



# A FRAMEWORK FOR MAJOR EMERGENCY MANAGEMENT

WORKING DRAFT

MULTI-AGENCY PROTOCOL (1)

MULTI-AGENCY RESPONSE TO RADIO-  
LOGICAL / NUCLEAR EMERGENCIES





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## PART I

### 1 INTRODUCTION TO PROTOCOL

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This protocol is prepared under the aegis of the National Steering Group on Major Emergencies, with the assistance and co-operation of the Nuclear Safety Section of the Department of Environment, Heritage and Local Government and the Radiological Protection Institute of Ireland (RPII). It is prepared as part of the implementation of the Framework for Major Emergency Management<sup>1</sup> via the Major Emergency Development Programme 2006 – 2008. It is intended that the draft protocol will be formally approved by all relevant agencies below when the consultation process is complete.

This protocol is prepared to enable the Principal Response Agencies (the Garda Síochána, The Health Service Executive and the Local Authorities) and their Principal Emergency Services to work together and to respond effectively and safely to, and to assist them in working, if necessary, with the RPII and others to successfully manage emergencies that may have a radiological/nuclear dimension.

The protocol is based on best available scientific knowledge from international sources, including the International Atomic Energy Agency (IAEA), World Health Organisation (WHO), and the International Commission on Radiological Protection (ICRP). In particular, it relies on the advice given in the IAEA's "Manual for First Responders to a Radiological Emergency" (Oct 2006).

The Framework for Major Emergency Management makes provision for linking the local and regional level co-ordination arrangements of the principal response agencies with those of specific, national-led emergencies. Section 5 of this protocol provides

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<sup>1</sup> The Framework for Major Emergency Management was devised to enable the Garda Síochána, the Health Service Executive and Local Authorities (the Principal Response Agencies) to prepare for and make a co-ordinated response to major emergencies resulting from local and regional events such as fires, transport accidents, hazardous substances incidents and severe weather. The Framework puts in place arrangements that facilitate the three Principal Response Agencies to co-ordinate their efforts whenever a major emergency occurs.

for linking the “National Emergency Plan for Nuclear Accidents” (NEPNA) with the Major Emergency Plans of the Principal Response Agencies, and sets out how this link is to be achieved.

It is agreed by all the agencies listed below that, as provided for in Section 5.8 of the Framework for Major Emergency Management document, its provisions will apply to all radiological/ nuclear emergencies, regardless of the scale of the incident, and whether a major emergency<sup>2</sup> is declared or not. The response to use of radiological/ nuclear materials as weapons (as in Radiological Dispersal Devices) are governed by the Inter-Agency Protocol No 3 of this series.

This version of the Protocol is a draft for consideration by interested parties. If you wish to make comment on this draft, please contact the Major Emergency Management Team, Department of Environment, Heritage and Local Government, Room G 59, Custom House, Dublin 1 or email at [mem@environ.ie](mailto:mem@environ.ie)

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<sup>2</sup> A Major Emergency is defined as: *an event which, usually with little or no warning, causes or threatens death or injury, serious disruption of essential services or damage to property, the environment or infrastructure beyond the normal capabilities of the principle emergency services in the area in which the event occurs, and requires the activation of specific additional procedures and the mobilisation of additional resources to ensure an effective, co-ordinated response.*

## 2 AGREEMENT and UNDERTAKING

It is hereby agreed that each of the agencies below will:

- Work with the other signatory agencies in accordance with the provisions of this protocol to manage emergencies having a nuclear/ radiological dimension;
- Adopt the provisions of this protocol into its Risk Assessment and Major Emergency Plans (in the case of the Principal Response Agencies) or other specific national emergency plans as appropriate, and into other relevant internal orders, code instructions, standard operating procedures, aide memoires etc.;
- Prepare to undertake the roles specified in this protocol and, in particular, will prepare its own internal procedures, consistent with the provisions of this protocol, for undertaking the roles (both general and specific) assigned to it;
- Promulgate this protocol and its own internal procedures within the agency, and undertake appropriate training for relevant staff based on the information contained in this protocol;
- Participate in inter-agency exercises to enhance preparedness;
- Report to the NSG on preparedness and on involvement in emergency events as appropriate.

