded radioactive material placed in any type of container and in a location capable of causing a radiation exposure to one or more individuals.² Also called a “Radiological Exposure Device (RED).”^{5, 6, 7}

An RED may cause a few deaths, but normally would not cause widespread radiological contamination.⁷ An RED may be hidden in public transportation (under a bus or subway seat), a busy shopping mall (the food court, for example), movie theater, or any other location where a large number of people may sit, stand, or pass close by.^{5, 6, 14} REDs reputedly have been used to target specific individuals by being placed in the individual’s vehicle, office, or home.^{22,23} The danger is from exposure, for extended periods of time, to high levels of radiation close to the radioactive material.¹⁴ Individuals who come in contact with, touch, or sit on a radioactive material container do not become contaminated. However, if an RED were to break open, then some of the radioactive material could be released, causing contamination.^{5, 6, 14} If this occurs, the RED becomes a non-explosive Radiological Dispersal Device (RDD), and people coming in contact with it could spread contamination elsewhere.^{5, 14}

Radiological Exposure Device (RED)

See *Radiation Exposure Device (RED)*



PRND Definitions

Note: these definitions are arranged by topic and are not in alphabetic order

Preventive Radiological/Nuclear Detection (PRND)

Capability to detect, illicit radiological/nuclear materials and radiological/nuclear WMDs at the points of manufacture, transportation, and use, and to identify the nature of material through adjudication or resolution of the detection alarm. This does not include actions taken to respond to the consequences of the release of radiological/nuclear materials (such as response to the detonation of a Radiological Dispersal Device).²⁵ Also called Preventative Radiological/Nuclear Detection (PRND) and Radiological Nuclear Detection (RND).²⁹

See *Alarm Adjudication* and *Alarm Resolution*

Discovering and locating the radiological/nuclear threats and/or hazards may be accomplished through active and passive surveillance and search procedures, which may include the use of systematic examinations and assessments, sensor technologies, or physical investigation and intelligence. The PRND capability includes the ability to recognize potential radiological/nuclear threats through equipment, education, and effective protocols, not just technology. The importance of training, communication, and close coordination with intelligence, law enforcement (LE), public safety, public health, and international partners is recognized as a critical enabler for this capability.^{24, 25}

Alarm Adjudication

The process of identifying with reasonable certainty, the type or nature of radiological/nuclear material or device that set off a radiation detection alarm and assessing the potential threat that the radiological/nuclear material might pose with corresponding implications for the need to take further action.²⁷

Alarm Resolution

The process of taking the necessary action to eliminate any threat posed by the radiological/nuclear material or device that set off the radiation detection alarm or taking measures to address an indeterminate alarm. In cases where a radiation detection alarm remains indeterminate or unknown after initial adjudication efforts, resolution may involve further action to complete the adjudication process- i.e., to identify the radiological/nuclear material and determine that it poses no threat - or may involve operational response activities.²⁷



Limited Area Radiological/Nuclear Detection

The ability to detect radiological/nuclear (RN) materials within the vicinity of the equipment operator by using either personal radiation detectors (PRDs) or radiation isotope identifier devices (RIIDs). These instruments are usually limited in range compared to Human-Portable Detector (Backpack) and Vehicle-Mounted Detection System, due to smaller detector elements.^{28, 32}

Out of Regulatory Control

Radiological/nuclear materials and devices being imported, possessed, stored, transported, developed, or used without authorization by the appropriate regulatory authority, either inadvertently or deliberately.^{28, 32}

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. Federal, state and/or local law designate the AHJ.³⁰

Primary Screener

The PRND or RND Primary Screener has the authority and/or responsibility during steady state or enhanced steady state operations for performing the Primary Screening process of detect, verify, locate, measure, and assess, followed by adjudicate or elevate as needed. The Primary Screener also coordinates with Secondary Screeners as required during the adjudication phase of the mission.²⁹

Primary Screeners are trained to specialize in the initial phase of radiation detection to include verification of the initial detector alarm, locating the general area from which radiation is being emitted, and first contact with an individual, vehicle, or shipment.^{28, 32}



Secondary Screener

The PRND or RND Secondary Screener has the authority and /or responsibility during steady state and enhanced steady state operations to interface with the Primary Screener to perform secondary screening tasks to include; collection of gamma radiation spectra, isotope (radionuclide) identification, reachback, adjudication, elevation of the incident, and any other pertinent or required actions.²⁹

Secondary Screeners assist the primary screeners in verifying a detector alarm by using RIIDs to pinpoint/measure the source of radiation which caused the initial detector alarm. If the situation requires further investigation, Secondary Screeners utilize technical reachback assistance to adjudicate, or identify, the type and nature of the material or device causing a detection alarm.^{28, 32}

Technical Reachback

The process of communicating gamma radiation spectroscopic information to the appropriate authority for analysis in order to identify the radiological material.^{28, 32}

Reachback

See Technical Reachback

Wide Area Radiological/Nuclear Detection

The ability to detect radiological/nuclear materials over a broader area by using either human-portable detectors (backpacks) or vehicle-mounted detection systems. These instruments have a greater detection range than PRDs and RIIDs in general because of larger detector elements. Therefore, a vehicle-mounted system typically has a wider area detection capability than a human-portable detector (backpack), which in turn typically has a wider area detection capability than a PRD or RIID.^{28, 32}



Personal Radiation Detector (PRD)

A pocket-sized detection instrument worn by an operator to detect the presence radiological/nuclear material in a limited area in the vicinity of the operator. PRDs detect small increases in gamma radiation above background levels and alert the operator. Some models have additional capabilities to measure gamma radiation dose rate levels, measure the accumulated gamma radiation dose, and/or a limited capability to detect neutron radiation.^{26, 28, 32}

Most models of PRDs will overload and cannot operate in high levels of gamma radiation. Some models of PRDs can also perform the safety functions of a Personal Emergency Radiation Detector (PERD) and monitor the radiation dose rate and dose in very high levels of radiation.

