EPR-FIRST RESPONDERS 2006

EMERGENCY PREPAREDNESS AND RESPONSE

Manual for First Responders to a Radiological Emergency

JOINTLY SPONSORED BY
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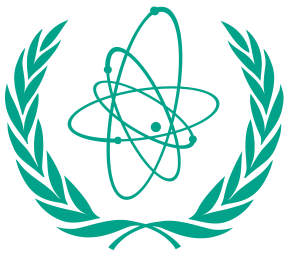
PUBLICATION DATE: OCTOBER 2006



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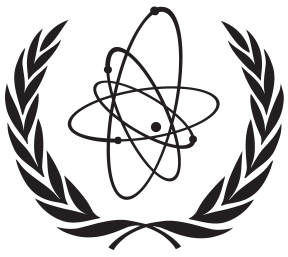

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FOREWORD

Under Article 5.a(ii) of the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention), one function of the IAEA is to collect and disseminate to States Parties and Member States information concerning methodologies, techniques and results of research relating to response to nuclear or radiological emergencies. As stated in IAEA Safety Standards Series No. GS-R-2 "Preparedness and Response for a Nuclear or Radiological Emergency", which establishes the requirements for an adequate level of preparedness for and response to a nuclear or radiological emergency in any State, "…first responders shall take all practicable and appropriate actions to minimize the consequences of a nuclear or radiological emergency…".

The IAEA General Conference, in resolution GC(49)/RES/9, continues to encourage Member States "…to adopt the relevant Agency standards, procedures and practical tools…" and underlines "…the need for first responders to have appropriate training for dealing with ionizing radiation during nuclear and radiological emergencies…".

This publication is intended to assist in meeting these requirements and to fulfil Article 5 of the Assistance Convention.

Its aim is to provide practical guidance for those who will respond during the first few hours to a radiological emergency (referred to here as 'first responders') and for national officials who would support this early response. It provides guidance in the form of action guides, instructions, and supporting data that can be easily applied by a State to build a basic capability to respond to a radiological emergency. This guidance should be adapted to fit the user State's organizational arrangements, language, terminology, concept of operation and capabilities.

This report, published as part of the IAEA Emergency Preparedness and Response Series, replaces and builds on IAEA-TECDOC-1162 in the area of early response and first responders' actions. It takes account of the lessons learned from using IAEA-TECDOC-1162, previous emergencies and research, while ensuring consistency with the IAEA Safety Standards Series No. GS-R-2.

The publication is cosponsored by the Comité technique international de prévention et d'extinction du feu (CTIF), the Pan American Health Organization (PAHO) and the World Health Organization (WHO).

The IAEA officers responsible for this publication were E. Buglova and T. McKenna of the Department of Nuclear Safety and Security.

EDITORIAL NOTE

The use of particular designations of countries or territories does not imply any judgement by the publisher, the IAEA, as to the legal status of such countries or territories, of their authorities and institutions or of the delimitation of their boundaries.

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1. INTRODUCTION

1.1. BACKGROUND

Radiological emergencies[1] are those emergencies involving radioactive material that can occur anywhere and include [1]:

- Uncontrolled (abandoned, lost, stolen or found) dangerous sources[2];
- Misuse of dangerous industrial and medical sources (e.g. those used in radiography);
- Public exposures and contamination from unknown origins;
- Serious overexposures[3];
- Malicious threats/acts; and
- Transport emergencies.

Experience shows that local emergency services (e.g. local medical, law enforcement, and fire brigades) will have the most important role in the early response to a radiological emergency. Within hours, national officials may also have an important role to play in supporting the response at the local level.

1.2. OBJECTIVE

The objective of this publication is to provide practical guidance for those responding within the first few hours of a radiological emergency. This includes the emergency service personnel who would initially respond at the local level and the national officials who would support this early response.

1.3. SCOPE

This publication provides guidance to the emergency services responding to radiological emergencies. It does not address the response to emergencies involving facilities or operations for which specific emergency arrangements should have been developed and be in place, as required by the Safety Requirements No. GS-R-2 [1]. Guidance on response to radiological emergencies not covered in this publication can be found in Appendix 7 of Reference [2]. This publication also does not apply to other types of hazardous materials such as chemicals or biohazards.

This publication is consistent with the Safety Requirements No. GS-R-2 [1] and the concepts contained in Reference [2]. It builds on and replaces guidance in IAEA-TECDOC-1162 [3] in the areas of early response and first responders' actions.

1.4. STRUCTURE

Section 2 covers the basic concepts and terms that must be understood to effectively use this publication and Section 3 describes how to apply the guidance. The remainder of the publication, Sections A, B and C, is in a form that can be easily converted into guidance for use by first responders. Section A contains action guides for the incident commander (IC) and the overall direction of the first response, while Section B contains action guides for specific responders and teams that will respond within a short time under the direction of the IC. The

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1 Referred to as threat category IV in the Safety Requirements No. GS-R-2 (Ref [1]).

2 Radioactive material that could, if not under control, give rise to exposure sufficient to cause severe deterministic health effects (e.g. can be handled by a member of the public who is unaware of the hazard).

3 Overexposure that can result in severe deterministic health effects.

action guides in Sections A and B serve as a basis for training. Section C contains instructions on how to perform various tasks called for in the action guides. Section D provides cards that summarize, in bullet form, the action guides in Sections A and B. These cards are intended to be used in the field by emergency services personnel during an actual response. Appendix I contains a registry form for persons involved in a radiological emergency. Appendix II contains sample media and public statements for different radiological emergencies. Appendix III describes those emergency preparedness arrangements that need to be in place to use this guidance effectively. Appendix IV contains answers to some of the frequently asked questions in case of a radiological emergency. Annex I provides a brief description of the basis for the radiological criteria used in this publication.

2. BASICS

2.1. THE RADIOLOGICAL EMERGENCY

The responses to radiological and chemical emergencies are very similar. In both cases, our senses (e.g. smell or sight) may not be able to detect hazardous levels of the material. Therefore, the initial response is often carried out based on secondary indications of the hazards such as labels, signs or placards indicating the presence of a hazardous material, the appearance of medical symptoms in exposed individuals or readings from specialized instruments.

In both radiological and chemical emergencies, the major goals of the response are:

- To protect the public; and
- To protect emergency personnel during response.

However, there are the following differences:

- Responders generally have no experience with radiation emergencies as they are very rare;
- Even very low levels of radiation, that pose no significant risk, can be detected rapidly with simple, commonly available instruments;
- Radioactive materials can cause radiation exposure even when persons are not in contact with them;
- The health effects resulting from radiation exposure may not appear for days, weeks or even years[4]; and
- The public, media and responders often have an exaggerated fear of radiation.

With both chemical and radiological emergencies, first responders at the initial stage of response are the same (local officials and emergency services personnel typically carry it out). Furthermore, the basic actions of first responders to radiological emergencies should not differ, in general, from those taken in response to emergencies involving other hazardous materials.

2.2. THE HAZARD

In this publication, any item, material or device that can cause radiation exposure is called a source; radioactive material in the form of smoke, dust or liquids is called contamination and if such material gets on a surface, object or person, they become contaminated. A source is referred to as

[4] Chemicals may also cause delayed effects, such as cancer induction, although the immediate health effects are often the main concern.

'dangerous' if it could, being not under control, give rise to exposure sufficient to cause severe deterministic health effects[5] [1].

Radiological emergencies can result in severe deterministic health effects. However, it must be realized that hazards other than radiation (e.g., fires, explosives) may represent a much greater health risk.

Although radiation exposure can also lead to cancer induction in the long term, it is very unlikely that a radiological emergency will result in any detectable increase in the incidence rate of cancer among the public or responders. It is therefore severe deterministic health effects, where the injury and damage are an inevitable consequence of the exposure, that are of major importance for first responders.

Radioactive materials present two hazards: external and internal. Some types of radioactive materials (e.g. gamma emitters) give off radiation that can be hazardous external to the body. Thus the hazard arises through what is called external exposure. In this case, the longer time spent near and the closer a person is to the source, the greater is the hazard. Picking up a dangerous source is particularly hazardous. Analysis of past emergencies showed that severe deterministic health effects have resulted from holding or carrying (e.g. in a pocket) a dangerous source for just a few minutes. Therefore efforts must be taken to prevent handling of possibly radioactive material (e.g. fragments from an explosion). However, limited stays (of a few minutes) near a very dangerous source[6], for example for life saving purposes, should not result in severe deterministic health effects. Another possibility is that contamination could get on the skin and cause severe skin burns. This is probably only possible by contact with radioactive materials leaking or spilled from a container. As discussed below, contaminated skin can also contribute to a hazard of internal contamination due to inadvertent ingestion.

Radioactive material can also be hazardous if it gets into a person's body, via inhalation, ingestion or through open wounds. This is called internal contamination. Inhalation of radioactive material within about 100 metres of a fire or an explosion involving a very large dangerous source could potentially cause severe deterministic health effects. However, this is probably only possible if the person does not have respiratory protection and stands in the smoke for most of the release duration. Inadvertent ingestion of contamination (e.g. resulting from eating with contaminated hands) could also cause severe deterministic health effects. However this is probably only possible if the person is in direct contact with material that is spilled or leaked from a source.

A fire, explosion or human activities involving a very large dangerous source may result in levels of ground contamination that may warrant, in accordance with the Safety Requirements No. GS-R-2 [1], relocation of the population or clean up due to the possible health effects of long exposure (e.g. years). However, remaining in contaminated areas with levels equal to these international standards for even up to several months will not result in any severe deterministic health effects even in the most sensitive members of the public (e.g. pregnant women).

Another concern may be contaminated water supply. It is probably impossible to contaminate a public water supply to a level that can cause severe deterministic health effects. However, it may be possible to contaminate water supplies to levels above the international standards [1] at which it is recommended that replacement water should be provided. However, these international standards are set at levels well below those that can cause severe deterministic health effects even if the water is consumed for a year. Water contaminated at levels many times higher than these international standards could be consumed for months without causing severe deterministic health effects, even in the most sensitive members of the public.

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[5] Deterministic health effects that are fatal or life threatening or result in a permanent injury (e.g. severe burns) that reduces quality of life [1].

[6] Assumed an unshielded 100 TBq (3000 Ci) Cs-137 source.

Contaminated waste from response actions such as the water used for decontamination should not represent a health hazard. But in order to reduce later clean up costs as well as anxiety among the public, reasonable efforts should be taken to minimize the spread of contamination. However, these efforts should not be allowed to delay other response actions.

All serious nuclear and radiological emergencies have resulted in the public taking some actions that were inappropriate[7] or unwarranted, and resulted in significant adverse psychological and economic effects. These have been the most severe adverse consequence of many radiological emergencies. These effects have occurred even at emergencies with few or no radiological consequences and resulted primarily because the public was not provided with understandable and consistent information from official sources. The public needs a plain language explanation of the hazards and associated risks and protective actions to be taken to reduce the risks, to ensure public safety and to protect the public's interests. It is important to realize that this applies to any event perceived as a serious emergency by the public or the media.

2.3. PROTECTION OF RESPONDERS AND THE PUBLIC

Even without radiation detection equipment, response personnel and the public can protect themselves in the event of a radiological emergency by adhering to the protection guidelines in Instructions 2 and 3 in Section C. The guidelines are built on the following basic principles[8]:

- Avoid touching suspected radioactive items;
- Perform only life saving and other critical tasks near a potentially dangerous radioactive source;
- Avoid the smoke or use available respiratory protection equipment (for response personnel) within 100 metres of a fire or explosion involving a potentially dangerous radioactive source;
- Keep the hands away from the mouth and do not smoke, eat or drink until your hands and face are washed (to avoid inadvertent ingestion);
- Change clothes and shower as soon as possible.

The possible presence of radioactive material should not prevent emergency services personnel from immediately performing life saving and other critical actions. There will be no or little risk to response personnel provided they take the precautions as outlined in Instruction 2, "Personnel protection guidelines".

Those who may have been significantly contaminated or exposed (e.g. those within the inner cordoned area, as described in Section 2.5.3) should be monitored for radioactive contamination. If monitoring cannot be performed immediately, they should shower and change their clothing as soon as possible.

Medical evaluation of those potentially exposed and/or contaminated may be necessary in order to determine their subsequent medical management. Therefore those who are involved in radiological emergency should be registered.

Clear public instructions/information should be provided in order that the recommended actions are taken efficiently, undue concerns are allayed and psychological and economic consequences are minimized. In addition, the public and responders should be reminded that advices from unofficial sources may be wrong or misleading. They should act only based on information from official sources.

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[7] Inappropriate actions include, for example, discrimination of potentially exposed persons, spontaneous evacuation, refusal to buy products from the State or region and unwarranted termination of pregnancy.

[8] However a radiological assessor should conduct an assessment of radiological conditions as soon as possible.

It is important to remember that instruments of the type normally used by emergency services that measure gamma dose rate, including radiation pagers, cannot detect hazardous levels of all forms of radioactive materials. Only a trained and properly equipped radiological assessor can perform a complete assessment of the radiological hazards. Therefore, the personnel protection guidelines and public protection guidelines (Instructions 2 and 3 respectively) should always be followed until a radiological assessor evaluates the hazard and provides specific recommendations.

2.4. IMPORTANT LESSONS LEARNED FROM FIRST RESPONSE TO PAST EMERGENCIES

An analysis of previous emergency responses has shown that the following lessons need to be kept in mind when developing arrangements for effective first response.

(1) Clear allocation of tasks and responsibilities:

- Failure to have a single person clearly assigned to direct the entire response and failure to clearly assign other responsibilities have contributed to an ineffective first response and resulted in avoidable health, economic and psychological effects.
- National officials have not been effective in directing the first response. Only local officials should direct the first response with support from the national authorities if required.
- The arrival of un-requested resources and volunteers can interfere with the response if not planned for.
- Only a radiological assessor can fully assess the radiological conditions[9].

(2) Keeping the public informed:

- Failure to have a single source of all official information and failure to address public and media concerns promptly in a coordinated, understandable and consistent manner have contributed to major economic and psychological consequences and the public taking unwarranted actions which did more harm than good[10].
- Media interest, including reporters arriving at the scene within hours, was not efficiently dealt with. Immense media interest should be expected.
- Uninformed people, acting as experts (e.g. local medical practitioners, school science teachers, etc.), may give wrong and misleading information resulting in people taking unwarranted actions.
- Lost or stolen dangerous radioactive items have been found and recovered following public announcements describing the items and the associated hazard.

(3) Managing the medical response:

- Medical specialists have refused to treat potentially contaminated victims because they were not properly informed about the risks and personal protection.
- People who were not exposed, contaminated or injured, but have concerns about their health (worried-well) have gone to the local hospitals on their own, thus interfering with the ability of the hospitals to treat those who were injured (especially if those injured arrived later).

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[9] Even without the results of radiological assessment, a person who follows the basic guidance presented in Instructions 2 and 3 will be adequately protected for virtually all radiological emergencies.

[10] A single location, through which all response organizations provide information, is the best solution for providing coordinated and consistent information to the public and media.

- Thousands of people (about 10% of the local population) have asked to be monitored once the media announced that there had been a radiological emergency in a public place [4].
- Medical professionals (local doctors) are often the first to discover a radiological emergency when they recognize symptoms indicating the possibility of radiation exposure in their patients.

(4) Managing the law enforcement/forensic evidence:

- Terrorists or criminal suspects could be among the public and could be a threat to those conducting treatment or monitoring.
- There is the potential of losing important intelligence and information if all items found and/or recovered from the scene are not treated as evidence.
- Evacuation points, staging areas, etc. have been identified in the past by terrorists or criminal groups as the ideal location for booby traps or secondary devices.
- Valuable forensic evidence has been lost or destroyed because responders were unaware that many of their actions (e.g. not tagging and retaining contaminated items or conducting decontamination) can destroy evidence.

(5) Communicating during an emergency:

- Local telephone systems (to include mobile/cell phone systems) have failed during emergencies due to overloading once the public became aware of the emergency.
- Mobile phones may be jammed at the scene for security reasons.

2.5. GENERAL CONCEPTS

The action guides in Sections A and B were developed for specific emergency arrangements based on specific emergency organizations, facilities and concept of operations as summarized below.

It is assumed that the organizational structure will be similar to the incident command system (ICS) described in Appendix 13 of Reference [2]. The most important characteristic of the ICS is that there should be a single incident commander (IC), possibly supported by a command group, responsible for directing the response of all the organizations responding to the emergency. The senior member of the initial response would be the initial IC. During the early stages of a radiological emergency, this would typically be the fire brigade chief or lead local law enforcement officer. The IC may change during the response to emergencies involving several jurisdictions or national interest. For these emergencies, the position of IC may pass from the initial IC of the first responders to a qualified local official or a national official and may be supported by a command group composed of representatives of the local and national organizations. Another basic concept of the ICS is that the same basic organization elements and response facility or location names are used for all emergencies thus promoting rapid integration of response assets as they arrive.

2.5.1. Concept of operations

The objectives of the first response are:

- To promptly perform all reasonable actions to protect the public in order to minimize the radiological and non-radiological (e.g. psychological) health effects;
- To protect emergency personnel during response operations;
- To gather and protect information that can be useful in managing health effects, for law enforcement purposes and in preventing similar emergencies in the future;
- To establish and maintain public trust in the response;
- To provide a basis for an extended response.

The concept of operations described here is for the response to a radiological emergency involving potential public exposure.