Signed for and on behalf of:

<b>DEHLG</b>	<b>DJELR</b>	<b>DH&amp;C</b>	<b>DoD</b>
<b>CCMA</b>	<b>AGS</b>	<b>HSE</b>	<b>PDF</b>
<b>NSS</b>			<b>CDB</b>
<b>RPII</b>			



### 3 SUMMARY OF KEY POINTS

- This protocol will inform and underpin response to emergencies with a nuclear/ radiological dimension.
- The relevant local authority will act as “lead agency”, in accordance with provisions of Section 5.4.2 of the Framework for Major Emergency Management, for the purpose of co-ordinating response;
- The Department of Environment, Heritage and Local Government will act as “lead government department” for nuclear/ radiological emergencies in accordance with the National Emergency Plan for Nuclear Accidents;
- Each agency will undertake the specific roles assigned to it in the later sections of this Protocol in responding to nuclear/ radiological emergencies. These are summarised in the Table below;
- Each agency will participate fully in the inter-agency co-ordination arrangements for the response;

**TABLE 1**  
**SUMMARY OF AGENCY ROLES**

Agency	R/N Id & Notification of others	Mobilisation	Lead Agency	Radiation measurement	Advice on Public Safety	Public Information	NEPNA Counter Measures	Evacuation	Clean-up/ Env
Local Auth	X	X	X	X	X	X	X	X	X
AGS	X	X					X	X	
HSE	X	X			X	X	X	X	
RPII	X	X		X	X	X	X		
DEHLG NSS		X	LGD		X	X	X		
Others		X <sup>3</sup>		X <sup>4</sup>	X		X <sup>5</sup>		X <sup>6</sup>

X denotes a role for the agency

<sup>3</sup> A range of organisations other than the 5 specified may be involved

<sup>4</sup> Licensed site holders should have appropriate radiation measuring capability

<sup>5</sup> The NEPNA specifies the full range of public services potentially involved in countermeasures

<sup>6</sup> Specialist contractors may be engaged in the tasks of cleaning up contaminated areas

## PART II

### 4 RESPONSE PROCEDURES FOR EMERGENCIES INVOLVING RADIOACTIVE SOURCES

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#### 4.1 Introduction

This section of the Protocol sets out the agreed response procedures and details the roles of the Principal Response Agencies for emergencies involving radioactive sources.

The primary objectives of the response are to:

- Protect the public and emergency services personnel involved in the response by taking all reasonable actions to minimise health effects.

#### 4.2 Normal Hazard Material (Haz Mat) Response Procedures.

The response of the principal emergency services to incidents involving radioactive substances should follow existing normal Hazardous Materials response procedures, including, where necessitated by the nature or scale of incidents, declaration of a Major Emergency. The generic structures and tools for co-ordination of multi-agency response to major emergencies, including site management arrangements and the information management system should be applied for multi-agency response to incidents involving radioactive substances.

Normal hazmat response procedures and guidance contained in Protocol No 4 of this series supporting the Major Emergency Framework, provide for response by the three principal emergency services, with roles allocated to each service.

Radiological emergencies will differ from other hazmat incidents however in the respect that:

- Emergency services personnel usually have little experience as these incidents are very rare;
- Radioactive materials can cause radiation exposure even when persons are not in contact with them;

- Health effects arising from an exposure may not appear for days, weeks or even years;
- The public, media and emergency services personnel themselves often have an exaggerated fear of exposure to radiation.
- Measurement of radiation levels is necessary to confirm the presence or otherwise of a radiation hazard.

### **4.3 Protection of Emergency Services Personnel and the Public**

Detailed information on the protection of emergency services personnel and the public are provided in Sections 1.10 and 1.11 respectively of Appendix 1 of this Protocol. Even without radiation detection equipment, emergency services personnel and the public can protect themselves in the event of a radiological emergency by adhering to the following protection guidelines:

- 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.
- Female emergency services personnel who are aware that they may be pregnant should inform their superior officer and should be excluded from operations potentially involving radiation.

Those who may have been significantly contaminated or exposed should be monitored for radioactive contamination. If monitoring cannot be performed immediately, they should shower and change their clothing as soon as possible. Patients with radioactive material on them or inside their bodies are said to be contaminated.