Spectroscopic PRD (SPRD)

A personal radiation detector (PRD) with spectroscopic capability to identify isotopes (radionuclides). Some models have additional capabilities to measure gamma radiation dose rate levels, measure the accumulated gamma radiation dose, and/or detect neutron radiation.³¹

SPRDs detect changes above background levels of radiation, notify the user to these changes, and provide a means to determine if the alarm was caused by an isotope (radionuclide) of interest that may require further evaluation.³¹

These devices are not primarily intended to provide a measurement of dose equivalent rate. However, their indication can provide an approximate value of exposure rate that should be reasonably accurate. In general, they are also not meant to provide isotope (radionuclide) identification at the same level of accuracy as a hand-held RIID.³¹

Radiation Isotope Identifier Device or Radioisotope Identification Device (RIID)

A RIID is hand-held instrument used primarily to identify the isotopes (radionuclides) in radiological/nuclear material by analyzing the gamma radiation from the material (spectroscopic capability). Most models have a limited capability to detect neutron radiation. Due to the size of the detector element(s), the detection range of these devices may be greater than PRDs but less than Human-Portable Detectors (backpacks) or Vehicle-Mounted Detection Systems.^{28, 32}

There are many other variations on the expansion of the acronym RIID currently used by organizations and manufacturers, including: radioactive isotope identification device, radioisotope identifier device, radionuclide identifier, and radionuclide identification device, and radionuclide identification detectors.



Human-Portable Detector (Backpack)

An instrument carried by an operator, usually in a backpack or shoulder bag, to detect the presence of radiological/nuclear material in a wide area around the operator. Human-Portable Detectors can detect gamma radiation or gamma and neutron radiation. Due to the size of the detector element(s), the detection range of these devices may be greater than PRDs or RIIDs but less than Vehicle-Mounted Detection Systems. Some models have the additional capability to identify isotopes (radionuclides).^{28, 32, 33, 34} Most models can be operated in a low profile mode.^{28,32} Also called a “Human Portable Radiation Detector.”³²

Backpack

See *Human-Portable Detector (Backpack)*

Vehicle-Mounted Detection System

A radiation detection instrument transported and operated on vehicular platform (truck, boat, or aircraft) for detecting gamma radiation or gamma and neutron radiation. Primarily used to detect the presence of radiological/nuclear material in a wide area around the vehicular platform. Some models have the additional capability to identify isotopes (radionuclides). The system may be permanently mounted in a vehicular platform (e.g., truck, boat, or aircraft) or relocatable between these platforms. Typically operated on a platform that is in motion but can also be used while stationary.³³ Due to the larger detector element(s), the detection range of this device may be greater than PRDs, RIIDs, and Human-Portable Detectors (backpacks).^{28, 29, 32} Also called “Mobile Detectors”³² and “Mobile Radiation Monitors.”³³

Transportable Detector or Transportable Radiation Monitor

Transportable radiation monitors are designed to be transported to a location and used for a specific task or for a specified period of time; they do not require permanent mounting platforms. Transportable radiation monitors may be mounted to a vehicle such as a trailer, and are only used when the vehicle is stationary.^{32, 33}



Radiation Portal Monitor (RPM)

A system using large, usually stationary, detector elements for detecting gamma radiation or gamma and neutron radiation. By virtue of the large size of the detector elements, these devices are much more sensitive than handheld detectors (such as PRDs, RIIDs). If the RPM is designed to be easily transported and set up in another location, it may also be called a “Transportable Radiation Monitor.” An RPM with spectroscopic capability to identify isotopes (radionuclides) is called a “Spectroscopic Portal Monitor (SPM).”^{32, 33}

Spectroscopic Portal Monitor (SPM)

A Radiation Portal Monitor (RPM) with spectroscopic capability to identify isotopes (radionuclides). See *Radiation Portal Monitor (RPM)*

Personal Emergency Radiation Detectors (PERD)

An alarming electronic radiation measurement instrument used to manage exposure by alerting the emergency responders when they are exposed to gamma radiation. The instrument provides rapid and clear indication of the level of radiation exposure (dose) and/or exposure rate (dose rate) and readily recognizable alarms. The alarms are both audible and visual, and distinguishable between exposure rate and exposure.³⁵

Although a PERD may physically resemble a Personal Radiation Detector (PRD), the key difference is that the PRD’s primary function is detection and the PERD’s primary function is safety monitoring. The PRD detects and alarms on small increases in gamma radiation levels (dose rate), while the PERD can measure and alarm on very high levels of radiation in which *most* models of PRDs would be overloaded and inoperable. Some models of PRDs can also perform functions of a PERD in high levels of radiation.



Reference List

The definitions listed above have been modified slightly from the original text to use terminology or formatting consistent with CTOS course materials. The original text from the references is listed in the next section.

1. United States Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA), *Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents*
2. United States Department of Energy (DOE), *Safeguards and Security Program References*
3. DOE, DHS, and United States Nuclear Regulatory Commission (NRC), *Joint DOE/DHS/NRC Classification Guide for Radiological Dispersal Devices and Radiation Exposure Devices*
4. United States Customs and Border Protection (CBP) and DOE, *Joint CBP/DOE Classification for the Nuclear Smuggling Information*
5. United States Department of Health & Human Services, Radiation Emergency Medical Management (REMM), *Dictionary of Radiation Terms*
6. United States Department of Health & Human Services, Office of the Assistant Secretary for Preparedness and Response (ASPR), *Responding to an RDD / RED Emergency: the HHS Playbook*
7. Radiation Source Protection and Security Task Force, *The Radiation Source Protection and Security Task Force Report*
8. National Council on Radiation Protection and Measurement (NCRP), *Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers*, NCRP Report No. 165
9. NCRP, *Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism*, NCRP Commentary No. 19
10. ASTM International, *Standard Practice for Radiological Emergency Response*
11. National Fire Protection Association (NFPA), NFPA 472-08, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*
12. International Atomic Energy Agency (IAEA), *Nuclear Safety & Security, Security of Radioactive Sources*, Nuclear Security Series No. 9