The concept of operations is based on the following principles:

- Local officials are responsible for the first response;
- The IC may request and receive support (that has been pre-planned) from national level (national teams); and
- National officials are responsible for national response, support to local response and for requesting international assistance if required.

The first response will be usually triggered by a report of a potential radiological emergency or receipt of a threat to use radioactive material for malicious purposes. Such reports or threats will be received by or referred to a local emergency dispatch centre (the response initiator). This centre will request assistance in assessing threats from the national emergency operations centre (EOC), and will immediately dispatch local emergency services personnel to the scene of the potential emergency[11]. Typically, as shown in Figure 1, this includes law enforcement, fire brigade and emergency medical services (ambulance and first aid). We may assume that the first responders have neither experience nor equipment to access radiological hazards. Consequently, first responders must always protect themselves and the public by following the personnel and public protection guidelines contained in this publication (Instructions 2 and 3 in Section C). They have to assume that a potential radiological hazard is present until a radiological assessor performs an assessment and confirms or rejects that assumption.

The senior member of emergency services to arrive at the scene will assume the role of IC and will follow the action guides in Section A to direct the entire response. As soon as possible, the IC will direct the response from the incident command post (ICP) that is located at a safe and secure location near the emergency scene. In a complex response, or for events with several areas of operations, the IC may appoint an on-scene controller to manage the operational response at the scene or at each area of operations. As soon as the IC realizes that the response requires additional resources, the IC will request additional local resources to expand the response as shown in Figure 2. These additional local resources will respond under the direction of the IC and follow the action guides in Section B. The IC will request the national EOC to provide advice on the response to the radiological hazard and to provide a radiological assessor/team. National support is assumed to arrive within a day.

In case of malicious acts, security will be provided at all public areas where responders interact with public, such as first aid or public monitoring/decontamination areas. Actions will be taken to preserve potential evidence.

If appropriate, a public announcement will be promptly made instructing the public on the actions to take. The local hospital will be informed to expect people wanting to be treated to arrive on their own and, therefore, will be instructed to establish the appropriate controls and arrangements.

We may assume that the emergency will receive intense media attention with the media reporting live nationally and locally within hours after the start of the emergency. Therefore, the IC will promptly identify a local public information officer who will coordinate with national and local officials to ensure the public receives useful, understandable and consistent information from a single local source. For an emergency with significant media interest, a public information centre (PIC) will be established as soon as possible in the vicinity of the emergency site from which all local and national information will be provided in a coordinated manner. National officials will address national issues in full coordination with local officials.

[11] The national EOC may also request international assistance through the IAEA.

Finally, the national officials directing the national response will co-locate with the IC as soon as possible at the ICP as part of a command group.

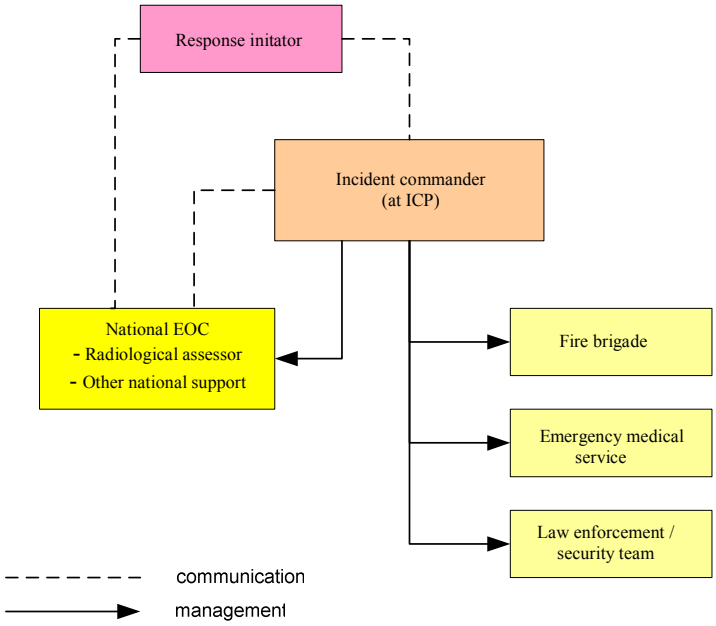
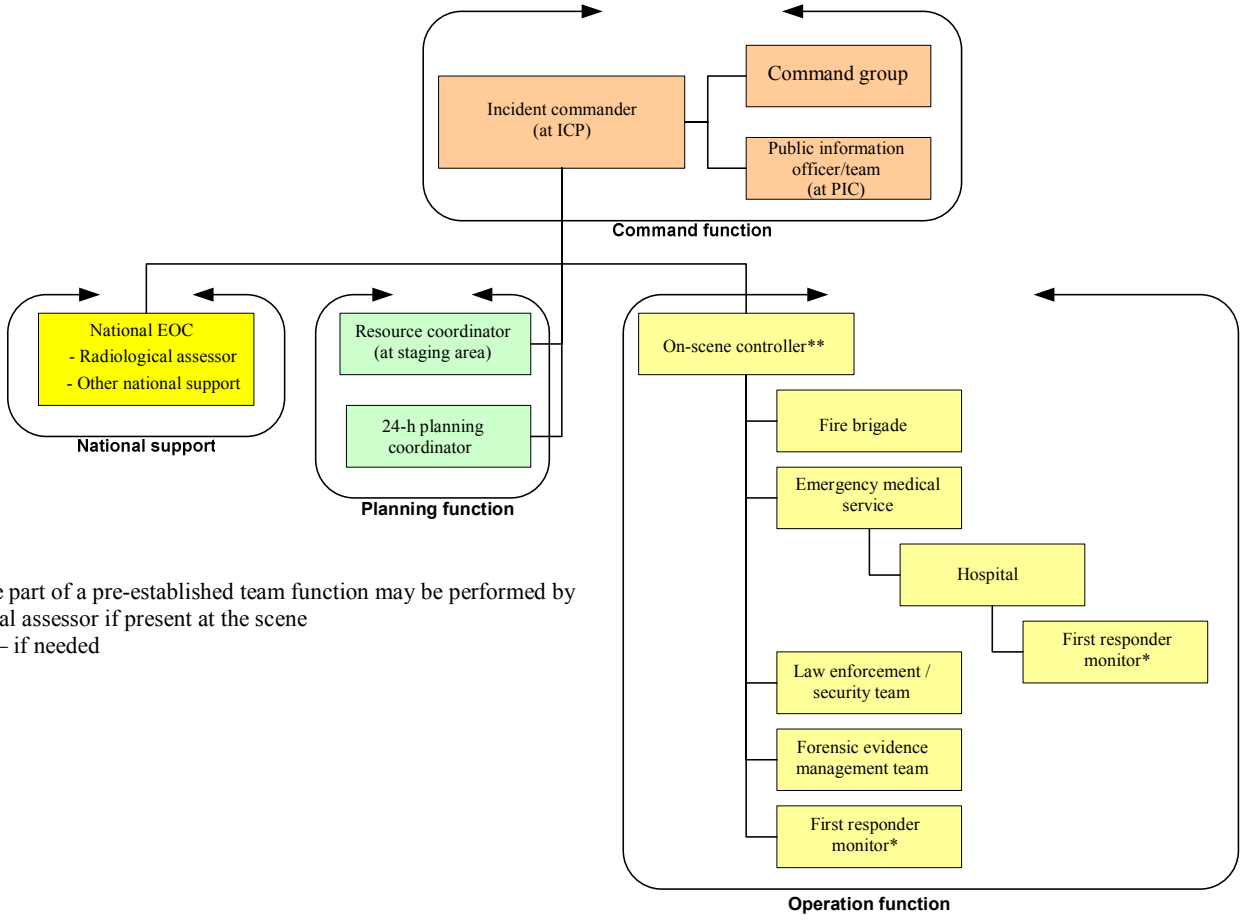


FIG. 1. Initial response organization.



* May not be part of a pre-established team function may be performed by Radiological assessor if present at the scene

** Optional — if needed

FIG. 2. Response organization at the local level within a few hours.

2.5.2. Response organization

The local response may include the following, as shown in Figures 1 and 2.

A **response initiator**[12] is responsible for receiving the initial notification of a potential radiological emergency, getting basic information about the emergency, providing initial advice to the caller, notifying and dispatching the local emergency services to the scene and having the threat assessed. This function is operational 24 hours per day 7 days per week. The response initiator might be the "on-call" dispatcher/communicator of emergency services, such as law enforcement or fire brigade.

A **command function** is set up for directing the entire response. A unified command structure is used and may include a command group. The IC commands the entire response and directs the command group. The IC may delegate authority for performing certain activities to others as required: e.g. to on-scene controller, the public information officer/team, etc., as specified below. The IC and command group normally operate at the incident command post (ICP). The command function could include:

- An **incident commander (IC),** who is in charge of the emergency response.
- A **command group,** who supports the IC. The command group may consist of local and national governmental representatives (or liaisons) responsible for conventional response functions as well as those responsible for the radiological response functions.
- A **public information officer (PIO)/team,** who is responsible for keeping the media and public informed and for coordinating with all sources of official information to ensure a consistent message is being provided to the public[13].

A **national emergency operations centre (EOC)** is the national level centre that is ready to receive requests for assistance from the local level. This is the centre to be contacted to request the radiological assessor; to provide advice on the response from the radiological assessor and through which local and national media releases will be coordinated until the PIC is established. The EOC coordinates the national level support provided to the local response.

A **planning function** is set up for planning, obtaining and coordinating the resources. The planning function may include:

- A **resource coordinator** who is responsible for: establishing the staging area; determining what resources are necessary; requesting the needed assistance and integrating assistance (including un-requested assistance) into the response when it arrives.
- A **24-hour planning coordinator** who is responsible for developing incident action plans. These plans define response activities and allocation of resources for the next 12 to 24 hours, for the remainder of the emergency phase and finally for the long-term recovery[14].

An **operations function** is set up for implementing the incident action plans (response activities). For a small emergency the IC may direct operations; however, for a major emergency coordination of operations may require the assignment of an on-scene controller. The operations functions may include:

- An **on-scene controller(s),** who is responsible for the operational management of response actions at the scene of an emergency as directed by the IC. The on-scene controller reports to the IC and is normally the senior member of the on-scene response teams.
- The **fire brigade** is typically responsible for: establishing the inner cordoned area; performing search and rescue operations, triage and first aid (until relieved by emergency

[12] This publication does not provide guidance for the response initiator.

[13] For a major emergency they would establish and run the PIC to ensure that local and national media releases are coordinated.

[14] Note that planning for the long term and recovery phases begins very early in the event.

medical service); dealing with conventional hazards (e.g. fires, hazardous materials); responder accountability; public processing, registration, monitoring and decontamination, and responder monitoring and decontamination.

- The **emergency medical service** (EMS) is responsible for providing the on-site medical response; advising medical transport and the local receiving hospital on the risks and appropriate protective actions to take; and establishing a temporary morgue area.
- A **law-enforcement/security team** is typically responsible for establishing the security perimeter and providing security for areas outside the security perimeter to include: ICP, hospital, staging area and PIC. This team is responsible for providing security at: public registration, triage/first aid and monitoring/decontamination areas. The team is responsible for managing evidence until relieved by the forensics evidence management team.
- A **forensic evidence management team** (FEMT) is responsible for gathering, examining and controlling evidence; dissemination of information and intelligence recovered from the scene through the IC; and formulation of a strategy of priorities in relation to the investigation of the scene.
- A **first responder monitor** is a person equipped and trained to use basic radiation monitoring instruments but is not a qualified radiological assessor. He/she will only perform simple assessment tasks. In most cases the first responder monitor will not be available immediately and must be requested from a nearby user of radioactive material (e.g. hospital, university, research reactor).
- A **radiological assessor/team**[15]**,** in most cases, will not be available for at least several hours. The radiological assessor/team is trained, equipped and qualified to assess alpha, beta, neutron and gamma emitting material, perform radiation surveys, perform dose assessments, control contamination, ensure radiation protection of emergency workers and formulate recommendations on protective actions. Upon arrival, they provide radiation protection support.

Other functions such as logistics and finance/administration may be needed as described in Reference [2].

2.5.3. Initial assessment and establishing of response areas and facilities

After arrival on the scene of a radiological emergency, first responders should perform an initial assessment of the situation and radiological hazard (see Instruction 1 which outlines this process). Based on this assessment, the first responders should establish a safety perimeter, which is the boundary of the inner cordoned area, and a security perimeter, which is the boundary of the outer cordoned area as shown in Figure 3 [2]. The inner cordoned area is the area around a dangerous radioactive source where precautions should be taken to protect the responders and the public from potential external exposure and contamination.

The outer cordoned area is the area around the inner cordoned area that is secured.

Table 1 provides suggestions for the approximate sizes and locations of the inner cordoned area[16] (within the safety perimeter in Figure 3) for various radiological emergencies [5]. These sizes are based on an examination of emergencies involving the largest amounts of radioactive material that could be encountered and on international guidance for transport [6].

The determination of size for inner cordoned area is based initially on information that can be directly observed (e.g. markings). The size may be expanded based on ambient dose equivalent

[15] This publication does not address the response functions of the radiological assessor/team.

[16] The public located within the inner cordoned area should be instructed to follow the guidelines in Instruction 3, "Public protection guidelines".

rate[17] readings when these data become available. However, since dose rate can not assess all exposure pathways, it should only be used as a basis for expanding the area, not for shrinking the size of the inner cordoned area. Only a radiological assessor can assess the entire radiological hazard and adjust the boundaries of the inner cordoned area accordingly.

TABLE 1. SUGGESTED RADIUS OF INNER CORDONED AREA (SAFETY PERIMETER) FOR A RADIOLOGICAL EMERGENCY

Situation	Initial inner cordoned area (safety perimeter)
Initial determination - outside	
Unshielded or damaged potentially dangerous source[18]	30 m around[19]
Major spill from a potentially dangerous source	100 m around[19]
Fire, explosion or fumes involving a potentially dangerous source	300 m radius [19]
Suspected bomb (potential RDD), exploded or unexploded	400 m radius or more to protect against an explosion[20]
Initial determination - inside a building	
Damage, loss of shielding or spill involving a potentially dangerous source	Affected and adjacent areas (including floors above and below)
Fire or other event involving a potentially dangerous source that can spread materials throughout the building (e.g. through the ventilation system)	Entire building and appropriate outside distance as indicated above
Expansion based on radiological monitoring[21]	
Ambient dose rate of 100 μSv/h[22]	Wherever these levels are measured

The actual boundaries of the safety and security perimeters should be defined in the way that they are easily recognizable (e.g. roads) and secured. However, the safety perimeter should be established at least as far from the source as indicated in Table 1, until the radiological assessor has assessed the situation.

The first responders should also establish, as appropriate, facilities and areas described in Table 2 and shown in Figure 3.

17 Terms dose rate and ambient dose rate will be used in this publication to mean the ambient dose equivalent rate.

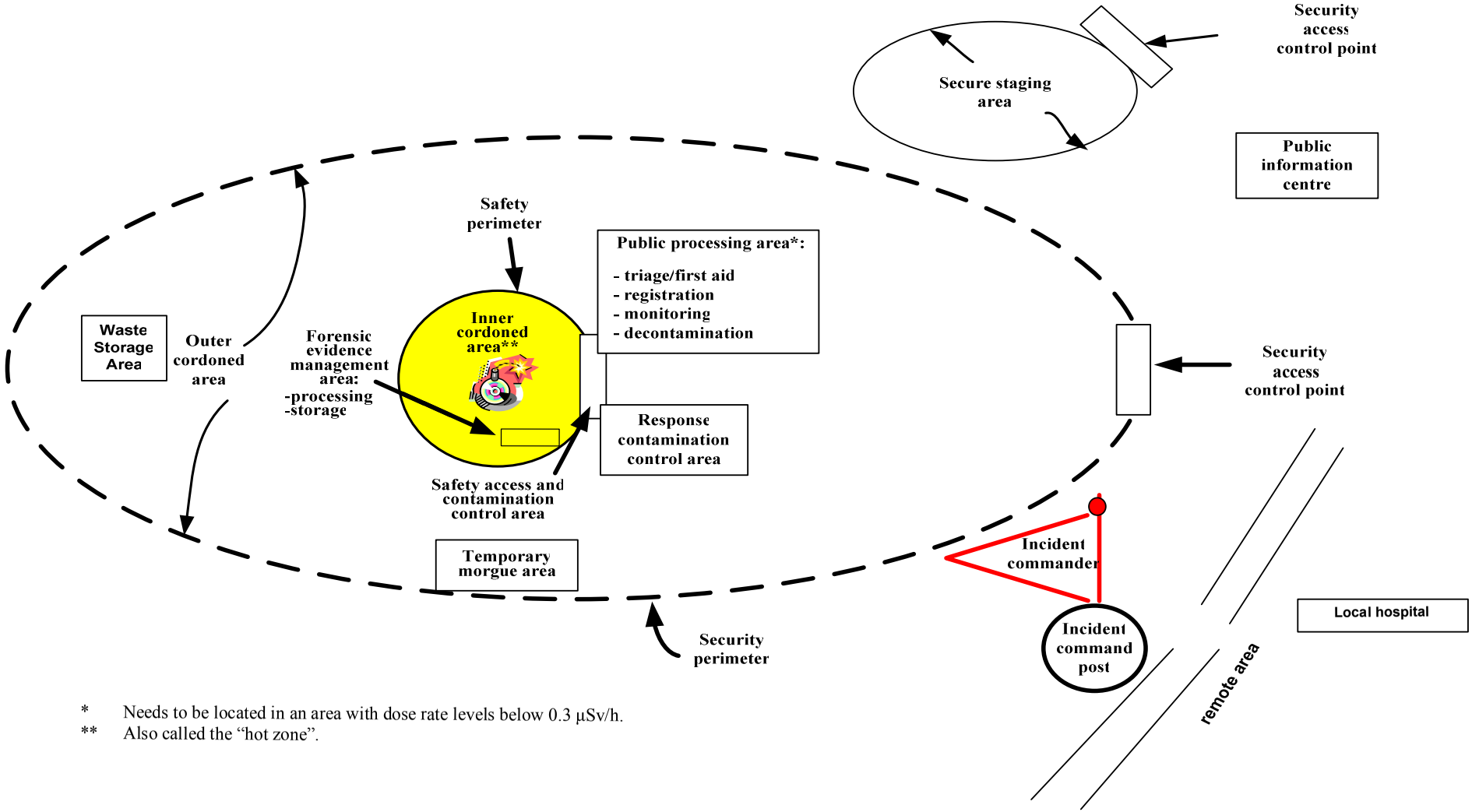
18 See Instruction 1 for guidance on identifying potentially dangerous sources.