Medical evaluation of those potentially exposed and/or contaminated may be necessary in order to determine their subsequent medical management. Therefore in association with the Controller of Operations HSE, those who are involved in radiological emergency should be registered. A sample registry form is given in Appendix 3.

Clear public instructions/ information should be provided in order that the recommended actions are taken efficiently, undue concerns are allayed and inappropriate or unwarranted actions which can result in damaging psychological and economic consequences are minimized. In addition, the public and emergency services personnel should be reminded that advices from unofficial sources may be wrong or misleading. They should act only on information from official sources involved in managing the response/ emergency.

#### **4.4 Immediate Steps to be taken by the Principal Emergency Services**

Where an event/ incident occurs which involves, or is suspected to involve, a significant radiological threat, the following immediate steps should be taken:

- Notify other emergency services, both via communications/control centre and those already on site;
- All three PES services to respond to the site;
- The Radiological Protection Officer or Adviser (RPO/ RPA) of the licensee to be mobilised where an emergency involves a licensed radioactive source (whether on-site or during transport);
- The Local Authority to notify the RPII duty contact officer via the Garda Síochána Communications & Control Centre, Harcourt Square, Dublin 2 at (Telephone Number provided in Agency circular). The notification should be made in the following format:

“This is Local authority XX. An incident involving (or suspected to involve) a significant radiation hazard had occurred at (location). The MEP has/ has not been activated. Will you please notify the RPII duty contact officer of the

above, and ask the RPII to make contact with ..... (specify name and phone number, and that of an alternate) and to mobilise a radiation assessment team and/ or provide such advice or services as may be appropriate for the circumstances”.

#### **4.5 Co-ordination of the On-site Response**

- The relevant local authority will act the “lead agency” for hazardous materials emergencies including for radiological or nuclear emergencies as per Appendix 7 of the Framework (Table 7.1).
- Fire Services, as PES of the local authority, will act on behalf of the lead agency and the senior fire officer on site will assume the role as the “on-site co-ordinator” for the local authority. (The Lead Agency is the Garda Síochána in the case of a suspected Radiological Dispersal Device (RDD) or so-called Dirty Bomb. The Garda Síochána may designate such locations as a crime scene.)
- Fire Service to lead development of “Site Management Plan” to match the typical site management arrangements and elements as set out in Appendix 10 of the Framework and to initiate and operate Information Management system. Each agency to contribute.
- It is the responsibility of the lead agency to ensure that inclusive decisions are made to:
  - Determine, as set out in Section 4.6 below (and modified after consultation with RPO/ RPA or RPII) the danger area and zones/distances for protective action
  - Provide information for the safety of the public locally and/ or protective action using a precautionary principle until such time, after consultation with the RPII, the advice is modified.
  - Establish site management arrangements,
  - Notify all responding agencies of the existence of a danger area, etc

Consideration should be given by lead agency to declaring a Major Emergency, where the implications of the incident require significant off-site support/

management and the Local Co-ordination Centre and Crisis Management Teams may be best placed to provide this support.

- The on-site co-ordinator should be provided with appropriate support/information from off-site sources in accordance with the authorities own procedures;
- Each principal response agency exercises command over its own resources in accordance with its normal command structure, command systems and arrangements.

#### **4.6 Initial Assessment of the Situation**

The three emergency services should participate in an initial assessment of the situation, led by the fire service, to determine if an event may be a potential radiological emergency, using the indications below:

- Building /vehicle/area marked with the radiation symbol (see Section A1.4).
- Medical symptoms of radiation injuries (such as burns without an apparent cause).
- Dangerous source that is lost, stolen, damaged, involved in a fire or leaking,
- Results of assessment by an RPO/ RPA or where Gamma dose rates:  $\geq 100 \mu\text{Sv/h}$  at 1 m from object or at 1m above the ground.
- Other information indicates the possible presence of radiation

If a radioactive substance release is believed to have occurred, the first task is the identification of the quantity of radioactive substance, the extent of contamination if any, the type of radiation hazard concerned and the physical and chemical form of the substance. This information will help to inform decisions as to whether the situation concerned poses dangers to emergency services personnel, the public and the environment. As soon as possible, the onsite coordinator should confer with the RPO/ RPA or with RPII representative and assess information such as the amount of a specific radioactive material or unusual readings.