13. IAEA, *Educational Programme in Nuclear Security*, IAEA Nuclear Security Series No. 12
14. Ansari, A, *Radiation Threats and Your Safety: A Guide to Preparation and Response for Professionals and Community*
15. Federal Interagency Committee, *Planning Guidance for Response to a Nuclear Detonation, Second Edition*
16. U.S. DHS/FEMA. *Nuclear/Radiological Incident Annex (NRIA) to the National Response Framework (NRF)*
17. United States Code, Title 18, Sections 178, 921, and 2332a
18. Homeland Security Presidential Directive 18: *Medical Countermeasures against Weapons of Mass Destruction*
19. IAEA, *Security in the Transport of Radioactive Material*, IAEA Nuclear Security Series No. 9
20. Glasstone, S. and P. Dolan. *The Effects of Nuclear Weapons*
21. Federal Bureau of Investigation (FBI), *Weapons of Mass Destruction, Frequently Asked Questions* website
22. Associated Press (AP), *Scientist plants radioactive material in rival's office*
23. Ilyin, L. A., V. Yu. Soloviev, A. E. Baranov, A. K. Guskova, N. M. Nadezhina, and I. A. Gusev, *Early medical consequences of radiation incidents in the former URRS territory*, 11th International Congress of IRPA
24. U.S. DHS, *HSEEP Exercise Evaluation Guide EEG-Prevention, Search, & Detection*. April 2013 Version
25. U.S. DHS, *HSEEP Exercise Evaluation Guide EEG-CBRNE Detection*, Version 1.1
26. ANSI/IEEE, *American National Standard Performance Criteria for Alarming Personal Radiation Detectors for Homeland Security*, ANSI N42.32-2006
27. U.S. DHS, Domestic Nuclear Detection Office (DNDO), *STC PRND Training and Exercise Guide Book*
28. U.S. DHS/DNDO, *Typed Resource Definitions Preventive Radiological/Nuclear Detection (PRND) Resources*, Document Number 400-INT-115300v1.00 [For Official Use Only], June 2011. [This document is For Official Use Only and is not available on the public internet.]



29. U.S. DHS/DNDO, *Radiological Nuclear Detection, Position Training Standards and Qualifications*, DRAFT March 2014
30. National Fire Protection Association (NFPA), *NFPA Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2013 Edition
31. ANSI/IEEE, *American National Standard Performance Requirements for Spectroscopic Personal Radiation Detectors (SPRDs) for Homeland Security*, ANSI N42.48-2008
32. U.S. DHS, *Fiscal Year 2012 DHS Preparedness Grant Programs, Supplemental Resource: Preventive Radiological/Nuclear Detection Guidance* [For Official Use Only], [This document is For Official Use Only and is not available on the public internet.]
33. ANSI/IEEE, *American National Standard Performance Criteria for Mobile and Transportable Radiation Monitors Used for Homeland Security*, ANSI N42.43-2006
34. U.S. DHS/DNDO, *Performance Specification For Human Portable Radiation Detection System (HPRDS)*, Document Number DNDO-PS-100680v4.00
May 12, 2006
35. ANSI/IEEE, *American National Standard for Performance Criteria for Alarming Electronic Personal Emergency Radiation Detectors (PERDs) for Exposure Control*, ANSI N42.49A-2011



Detailed Reference List and Full Original Text

The original text from which the CTOS definitions were derived is provided here, for most of the referenced documents. In some cases, information from multiple documents was combined and/or the language was simplified for the target audience.

1. United States Department of Homeland Security, Federal Emergency Management Agency, 2008. *Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents*, Federal Register, Vol. 73, No. 149. pg. 45031.

http://www.fema.gov/good_guidance/download/10260 [Accessed September 21, 2009]

- *RDD* Radiological Dispersal Device—Any device that causes the purposeful dissemination of radioactive material, across an area with the intent to cause harm, without a nuclear detonation occurring.
- Radiological Dispersal Device (RDD)
An RDD poses a threat to public health and safety through the malicious spread of radioactive material by some means of dispersion. The mode of dispersal typically conceived as an RDD is an explosive device coupled with radioactive material. The explosion adds an immediate threat to human life and property. Other means of dispersal, both passive and active, may be employed.
- *IND* Improvised Nuclear Device—An illicit nuclear weapon that is bought, stolen, or otherwise obtained from a nuclear State, or a weapon fabricated by a terrorist group from illegally obtained fissile nuclear weapons material and produces a nuclear explosion.
- Improvised Nuclear Device (IND)
An IND is an illicit nuclear weapon bought, stolen, or otherwise originating from a nuclear State, or a weapon fabricated by a terrorist group from illegally obtained fissile nuclear weapons material that produces a nuclear explosion. The nuclear yield achieved by an IND produces extreme heat, powerful shockwaves, and prompt radiation that would be acutely lethal for a significant distance. It also produces radioactive fallout, which may spread and deposit over very large areas. If a nuclear yield is not achieved, the result would likely resemble an RDD in which fissile weapons material was utilized.



2. United States Department of Energy (DOE), Office of Security and Safety Performance Assurance, 2005, *Safeguards and Security Program References DOE M 470.4-7*, Washington, DC. pg A-48.
 - **RADIATION EXPOSURE DEVICE (RED)**. A device that is intended to expose people to radiation without dispersal of radioactive material into the air by detonation with conventional explosives or other means. An example of a RED is unshielded or partially shielded radioactive materials placed in any type of container and in a location capable of causing a radiation exposure to one or more individuals.
 - **RADIOLOGICAL DISPERSAL DEVICE (RDD)**. A device or mechanism that is intended to spread radioactive material from the detonation of conventional explosives or other means.

3. United States Department of Energy (DOE), Office of Classification, United States Department of Homeland Security (DHS) Office of Security, United States Nuclear Regulatory Commission, Office of Nuclear Security and Incident Response, 2009, *Joint DOE/DHS/NRC Classification Guide for Radiological Dispersal Devices and Radiation Exposure Devices (U)*, *CG-RDD-1* [Official Use Only], Washington, DC. pg A-1. [This document is Official Use Only and is not available on the public internet.]
 - **Radiological Dispersal Device (RDD) (U)** – The combination of radioactive material and the means (whether active or passive) to disperse the material with malicious intent. RDDs may include fission products and/or fissile material but fission reactions do not occur in the RDD or its dispersed material. (U)
 - **Radiation Exposure Device (RED) (U)** – An object used to maliciously expose people, equipment, and/or the environment to ionizing radiation without dispersal of radioactive material. REDs may include fission products and/or fissile material but fission reactions do not occur in the RED. (U)



4. United States Customs and Border Protection (CBP) and United States Department of Energy (DOE), *Joint CBP/DOE Classification for the Nuclear Smuggling Information* [Official Use Only], *CG-SMG-2 Change 1*. Washington, DC: U.S. CBP and DOE Office of Security, 2003 (Change 1: 2009). pg .A-2. [This document is Official Use Only and is not available on the public internet.]
 - **Improvised Nuclear Device (IND)** - A device incorporating radioactive materials which is made outside of official U.S. Government or other nuclear-weapon-state program and which has, appears to have, or is claimed to have the capability to produce a nuclear explosion.
 - **Radiological Dispersal Device (RDD)** - A device which has, appears to have, or is claimed to have, the capability to produce radioactive contamination over an area without a nuclear explosion.