19 Provides protection from external exposure from very large source (e.g. 100 TBq Cs-137), which could result in severe deterministic health effects. Recommended radius is consistent with Reference [6].

20 To provide protection from bomb fragments (to include radioactive fragments).

21 Dose rate can not assess all exposure pathways and should only be used as a basis for expanding the area, not for shrinking the size of the inner cordoned area. Only a radiological assessor can assess the entire radiological hazard. Only a radiological assessor can reduce the size of the area based on radiological conditions.

22 The ambient dose rate is measured at 1 m above ground level or from an object.



* Needs to be located in an area with dose rate levels below 0.3 µSv/h.
** Also called the "hot zone".

FIG. 3. Generic layout of the response facilities and locations within areas established for a radiological emergency[23].

[23] The figure represents the generic layout; the specific layout in an emergency will depend on the character and extent of the particular emergency situation.

TABLE 2. DESCRIPTIONS OF RECOMMENDED EMERGENCY FACILITIES AND AREAS ESTABLISHED FOR A RADIOLOGICAL EMERGENCY

Facility/ location	Description/Functions	Characteristics
Incident command post (ICP)	Location of the IC and other members of the unified command and support staff.	An area that is secure, safe and convenient for directing operations.
Forensic evidence management area	Location consisting of the forensic evidence processing centre (location for the supervised processing, recording, examination and photography of items and evidence recovered from the scene) and forensic evidence storage area (location for the secure storage of evidence recovered from the scene and for maintenance of the continuity and integrity of evidence).	Located in the inner cordoned area adjacent to the safety access and contamination control area.
Public information centre (PIC)	Location for the coordination of all official information released to the media concerning the emergency.	Located in a secure area in the vicinity of the emergency scene near the ICP with space and infrastructure to support the media briefings.
Public processing area	Location consisting of the triage/first aid area, registration area, public monitoring / decontamination area. At this location the following tasks are performed: - processing and registering the public evacuated from the inner cordoned area; - medical triage, first aid and preparation of victims for transport; and - monitoring and decontamination of the public evacuated from the inner cordoned area.	Located within the outer cordoned area with access for medical transport. Ambient dose rates in the area need to be at levels close to background levels.
Local hospital	Hospital to provide the first treatment to exposed and/or contaminated people.	Located close to the scene of an emergency and that has been contacted to prepare to receive exposed and/or contaminated victims.
Response contamination control area	Location for the control of contamination from response personnel entering and leaving the inner cordoned area.	Located at the boundary of the inner cordoned area and away from the public processing area.
Staging area	Location used to collect and organize additional resources as they arrive in the vicinity of the emergency.	Located where it will not interfere with other ongoing response actions and has been searched and secured.
Temporary morgue area	Location for the dignified storage of deceased victims whose bodies may be contaminated or have not been released by the FEMT.	May be located in a tent or existing facility that is secured within the outer cordoned area away from the view of the general public.
Waste storage area	Location where potentially contaminated items (e.g. clothing) are stored.	Located within the outer cordoned area that is secured and preferably in a structure to prevent the spread of contamination (e.g. by wind or rain).

3. USE OF GUIDANCE

In order to respond to an emergency and to apply the action guides and instructions provided in this publication, a minimum capability to respond must be in place. This capability does not need to be optimal. In the interest of quickly developing this minimum capability, currently available means and resources should be used with only minimal additional arrangements (e.g. training).

Appendix III lists the minimum arrangements that must be in place to apply the guidance in this manual[24].

The material in this guidance should be integrated with the national and local arrangements in the State in which it will be used. This would include translating the material into the local language and revising it to be consistent with local terminology, response organizations and concepts of operation. Once the State specific material is completed, training should be performed and the response tested during drills and exercises.

The exact application of each action guide in Sections A and B will depend on the specific details of each emergency. The sequence of steps in the action guides and instructions may need to be adapted at the time of the response. The action guides in Sections A and B serve as a reference in the field and as a basis for training. Section D provides cards[25] that summarize, in bullet form, the specific action guides in Sections A and B. Cards similar to these should be developed for emergency services personnel to be used as reminders during an actual response in the field. The recommended use of the guidance is presented in Figure. 4.

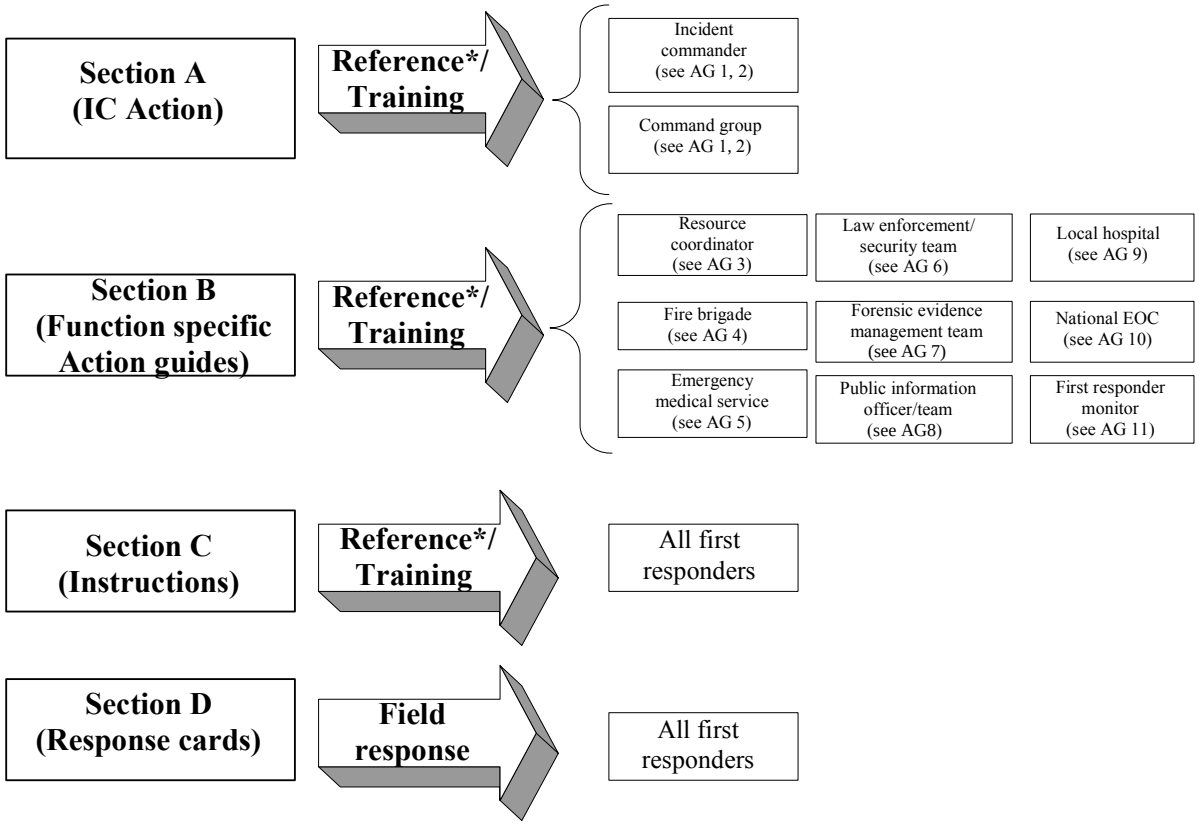


FIG. 4. Recommended use of guidance.

This publication does not address emergencies involving biological or chemical agents. However, an emergency may involve these hazards and first responders (including the local hospital) may not be able to determine if the emergency involves radiological, chemical or biological hazards/contamination. Consequently, procedures contained in this publication should be incorporated into the procedures that address all these hazards or at least should be revised to ensure that they are consistent with the procedures used for these other hazards.

[24] Reference [2] provides a complete description of the total process of developing an emergency response capability that meets international requirements.

[25] Cards are prepared in the format 60 mm × 90 mm ready for reproduction and use in the field.

SECTION A
ACTION GUIDES FOR INCIDENT COMMANDER

AG.1. GENERAL ON-SCENE RESPONSE TO A RADIOLOGICAL EMERGENCY

When to apply the Action Guide:

In case of potential or actual significant public external exposure or radioactive contamination.

ACTIONS (as appropriate and practical)

Incident commander:

- ❑ Being the senior first responder, assume the role of the IC until relieved.

Protect self/assess (size up) the situation

- ❑ Observe from a distance (at least 30 metres) and look for:
  - Possible radiological hazard in accordance with Instruction 1 and other possible hazards.
  - People at risk.
  - Security concerns, such as: armed individuals, explosives; and
  - Transport dangerous goods placard(s)/label(s)/markings or UN number (see Instruction 1, Table 3).
- ❑ Assess the situation. Determine the inner cordoned area. Reposition personnel, vehicles and equipment accordingly (see Instruction 1 and Figure 3).
- ❑ Respond following the personnel protection guidelines in Instruction 2.
- ❑ For criminal/terrorist activity, assume that perpetrators are among the public and avoid the use of mobile phones and radio communications until the area is cleared of explosives, secondary devices and booby traps.
- ❑ Maintain the records of your decisions.

Save lives and prevent escalation

NOTE

Do not delay life saving actions because of the presence of radioactive materials.

Ensure implementation of the following:

- ❑ Rescue people in life threatening situations.
- ❑ Establish and mark the safety perimeter (inner cordoned area boundary) in accordance with Instruction 1. Within this area:
  - Keep account of personnel.
  - Limit entry to response personnel only.
  - Follow personnel protection guidelines (Instruction 2).
  - Continue life saving actions, searching for and rescuing the injured.
  - Evacuate the public.
  - Assume that people from the area are contaminated.
  - Deal with serious conventional hazards (e.g. fire).
- ❑ Take actions to protect the public in accordance with Instruction 3.
- ❑ Establish an ICP and a staging area outside the inner cordoned areas.
- ❑ Conduct interviews to locate suspected radioactive devices and to identify possibly exposed individuals.

- ❑ For a transport emergency obtain the shipping papers from the driver or shipper and determine the UN number and description of the dangerous goods.
- ❑ Request, through the national EOC, a radiological assessor/team and obtain advice by phone.
- ❑ Obtain from a user of radioactive material (e.g. hospital, university, research reactor) a person equipped and experienced to perform tasks of first responder monitor (see AG.11).
- ❑ Perform triage and provide first aid outside the safety perimeter (see Instruction 9).
- ❑ Transport the injured and inform the receiving hospital of potential contamination and the need to follow AG. 9 and personnel protection guidelines.
- ❑ Register and monitor (if possible) people from within the inner cordoned area or who may be exposed in accordance with Instructions 4 and 5.
- ❑ Have first responder monitor support operations in accordance with AG. 11.
- ❑ Have the first responder monitor or radiological assessor/team screen public groups and locations, e.g. hospitals, to ensure that any sources with ambient dose rates above 100 μSv/h at 1 metre are isolated.
- ❑ Establish a security perimeter (outer cordoned area boundary).
- ❑ Establish response areas and facilities as appropriate (see Figure 3).
- ❑ Until proven otherwise, treat the scene as a crime scene.
- ❑ Inform all appropriate authorities of the situation and of the name of the IC.
- ❑ For a security event:
  - Provide security where there is interaction with the public at the scene and at the hospital.
  - Search for weapons before registration, transport and decontamination.
- ❑ Inform the local hospital of the potential for receiving contaminated self-presenters and worried-well and advise them to implement controls.
- ❑ Interview people who may have information useful to a criminal or safety investigation.
- ❑ Control contamination at the inner cordoned area boundary in accordance with Instructions 5, 6, 7 and 8.
- ❑ For possible contamination of public food, water, or transport (e.g. buses) act to limit possible public exposure until advised by the radiological assessor/team.
- ❑ Have the PIO issue appropriate public media releases (from Appendix II) coordinated locally and nationally and prepare for media interest (see AG.8).
- ❑ For the public who may have left the scene have the PIO issue instructions on the actions they should take (see Instruction 3).
- ❑ Notify the national EOC if other States or their citizens may be affected (transnational emergency).
- ❑ Take practical actions to limit the spread of contamination but do not interfere with life saving actions.

Extension of the response

- ❑ Re-evaluate the initial response.
- ❑ Have resource coordinator assess and obtain needed resources (see AG.3) and develop a 24 hours plan.
- ❑ Ensure that function specific action guides in Section B are followed.
- ❑ Confirm that responders are following the personnel protection guidelines (see Instruction 2) and that the public protection guidelines have been implemented (see Instruction 3).
- ❑ Consider the possibility of a second event – commitment of all resources at one event is not advisable.
- ❑ Do not attempt recovery or decontamination of the scene until:
  - The recovery plan is prepared and radiological assessor has implemented procedures to control the dose; and
  - Coordinated with the FEMT, if applicable.
- ❑ For a major emergency, form a command group and prepare for long term operations.

AG.2. RESPONSE TO A LOST OR STOLEN POTENTIALLY DANGEROUS SOURCE

When to apply the Action Guide:
In case of a lost or stolen potentially dangerous source according to Instruction 1.

ACTIONS (as appropriate and practical)

First responsible person to become aware of the event:

- ❑ Report loss/theft to the appropriate officials.
- ❑ Request, through the national EOC (or in accordance with prior arrangements), a radiological assessor/team and obtain advice, by phone.
- ❑ Secure area and treat as a crime scene.
- ❑ Conduct a local search and investigation of the possible means of loss.
- ❑ Check and ensure the physical security and control of other sources.

Incident commander

- ❑ Being the senior first responder assume the role of the IC until relieved.
- ❑ Respond following the personnel protection guidelines in Instruction 2.
- ❑ Assess the situation in accordance with Instruction 1.
- ❑ Confirm the completion of the tasks of the first responsible person listed above.
- ❑ Maintain the records of your decisions.
- ❑ If public contamination or exposure is possible, implement AG.1. "General on-scene response to a radiological emergency".
- ❑ Coordinate all response actions with law enforcement.
- ❑ Conduct interviews to locate and isolate the source and to identify possibly exposed individuals.
- ❑ Inform all appropriate authorities of the situation and of the name of the IC.
- ❑ Alert nearby medical facilities, fire fighters, law enforcement, border crossings and scrap metal dealers, providing a description of the source and associated hazard.
- ❑ Have radiation medical experts or national EOC provide local hospitals with a description of radiation injuries (e.g. skin burns with no apparent cause).
- ❑ After informing local officials, make a public announcement describing the source and stressing the associated hazard (see Appendix II for an example media statement).
- ❑ Notify the national EOC if there are indications that other States or their citizens may be affected (transnational emergency).
- ❑ Plan and initiate public searches in cooperation with the radiological assessor/team.
- ❑ If the source is found and/or public contamination or exposure is possible, implement AG.1. "General on-scene response to a radiological emergency".

SECTION B
ACTION GUIDES FOR SPECIFIC FIRST RESPONDERS

AG.3. RESOURCE COORDINATOR

ACTIONS (as appropriate and practical)

- ❑ Operate under the IC and follow the personnel protection guidelines in Instruction 2.
- ❑ Receive a briefing from the IC.
- ❑ Be integrated into the response and receive regular briefings.
- ❑ Prepare for arrival of non-requested resources.
- ❑ Establish a secure staging area and coordinate resources (requested and non-requested).
- ❑ Integrate responders into the response – ensure they understand the organization, follow the personnel protection guidelines in Instruction 2 and direct media inquires to the PIO.
- ❑ For mass casualties, support EMS and request assistance from other agencies to include transportation.
- ❑ Establish provisions to communicate with responders on the scene to get information on additional resources needed.
- ❑ Determine what resources and personnel are needed using the table below. Confirm with the IC and obtain the resources.