#### **4.7 Site Management and an Inner Cordon Area (Danger Area)**

One of the first decisions to be taken when it is determined there is a radiological emergency is to establish an inner cordoned area (or Danger Area) in line with the

criteria set out in Table 2 below. The Danger area should be established as part of the typical site management layout set out in Appendix 10 of the Framework.

The perimeter of the Danger Area should be established where it can be easily defined, recognized (e.g. roads) and secured. Within the Danger Area the guidelines set out in Section 4.3 above for protecting emergency services personnel and protecting the public should be followed. Members of the public should be evacuated from within the designated Danger Area immediately.

**TABLE 2**  
**SUGGESTED RADIUS OF INNER CORDONED AREA**  
**FOR A RADIOLOGICAL EMERGENCY**

Situation	Initial Inner Cordoned Area
<b>Initial Determination – Outside</b>	
Unshielded or damaged potentially dangerous source <sup>7, 8</sup>	30 m around
Major spill from a potentially dangerous source	100m around
Fire, explosion or fumes involving a potentially dangerous source	300m around
<b>Initial Determination – Inside a Building</b>	
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 (ventilation system)	Entire building and appropriate outside distance as indicated above
<b>Expansion of Danger Area based on Radiological Monitoring</b>	
Ambient dose rate of 100 µSv/h	Wherever these levels are measured

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**Indications of a dangerous source:**

- A heavy container with the radiation symbol.
- Item with radiation warning labels.
- Item with relevant transport UN numbers or markings.
- Device used for cancer treatment (teletherapy or brachytherapy).
- Radiography cameras or sources.
- Well logging sources used in drilling operations.
- Dangerous quantity of material (> D-value, as assessed by a radiological assessor).

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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.

#### 4.8 Role of the On-site Coordinator

In cases of potential or actual significant public external exposure or radioactive contamination, the following should be the main considerations of the On-site Coordinator.

- Assess the situation as set out above with other services;
- Determine if possible radiological hazard exists (and seek or ensure that RPO/RPA or RPII support has been sought)
- Determine and mark Danger Area and develop and inform all agencies of site management arrangements, including danger area
- **Do not delay life saving actions because of the potential presence of radioactive materials, but ensure that emergency services personnel follow appropriate protection advice;**
- Rescue people in life threatening situations;
- Ensure all persons accounted for and search for missing persons if required;
- Evacuate the public from the vicinity of the incident, starting with the danger area;
- Control access into and keep account of emergency services personnel in danger area and ensure all emergency services follow appropriate protection advice;
- Register all persons who may have been exposed to the radiation; (see Appendix 3)
- Ensure that conventional hazards (e.g. fire) are dealt with;
- Where practicable, take steps to limit the spread of contamination; Control the further spread of contamination by decontaminating personnel as they leave the danger area;
- Ensure that first aid is provided to injured persons outside the danger area, and that injured persons are triaged/ transported to hospital as soon as possible;
- Establish decontamination facility. **Do not delay transport of casualties from the scene to hospital for decontamination. Instead, outer clothing should be removed, the casualties wrapped in a blanket, and tagged as possibly contaminated;** Ensure that those dealing with potentially



contaminated casualties are aware that this is the case, so that casualties can be assessed and facilities decontaminated if necessary;

- Seek advice of RPO/ RPA and RPII re managing the situation, and adjust the plan in light of this advice;
- Ensure that appropriate information is made available to the public, who may have been contaminated but have left the site, and to reassure the “worried well” - those who are afraid they may have been exposed in some way although they have not;
- Prepare for extended duration operations;
- Prepare for hand-over of site for investigation where appropriate or clean-up (subject to safety advice)

## **4.9 Roles of Principal Response Agencies**

### **4.9.1 The Garda Síochána –**

- Assist the on-site coordinator, and participate in on-site coordination group, and undertake appropriate actions arising from the decisions of this group;
- Securing the scene, establishing cordons in accordance with the site management plan and access thereto,
- Evacuation of the public (where necessary) and documenting members of the public involved in the emergency,
- Traffic and crowd control,
- Protecting the scene for subsequent investigation and investigation of crimes, and working with the RPO/RPA or RPII to deal with potentially contaminated evidence
- Ensuring that members follow appropriate safety precautions;

### **4.9.2 Health Service Executive**

- Assist the on-site coordinator, and participate in on-site coordination group, and undertake appropriate actions arising from the decisions of this group;