5. United States Department of Health & Human Services, Radiation Emergency Medical Management (REMM), *Dictionary of Radiation Terms*, [Internet]. 2014.
<http://www.remm.nlm.gov/dictionary.htm> [Accessed March 11, 2014]
 - **Radiological dispersal device (RDD):** a device that disperses [radioactive material](#) by conventional explosive or other mechanical means, such as a spray. *See also* [dirty bomb](#).
 - **Dirty bomb:** a device designed to spread [radioactive material](#) by conventional explosives when the bomb explodes. A dirty bomb kills or injures people through the initial blast of the conventional explosive and spreads radioactive [contamination](#) over possibly a large area—hence the term “dirty.” Such bombs could be miniature devices or large truck bombs. A dirty bomb is much simpler to make than a true nuclear weapon. *See also* [radiological dispersal device](#).
 - **Kiloton (Kt):** the energy of an explosion that is equivalent to an explosion of 1,000 tons of TNT. One kiloton equals 1 trillion (10^{12}) calories. *See also* [megaton](#).
 - **Megaton (Mt):** the energy of an explosion that is equivalent to an explosion of 1 million tons of TNT. One megaton is equal to a quintillion (10¹⁸) calories. *See also* [kiloton](#).
 - **Radiological exposure device (RED):** also called a "hidden sealed source." An RED is a terrorist device intended to [expose](#) people to significant doses of ionizing radiation without their knowledge. Constructed from partially or fully unshielded radioactive material, an RED could be hidden from sight in a public place (e.g., under a subway seat, in a food court, or in a busy hallway), exposing those who sit or pass close by. If the seal around the source were broken and the radioactive contents released from the container, the device could become a [radiological dispersal device](#) (RDD), capable of causing radiological [contamination](#).



6. U.S. Department of Health & Human Services, Office of the Assistant Secretary for Preparedness and Response (ASPR), *Responding to an RDD / RED Emergency: the HHS Playbook*, [Internet.] 2010.
<http://www.phe.gov/Preparedness/planning/playbooks/rdd/Pages/default.aspx> [Accessed May 5, 2011]
 - **RDD- Radiological Dispersal Device** can be of two general types. In both, radioactive material is dispersed into the environment.
 - Dispersal of radioactive material via explosive detonation, i.e., a combination of an Improvised Explosive Device (IED) and radioactive material
 - Dispersal of radioactive material via non-explosive means, e.g., in food, water, soil, or air, etc.
 - **RED- Radiological Exposure Device** refers to a sealed radioactive source that is placed in a public place and causes exposure but not contamination to those in proximity. (Note: if an RED were to break open, it would then be similar to an RDD)

7. Radiation Source Protection and Security Task Force, *The Radiation Source Protection and Security Task Force Report*, 2006. Washington, D.C.
<http://www.nrc.gov/reading-rm/doc-collections/congress-docs/correspondence/2006/president-08-15-2006.pdf> [Accessed May 9, 2011]. pp 6-7.
 - Preventing a terrorist attack involving a radiological dispersal device (RDD) or radiological exposure device (RED) has been a top priority for the Bush administration.
 - Loss or theft of such materials, in risk-significant quantities, could lead to their diversion for malicious use in an RDD or an RED. An RDD is a device or mechanism that is intended to spread radioactive material from the detonation of conventional explosives or other means. RDDs are considered weapons of mass disruption; few deaths would occur due to the radioactive nature of the event, however, significant social and economic impacts could result from public panic, decontamination costs, and denial of access to infrastructure and property for extended periods of time. An RED is a device whose purpose is to expose people to radiation, rather than to disperse radioactive material into the air, as would an RDD.
 - REDs may result in a few deaths, but would not cause widespread contamination.



8. National Council on Radiation Protection and Measurement (NCRP), *Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers*, NCRP Report No. 165, 2010. Bethesda, Maryland, pp 7, 9, 11, 12, 13.
- Radiological terrorism involves the use of radioactive material and nuclear terrorism involves the detonation of a nuclear device (Ansari, 2009). The types of radiological and nuclear terrorist incidents that are considered in the context of this Report are:
 - radiological dispersal devices (RDDs);
 - radiation exposure devices (REDs)
 - deliberate contamination of food, water, or other consumables with radioactive material;
 - dispersal of radioactive material from fixed radiological or nuclear facilities or material in transit; and
 - improvised nuclear devices (INDs)
 - *Radiological Dispersal Devices*. A device that spreads radioactive material with malicious intent is called a radiological dispersal device (RDD). An RDD that uses explosives for dispersion of the radioactive material is commonly referred to as a “dirty bomb.” An RDD may or may not effectively disperse the radioactive material. An explosive RDD might fail to detonate or be discovered prior to being triggered. In the latter case, the device could be rendered safe by bomb disposal technicians with particular care exercised not to cause a release of radioactive material.
 - A malfunctioning IND could result in consequences similar to an RDD.
 - *Radiation Exposure Devices*. A radiation exposure device (RED) consists of a large quantity of radioactive material clandestinely placed to expose people to ionizing radiation. This form of terrorism would use an intact sealed source or radioactive material enclosed in a container to expose unsuspecting people instead of widespread dispersal of the material. An RED might go undetected for a relatively long time, complicating the assessment of the exposed population.
 - *Improvised Nuclear Device*. A nuclear weapon could be constructed from stolen nuclear weapon components or fabricated de novo from fissile material (e.g., ^{239}Pu or uranium highly enriched in ^{235}U). This type of device is referred to as an improvised nuclear device (IND). Alternatively, a nuclear weapon could be stolen, bought, or otherwise obtained from a state with nuclear weapon capability.