Position and functions	Needed		Assigned	
	Yes	No	Yes (name)	No
Incident commander (IC)	X			
Resource coordinator				
24-hour planning coordinator				
On-scene controller(s)				
Safety officer				
Fire brigade:				
▪ Responder accountability				
▪ Search and rescue				
▪ Control of conventional hazards				
▪ Establishment of the safety perimeter				
▪ On-site triage and first aid until relieved				
▪ Responder contamination control				
▪ Public registration, monitoring and decontamination				
▪ Evacuation of inner cordoned area				
Emergency medical service (EMS):				
▪ On-site first aid and triage (relieve fire brigade)				
▪ Coordination with medical transport				
▪ Coordination with receiving hospitals				
▪ Establishment of a temporary morgue area				
▪ Ensure protection guidelines are followed by medical personnel				
Law enforcement/security team:				
▪ Establishment of a security perimeter				
▪ Security at facilities/areas outside the security perimeter:				
➢ Incident command post (ICP)				

Position and functions	Needed		Assigned	
	Yes	No	Yes (name)	No
➢ Receiving hospital				
➢ Staging area				
➢ Public information centre (PIC)				
▪ Security at public registration, monitoring / decontamination, triage/first aid areas and during transport to hospital				
▪ Management of evidence until relieved by FEMT				
Forensic evidence management team (FEMT)				
▪ Establishment of strategy for scene examination and evidence recovery				
▪ Establishment of protocols for evidence management outside the scene (e.g. in hospitals)				
▪ Establishment/maintaining the forensic evidence management area				
▪ Management of evidence:				
➢ On the scene				
➢ Outside the scene (e.g. hospitals, morgues)				
Public information officer (PIO)/team:				
▪ Preparation for immense media attention				
▪ Coordination of local and national response to inquires				
▪ Development of press releases				
▪ Establishment of PIC				
First responder monitor / radiological assessor/team:				
To support:				
▪ Protection of first responders				
▪ Defining the inner condoned area				
▪ Triage/first aid area				
▪ Public monitoring/decontamination area				
▪ Response contamination control area				
▪ Forensics evidence management team (FEMT)				
▪ Local receiving hospital				
▪ Law enforcement/security team				
▪ Facility holding/processing suspects				

- ❑ Establish (in cooperation with relevant organizations) a secure secondary location for monitoring/reassurance of worried-well.
- ❑ Coordinate the receipt and integration of the resources into the response.
- ❑ Make provisions for 24-hour planning and coordination for ongoing operations.
- ❑ Make provisions to collect and retain the registration forms (Appendix I) for all the responders and public involved.
- ❑ Review the resources and request for assistance regularly (in coordination with the IC).

AG.4. FIRE BRIGADE

ACTIONS (as appropriate and practical)

- ❑ Being the first responder at the scene assume the role of IC until relieved, following the appropriate action guide:
  - AG.1. General on-scene response to a radiological emergency.
  - AG.2. Response to lost or stolen potentially dangerous source.
- ❑ Operate under the IC and follow the personnel protection guidelines in Instruction 2.

NOTE

Don't delay life saving actions because of the presence of radioactive material. The presence of radioactive material should not influence the fire control process and the selection of techniques.

- ❑ Protect fire brigade members as appropriate:
  - Wear standard fire fighting protective clothing;
  - Select the highest level of respiratory protection available.
- ❑ Start or continue the actions as directed by the IC:
  - Confirm/establish the safety perimeter in accordance with Instruction 1.
  - Account for personnel within the inner cordoned area.
  - Search/rescue following standard operating procedures.
  - Deal with conventional hazards (e.g. fire) following standard operating procedures.
  - Evacuate the people from the inner cordoned area.
  - Provide first aid and triage (until relieved by EMS) in accordance with Instruction 9.
  - Perform contamination control for those entering/leaving the inner cordoned area following Instruction 7.
  - Perform public registration, monitoring/decontamination for those evacuated from the inner cordoned area following Instructions 4, 5, 6 and the form in Appendix I.
- ❑ For a security event, confirm law enforcement is:
  - Providing protection/security where interaction with the public is needed.
  - Searching for weapons before registration, monitoring, transport, decontamination.
- ❑ Coordinate with law enforcement to the extent possible consistent with public protection to:
  - Preserve evidence and identify/record possible people involved or suspects.
  - Prevent possible criminal acts at the scene (e.g. theft, destruction of documents).
- ❑ Coordinate with emergency medical service.
- ❑ Take practical actions to limit the spread of contamination – but do not let this interfere with response actions.
- ❑ Provide information to the PIO on the status of the response.
- ❑ Upon the arrival of the radiological assessor/team, review and revise operations as indicated.
- ❑ Direct media inquires to the PIO.
- ❑ Assess needs and request additional resources.

AG.5. EMERGENCY MEDICAL SERVICE (EMS)

ACTIONS (as appropriate and practical)

- ❑ Operate under the IC and follow the personnel protection guidelines in Instruction 2.

NOTE

Do not delay life saving actions because of the presence of radioactive materials. Do not delay transport of seriously injured victims because of decontamination procedures. Perform the following to prevent the spread of contamination: remove their outer clothing, wrap them in a blanket and tag as possibly contaminated.

- ❑ Get briefed by the lead person in your professional area or the IC.
- ❑ Implement and manage the on-scene medical response:
  - Start or continue the actions (if previously started) in your professional area:
    - First aid and field triage;
    - Management of triage/first aid area in accordance with Instruction 9.
  - In cooperation with hospitals confirm/arrange for transport and treatment of:
    - Life threatening injuries;
    - Non life threatening injuries requiring treatment in hospital.
- ❑ Direct members of the public concerned about radiation exposure/contamination (worried-well) to a secondary location for monitoring/reassurance established by the resource coordinator.
- ❑ Confirm/ensure that caregivers (medical transport/ receiving hospitals) know:
  - That the risk from a contaminated patient is negligible if the personnel protection guidelines in Instruction 2 are followed.
  - How to take practical actions to limit the spread of contamination.
  - That actions to limit the spread of contamination should not interfere with life saving actions.
- ❑ Advise the receiving hospital to follow AG.9.
- ❑ Inform the resource coordinator on the need to set up a secure secondary location to manage the assessment of the worried-well.
- ❑ Set up a temporary secured morgue away from public view and ensure coordination with FEMT.
- ❑ Register each person involved as appropriate using the form in Appendix I.
- ❑ For a security event, confirm law enforcement is:
  - Providing protection/security where interaction with the public is needed.
  - Searching the public for weapons before medical treatment or transport.
- ❑ Coordinate with law enforcement to the extent possible consistent with public protection to:
  - Preserve evidence and identify/record possible people involved or suspects.
  - Prevent possible criminal acts at the scene (e.g. theft, destruction of documents).
- ❑ Provide information to the PIO on the status of the response.
- ❑ Upon the arrival of the radiological assessor/team, review and revise operations as indicated.
- ❑ Direct media inquires to the PIO.
- ❑ Assess needs and request additional resources.

AG.6. LAW ENFORCEMENT/SECURITY TEAM

ACTIONS (as appropriate and practical)

- ❑ Being the first responder at the scene assume the role of IC until relieved, following the appropriate action guide:
  - AG.1. General on-scene response to a radiological emergency.
  - AG.2. Response to lost or stolen potentially dangerous source.
- ❑ Operate under the IC and follow the personnel protection guidelines in Instruction 2.

NOTE

Do not delay life saving actions because of the presence of radioactive materials.

- ❑ Establish / maintain a security perimeter (outer cordoned area boundary).
- ❑ Treat scene as a crime scene, until proven otherwise, in cooperation with other response personnel (do not interfere with life saving operations).
- ❑ Secure response facilities outside the outer cordoned area to include ICP, staging area and PIC.
- ❑ For a security event:
  - Check for suspects, terrorists, booby traps and/or devices.
  - Provide protection/security for responders interacting with the public:
    - Within public registration, triage/first aid and monitoring/decontamination areas;
    - At receiving hospitals and during medical transport.
  - Search for weapons before registration, monitoring, decontamination, transport.
- ❑ Consistent with public protection take actions to:
  - Preserve evidence and identify or apprehend possible people involved or suspects.
  - Prevent possible criminal acts at the scene (e.g. theft, destruction of documents).
- ❑ Confirm that law enforcement personnel know:
  - That the risk from a contaminated person is negligible if they follow the personnel protection guidelines in Instruction 2.
  - How to take practical actions to limit the spread of contamination - but do not allow this to interfere with response actions.
  - That actions to limit the spread of contamination should not interfere with life saving actions.
- ❑ Inform organizations receiving contaminated people (e.g. local jail) to follow the personnel protection guidelines in Instruction 2.
- ❑ Register each person involved as appropriate using the form in Appendix I**.**
- ❑ In cooperation with the local hospital and emergency medical service, cordon the area around the local hospital(s) to redirect self presenters (worried-well) to the secondary location established by the resource coordinator for monitoring/reassurance.
- ❑ Maintain continuity and integrity of all evidence taken from the scene.
- ❑ Provide information to the PIO on the status of the response.
- ❑ Direct media inquires to the PIO.
- ❑ Gather and provide security information for the IC.
- ❑ Assess needs and request additional resources.

AG.7. FORENSIC EVIDENCE MANAGEMENT TEAM (FEMT)

ACTIONS (as appropriate and practical)

- ❑ Operate under the IC and follow the personnel protection guidelines in Instruction 2.
- ❑ Receive a briefing from the IC.
- ❑ Follow normal crime scene procedures, adjusting them to assume all materials are potentially contaminated or radioactive; treat them accordingly until assessed by the radiological assessor/team.
- ❑ Coordinate actions with other response teams (do not interfere with life saving operations).
- ❑ Form a FEMT with representatives from major response teams/functions to include medical, law enforcement and first responder monitor or member from radiological assessment team.
- ❑ Develop and formulate the strategy for scene examination and evidence recovery in cooperation with the radiological assessor/team and other response teams:
  - Evidence is removed under control of the FEMT.
  - Responders are instructed to preserve evidence (monitoring results, clothing, etc.) while not compromising safety.
  - Collection, handling and labelling of evidence are performed safely and in an appropriate manner.
  - Evidence is photographed and recorded in situ before removal.
  - Evidence is packed for future forensic examination.
  - Deceased persons are examined for evidence.
- ❑ Establish with the radiological assessor/team a secure forensic evidence management area.
- ❑ Establish protocols with the local hospital for the examination of injured people to identify and recover any evidence from the scene, including arrangements for:
  - Blood samples before transfusion.
  - X ray examination.
  - Recovery of evidence such as foreign objects removed during surgery.
  - Recovery of monitoring results or contaminated clothing.
- ❑ Establish protocols with the local hospital/morgue for examination of deceased persons and/or body parts in order to identify and recover any evidence from the scene, including arrangements for:
  - Retaining the bodies until examined for forensic evidence.
  - X ray examination.
  - Presence of a member of the FEMT during any subsequent post mortem examination to collect evidence and ensure the chain of custody.
- ❑ Provide information to the PIO on the status of the response.
- ❑ Direct media inquires to the PIO.
- ❑ Assess needs and request additional resources.

AG.8. PUBLIC INFORMATION OFFICER (PIO)/TEAM

ACTIONS (as appropriate and practical)

- ❑ Operate under the IC and follow the personnel protection guidelines in Instruction 2.
- ❑ Receive a briefing from the IC.
- ❑ Take all practical steps to provide the public with useful, timely, truthful, consistent and appropriate information throughout an emergency. (See crisis communication tips below.)
- ❑ Prepare, in cooperation with law enforcement team, for immense media attention including the arrival of reporters at the scene.
- ❑ Confirm with the IC that you are the official source of public information and inform the on scene responders, law enforcement, hospitals, local government and national EOC to refer media inquires to you.
- ❑ Develop with the IC and issue a press release (see Appendix II for examples) describing:
  - The threat;
  - Appropriate and inappropriate public response actions; and
  - Actions being taken to ensure public safety, protection of products, etc.
- ❑ As soon as possible, establish a PIC where media briefings from a single qualified spokesperson or a panel with representatives of all organizations involved in the response will be provided. Include representatives of local and national governments in briefings.
- ❑ Assess the needs and request additional resources.
- ❑ Prepare for international inquires and rumours.

Crisis communication tips

As a spokesman:	➢ Stay within the scope of responsibilities. ➢ Tell the truth. Be transparent. ➢ Ensure there is a single official message.
Top tips:	➢ Do not use technical terms. ➢ Do not over-reassure. ➢ Acknowledge uncertainty. ➢ Express wishes (“I wish I had answers”). ➢ Explain the process in place to find answers. ➢ Acknowledge people’s fear. ➢ Give people things to do.
Prepare to answer these questions:	➢ Are my family and I safe? ➢ What can I do to protect my family and myself? ➢ Who is in charge? ➢ Why did this happen? ➢ Why wasn’t this prevented? ➢ What else can go wrong?
Stay on message:	➢ “What’s important to remember…” ➢ “I can’t answer that question, but I can tell you…” ➢ “Let me put this in perspective…” ➢ Repeat important points.
Be coherent, consistent and helpful:	➢ We will do all we can to help you to make responsible decisions for yourself and your loved ones. ➢ We will not engage in speculation. ➢ We may need to withhold information that may aid terrorists.

AG.9. LOCAL HOSPITAL

ACTIONS (as appropriate and practical)

- ❑ Operate under the IC and follow the personnel protection guidelines in Instruction 2.
- ❑ Brief health care staff that the risk from a contaminated person is negligible if they follow the personnel protection guidelines in Instruction 2.
- ❑ Have law enforcement provide a cordoned area around the hospital(s) to redirect self-presenters (worried-well) to the secondary location for monitoring/reassurance established by the resource coordinator.
- ❑ For a security event, coordinate with the law enforcement/security team and FEMT to provide protection/security for the hospital and to preserve evidence.
- ❑ Make arrangements to screen arrivals for dangerous sources (ambient dose rate > 100 μSv/h at 1 m) and isolate such sources if found.
- ❑ Prepare an ambulance reception area and treatment area for receiving casualties:
  - Designate an ambulance reception area and treatment area. Set up an area large enough to handle the anticipated number of victims. Clear the area of visitors and patients. Re-route the traffic of other patients as appropriate, e.g. direct other medical emergencies to another hospital entrance. Make a path from the ambulance entrance to the hospital entrance using rolls of plastic, wrapping or butcher paper about 1 m wide. Cover the floor. Tape the covering securely to the floor. Remove or cover equipment that will not be needed. Rope off and mark the route to prevent unauthorized entry.
  - Restrict access to the controlled treatment area.
  - Prepare several large plastic-lined waste containers; plastic bags of varying sizes and labels for personal effects; warning labels and signs.
  - Prepare the decontamination room of the treatment area if one has been previously designated. Otherwise, designate a decontamination room near the entrance. Establish a control line at the entrance to the decontamination room. Use wide strip tape to clearly mark the floor at the entrance to the room to differentiate the controlled (contaminated) from the non-controlled (uncontaminated) side. Check and prepare survey meters for use (if available).
  - Prepare enough instruments and supplies (e.g. outer gloves, dressings) to change when they become contaminated.

NOTE

Extension of these actions depends on the time available.

- ❑ Prepare the medical staff. Use universal precautions. Use two sets of gloves (outer gloves should be easily removable and replaced between patients).
- ❑ Meet the victims at the established location. Request that ambulance personnel stay in their vehicle until surveyed and released by first responder monitor/radiological assessor. Survey of the ambulance may be delayed if a large number of victims must be transported.

NOTE

Be aware that the walking wounded will try to go to the hospital as soon as possible.

- ❑ Assess and treat injuries (assume the patient to be contaminated):
  - Perform medical stabilization first; if necessary for life saving, bypass the decontamination room. Remove the patient's clothing and wrap the patient in a sheet to limit contamination of the treatment area.

- Conduct a radiological survey (by the first responder monitor/radiological assessor - if he/she is available and if actions do not interfere with medical actions or adversely influence the patient's medical status);
- Perform physical examinations and blood tests (complete blood count with differential) promptly.

NOTE

If the patient had nausea or vomiting, hospitalize, treat symptomatically and repeat complete blood count every 6 hours for 2-3 days to see if lymphocytopenia develops.

- ❑ If the patient could not be checked by the first responder monitor/radiological assessor (if not available or because assessment may worsen the patient's health condition) patient(s) should shower and change into a hospital gown or other suitable clothing (if these actions will not adversely affect patient's medical status).

CAUTION

Depending on the emergency scenario and circumstances of the exposure (if known), the patient is considered contaminated until checked by first responder monitor/radiological assessor. Procedures to prevent the spread of contamination should apply.

- ❑ If patient is contaminated, proceed with full decontamination:
  - Remove clothing and place in a labelled plastic bag;
  - Perform a radiological survey (by first responder monitor/radiological assessor);
  - Decontaminate the skin with soap using warm water. Do not scrub too vigorously. Handle any unknown metal objects with a hemostat or forceps;
  - Save samples and label them (smears of contamination, nasal smear, extracted tooth, hair and nails, purged bone pieces, etc.);
  - If a wound is contaminated, survey, rinse, debride only for surgical reasons;
  - If contamination persists, consider covering area or consider that contamination may be internal;
  - Perform a final radiological survey (by first responder monitor/radiological assessor).
- ❑ Transfer the uncontaminated patient to the clean area. Use clean gloves to move the patient to a clean stretcher and exit the contaminated area.
- ❑ Control the spread of contamination:
  - Survey staff for possible contamination; remove contaminated clothing and shower before exiting contaminated area. Survey medical equipment for contamination before removing it from the contaminated area.
- ❑ Direct media inquires to the PIO.
- ❑ After discharging the patient and at the end of the emergency phase clean up the area following the procedures established by the radiological assessor to control doses. Do not return the area to normal until approved by the radiological assessor.
- ❑ Segregate presumptive or confirmed radiological waste for retrospective analysis if considered necessary and in consultation with a member of the FEMT.
- ❑ Assess needs and request additional resources if needed. Request a consultation from national experts or inform the national EOC of the need for international assistance (if necessary).

AG.10. NATIONAL EMERGENCY OPERATIONS CENTRE (EOC)

When to apply the Action Guide:

- When requested by the IC;
- In case of significant media or international attention.

ACTIONS (as appropriate and practical)

- ❑ Activate national EOC to coordinate the national support to the local response.
- ❑ Support the IC.
- ❑ Inform all appropriate authorities that the IC is leading the response and brief on their roles.
- ❑ Ensure that any response to the media is coordinated through the local PIO, and that the national interface with the media is moved to the local vicinity as soon as possible.
- ❑ Establish communication line between the IC and radiological assessor/team to provide on-going consultation and advice on dealing with the radiological hazard.
- ❑ Activate a designated national hospital.
- ❑ Dispatch the national radiological assessment team and other resources as required: coordinate their arrival with the IC or resource coordinator at the scene.
- ❑ Keep the IC informed of all relevant and up-to-date intelligence.
- ❑ Take action to mitigate the economic and psychological consequences including:
  - Restricting national and international trade of potentially contaminated items until assessed against international standards;
  - Addressing concerns about national and international movement of potentially contaminated people;
  - Informing the media of actions taken after coordination with the PIO at the scene.
- ❑ Reduce the likelihood of similar events (e.g. enhanced security).
- ❑ Respond to international inquiries and rumours in cooperation with the IC.
- ❑ Have a national competent authority notify potentially affected States and the IAEA if there are indications that other States or their citizens may be affected (transnational emergency).
- ❑ Request international assistance through the IAEA if needed.

AG.11. FIRST RESPONDER MONITOR

When to apply the Action Guide:

If there is a person available who is equipped and experienced to perform basic radiation monitoring.

CAUTION

Perform this function only if you feel confident that you have the necessary experience.
This instruction is not a substitute for the radiological assessment performed by the radiological assessor/team.

ACTIONS (as appropriate and practical)

- ❑ Operate under the IC and follow the personnel protection guidelines in Instruction 2.
- ❑ Receive a briefing from the IC.
- ❑ Assist the resource coordinator to obtain additional first responder monitors, if required, before arrival of the radiological assessor/team to perform tasks listed below.
- ❑ Consult with the radiological assessor/team by phone before their arrival, if required.
- ❑ Perform operational checks of the instruments. If more than one instrument is available, perform crosschecks between instruments to ensure consistent readings. Confirm gamma dose rate meter(s) can measure from 0.1μSv/h to 1000 mSv/h (1 Sv/h).
- ❑ Store in a clean place outside of inner cordoned area one instrument for monitoring of low level contamination.

CAUTION

Some instruments can be saturated (be overwhelmed) by very high radiation levels and show a low or "0" reading in very dangerous areas.

- ❑ Approach the scene with an instrument that can read at least 100 mSv/h switched on and do not enter areas with ambient dose rates > 100 mSv/h.
- ❑ Arrange for monitoring to:
  - Locate and mark areas where ambient dose rates are:
    - > 100 mSv/h - area where only life saving actions should be performed and time of staying there limited to < 30 min;
    - > 0.1 mSv/h (100 μSv/h) - boundary of inner cordoned area.
  - Screen public groups and locations, e.g. hospitals, to locate and isolate sources with ambient dose rates above 100 μSv/h at 1m.
  - Support decontamination of people and equipment (see Instructions 6 and 8).
  - Support the response contamination control area (see Instruction 7).
  - Support actions of law enforcement/security team and FEMT.
  - Support actions of local hospital (see AG.9).
- ❑ Fill the form in Appendix I for each person monitored as appropriate.
- ❑ Monitor for gamma, beta and alpha radiation (as equipped) and immediately inform the radiological assessor/team if any alpha radiation is detected.
- ❑ Direct media inquires to the PIO.
- ❑ Keep track of your dose or activities for future reconstruction of the individual dose.
- ❑ Fully brief radiological assessor/team upon their arrival.

SECTION C
INSTRUCTIONS

INSTRUCTION 1. ASSESSMENT OF THE HAZARD AND ESTABLISHMENT OF INNER CORDONED AREA

User: First responder who arrives from emergency services.

When to apply the Instruction: In case there is an indication for a radiation hazard.

(1) Determine if an event may be a potential radiological emergency using the indications below.

Indications of a possible radiological emergency (hazard):
- Suspected or actual bomb. - Credible threats or threatening messages. - Device that appears intended to spread contamination. - Signs of possible contamination[26] (e.g. spill). - Gamma dose rates: > 100 μSv/h at 1 m from object or at 1m above the ground. - Medical symptoms of radiation injuries (such as burns without an apparent cause). - Building / area marked with the radiation symbol (see Fig 5). - Results of assessment of a radiological assessor[27]. - Neutron radiation. - Dangerous source that is lost, stolen, damaged, in a fire, leaking, or potentially involved in a terrorist act or explosion.
Indications of a dangerous source:
- A heavy container with the radiation symbol[28] (see Figure 5). - Item with labels in Figure 6, [6]. - Item with transport UN numbers or markings in Table 3 [6]. - Device used for cancer treatment (teletherapy or brachytherapy). - Radiography cameras or sources (see Figure 7 and 8). - Well logging sources used in drilling operations. - Dangerous quantity of material (> D-value, [7]), as assessed by a radiological assessor[27].

(2) As soon as possible confer with the radiological assessor through the national EOC and assess information such as the amount of a specific radioactive material or unusual readings.

(3) For a potential radiological emergency follow as appropriate AG.1 or AG.2 and establish an inner cordoned area as indicated in Table 4 [5]. The perimeter should be established where it can be easily defined, recognized (e.g. roads) and secured.

(4) Within the inner cordoned area follow the personnel protection guidelines in Instruction 2 and protect the public according to the public protection guidelines in Instruction 3.

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[26] Surface contamination can only be assessed by a radiological assessor.

[27] Appendix 8 of Reference [2] and References [5,7] provide guidance in determining if a source (quantity) of radioactive material is dangerous (exceeds D-value).

[28] Many objects that are not dangerous have the radiation-warning symbol, for example portable moisture density gauges, smoke detectors, tritium signs, watches and compasses with illuminated dials.

TABLE 3. GUIDE TO TRANSPORT PACKAGES MARKINGS [6]

UN Number	Possible other marking	Threat
2909, 2908, 2910, 2911	None	**Not dangerous**
2912; 2913, 3321, 3322, 3324; 3325, 3326	Type IP-1, Type IP-2, Low Specific Activity (LSA), Surface Contaminated Object (SCO)	**Possibly dangerous** if material is inhaled or ingested
2915; 2982, 3327, 3332, 3333	Type A	**Possibly dangerous**
2916, 2917, 3328, 3329	Type B (U), Type B (M)	
3323, 3330	Type C	

TABLE 4. SUGGESTED RADIUS OF INNER CORDONED AREA (SAFETY PERIMETER) FOR A RADIOLOGICAL EMERGENCY

Situation	Initial inner cordoned area (safety perimeter)
Initial determination - outside	
Unshielded or damaged potentially dangerous source	30 m around
Major spill from a potentially dangerous source	100 m around
Fire, explosion or fumes involving a potentially dangerous source	300 m radius
Suspected bomb (potential RDD), exploded or unexploded	400 m radius or more to protect against an explosion
Initial determination - inside a building	
Damage, loss of shielding or spill involving a potentially dangerous source	Affected and adjacent areas (including floors above and below)
Fires or other event involving a potentially dangerous source that can spread materials throughout the building (e.g. through the ventilation system)	Entire building and appropriate outside distance as indicated above
Expansion based on radiological monitoring [(a)]	
Ambient dose rate of 100 μSv/h[29,30]	Wherever these levels are measured

[(a)] Dose rate can not assess all exposure pathways and should only be used as a basis for expanding the area, not for shrinking the size of the inner cordoned area. Only a radiological assessor can assess the entire radiological hazard. Only a radiological assessor can reduce the size of the area based on radiological conditions.

FIG. I1. Radioactive material identification symbol.

[29] The ambient dose rate is measured at 1 m above ground level.

[30] See Annex I for surface contamination levels. However, these levels can only be assessed by a radiological assessor based on instrument readings (operational criteria) corresponding to these levels.

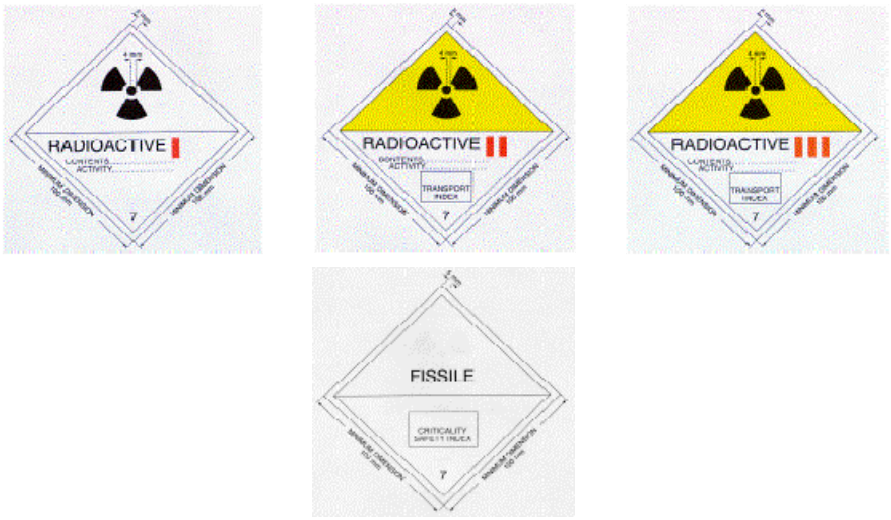

FIG. 6. Labels of packages with potentially dangerous sources.

FIG. 7. Typical radiography camera.

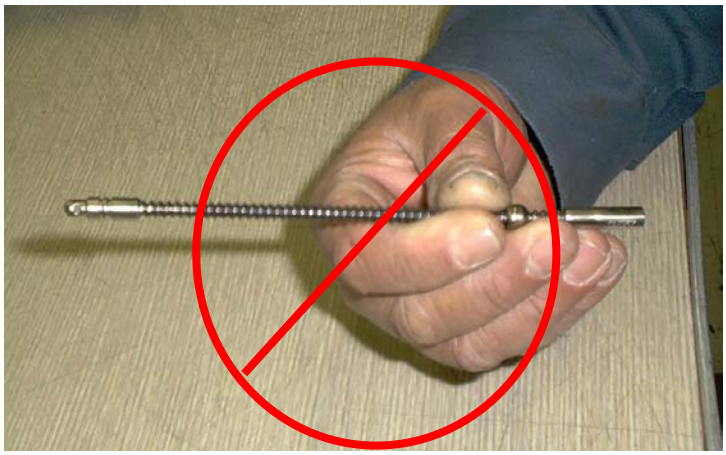

FIG. 8. Very dangerous source from radiography camera (should never be picked up).

INSTRUCTION 2. PERSONNEL PROTECTION GUIDELINES

User: All responders.

When to apply the Instruction: Always when responding to a radiological emergency unless directed otherwise by radiological assessor.

Part A:

Guidelines that should always be followed

CAUTION

Female workers who become aware that they may be pregnant should notify the appropriate authority and must be excluded from emergency duties.

(1) Follow standard safety procedures for your professional area.

(2) Be visually identifiable and ensure you are in the accountability system when within the inner cordoned area.

(3) Do not touch/hold suspected radioactive items, including bomb fragments (shrapnel).

(4) Perform only life saving actions within:

- 1 metre of suspected dangerous radioactive materials/source;
- 100 metres of fire or explosion unless equipped with respiratory protection.

(5) Minimize time spent within 10 metres of suspected dangerous radioactive materials/source.

(6) When dispersion of radioactive material (dust/smoke) and contamination are suspected or confirmed:

(a) Use available respiratory protection equipment or cover mouth with a mask or handkerchief.

(b) Keep hands away from mouth, do not smoke, eat or drink and wash hands regularly.

(c) When treating or transporting contaminated persons use normal barrier methods (standard precautions) such as surgical gloves and masks. Keep hands away from mouth and wash hands regularly.

(7) Ensure your name and activities performed are recorded – for possible follow-up and dose reconstruction.

(8) Get monitored for radioactive contamination after being within inner cordoned area. If not immediately possible, shower and change clothing as soon as possible.

(9) Once emergency operations have ended, other activities (source recovery, cleanup, waste disposal, etc.) should follow occupational radiation protection guidance directed by radiological assessor.

(10) As soon as possible have work areas monitored (Part B).

Part B:

Guidelines that should be followed if gamma dose rate is known

(1) Follow Part A of the guidelines above.

(2) If ambient dose rate in a particular area is greater than 100 mSv/h:

- Perform only life saving actions.
- Limit total time of staying there to < 30 minutes.

(3) Do not proceed into area with an ambient dose rate of greater than 1000 mSv/h unless directed by radiological assessor.

Part C:

Guidelines that should be followed if self-reading dosimeters are being used

CAUTION

Self-reading dosimeters **do not** measure the dose from inhalation, ingestion or skin contamination; consequently responders must also follow all the general guidelines in Part A to limit the dose from these pathways.

(1) Follow Part A of the guidelines above.

(2) Make all reasonable efforts not to exceed the dose guidance from Table 5 [1,2,8,9,10].

TABLE 5. EMERGENCY WORKER TURN BACK DOSE GUIDANCE [31]

Tasks	Do not exceed unless approved by incident commander, *Hp (10)*
Life saving actions, such as: • rescue from immediate threats to life; • provision of first aid for life threatening injuries; • prevention/mitigation of conditions that could be life threatening.	1000 mSv [31, 32, 33, 34]
Actions to prevent severe health effects or injuries, such as: • evacuation/protection of the public; • environmental monitoring of populated areas to identify where evacuation, sheltering or food restriction are warranted; • rescue from potential threats of serious injury; • immediate treatment of serious injuries; • urgent decontamination of people. **Actions to prevent the development of catastrophic conditions, such as:** • prevention or mitigation of fires, etc; • apprehension of terrorist suspects.	500 mSv [31, 33, 34]
Actions to avert a large collective dose, such as: • environmental sample collection and analysis for environmental monitoring of populated areas; • localized decontamination if required to protect the public.	50 mSv [31]

[31] This dose guidance is set at the levels that will allow completion of tasks and return to the base without exceeding the levels in the international guidance [1]. Emergency worker dose level guidance values are expressed as integrated external dose and it is assumed that all necessary precautions are taken to prevent internal exposure. The guidance is for the entire time of the emergency.

[32] In principle, no dose restrictions are recommended for life saving if, and ONLY IF, the benefit to others clearly is more important than rescuer's own risk.

[33] Workers shall be volunteers and be provided with information on the potential health consequences of exposure to allow them to make an informed decision [1, 10]. For example: 3000 mSv exposure could be life threatening, 500-1000 mSv can result in short term vomiting, reduction in sperm count and an increase in the chance (risk) of development of fatal cancer from the normal rate of about 25% to about 30%. Exposure in dose of 100 mSv will not result in any short term effects, but will result in small increase (about 0.5%) for the risk of development of fatal cancer [8, 9].

[34] Every effort should be made to keep doses below this dose while performing life saving actions.

INSTRUCTION 3. PUBLIC PROTECTION GUIDELINES

User: IC or his/her designee.

When to apply the Instruction: Always when responding to a radiological emergency with public involvement.

Part A:

For those members of the public who are within the inner cordoned area when first responders arrive

(1) Promptly evacuate as possible. Before evacuation takes place instruct the public to take best available shelter (e.g. go to indoor hall, stay away from windows).

(2) Instruct them not to handle, but to isolate and identify to a responder any possible radioactive item.

(3) Instruct them not to smoke, eat, drink or place hands near mouth; to wash hands, shower and change clothes when possible to avoid inadvertent ingestion.

(4) Following evacuation:

- Register;
- If contamination is a concern (possible presence of radioactive smoke, liquid or dust):
  - Remind evacuees not to smoke, eat, drink or place hands near mouth; to wash hands, shower and change clothes when possible to avoid inadvertent ingestion.
  - Perform monitoring (if available).
  - If warranted and practical, conduct immediate decontamination in accordance with Instruction 6.
- Provide them with the instructions on where to go for further information and/or medical/radiological assessment.
- Instruct them on the need, after leaving the scene, to:
  - Shower and change clothes when possible, place clothes in plastic bag and save (if not implemented yet).
  - Listen for further instructions on where to get information and/or medical/radiological assessment.

Part B:

For those members of the public who may have left the inner cordoned area without regristration

(1) Instruct them, if necessary via the media, on the following:

- Not to handle but to report to the local police any items they might have picked up at the scene.
- Not to smoke, eat, drink or place hands near the mouth until a shower is taken and clothes are changed.
- To shower and change clothes when possible, place clothes in plastic bag and save.
- To continue to listen for and follow official instructions given via the media (TV or radio).

Part C:

For those members of the public outside the inner cordoned area

If there has been an atmospheric release (smoke from fire or bomb) instruct public, via the media, within about 1 km of the release point that it would be prudent:

(1) To remain inside building during the release (smoke).
(2) Not to eat any vegetables grown outside or drink rainwater.
(3) Not to play on the ground.
(4) To wash hands before eating.
(5) To avoid dusty areas or activities that will generate dust.
(6) To listen for and follow official instructions given via the media (TV or radio).

INSTRUCTION 4. PUBLIC REGISTRATION

User: Typically fire brigade.

When to apply the Instruction: At the scene of a radiological emergency for all the public not requiring immediate medical treatment / transport that may have been within the inner cordoned area (evacuated or left on their own before arrival of emergency services).