A nuclear terrorism incident would result in large-scale consequences to public health and safety. The effects in the immediate area of the nuclear terrorism incident would be catastrophic and the emergency-response support capability in the immediate area would likely be destroyed or severely compromised. Response units in areas of heavy fallout within 10 to 20 miles (~15 to 30 km) of the detonation site may be sheltered for several hours to protect themselves from potentially lethal levels of radiation.



9. National Council on Radiation Protection and Measurement (NCRP), *Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism*, NCRP Commentary No. 19, 2005. Bethesda, Maryland, pp 3, 12-15.

- Radiation Exposure Devices. An RED consists of radioactive material, either as a sealed source or as material within some type of container, that directly exposes people to radiation.

The radioactive material in an RED could be in any form, including sealed sources used for medical and industrial applications, and little preparation is required other than removal of the shielding. ...

An RED may be used by terrorists to cause harm by exposing people to ionizing radiation, most likely gamma radiation, emitted by the radioactive material.

- An RDD uses conventional explosives or some other mechanism to spread radioactive contamination.

The radioactive material in an RDD could be in the form of a fine powder, a liquid mist, or a gas. The material could be spread by hand, such as by simply emptying a container over the desired area, by entering it into a ventilation system, or by incorporating the radioactive material into a conventional explosive device. Usually an explosive device will have the potential to spread the material initially over a larger area than manual dispersal. However, delayed discovery of covert contamination by an RDD could result in a significant distribution of the radioactive material beyond the initial site of contamination

- An IND incorporates nuclear materials designed to produce a nuclear explosion. An IND may be fabricated in a completely improvised manner, may be an improvised modification to a nuclear weapon, or may be acquired in some other way.



10. ASTM International, *Standard Practice for Radiological Emergency Response*, E 2601 – 08, 2008. West Conshohocken, PA. pp 3, 4, 15.

- An improvised nuclear device is defined as follows: A device incorporating fissile materials designed or constructed outside of an official government agency and that has, or appears to have, or is claimed to have the capability to produce a nuclear explosion. It also may be a nuclear weapon that is no longer in the custody of competent authority or custodian, or has been modified from its designated firing sequence, or it may have been assembled from illegally obtained nuclear weapons components or special nuclear materials.
- 3.1.24 radiological dispersal device (RDD)—a device designed to spread radioactive material through a detonation of conventional explosives or other (non-nuclear) means. RDD is used interchangeably with the term “dirty bomb”. NCRP Report No. 138
- 3.1.25 radiation exposure device (RED)—a RED consists of radioactive material, either as a sealed source or as material within some type of container, that directly exposes people to radiation. NCRP Commentary No. 19
- 7.2.2.2(1) Radiological Dispersal Devices (RDD):
An RDD is a device intended to disperse radioactive material over a large area for malicious reasons. An RDD is not capable of producing a nuclear yield and is not an atomic bomb. An RDD would use the force of conventional explosives to scatter radioactive material. The detonation of a large-scale explosive device near a target that contains a large amount of radioactive material could cause a dispersion of that material. Depending on wind speed and direction, the radioactive material could be spread over a large area. Because fires, which would likely occur following an RDD event, could further spread radioactive material responders should extinguish fires as soon as it is safe to do so.
- 7.2.2.2(2) Radiological Exposure Devices (RED):
A RED is a powerful beta-, gamma-, and/or neutron-emitting radioactive source that can be placed in a high profile location, such as a high-traffic urban area or government facility. A RED could expose a large number of people to an intense radioactive source. It can also be used to target specific individuals or harm a limited number of people over a long period of time.



- 7.2.2.2(3) Other Deliberate Acts of Radioactive Material Release or Radiation Exposure:

A terrorist’s use of radioactive materials can take other forms, in which radioactive material is distributed. Non-explosive RDDs are often referred to as radiological dispersal weapons (RDWs) or simple radiological dispersal devices (SRDD). RDWs can use inexpensive and common items such as pressurized containers, fans, and mechanical devices to spread contamination. RDWs could also be spray dispersal systems, simple spreading by hand, or they may be dispersed into water systems at source, in pretreatment, during treatment, or into the distribution system. It might also include random placement of contaminants in public locations so that they can be spread widely. RDWs/SRDDs could also be used in conjunction with building ventilation systems to contaminate occupants.

11. National Fire Protection Association (NFPA), NFPA 472-08, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2008 Edition, 2008. Quincy, MA.

- **3.3.62*Weapon of Mass Destruction.** (1) Any destructive device, such as any explosive, incendiary, or poison gas, bomb, grenade, rocket having a propellant charge of more than four ounces, missile having an explosive; or incendiary charge of more than one-quarter ounce (7 grams), mine, or device similar to the above; (2) any weapon involving toxic or poisonous chemicals; (3) any weapon involving a disease organism; or (4) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.
- **A3.3.62 Weapon of Mass Destruction (WMD).** The source of this definition is 18 USC 2332a.
[Note: the terms “non-explosive RDD” and “RED” are not used in this document, but these devices are described via scenario descriptions.]
- D4.2(1) Given a simulated incident involving the concealment of a radioactive material source in a public area, describe the procedures for the following...
- D4.2(2) Given a simulated incident involving a release of radioactive material from a dissemination device or air-handling system, describe the procedures for the following...
- D4.2(4) Given a simulated incident involving a release of radioactive material from a radiological dispersion device [RDD] or a container breach, describe the procedures for the following...
- D4.2(4) Given a simulated incident involving a release of radioactive material from the detonation of an IND, describe the procedures for the following...



12. International Atomic Energy Agency (IAEA), *Nuclear Safety & Security, Security of Radioactive Sources*. [Internet]. 2010. <http://www-ns.iaea.org/security/sources.asp> [Accessed May 9, 2011]

- Substantial evidence indicates the intent of terrorist groups to acquire and use radioactive sources to develop radiological dispersal [sic] devices (RDDs), or 'dirty bombs'. Radioactive sources can also be used maliciously in a radiation exposure device (RED) that is designed to intentionally expose members of the public.

13. International Atomic Energy Agency (IAEA), *Educational Programme in Nuclear Security*, Nuclear Security Series No. 12, 2010. Vienna, Austria. pg 25. http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439_web.pdf [Accessed May 9, 2011]

- NS1.6. Chemical, biological, radiological and nuclear (CBRN) weapons
 - CBRN weapons;
 - Potential targets and methods of CBRN adversaries;
 - Four main nuclear and radiological concerns;
- Theft of nuclear weapon;
- Acquisition of nuclear material and improvised nuclear device (IND) development;
- Sabotage;
- Development of radiological dispersal device (RDD) and radiation exposure device (RED).