CAUTION

Treatment or transport of seriously injured people should not be delayed for registration, monitoring or decontamination.

(1) Establish a public registration area outside the inner condoned area (safety perimeter) (see Figure 3) that is secured and protected from the weather if required.

(2) If terrorism or criminal activity is suspected, ensure that people are searched for weapons before coming to the public registration area and emergency workers are protected from potentially armed suspects.

(3) Instruct non-injured members of public who were within the inner cordoned area:

- Not to take any items that may be radioactive.
- As a precaution to keep hands away from mouth and not to eat or drink until they wash their face and hands.
- To go to a public registration area where they can wait safely while being processed.

(4) If contamination is not suspected, register them using the form in Appendix I and release them.

(5) If the public may be contaminated (possible presence of radioactive smoke, liquid or dust) and:

- Arrangements for decontamination are in place:
  - send them for field or full decontamination. Make sure this action does not interfere with necessary first aid actions.
- Arrangements for decontamination are not in place:
  - register them, using the form in Appendix I;
  - instruct them:
    - ♦ not to eat, drink, smoke or place hands near mouth until their hands and face are washed and potentially contaminated outer clothing is changed;
    - ♦ to shower and change clothes when possible, and to place clothes in plastic bag and save them;
    - ♦ to listen for and follow official instructions given over the media (TV or radio);
  - release members of the public.

INSTRUCTION 5. MONITORING OF THE PUBLIC AND RESPONDERS

User: First responder monitor.

When to apply the Instruction: When a first responder monitor or radiological assessor is available and there is an indication that people may be contaminated (possible presence of radioactive smoke, liquid or dust) and conducting monitoring is feasible.

CAUTION

Do not delay medical treatment or transport for registration or monitoring. If you do not understand how to perform the operational steps or to use units below, another qualified person should conduct monitoring.

Some instruments can be saturated (be overwhelmed) by very high radiation levels and show a low or "0" reading in very dangerous areas.

(1) Approach the scene with an instrument that can read at least 100 mSv/h switched on and do not enter areas with ambient dose rates > 100 mSv/h.

(2) If terrorism/criminal activity is suspected, ensure law enforcement searches the people for weapons before being monitored and emergency workers are protected from potentially armed suspects.

(3) Perform an operational check of the monitoring instrument(s) in an area away from the scene:

- Check the battery.
- Confirm that the instrument can measure ambient dose rates in the range of local background (typically between 0.05-0.2 μSv/h). Make sure you understand units displayed and how ranges are changed.
- Open beta window if available.
- Wrap instrument in plastic bag.
- Record instrument number and the background level[35] in an area not close to the scene.

(4) Keep one check instrument in a "clean area" and do not use it for routine monitoring.

(5) Establish monitoring location in an area with ambient dose rates below 0.3 μSv/h that is close to the decontamination area.

(6) To ensure that any objects with an ambient dose rate > 100 μSv/h at 1 metre are identified and isolated before members of the public are entering monitoring area, have the public screened away from the monitoring area (walk within 2 metres of an instrument measuring in a range of 100 μSv/h or more). Isolate identified objects with an ambient dose rate > 100 μSv/h.

(7) Instruct people to be monitored not to eat, drink or smoke until hands are washed; to shower and change clothing as soon as possible and after release to listen for and to follow official instruction given over the media (TV or radio).

(8) When monitoring:

- Wear gloves and protective clothing as available, change gloves regularly.
- Follow personnel protection guidelines in Instruction 2.
- Periodically get monitored and if contaminated > 0.3 μSv/h[36], get decontaminated.
- Periodically confirm the instrument is operational and not contaminated (it can measure background). If contaminated, replace the plastic bag, and re-check.

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[35] Record the background in units on the instrument (e.g. μGy/h, mR/h, mSv/h, etc).

[36] A lower criteria (0.3 μSv/h) is used for the person performing monitoring than for the public to ensure that the ambient dose rate from a contaminated person performing monitoring does not interfere with process for public monitoring

(4) Monitor a person's hair, hands, pockets, dirty parts of clothes, feet and face holding the monitor about 10 cm from the monitored surface.

(5) Record the results of contamination survey using the form in Appendix I.

(6) Perform the following actions depending on the results of survey:

Personal survey measurements of gamma dose rate at 10 cm from body surface (clothes):	
< 1 μSv/h[37]	> 1 μSv/h [37]
▪ Remind those monitored to: – shower and change clothing as soon as possible; – listen for official instructions. ▪ Send them home (release).	▪ Send those monitored for immediate decontamination (see Instruction 6). ▪ If immediate decontamination is not available, remind them to: – shower and change clothing as soon as possible; – listen for official instructions. ▪ Send them home (release).

[37] See Annex I for contamination levels. However, these levels can only be assessed by a radiological assessor based on predetermined instrument readings (operational criteria).

INSTRUCTION 6. PUBLIC DECONTAMINATION

User: Typically fire brigade.

When to apply the Instruction: If there is an indication that people (not requiring immediate medical treatment or transport) may be contaminated by the presence of radioactive smoke, liquid or dust or by available monitoring results and decontamination area could be promptly established.

CAUTION

Do not delay transport of seriously injured victims because of decontamination procedures. Perform the following to prevent the spread of contamination: remove their outer clothing, wrap them in a blanket and tag as possibly contaminated.

If decontamination area cannot be promptly established, the public should be reminded to shower and change clothing as soon as possible and to listen for official instructions and then should be sent home (released).

(1) Establish a decontamination area outside the inner condoned area (see Figure 3) as appropriate for the available resources and number of people to be decontaminated:
   - Field decontamination for large numbers.
   - Full decontamination for small numbers.

NOTE

Establish field decontamination in an area with security and protection from the weather (if required) and with controlled entrance and exit points and provisions for people to wash hands and face and partly remove outer clothing.

Establish full decontamination in an area with security and provisions for taking a shower and immediately obtain clean clothing. Separate areas for males and females must be established.

Water used for decontamination should be collected if it can be done without delaying the decontamination.

(2) Acquire blankets, clothing and anything else that could be used to dress people who have removed their outer clothing.

(3) Acquire a receipt for contaminated item(s), tags for marking bags of contaminated clothing and bags for other items.

(4) If terrorism or criminal activity is suspected, ensure that people are searched for weapons before being decontaminated and emergency workers are protected from potentially armed suspects.

(5) Perform decontamination using the instructions below:

Instructions for performing immediate decontamination

Step 1. Wear gloves and protective clothing as available, changing gloves regularly. Follow personnel protection guidelines. Periodically get monitored. If contaminated to levels > 1 μSv/h, get decontaminated.

Step 2. Keep families together and ask adults to assist children or others needing assistance (if possible).

Step 3. Instruct the people as follows depending on the level of decontamination being performed:

Field decontamination

- Not to eat, drink or smoke and to keep hands away from mouth until outer clothing will be removed and person showered.
- To remove as much as possible of their outer clothing (as conditions permit and if replacement clothing is available) and to place the clothing in bags with a tag identifying owner.
- To wash their face and hands with water or with a wet cloth.
- To change all clothing and shower as soon as possible after being released.
- To place potentially contaminated outer clothing in a bag for potentially contaminated waste.

Full decontamination

- Not to eat, drink or smoke and to keep hands away from mouth until outer closing will be removed and person showered.
- To completely remove their clothes and to place the clothing in a bag for potentially contaminated waste.
- To shower with water and detergents (if available). Very carefully wash hair – this part of body potentially could be most contaminated.
- Provide decontaminated people with new clothing.

Step 4. Fill out a registration form (Appendix I).

Step 5. Provide people with information on where to get further instructions once released.

Step 6. Issue a receipt for contaminated clothing and personal items and release the person.

Step 7. Treat monitoring results, registration form and contaminated clothing as evidence.

Step 8. Move bags with potentially contaminated items to an isolated and secure location regularly.

Step 9. When relieved from your monitoring duties, do not leave until decontaminated at the response contamination control area.

INSTRUCTION 7. RESPONSE CONTAMINATION CONTROL

User: Person responsible for contamination control of responders, typically member of the fire brigade.

When to apply the Instruction: If there is an indication that an area may be contaminated by the presence of radioactive smoke, liquid or dust.

(1) Establish a response contamination control area at the boundary of the inner cordoned area (see Figure 3). There should be provisions for:

- A controlled entrance and exit.
- Logging in and out of area (e.g. tag board).
- Collection of the equipment used inside of inner condoned area.
  - Storage area for tools.
- Decontamination of equipment:
  - Hose line with attempt to confine runoff so that it cannot affect other operational areas.
- Decontamination of personnel:
  - Hose line with attempt to confine runoff so that it cannot affect other operational areas.
  - Provisions to change outer clothing and wash hands and face.
  - Provisions to replace protective equipment (air supplies and filters).
  - Provisions to bag / control waste.

(2) Ensure that first responders follow the steps below:

- **Entering the inner cordoned area:**
  - Cover instruments with plastic bags.
  - Log in (keep account of those in the area).
  - Limit taking additional tools going into the area if possible (use tools already in the area).
  - Follow personnel protection guidelines (Instruction 2) when in the area.
- **Leaving the inner cordoned area:**
  - Remove plastic cover from the instruments.
  - Leave instruments and equipment used inside of the inner cordoned area for further use.
  - Receive monitoring using Instruction 5.
  - Receive field decontamination:
    - ♦ Hose down (wash boots, gloves and protective clothing, if fully isolating protective clothing is used).
    - ♦ Remove outer protective clothing.
    - ♦ Wash hands and face.
    - ♦ Get monitored (if monitoring is available).
  - Before leaving the scene get a full decontamination (Instruction 6) and if decontamination is not performed — remain isolated until showered and all clothing changed (bag clothing).
  - Log out.

INSTRUCTION 8. MONITORING/DECONTAMINATION OF VEHICLES AND EQUIPMENT

User: Typically member of the fire brigade.

When to apply the Instruction: If first responder monitor/radiological assessor and necessary equipment are available and there is an indication that vehicles/equipment/items[38] may be contaminated by the possible presence of radioactive smoke, liquid or dust.

NOTE

Equipment or items which were inside of the inner cordoned area or any vehicle used for the transport of potentially contaminated victims cannot be released for general use until monitored by a radiological assessor/team. This includes private vehicles and taxis.

CAUTION

Some instruments can be saturated (be overwhelmed) by very high radiation levels and show a low or "0" reading in very dangerous areas. Approach the scene with an instrument that can read at least 100 mSv/h switched on and do not enter areas with ambient dose rates > 100 mSv/h.

(1) Establish an equipment monitoring and decontamination area in an area on the boundary of the inner condoned area with a background ambient dose rate below 0.3μSv/h and with needed decontamination supplies (e.g. fire hoses, scrub brushes and detergents). Water used for decontamination should be collected if it can be done without delaying any emergency operations.

(2) Perform an operational check of the monitoring instrument(s) in an area away from the scene:

- Check battery.
- Confirm that the instrument can measure ambient dose rates in the range of local background (typically between 0.05-0.2 μSv/h).
- Make sure you understand units displayed and how ranges are changed.
- Open beta window if available.
- Wrap instrument in plastic bag.
- Record the background level and instrument number.
- Keep one check instrument in a "clean area" and do not use it for routine monitoring.

(3) To ensure that any objects with an ambient dose rate > 100 μSv/h at 1 metre are identified and isolated before members of the public are entering monitoring area, have the public screened away from the monitoring area (walk within 2 metres of an instrument measuring in a range of 100 μSv/h or more). Isolate identified objects with an ambient dose rate > 100 μSv/h.

(4) When monitoring:

- Wear gloves and protective clothing as available, change gloves regularly.
- Follow personnel protection guidelines in Instruction 2.
- Periodically get monitored and if contaminated > 0.3 μSv/h, get decontaminated.
- Periodically confirm the instrument is operational and not contaminated (it can measure background). If contaminated, replace the plastic bag and re-check.

(5) Monitor the item for gamma contamination holding the monitor about 10 cm from the surface.

(6) Perform the following actions if contamination levels are > 1 μSv/h:

[38] This applies to the monitoring and decontamination of equipment, vehicles and other items that are important to the response efforts or public safety.

- Decontaminate using fire hoses, scrub brushes and detergents.
- Do not delay/interfere with the response to remove/replace contaminated filters.
- Re-survey the contaminated areas and perform the following:

If ambient dose rate at 10 cm is:	Perform the action:
> 1 μSv/h and <10 μSv/h	Use for response activities only.
> 10 μSv/h and <100 μSv/h	Use for critical response activities only (e.g. needed for transport of injured). The use of these items must be controlled. Once their use is no longer critical they should be isolated. The people who use this equipment must follow Instruction 2 and take all reasonable action to reduce their skin exposure (wear gloves) and limit use to less than a few hours.
> 100 μSv/h	Isolate and use only with radiological assessor approval.

(7) Only release potentially contaminated vehicles and equipment for general use when assessed by a radiological assessor and found to meet national criteria.

INSTRUCTION 9. FIELD TRIAGE FOR MASS CASUALTIES

User: Fire brigade until relieved by emergency medical service.

When to apply the Instruction: In case of a radiological emergency resulting in mass casualties.

(1) Establish the triage/first aid area outside the inner cordoned area and within the outer cordoned area.

(2) Consider using a flashing blue light to draw people towards the triage/first aid area.

(3) Categorize[39] people:

Priority 1: need immediate treatment.
Priority 2: need early treatment.
Priority 3: can wait for treatment.
No actions: no need for treatment.

(4) Tag victims with their medical conditions and category using the form in Appendix I.

NOTE

Serious medical problems always have priority over radiological concerns.
Those who are able to respond to a voice announcement to come to the gathering point most probably can wait for medical attention.
Keep families together.

(5) Provide first aid as required.

(6) Obtain an estimate on the number of victims the transport unit and hospital can handle.

(7) Take actions to limit the spread of contamination, if there is an indication that people could be contaminated:

- Persons with life-threatening injuries should be wrapped in blankets or sheets and transported to the hospital immediately.
- Persons with non-life threatening injuries and non-injured persons should undergo field decontamination/full decontamination, as appropriate (see Instruction 6).

(8) Inform the transport unit and the receiving medical facilities on the nature of event, number of injured people, nature of injuries, and cases of suspected or confirmed contamination or radiation exposure.

(9) Arrange for transportation of injured depending on their injuries:

- Life-threatening injuries should be transferred to the nearest hospital.
- Non-life threatening injuries should be transferred to the secondary hospital or designated hospital (for radiation induced injuries)[40].

(10) Coordinate activities with law enforcement/security team and FEMT when possible and if required.

(11) Have PIO make a public announcement to reduce the number of worried-well (self presenters) going to the local hospital unless they are injured. Indicate the place where they can go for monitoring and reassurance.

(12) Ask national EOC for additional resources or activate needed support at the national level.

---

[39] Capabilities of the local hospital, available resources at the scene, and transport capabilities need to be taken into account while establishing categories of injured people. A typical local hospital may be able to provide intensive care for about 10 people.

[40] Designated in the country to deal with radiation injuries. It maintains minimum required capabilities and resources for medical management of radiation emergencies at the national level.

SECTION D
RESPONSE CARDS

Adjacent cards, marked (1) and (2) are the front and back of the same card.

Incident commander actions in response to general radiological emergency

Incident commander actions in response to general radiological emergency (1)

- ❑ Stand off, observe and assess.
- ❑ Determine inner cordoned area.
- ❑ Reposition response personnel, vehicles and equipment.
- ❑ Follow personnel protection guidelines.
- ❑ Take life saving actions.
- ❑ Establish an ICP and staging area.
- ❑ Consider terrorism/bomb/second event.
- ❑ Check and identify packages, people, papers and vehicles.
- ❑ Mark inner cordoned area.
- ❑ Evacuate public from inner cordoned area.
- ❑ Request radiological assessor – get phone advice on radiation issues.

Incident commander actions in response to general radiological emergency (2)

- ❑ Request initial assessment from first responder monitor.
- ❑ Establish response areas/facilities.
- ❑ Account for all response personnel.
- ❑ Manage field triage, registration, monitoring and decontamination.
- ❑ Establish a security perimeter at scene and other facilities.
- ❑ Limit spread of contamination.
- ❑ Notify transport/medical facilities.
- ❑ Notify national EOC. Consider need for full response (specialised teams).
- ❑ Brief requested teams upon arrival.
- ❑ Keep the public informed through a single official source.
- ❑ Treat scene as a crime scene.
- ❑ Do not attempt recovery or decontamination of the scene.

Incident commander actions in response to radiological emergency involving lost or stolen source

Incident commander actions in response to radiological emergency involving lost or stolen source (1)

- ❑ Request a radiological assessor.
- ❑ Follow personnel protection guidelines.
- ❑ Secure area, treat as a crime scene.
- ❑ Conduct search and investigate.
- ❑ Ensure the security of other sources.
- ❑ Locate and isolate the source.
- ❑ Identify possibly exposed individuals.
- ❑ Make public announcement describing the source and hazards.

Incident commander actions in response to radiological emergency involving lost or stolen source (2)

- ❑ Notify nearby medical facilities to be on alert for symptoms of radiation exposure.
- ❑ Alert emergency services, border crossings and scrap dealers.
- ❑ Notify the national EOC.
- ❑ For public contamination or exposure follow Incident commander actions in response to general radiological emergency.

Actions of all first responders in a radiological emergency

Actions of all first responders in a radiological emergency (1)

- ❑ Protect yourself.
- ❑ Operate under the IC.
- ❑ Follow personnel protection guidelines (on back of card).
- ❑ Ensure that public follows public protection guidelines.
- ❑ Do not delay life saving actions due to presence of radiation.
- ❑ Direct media inquires to the public information officer.
- ❑ Treat scene as a crime scene.
- ❑ Follow your specific action guide.

Personnel protection guidelines (2)

- ❑ Follow your standard safety procedures.
- ❑ Be visually identifiable.
- ❑ Minimize time near a potentially dangerous source.
- ❑ Do not touch/hold suspected radioactive items.
- ❑ If applicable use available respiratory protection.
- ❑ Keep hands away from mouth, do not smoke, eat or drink and wash hands regularly.
- ❑ Ensure your name/activities performed are recorded.
- ❑ Get monitored and registered.
- ❑ Shower and change clothing as soon as possible.

Local hospital actions in radiological emergency

Local hospital actions in radiological emergency (1)

- ❑ Operate under the IC. Follow personnel protection guidelines.
- ❑ Brief health care staff on negligible risk in treating contaminated patients if appropriate precautions are followed.
- ❑ Have law enforcement provide a cordoned area around the hospital(s) to redirect worried-well to the secondary location.
- ❑ Prepare ambulance reception area and treatment area.
- ❑ Set up a controlled area and control lines.
- ❑ Prepare the medical staff. Use universal precautions.
- ❑ Assess and manage injuries (assumed to be contaminated): (1) Medical stabilization first; (2) Radiological survey (if possible); (3) Physical examinations and blood tests (CBC with differential) promptly. If internal contamination is suspected take nasal swabs.

Local hospital actions in radiological emergency (2)

- ❑ If the patient could not be checked for contamination, have him/her take a shower and change clothing as soon as possible (if will not adversely affect patient's medical status).
- ❑ If the patient is contaminated — perform full decontamination.
- ❑ Survey and transfer the uncontaminated patient to the clean area.
- ❑ Control the spread of contamination: Before exiting /removing from contaminated area (1) Survey staff, remove contaminated clothing and shower. (2) Survey equipment.
- ❑ Conduct clean up under direction of radiological assessor.
- ❑ Don't release areas and ambulance for normal use until approved by radiological assessor.
- ❑ Assess needs and request additional resources.

Indications of a possible radiological emergency and of a dangerous source

Indications of a possible radiological emergency (1)

- Suspected or actual bomb.
- Credible threats or threatening messages.
- Device that appears intended to spread contamination.
- Signs of possible contamination (e.g. spill)
- Gamma dose rates: > 100 μSv/h at 1 m from object or above the ground.
- Medical symptoms of radiation injuries.
- Building / area marked with the radiation symbol.
- Results of assessment of a radiological assessor.
- Neutron radiation.
- Dangerous source that is lost, stolen, damaged, in a fire, leaking, or involved in a terrorist act or explosion.

Indications of a dangerous source (2)

- A heavy container with the radiation symbol.
- Item emitting neutron radiation.
- Item with yellow I, II and III label.
- Package marked with type IP, A, B, C, LSA or SCO.
- Device used for teletherapy or brachytherapy.
- Radiography cameras or sources.
- Well logging sources.
- Dangerous quantity of material (> D-value)

Inner cordoned area (safety perimeter) for a radiological emergency

Inner cordoned area (safety perimeter) for a radiological emergency (1)

Situation with potentially dangerous source	Area
Initial determination — outside	
Unshielded/damaged	30 m around
Major spill	100 m around
Fire, explosion or fumes	300 m radius
Suspected bomb (potential RDD)	400 m radius or more
Initial determination — inside a building	
Damage, loss of shielding or spill	Affected and adjacent areas, including floors above and below

Inner cordoned area (safety perimeter) for a radiological emergency (2)

Situation with potentially dangerous source	Area
Initial determination — inside a building	
Fires/other event spreading materials throughout the building	Entire building and appropriate outside distance
Expansion based on radiological monitoring	
100 μSv/h dose rate at 1 m	Wherever these levels are measured

APPENDICES

Appendix I
Registry form

Date_____

Full Name:_____

Date of birth:_____/_____/_____ Sex: □ M □ F
Day Month Year

Nationality:_____ Place of birth:_____

ID type and number:_____

Current permanent full address:_____

Telephone No_____

Member of: □ Public □ Emergency Services □ Other (specify)_____

Witness to the incident: □ Yes □ No Photographed: □ Yes □ No

Possibly pregnant: □ No □ Yes If yes, estimate term:_____

Location(s) during emergency:_____

Time spent at each location:_____

_____

Radiological survey performed:□ No[41] □ Yes Instrument type:_____

Model:_____ Background reading:_____ Personal survey measurements:

< 1 μSv/h: □ > 1 μSv/h: □

Decontamination procedures performed:

Field decontamination: □ Yes □ No Full decontamination: □ Yes □ No

Medical triage category: (based on the medical condition):

Priority 1: □ need immediate treatment

Priority 2: □ need early treatment

Priority 3: □ can wait for treatment

No actions: □ no need for treatment

Scheduled for follow-up: □ Yes □ No

Remarks: _____

_____

_____

Signature:_____(full name)
Date: _____ Time: _____
Organization:_____
Telephone number:_____

Provide the form to Resource coordinator or _____ (specify)

[41] Should be managed as contaminated if not monitored or decontaminated.

Appendix II
Sample media releases

These example releases must be reviewed carefully and revised to conform with the emergency situation. The content of the media releases should be approved by the IC.

Example media releases are provided for:

- Use before specific information is available (holding statement).
- A radiological emergency to include RDDs and transport emergencies.
- A lost or stolen dangerous source.
- Discovery of a dangerous source in a public place (e.g. customs or post office).

See Appendix IV for example answers to questions concerning radiological emergencies.

Sample Holding Statement
(For use before specific information is available):

Date: [date of issue]
Time: [time of issue]

[News Release Number]

[Organization name] confirms that it has received a report of [nature of event]. According to the information received at this time, the [event] occurred at [time and location]. Reports indicate that [any confirmed information on the event] and that [any initial measures] measures are being taken to protect [the public, responders, products, trade, or specify as appropriate]. The [specify plan as appropriate] emergency plan has now been activated [and we have activated our public information centre].

[Organization name] is coordinating its activities with responders now at the scene and other involved agencies [specify as appropriate]. We will be providing further information as soon as it becomes available. [Provide details on timing of any updates or briefings]. The next [briefing/update] will take place at [location and/or time].

_____

For further information:

Name [name of contact for the media]:
Title [title of media contact]:
Organization:
Telephone:
Mobile:
Email:
Website:

Sample News Release
(for a radiological emergency to include RDDs and transport emergencies):

Date: [date of issue]
Time: [time of issue]

[News Release Number]

[Organization name] confirms that there is an event possibly involving radioactive material [nature of event]. According to the information received at this time, the [event] occurred at [time and location]. Reports indicate that [any confirmed information on the event] and that [any initial measures] measures are being taken to protect [the public, responders, food, products, trade or specify as appropriate]. The [specify plan as appropriate] emergency plan has now been activated [and we have activated our public information centre].

The public is advised on the following:

- do not handle, isolate and identify to [specify] any possible radioactive item (e,g fragment from a bomb or any item picked up at the scene).
- those who left the scene without being assessed by the [specify] should change their clothing, shower (if possible), wash hands before eating and go to [specify] to be assessed and get instructions.
- anyone who transported anyone (e.g. victims) must go to [specify the place] for individual monitoring and monitoring of vehicles for contamination.

[If an airborne release is suspected (specify, depending on scenario)] the public within about 1 km of [specify local description – roads, districts – that will be understandable to the public] are advised on the following:

- remain inside until [specify when any actual or possible release will be over];
- do not eat or drink anything that may have been contaminated (e.g. vegetables grown outside or rainwater) until informed otherwise;
- make sure that children are not playing on the ground;
- wash hands before eating;
- avoid dusty areas or activities that will make dust;
- do not be concerned about those evacuated (they are not dangerous to be near);
- do not go to the scene to volunteer or to help. If assistance is needed, announcements will be made.

If you have a health concern go to [once available specify a location away from the local hospital where monitoring will be performed and questions answered].

Medical practitioners should be alerted for patients that have symptoms of radiation exposure (burns with no apparent cause — the person does not remember being burned).

If you have any questions please call [give a hot line number where large number of calls will not interfere with the response].

We will be providing further information as soon as it becomes available. [Provide details on timing of any updates or briefings]. The next [briefing/update] will take place at [location and/or time].

For further information:
Name [name of contact for the media]:
Title [title of media contact]:
Organization:
Telephone: (land line and mobile:
Email:
Website:

Sample News Release
(for a lost or stolen source):

Date: [date of issue]
Time: [time of issue]

[News Release Number]

[Organization name] confirms that a dangerous radioactive item was lost/stolen [specify]. According to the information received at this time, it was lost/stolen [specify] at [time and location]. The [specify the governmental organization leading the response] is [specify initial measures being taken, e.g. conduct a search] and is asking the public for help in finding this dangerous item. The [specify plan as appropriate] emergency plan has now been activated [and we have activated our public information centre].

The item looks like [describe and provide picture or drawing if possible].

The public is advised on the following:

- This item is very dangerous and if found should not be touched and everyone should keep at least 10 metres away from it.
- Those who may have seen the item should immediately report on it to the [specify].
- If you touched or have been near the item you should contact [specify a phone number where large number of calls will not interfere with the response].

Medical practitioners are advised of the possibility that patients may appear with symptoms of radiation exposure [burns with no apparent cause — the person does not remember being burned].

Scrap metal dealers and buyers of used metal items are asked to be on alert.

If you believe you have information that may be helpful, please call [give a hotline number where a large number of calls will not interfere with the response].

We will be providing further information as soon as it becomes available. [Provide details on timing of any updates or briefings]. The next [briefing/update] will take place at [location and/or time].

For further information:

Name [name of contact for the media]:
Title [title of media contact]:
Organization:
Telephone:
Mobile:
Email:
Website:

Sample News Release
(for discovery of dangerous source in a public place (e.g. customs or post office):

Date: [date of issue]
Time: [time of issue]

[News Release Number]

[Organization name] confirms that the dangerous radioactive material was discovered at [specify]. According to the information received at this time, the material was discovered at [time and location]. Reports indicate that [any confirmed information on effects] and that [any initial measures] measures are being taken to protect [the public or specify as appropriate]. The [specify plan as appropriate] emergency plan has now been activated [and we have activated our public information centre].

The public is advised on the following:

- those who may have been near to where the material was found within the past [specify time interval] and/or may have been near to it while it was being carried/shipped [specify details] should contact [specify] to be assessed and get instructions.

Medical practitioners are advised of the possibility that patients may present with symptoms of radiation exposure [burns with no apparent cause — the person does not remember being burned]. If you believe you have information that may be helpful or questions please call [give a hotline number where a large number of calls will not interfere with the response].

We will be providing further information as soon as it becomes available. [Provide details on timing of any updates or briefings]. The next [briefing/update] will take place at [location and/or time].

_____

For further information:

Name [name of contact for the media]:
Title [title of media contact]:
Organization:
Telephone:
Mobile:
Email:
Website:

Appendix III
Minimum capability for effective first response

To respond to an emergency and to apply the Action Guides and Instructions provided in this publication, a minimum capability to respond must be in place. This capability does not need to be optimal. In the interest of quickly developing this interim capability, currently available means and resources should be used with only minimal additional arrangements (e.g. training).

These minimum capabilities include:

(1) Clear assignment of responsibilities during a radiological emergency. This should include provisions for the appointment of an individual from local emergency services who has the authority and responsibility to direct the response (incident commander). The authority of this position should be recognized by all the local and national organizations that may be part of the response. These arrangements can be informal initially and should be tested during a national tabletop exercise.

(2) Availability to the fire and police services of information on established users of dangerous quantities of radioactive material and designated transport routes in their jurisdiction. Contact points including telephone numbers should be readily available for each location and shipment.

(3) Information on telephone numbers for the response initiator (e.g. emergency dispatcher), known by local officials, where the public would report on actual or possible radiological emergency.

(4) First responders trained to perform the following tasks:
- fire fighting and rescue operations;
- emergency medical management
- law enforcement/security;
- forensic evidence management;
- public information;

(5) A radiological assessor and national radiological assessment team and other trained teams (expanded response) with expertise in applying this publication.

(6) A national capability (national EOC) that can:
- Provide immediate advice (over the phone):
  - on response to a radiological emergency based on this publication;
  - on interpretation of transport placards, labels and markings and provide emergency response advice consistent with international guidance [6];
  - on recognition and immediate treatment of possibly contaminated or exposed victims.
- Establish communication line between the IC and radiological assessor/team to provide on-going consultation and advice on dealing with the radiological hazard, including recognition of a radiological emergency, determining if a quantity of contamination or material is considered dangerous[42] and on appropriate response actions to a radiological emergency.
- Provide national level support to local responders to include: (1) a radiological assessor and radiological assessment team that are trained, equipped and qualified to assess alpha, beta, neutron and gamma emitting radiation, perform radiation surveys, perform dose assessments, control contamination, ensure radiation protection of emergency

[42] Appendix 8 in Reference [2] and References [5,7] provide guidance on determining if an amount of radioactive material is dangerous.

workers and formulate recommendations on protective actions and (2) other trained teams with expertise in applying the Action Guides and Instructions in this publication.
- Coordinate the national support provided to local officials (involves clearly assigned responsibilities).
- Provide 24 hour notification and dispatching.
- Implement the national levels actions specified in the national EOC Action Guide (AG 10).

(7) Designated hospital at the national level with trained specialists and provisions to perform immediate specialized treatment and management of a limited number of exposed and/or contaminated victims.

(8) Provisions to provide the guidance in this publication to local officials along with the guidance on where they can obtain assistance at the national level.

(9) Arrangements to ensure that all public announcements and media statements are coordinated with local officials.

(10) Provisions to obtain international assistance to include from the IAEA (as outlined in Reference [11]) for: radiological assessment, medical treatment, public affairs, criminal investigation and forensics. This should include provisions to request and coordinate these requests promptly.

(11) Provisions to provide information, on an ongoing basis, to border crossing, customs, postal offices, hospitals, and emergency services on the recognition and immediate actions in a radiological emergency, including information on those to be notified to initiate the response.

(12) A regular programme of training for all personnel who may be called upon to deal with a radiological emergency. Training should include regular field exercises.

Appendix IV
Frequently asked questions in a radiological emergency: suggested answers

CAUTION

These answers are general in nature and must be revised based on the emergency and local conditions and arrangements.

General opening remarks:

I am with ***[insert name of official source of information and recommendations***] and we are the official source of information concerning this emergency. We understand that you may be concerned or even frightened. It is very early in the emergency and many things are very uncertain but I will keep you informed of any information that can help you to make responsible decisions. I may not be able to answer all your questions either because I do not know the answer, so I will not speculate, or for security reasons.

Answers to questions:

1. ***Who is in charge?***

[Insert name] is responsible for coordinating the joint response to this emergency. The official in charge is ***[insert name of official source of information and recommendations]***. For further information, the public should contact *[name and phone number or website address*].

2. ***What can I do to ensure that my family and I are safe now?***

You should follow the directions from [***name of official source of recommendations***]. Currently you are advised to [***summarize current recommendations, see Instruction 3***]. You should also be careful when considering the assessments and recommendations from non official sources. In the past such assessments and recommendations have resulted in people taking actions that were not justified and have done more harm than good.

3. ***Is my family safe now? What could be the consequences for my health?***

Based on experience from past emergencies, it is very unlikely that anyone, including unborn children, has been exposed to a radiation level that will result in any detectable health effects. However, in some cases, it may be necessary to conduct a further evaluation to determine if someone needs medical treatment or follow-up. Therefore some people may be asked to come in for a further assessment. Being called in for such assessment is a precaution and does not mean that you are at undue risk. It is important to realize that assessing the risk from a radiological emergency is highly specialized and can only be performed by someone with experience in this area.

4. ***Why is it safe to be outside the safety boundary around the site of an emergency?***

During an emergency, initial measurements are taken to determine the areas in which people can safely remain. These measurements consider the immediate effects possible from the levels of radiation present. The boundary for any evacuation areas is established using criteria to ensure that people outside this area remain safe until further tests are performed. This includes considering children playing on the ground and pregnant women. Those living very close to such boundaries are safe from immediate effects in the short term. However, it would be prudent to [***list recommendations to the people outside the inner cordoned area, see Instruction 3***]. Over a longer period, some of the areas near the boundary may require further

measures, such as decontamination or brief evacuation, to reduce the risk of longer term effects from the cumulative exposure to low levels of radiation. In order to determine whether any such measures are needed, teams may be sampling and monitoring for radioactive contamination in the area. This does not mean that the area is unsafe; ongoing monitoring provides officials with the information needed to determine whether or not further measures might be needed in the area.

5. ***What is contamination and is it dangerous? Are the food, water, milk and other products safe?***

As a result of a radiological emergency, radioactive dust or liquid could get on the ground, products, food, in the water or even on a person. This is called contamination. The levels of contamination that could represent a health hazard would be very high, many times the amounts of radioactive material normally found in nature. The hazard from any contamination can only be determined based on criteria developed by experts and measurements taken by trained personnel. The criteria we are using to assess contamination are established well below the levels that could result in any health effects. (Therefore based on our current evaluation the following [***list***] are safe. **(or)** We are currently carrying on our evaluation and will inform you immediately on the results; but until notified you should [***insert recommendation***].)