14. Ansari, A., *Radiation Threats and Your Safety: A Guide to Preparation and Response for Professionals and Community*, 2009. CRC Press, Boca Raton, Florida. pp. 76, 77, 91, 92, 98, 99.

- A nuclear incident involves detonation of a nuclear weapon (i.e., the proverbial mushroom cloud). Any and all other radiation incidents that do not involve a nuclear detonation are called radiological incidents... You only need to remember that a nuclear incident occurs if, and only if, there is a nuclear detonation. Otherwise, a radiological incident has occurred.
- **IMPROVISED NUCLEAR DEVICE**
An improvised nuclear device (IND) is a crude, low-yield atomic bomb or nuclear weapon. A nuclear weapon produces a nuclear detonation involving fission (or splitting) of atoms. As a result of these fission reactions, a tremendous amount of energy is released in a fraction of a second, creating an immense shockwave and intense heat. The release of energy in this form will cause great destruction and loss of life if the bomb is detonated near a populated urban area. Furthermore, the release of radioactivity and radiation as a result of this detonation can present a serious health hazard to people who survive the blast.
- **RADIOLOGICAL DISPERSAL DEVICES**
A radiological dispersal device (RDD) is a tool specifically designed to spread radioactive material and contaminate humans or the environment. The method of dispersal can be by any number of means (e.g., explosion, spraying a liquid, aerosol). The most talked about example of an RDD is the so-called "dirty" bomb. In constructing a dirty bomb, perpetrators can use any conventional explosives (such as dynamite, C-4 plastic explosive, or a homemade fertilizer bomb) and package it with any radioactive material they can find. When the explosives are set off, in addition to the destructive effect of the explosion, the blast disperses the radioactive material into the surrounding area... The most important point to keep in mind is that, in the case of an RDD, it is the conventional explosion that causes destruction and fatalities, if any. The radioactive component of a dirty bomb is aimed at creating panic by contaminating people and the places where they work, live, or engage in commerce. In other words, the purpose is to create societal disruption-not destruction. For this reason, RDDs are sometimes referred to as "weapons of mass disruption."



- **RADIATION EXPOSURE DEVICE**

A piece of radioactive material may be intentionally placed in a public place, hidden from sight, with the sole purpose of exposing people to radiation without their knowledge. Such a device is called a radiation exposure device (RED). It may also be called a radiation emitting device, a hidden source, or a silent source; however, all this terminology refers to the same type of incident. An RED may be placed in public transportation (under a bus or subway seat), a busy shopping mall (the food court, for example), movie theater, or any other location where a large number of people may sit, stand, or pass close by. The radioactive source, used in this manner, is likely to be a "sealed" source. This means that the radioactive material is encased in some form of plastic or metal housing and does not leak. Therefore, radioactive contamination is not an issue. Only penetrating radiation leaves the source container and can expose or irradiate people nearby. Individuals who come in contact with or even touch or sit on a sealed source do not become contaminated ... The danger is from exposure to high levels of radiation in close proximity to the source for extended periods of time, assuming that the RED is a radiation source emitting high levels of radiation. If the radioactive source is not sealed, or if the seal around the source is somehow breached, some of the radioactive material could be released and cause contamination. At that point, the device is more like a radiation dispersal device and people coming in contact with the source could spread contamination elsewhere.

15. Federal Interagency Committee, *Planning Guidance for Response to a Nuclear Detonation, Second Edition*, 2010. Washington, DC. pp. 14-15.

http://www.hps.org/hsc/documents/Planning_Guidance_for_Response_to_a_Nuclear_Detonation-2nd_Edition_FINAL.pdf

[Accessed May 9, 2011].

- A nuclear detonation would produce several important effects that impact the urban environment and people. In this discussion, the term 'nuclear effects' will mean those outputs from the nuclear explosion, namely primary effects including blast, thermal (heat), and initial radiation and secondary effects including electromagnetic pulse (EMP) and fallout. All of these effects impact people, infrastructure, and the environment, and they significantly affect the ability to respond to the incident.



16. DHS/FEMA. *Nuclear/Radiological Incident Annex (NRIA) to the National Response Framework (NRF)*, 2008

http://www.fema.gov/pdf/emergency/nrf/nrf_nuclearradiologicalincidentannex.pdf

[Accessed May 9, 2011]

- A radiological dispersal device is any device used to spread radioactive material into the environment with malicious intent. The harm caused by an RDD is principally contamination, and denial of use of the contaminated area, perhaps for many years. The costs to the Nation associated with an effective RDD could be very significant. Of greatest concern to U.S. security is the potential for a terrorist attack using a nuclear weapon. A nuclear device could originate directly from a nuclear state, be modified from preexisting weapons components, or be fashioned by terrorists from the basic fissile nuclear materials (uranium-235 or plutonium-239). Even a small nuclear detonation in an urban area could result in over 100,000 fatalities (and many more injured), massive infrastructure damage, and thousands of square kilometers of contaminated land.

17. United States Code, Title 18, Sections 178, 921, and 2332a. 2009 Edition

<http://uscode.house.gov/pdf/2009/2009usc18.pdf>

[Accessed May 10, 2011]

- 18 U.S.C. § 2332a : US Code - Section 2332a: Use of weapons of mass destruction
18 U.S.C. § 2332a(c)(2)

(c) Definitions. - For purposes of this section -
...
(2) the term "weapon of mass destruction" means –
(A) any destructive device as defined in section 921 of this title;
(B) any weapon that is designed or intended to cause death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals, or their precursors;
(C) any weapon involving a biological agent, toxin, or vector (as those terms are defined in section 178 of this title); or
(D) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life;.



- 18 U.S.C. § 921 : US Code - Section 921: Definitions
18 U.S.C. § 921(a)(4)
 - (4) The term "destructive device" means -
 - (A) any explosive, incendiary, or poison gas -
 - (i) bomb,
 - (ii) grenade,
 - (iii) rocket having a propellant charge of more than four ounces,
 - (iv) missile having an explosive or incendiary charge of more than one-quarter ounce,
 - (v) mine, or
 - (vi) device similar to any of the devices described in the preceding clauses;
 - (B) any type of weapon (other than a shotgun or a shotgun shell which the Attorney General finds is generally recognized as particularly suitable for sporting purposes) by whatever name known which will, or which may be readily converted to, expel a projectile by the action of an explosive or other propellant, and which has any barrel with a bore of more than one-half inch in diameter; and
 - (C) any combination of parts either designed or intended for use in converting any device into any destructive device described in subparagraph (A) or (B) and from which a destructive device may be readily assembled.

The term "destructive device" shall not include any device which is neither designed nor redesigned for use as a weapon; any device, although originally designed for use as a weapon, which is redesigned for use as a signaling, pyrotechnic, line throwing, safety, or similar device; surplus ordnance sold, loaned, or given by the Secretary of the Army pursuant to the provisions of section 4684(2), 4685, or 4686 of title 10; or any other device which the Attorney General finds is not likely to be used as a weapon, is an antique, or is a rifle which the owner intends to use solely for sporting, recreational or cultural purposes.



- 18 U.S.C. § 178 : US Code - Section 178: Definitions
18 U.S.C. § 178(1)

As used in this chapter -

(1) the term "biological agent" means any microorganism (including, but not limited to, bacteria, viruses, fungi, rickettsiae or protozoa), or infectious substance, or any naturally occurring, bioengineered or synthesized component of any such microorganism or infectious substance, capable of causing -

(A) death, disease, or other biological malfunction in a human, an animal, a plant, or another living organism;

(B) deterioration of food, water, equipment, supplies, or material of any kind; or

(C) deleterious alteration of the environment;

(2) the term "toxin" means the toxic material or product of plants, animals, microorganisms (including, but not limited to, bacteria, viruses, fungi, rickettsiae or protozoa), or infectious substances, or a recombinant or synthesized molecule, whatever their origin and method of production, and includes -(A) any poisonous substance or biological product that may be engineered as a result of biotechnology produced by a living organism; or

(B) any poisonous isomer or biological product, homolog, or derivative of such a substance;

(3) the term "delivery system" means -

(A) any apparatus, equipment, device, or means of delivery specifically designed to deliver or disseminate a biological agent, toxin, or vector; or

(B) any vector;

(4) the term "vector" means a living organism, or molecule, including a recombinant or synthesized molecule, capable of carrying a biological agent or toxin to a host;



18. Homeland Security Presidential Directive 18: Medical Countermeasures against Weapons of Mass Destruction, 2007.

http://www.dhs.gov/xabout/laws/gc_1219175362551.shtm#1 [Accessed May 10, 2011]

- Weapons of Mass Destruction (WMD) -- chemical, biological, radiological, and nuclear agents (CBRN) -- in the possession of hostile states or terrorists represent one of the greatest security challenges facing the United States. An attack utilizing WMD potentially could cause mass casualties, compromise critical infrastructure, adversely affect our economy, and inflict social and psychological damage that could negatively affect the American way of life.
- 7. Nuclear and Radiological Threats
Threats posed by fissile and other radiological material will persist. Our Nation must improve its biodosimetry capabilities and continue to develop medical countermeasures as appropriate to mitigate the health effects of radiation exposure from the following threats:
 - a. Improvised Nuclear Devices: Improvised nuclear devices incorporate radioactive materials designed to result in the formation of a nuclear-yield reaction. Such devices can be wholly fabricated or can be created by modifying a nuclear weapon.
 - b. Radiological Dispersal Devices: Radiological Dispersal Devices (RDDs) are devices, other than a nuclear explosive device, designed to disseminate radioactive material to cause destruction, damage, or injury.
 - c. Intentional Damage or Destruction of a Nuclear Power Plant: Deliberate acts that cause damage to a reactor core and destruction of the containment facility of a nuclear reactor could contaminate a wide geographic area with radioactive material.

19. IAEA, *Security in the Transport of Radioactive Material*, IAEA Nuclear Security Series No. 9, 2008. Vienna, Austria. pg 8.

http://www-ns.iaea.org/security/nuclear_security_series.asp [Accessed May 10, 2011]

- Sabotage is deliberate damage; sabotage in this context means deliberate damage to nuclear material or radioactive material in use, storage or transport or to an associated facility. A deliberate act directed against a nuclear facility or radioactive material in use, storage or transport could directly or indirectly endanger the health and safety of personnel, the public or the environment by exposure to radiation or release of radioactive material...



20. Glasstone, S. and P. Dolan. *The Effects of Nuclear Weapons*, 1977. U.S. Department of Defense and Energy Research and Development Administration.
<http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA087568&Location=U2&doc=GetTRDoc.pdf> [Accessed March 11, 2014]

21. Federal Bureau of Investigation (FBI), *Weapons of Mass Destruction, Frequently Asked Questions* website
http://www.fbi.gov/about-us/investigate/terrorism/wmd/wmd_faqs [Accessed March 25, 2014]

- What are Weapons of Mass Destruction?

Weapons of Mass Destruction (WMD) are defined in US law (18 USC §2332a) as:

“(A) any destructive device as defined in section 921 of this title (i.e. explosive device);

(B) any weapon that is designed or intended to cause death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals, or their precursors;

(C) any weapon involving a biological agent, toxin, or vector (as those terms are defined in section 178 of this title)

(D) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.”

WMD is often referred to by the collection of modalities that make up the set of weapons: chemical, biological, radiological, nuclear, and explosive (CBRNE). These are weapons that have a relatively large-scale impact on people, property, and/or infrastructure.

22. Associated Press (AP), *Scientist plants radioactive material in rival's office*, 2003
<http://www.azcentral.com/news/articles/0929ChinaRadCrime29-ON.html> [Accessed September 29, 2013]

A Chinese nuclear scientist has been given a suspended death sentence for planting radioactive materials in the office of a business rival, sickening the man and 74 other people, official newspapers reported Monday. Nuclear medicine researcher Gu Jiming stashed a case containing pellets of iridium 192 above ceiling panels at a hospital in the southern city of Guangzhou, the Beijing Evening News reported.