6. ***I was monitored and contamination was found. Am I safe?***

People who may have been contaminated as a result of an emergency are monitored to assess the risk. Very low levels of radioactive materials can be detected by the instruments used to monitor for contamination. The levels of contamination that could represent a health hazard would be very high: many times the minimum amounts of radioactive material that can be detected by monitoring instruments or that are normally found in nature. The criteria used to determine if a person is contaminated to levels which warrant some actions (for example, showering and changing clothing) were established well below the levels that could result in any health effects. However, in some cases, it may be necessary to conduct a further evaluation to determine if someone needs medical treatment or follow-up. Therefore some people may be asked to come in for a further assessment. Being called in for such an assessment is a precaution and does not mean that you are at undue risk. It is important to realize that assessing the risk from a radiological emergency is highly specialized and can not be performed by anyone without experience in this area.

7. ***I am pregnant — what are the dangers for my baby?***

It requires very high levels of exposure to radiation to cause even a small chance that the baby will be affected. These levels would be at least a million times what you normally receive from natural sources of radiation in an hour. Determining the risk to the baby is very complex and does not depend solely on the levels of exposure to radiation. Local officials have criteria to identify those who should be assessed. Being called in for such assessment is a precaution and does not mean that your baby or you are at undue risk. The risk to your baby can only be assessed by an expert with experience in this field.

8. ***Why are higher doses for the public acceptable in this emergency rather than during the normal operation of a nuclear facility?***

Around a nuclear facility, such as a nuclear power plant, the dose limits for the public are established well below levels at which any health effects, including cancers, would be seen in

anyone, including pregnant woman or children. This is done to ensure that the facility is operated safely and that an accident is unlikely to cause any health concern. During an emergency dose criteria are established that also ensures that all members of the public are safe. The dose criteria used to decide on the actions taken during an emergency are established based on many factors such as ensuring those that are at risk in the near term are protected first.

9. ***How can I find out what dose I may have received and what it means to my health?***

We recognize that everyone is concerned about their health and the health of their loved ones. It is very early in the development of the emergency situation and it will be some time before an accurate assessment of the possible health consequences of the emergency can be made. It is important to realize that assessing the health risk from a radiological emergency is a highly specialized task and the risk can only be assessed by those who have experience in the field. We know that this emergency has caused considerable anxiety and you would like definitive answers now. But we also realize that it is important that any assessment be as good as possible. Therefore, we will inform every one of their risks and actions you should take as soon as possible. In some cases, it may be necessary to conduct a further evaluation to determine if someone needs medical treatment or follow-up. Therefore, some people may be asked to come in for a further assessment. Being called in for such assessment is a precaution and does not mean that you are at undue risk.

10. ***Immediately following the emergency I was checked for contamination and I was told to change my clothes, take a shower, and listen for official instructions; what am I listening for?***

The first responders screened people for external contamination using hand held instruments to determine who needed immediate decontamination to prevent serious injury. In the next phase of the response, specialists trained in radiological assessment determine the specific type, form and quantity of radioactive materials present at the scene. Based on their analysis they may recommend that additional monitoring or evaluations be performed to better determine the dose received by specific individuals.

Some people may be requested to present themselves for additional monitoring and evaluation. The request could be made by a public official using local radio or television if large numbers of people were involved, or you could be individually contacted if only a small number of people were exposed to the radiological hazard.

Annex
Basis for radiological criteria

This Annex is for use by the radiological assessor or other technically competent experts supporting the first responders. It provides a brief description of the basis for the radiological criteria (operational intervention levels, OILs) presented in this manual and also provides additional criteria for use by a radiological assessor [5].

Criteria determining the boundary of the inner cordoned area

For use by first responder monitor: Ambient dose rate of 100 μSv/h at 1 metre (Table 1 and Table 4 of Instruction 1)
Related criteria (for use by radiological assessor only): > 1000 Bq/cm^2 gamma/beta deposition [43] > 100 Bq/cm^2 alpha deposition[43]
Discussion
Only the ambient dose rate criterion of 100 μSv/h is provided for use by first responder monitors. This criterion can only be used to assess ground contamination from strong gamma emitters and can not be used to assess beta and alpha ground contamination which could represent a hazard from intake (inhalation of dust or inadvertent ingestion). Therefore, this ambient dose rate criterion should be used to increase the size of the inner cordoned area, and not to reduce it. In addition, the public near the scene should always be instructed to take those actions in Instruction 3 intended to reduce intake. Criteria in terms of ground deposition concentrations (Bq/cm^2) are provided for use by the radiological assessor for assessment of all types of radiological materials. The criteria are established at levels at which it would be warranted to relocate the public in order to reduce long term exposure. The criteria are based on the Generic Intervention Level (GIL) for temporary relocation (30 mSv averted in 30 days) from Reference [1]. These criteria are set at levels well below those at which any severe deterministic health effects would be observed. The following were considered in developing the criteria: • All the important isotopes, • All members of the public, including children and pregnant women, • Inadvertent ingestion for children playing outside, • Urban and non-urban environments, • External dose from penetrating radiation from deposited radionuclides, • Inhalation from re-suspension consistent with normal conditions, and • Normal activity. The criteria are conservative because it is assumed that the exposed individual is outside during entire exposure duration of 30 days; however, inhalation dose from re-suspension of deposited alpha emitters may be underestimated for very dusty conditions (e.g. ploughing in dry conditions). However, any dose from an emergency during dusty conditions would not approach that needed to result in severe deterministic health effects.

[43] The contamination levels are not provided for use by the first responder monitor because they can only be assessed by a radiological assessor based on instrument readings (operational criteria) developed in advance corresponding to these ground deposition concentrations.

Skin and clothing contamination criteria for determining if decontamination is warranted

For use by first responder monitor: > 1 μSv/h at 10 cm (Instruction 5)
Related criteria (for use by radiological assessor only): > 10000 Bq/cm^2 beta/gamma contamination[43] > 1000 Bq/cm^2 for alpha emitters[43]
Discussion
These criteria indicate the level of skin contamination which could represent a hazard from direct irradiation of the skin, from intake by inadvertent ingestion, or that could indicate that the person has already inhaled or ingested significant amounts of radioactive material. Only one ambient dose rate criterion of 1 μSv/h is provided for use by the first responder. This criterion can only be used to assess skin/clothing contamination from strong gamma emitters. Therefore the public near the scene should always be instructed to take those actions in Instruction 3 intended to reduce intake from inadvertent ingestions and risk from skin contamination (e.g. wash hands and face). They also should be registered in case further medical follow-up is indicated due to ingestion of alpha or beta contamination. The ambient dose rate criteria were established at levels for strong gamma emitters that can be easily detected under emergency conditions but still correspond to contamination levels more than 100 times below those at which severe deterministic health effects would be expected. Criteria in terms of concentrations (Bq/cm^2) are provided for use by the radiological assessor for assessment of all types of radioactive materials. The criteria were established at levels which are below those at which contaminated people would experience deterministic health effects warranting medical treatment or follow-up [8]. The following were considered in the developing the criteria: • All the important isotopes, • All members of the public, including children and pregnant women, • Inadvertent ingestion of contamination from the skin, • External dose from skin contamination, and • Skin contamination as an indicator of inhalation dose. Generally conservative assumptions were used in the calculations (e.g. it is assumed that the skin contamination is undiminished for 4 days). For inhalation it was assumed that the skin contamination may have resulted from an airborne cloud and thus is an indicator of inhalation dose.

Criteria for screening of groups and locations, to ensure that any sources that could give ambient dose rates above 100 μSv/h are isolated

For use by first responder monitor: > 100 μSv/h at 1 metre (AG. 11)
Discussion
This criterion is used to screen areas or groups of people to locate an object, exposure from which could result in severe deterministic health effects if carried or handled. The criteria were established at the level of ambient dose rate at 1 metre from a source that has about 1/10 the activity that has been shown (based on experience) to cause radiation injures if carried (the D_1 values, Refs. [2,7]).

Equipment or vehicle contamination criteria

For use by first responder monitor:
Ambient dose rate at 10 cm (Instruction 8):

> 1 μSv/h and < 10 μSv/h: use of equipment or vehicle for response activities only

> 10 μSv/h and < 100 μSv/h: allow use of equipment or vehicle for critical response activities only

> 100 μSv/h: isolate equipment or vehicle and use only with radiological assessor approval

Discussion

These criteria can only be used to assess contamination from gamma emitters and can not be used to adequately assess beta and alpha contamination which could represent a hazard from intake by inadvertent ingestion or skin dose from contamination. Therefore the response personnel using equipment that may be contaminated should always take actions to reduce intake from inadvertent ingestions (e.g. wash hands and face) and skin dose from contamination (e.g. wear gloves).

The criteria were set up on the levels to ensure that responders are protected and that critical equipment will remain available:

- >1 μSv/h and < 10 μSv/h:

  At this level there is no hazard of severe deterministic health effects from external exposure. This level was established to be consistent, assuming a 10% transfer rate, with that at which public and responders would be advised to be decontaminated in accordance with Instruction 5.

- >10 μSv/h and < 100 μSv/h:

  Allow use of critical items. This level may be the lowest ambient dose rate that can be effectively measured near the boundary of the inner cordoned area. For gamma emitters the dose resulting from the use of items contaminated at this level will be well below that resulting in severe deterministic health effects.

- >100 μSv/h:

  Isolate and do not use without approval of radiological assessor. This criterion is at a level that *should be* well below that resulting in severe deterministic health effects for gamma emitters. However, it was selected to ensure that severe deterministic health effects are not possible taking into account uncertainties in measurement techniques.

Generally conservative assumptions were used to establish these criteria. It is assumed that the contaminated area is almost in contact, through clothing, with a specific area of tissue for 10 hours. Experience has shown that a much lower dose would be expected in the tissue due to movement of the source relative to the tissue over the 10 hours. It is also assumed that the ambient dose rate to the tissue itself is 1000 or more times the ambient dose rate measured at 10 cm. Assumptions used in calculation will overestimate the ambient dose rate to the tissue for most contamination scenarios (e.g. if the contamination covers an area of more than about 1 cm^2).

In all cases the effective dose to the whole body in 10 hours is below the emergency worker turn back dose guidance in Table 5 of Instruction 2.

See Reference [8] for a discussion of the thresholds for deterministic health effects and Reference [7] for a discussion of exposure scenarios.

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ABBREVIATIONS

EMS	emergency medical service
EOC	emergency operations centre
FEMT	forensics evidence management team
IC	incident commander
ICP	incident command post
ICS	incident command system
OIL	operational intervention level
PIC	public information centre
PIO	public information officer
RDD	radiological dispersal device

DEFINITIONS

(Definitions marked with an asterisk apply for the purposes of the present publication only.)

arrangements (for emergency response)

The integrated set of infrastructure elements necessary to provide the capability for performing a specified function or task required in response to a nuclear or radiological emergency. These elements may include authorities and responsibilities, organization, coordination, personnel, plans, procedures, facilities, equipment or training.

contamination*

Radioactive substances (dust, dirt, liquid) on surfaces (e.g. skin) , or within solids, liquids or gases (including the human body), where their presence is unintended or undesirable.

dangerous source

A source that could, if not under control, give rise to exposure sufficient to cause severe deterministic effects. This categorization is used for determining the need for emergency response arrangements and is not to be confused with categorizations of sources for other purposes.

deterministic effect

A health effect of radiation for which generally a threshold level of dose exists above which the severity of the effect is greater for a higher dose. Such an effect is described as a 'severe deterministic effect' if it is fatal or life threatening or results in a permanent injury that reduces quality of life.

emergency

A non-routine situation or event that necessitates prompt action, primarily to mitigate a hazard or adverse consequences for human health and safety, quality of life, property or the environment. This includes nuclear and radiological emergencies and conventional emergencies such as fires, release of hazardous chemicals, storms or earthquakes. It includes situations for which prompt action is warranted to mitigate the effects of a perceived hazard.

emergency plan

A description of the objectives, policy and concept of operations for the response to an emergency and of the structure, authorities and responsibilities for a systematic, coordinated and effective response. The emergency plan serves as the basis for the development of other plans, procedures and checklists.

emergency preparedness

The capability to take actions that will effectively mitigate the consequences of an emergency for human health and safety, quality of life, property and the environment.

emergency procedures

A set of instructions describing in detail the actions to be taken by response personnel in an emergency.

emergency response

The performance of actions to mitigate the consequences of an emergency for human health and safety, quality of life, property and the environment. It may also provide a basis for the resumption of normal social and economic activity.

emergency services

The local off-site response organizations that are generally available and that perform emergency response functions. These may include law enforcement, fire fighters and rescue brigades, ambulance services and control teams for hazardous materials.

emergency worker

A worker who may be exposed in excess of occupational dose limits while performing actions to mitigate the consequences of an emergency for human health and safety, quality of life, property and the environment.

exposure

The act or condition of being subject to irradiation. Exposure can be either external exposure (due to a source outside the body) or internal exposure (due to a source within the body).

field triage*

Triage at the scene of radiation emergency. See *triage* for details.

field decontamination*

Decontamination at the scene of radiation emergency. As this activity needs to be quick, simple and effective, it usually includes the following as possible: removal of outer clothing, washing of face and hands, covering of victim in the blanket. Further decontamination is usually applied at the later stage of response.

first responder

The first members of an emergency service to response at the scene of an emergency.

inadvertent ingestion*

Ingestion (eating) of a hazardous substance that occurs unintentionally (by chance) while eating, drinking or smoking in contaminated areas or with contaminated hands. It can also occur as the result of placing ones hands near the mouth.

mass casualty event*

Any event resulting in number of victims large enough to disrupt the normal course of emergency and health care services.

nuclear or radiological emergency

An emergency in which there is, or is perceived to be, a hazard due to:

(a) the energy resulting from a nuclear chain reaction or from the decay of the products of a chain reaction; or
(b) radiation exposure.

off-site

Outside the site area.

on-site

Within the site area

operational intervention level (OIL)

A calculated level, measured by instruments or determined by laboratory analysis, that corresponds to an intervention level or action level. OILs are typically expressed in terms of dose rates or of activity of radioactive material released, time integrated air concentrations, ground or surface concentrations, or activity concentrations of radionuclides in environmental, food or water samples. An OIL is a type of action level that is used immediately and directly (without further assessment) to determine the appropriate protective actions on the basis of an environmental measurement.

operator (or operating organization)

Any organization or person applying for authorization or authorized and/or responsible for nuclear, radiation, radioactive waste or transport safety when undertaking activities or in relation to any nuclear facilities or sources of ionizing radiation. This includes private individuals, governmental bodies, consignors or carriers, licensees, hospitals and self-employed persons. It includes those who are either directly in control of a facility or an activity during use (such as radiographers or carriers) or, in the case of a source not under control (such as a lost or illicitly removed source or a re-entering satellite), those who were responsible for the source before control over it was lost.

protective action

An intervention intended to avoid or reduce doses to members of the public in emergencies or situations of chronic exposure.

radiological assessor

A person who in the event of a nuclear or radiological emergency assists the operator of a dangerous source by performing radiation surveys, performing dose assessments, controlling contamination, ensuring the radiation protection of emergency workers and formulating recommendations on protective actions. This radiological assessor would generally be the radiation protection officer.

radiological dispersal device (RDD)*

A device to spread radioactive materials using conventional explosives or other means.

regulatory body

An authority or a system of authorities designated by the government of a State as having legal authority for conducting the regulatory process, including issuing authorizations, and thereby regulating nuclear, radiation, radioactive waste and transport safety.

response organization

An organization designated or otherwise recognized by a State as being responsible for managing or implementing any aspect of an emergency response.

source*

Anything that may cause radiation exposure.

tag*

The label or documents attached to evidence, items, or people documenting specific information for follow-up or maintenance of evidence.

transnational emergency

A nuclear or radiological emergency of actual, potential or perceived radiological significance for more than one State. This includes:

(1) A significant transboundary release of radioactive material (however, a transnational emergency does not necessarily imply a significant transboundary release of radioactive material);
(2) A general emergency at a facility or other event that could result in a significant transboundary release (atmospheric or aquatic) of radioactive material;
(3) Discovery of the loss or illicit removal of a dangerous source that has been transported across or is suspected of having been transported across a national border;
(4) An emergency resulting in significant disruption to international trade or travel;
(5) An emergency warranting the taking of protective actions for foreign nationals or embassies in the State in which it occurs;
(6) An emergency resulting in or potentially resulting in severe deterministic effects and involving a fault and/or problem (such as in equipment or software) that could have serious implications for safety internationally;
(7) An emergency resulting in or potentially resulting in great concern among the population of more than one State owing to the actual or perceived radiological hazard.

triage*

Rapid method utilizing simple procedures to sort persons into groups based on their injury and/or disease for the purpose of expediting clinical care and maximizing the use of the available clinical services and facilities.

turn back guidance*

An integrated dose reading on a safe-reading dosimeter indicating that an emergency worker dose guidance has been exceeded and that the emergency worker should leave the areas where further significant dose is possible.

urgent protective action

A protective action in the event of an emergency which must be taken promptly (normally within hours) in order to be effective, and the effectiveness of which will be markedly reduced if it is delayed. The most commonly considered urgent protective actions in a nuclear or radiological emergency are evacuation, decontamination of individuals, sheltering, respiratory protection, iodine prophylaxis and restriction of the consumption of potentially contaminated foodstuffs.

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