23. Ilyin, L. A., V. Yu. Soloviev, A. E. Baranov, A. K. Guskova, N. M. Nadezhina, and I. A. Gusev, *Early medical consequences of radiation incidents in the former URRS territory*, 11th International Congress of IRPA, May 2004.
<http://irpa11.irpa.net/pdfs/7c20.pdf> [Accessed May 1, 2008]
24. U.S. DHS, *HSEEP Exercise Evaluation Guide EEG-Prevention, Search, & Detection*, April 2013.
<https://www.llis.dhs.gov/HSEEP/Documents/eeg-prevention-screening-search-detection>
[Accessed March 26, 2014]

Core Capability: Screening, Search, and Detection

Identify, discover, or locate threats and/or hazards through active and passive surveillance and search procedures. This may include the use of systematic examinations and assessments, sensor technologies, or physical investigation and intelligence.

25. U.S. DHS, *HSEEP Exercise Evaluation Guide EEG-CBRNE Detection*, Version 1.1, 2006.

CBRNE Detection

Capability Description:

The Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Detection capability provides the ability to detect CBRNE materials at points of manufacture, transportation, and use through area monitoring. It does not include the detection of CBRNE materials through their effects (i.e., symptoms) on humans and animals (addressed through the public and animal health capabilities), and does not include actions taken to respond to the consequences of a release or activities to render any CBRNE device safe (Refer to WMD/HAZMAT Response and Decontamination EEG).

The CBRNE Detection target capability is the ability to recognize potential CBRNE threats through equipment, education, and effective protocols, not just technology. The importance of training, communication, and close coordination with intelligence, law enforcement (LE), public safety, public health, and international partners is recognized as a critical enabler for this capability. However, only the CBRNE Detection-specific tasks to these cross-cutting elements have been identified in this capability.

Capability Outcome:

CBRNE materials are rapidly detected and characterized at borders, critical locations, events, and incidents.



26. ANSI/IEEE, American National Standard Performance Criteria for Alarming Personal Radiation Detectors for Homeland Security, ANSI N42.32-2006, January 2007.

This standard describes design and performance criteria along with testing methods for evaluating the performance of instruments for homeland security that are pocket-sized and worn on the body for the purpose of rapid detection of radioactive materials.

These instruments are used for detection of photon-emitting, and optionally neutron-emitting, radioactive substances for the purposes of detection, interdiction, and prevention.

The performance criteria contained in this standard are meant to provide a means for verifying the capability of these instruments to reliably detect significant changes above background levels of radiation and alert the user to these changes.

This standard does not apply to instruments that are primarily intended to provide a measurement of dose equivalent, or dose equivalent rate. However, devices that comply with this standard can provide an approximate value of exposure rate.

27. U.S. DHS, Domestic Nuclear Detection Office (DNDO), *STC PRND Training and Exercise Guide Book* [For Official Use Only], May 2011. [This document is For Official Use Only and is not available on the public internet.]
28. U.S. DHS/DNDO, *Typed Resource Definitions Preventive Radiological/Nuclear Detection (PRND) Resources*, Document Number 400-INT-115300v1.00 [For Official Use Only], June 2011. [This document is For Official Use Only and is not available on the public internet.]
29. U.S. DHS/DNDO, *Radiological Nuclear Detection, Position Training Standards and Qualifications*, DRAFT March 2014.
30. National Fire Protection Association (NFPA), *NFPA Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2013 Edition.
31. ANSI/IEEE, *American National Standard Performance Requirements for Spectroscopic Personal Radiation Detectors (SPRDs) for Homeland Security*, ANSI N42.48-2008.
32. U.S. DHS, *Fiscal Year 2012 DHS Preparedness Grant Programs, Supplemental Resource: Preventive Radiological/Nuclear Detection Guidance* [For Official Use Only], [This document is For Official Use Only and is not available on the public internet.]
33. ANSI/IEEE, *American National Standard Performance Criteria for Mobile and Transportable Radiation Monitors Used for Homeland Security*, ANSI N42.43-2006.



34. U.S. DHS/DNDO, *Performance Specification For Human Portable Radiation Detection System (HPRDS)*, Document Number DNDO-PS-100680v4.00, May 2006.
35. ANSI/IEEE, *American National Standard for Performance Criteria for Alarming Electronic Personal Emergency Radiation Detectors (PERDs) for Exposure Control*, ANSI N42.49A-2011



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National Domestic Preparedness Consortium

The National Domestic Preparedness Consortium (NDPC) is sponsored through the Department of Homeland Security/FEMA National Preparedness Directorate. It is the principle means through which the Directorate identifies, develops, tests, and delivers training to state and local emergency responders.

Since its establishment in 1998, the NDPC's impact on national preparedness has been substantial. The NDPC has conducted training in all 50 states and each U.S. territory. This training has benefited more than 1.9 million people since 1998. Today, the consortium's various programs meet the training and education needs of more than 126,000 emergency responders and state, local, and tribal government employees each year. The consortium applies its expertise in academics, curriculum development, and instructional techniques to produce training programs that address the most urgent needs of the emergency response community.

The mission of the NDPC is to enhance the preparedness of federal, state, local, and tribal emergency responders/first receivers and teams, including non-governmental organizations and the private sector, to reduce the Nation's vulnerability to incidents involving weapons of mass destruction (WMD), terrorism, and all-hazard high-consequence events by developing, delivering, and assessing plans, training, technical assistance, and exercises.

For more information on the NDPC and its members, please contact their websites at:

- National Domestic Preparedness Consortium (NDPC)
www.ndpc.us
- Louisiana State University, National Center for Biomedical Research & Training, Academy of Counter-Terrorist Education (NCBRT)
www.ncbrt.lsu.edu
- New Mexico Tech, Energetic Materials Research and Testing Center (EMRTC)
www.emrtc.nmt.edu
- Texas A&M University, Texas Engineering Extension Service,
National Emergency Response and Rescue Training Center (TEEX/NERRTC)
www.teexweb.tamu.edu/nerrtc
- Association for American Railroads, Transportation Technology Center, Inc. (TTCI), Emergency Response Training Center–Colorado
www.aar.com
- University of Hawai'i at Mānoa, National Disaster Preparedness Training Center
www.manoa.hawaii.edu
- U.S. Department of Energy (DOE), National Nuclear Security Administration,
Nevada Field Office (NNSA/NFO), CTOS-Center for Radiological/Nuclear Training at the Nevada National Security Site (NNSS)
www.ctosnnsa.org
- U.S. Department of Homeland Security, Center for Domestic Preparedness (CDP)
www.cdp.dhs.gov