- Start (or continue if already underway) first aid and field triage. In association with HSE Controller of Operations at Site confirm/ arrange for transport and treatment of casualties with life-threatening injuries as a priority. Those with non-life threatening injuries requiring treatment in hospital should be decontaminated at on site facility to limit spread of contamination. The transport of critically injured casualties to hospital should not be delayed. 90% of contamination risk posed by contaminated casualties to emergency response personnel is removed by decontamination. **Therefore outer clothing should be removed, (and tagged as possibly contaminated) and the casualties wrapped in a blanket, (Emergency decontamination)**<sup>9</sup> Ensure that those dealing with potentially contaminated casualties are aware of **current status of casualty** so that casualties can be assessed and treated appropriately.
- Ensure that all health services personnel are aware of appropriate safety precautions, and how this protects them from the remaining negligible risk from a contaminated patient, and that normal life-saving actions should not be interfered with by actions to limit the spread of contamination;
- HSE to mobilise members of its staff who are RPOs for HSE licensed radiation facilities as necessary and appropriate for both site and hospital locations.
- Public Health section to be included in HSE response where the incident may give rise to concerns about public health.
- Establish facility (s) where members of the public concerned about radiation (the “worried well”) may be directed for monitoring/ information/ reassurance.

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<sup>9</sup> Prior to the arrival of dedicated equipment, emergency decontamination may be carried out using fire-fighter decontamination or improvised facilities. This practice should be carried out under the guidance of medical personnel. It should be noted that emergency decontamination carries risks for vulnerable groups, such as the elderly and the injured.

- In association with the HSE On-Site Controller of Operations, register all casualties dealt with/ involved using form in Appendix 3.
- Pre designated receiving hospitals should activate their radiological incident response plan to receive potentially contaminated casualties.
  - Screen for dangerous sources (ambient dose rate > 100  $\mu$ Sv/h at 1 m) and isolate such sources if found;
  - Designate ambulance reception area and treatment area for anticipated number of casualties;
  - Clear this area of others, restrict access and redirect normal casualties/ patients;
  - Cover/ protect areas to be trafficked/ involved with plastic to assist later decontamination;
  - Prepare and operate a patient triage facility at or near the entrance to the treatment area;
  - Patients identified as requiring decontamination should then be decontaminated as per local arrangements.
  - Perform medical stabilisation first; if necessary life-saving measures may be performed prior or during decontamination.
  - Have sufficient instruments and supplies (outer gloves/ dressings) available to change as they become contaminated;
  - Medical staff to use universal precautions. Use two sets of gloves (outer gloves should be easily removable and replaced between patients);

Ambulance personnel to stay with vehicle until surveyed and released by RPO monitor/ assessor.

#### **4.9.3 Local Authorities (including Fire Services and Civil Defence)**

##### **4.9.3.1 Fire Service**

- Senior officer of fire brigade assumes role as the on-site coordinator, and convenes the on-site coordination group, and

undertakes appropriate actions arising from the decisions of this group;

- Protection and rescue of persons and property, **Do not delay life-saving operations because of the presence of radioactive material; Wear standard fire-fighting protective clothing and instruct use of BA.**
- Deal with other threats, conventional hazards such as fire. The presence of radioactive material should not influence the fire control process and the selection of techniques.
- Fire Service to contain the radioactive substances, if practicable.
- Perform contamination control for those leaving the danger area;
- Undertake registration/ monitoring / decontamination of persons,
- Identifying and dealing with radiological spills and emissions, Local authority will rely on RPO/RPA of licensed sites and may mobilise Civil Defence Scientific Intelligence Officers (SIO) who are provided with radiation monitoring equipment, where appropriate.
- Evacuation of public from danger area,

#### 4.9.3.2

##### **Local Co-ordination Centre**

Local authority to activate Local co-ordination centre with objectives of

- Assisting/ supporting the on-site co-ordinator and other services at the site
- Linking with RPII
- Providing information for the public
- Dealing with media interest in the incident
- Managing other consequences of the incident
- Site clearance and clean-up operations. Local authority to arrange for clean-up/ decontamination at the scene and or identified secondary sites with advice from assessors (after the Garda Síochána has concluded any necessary investigation).

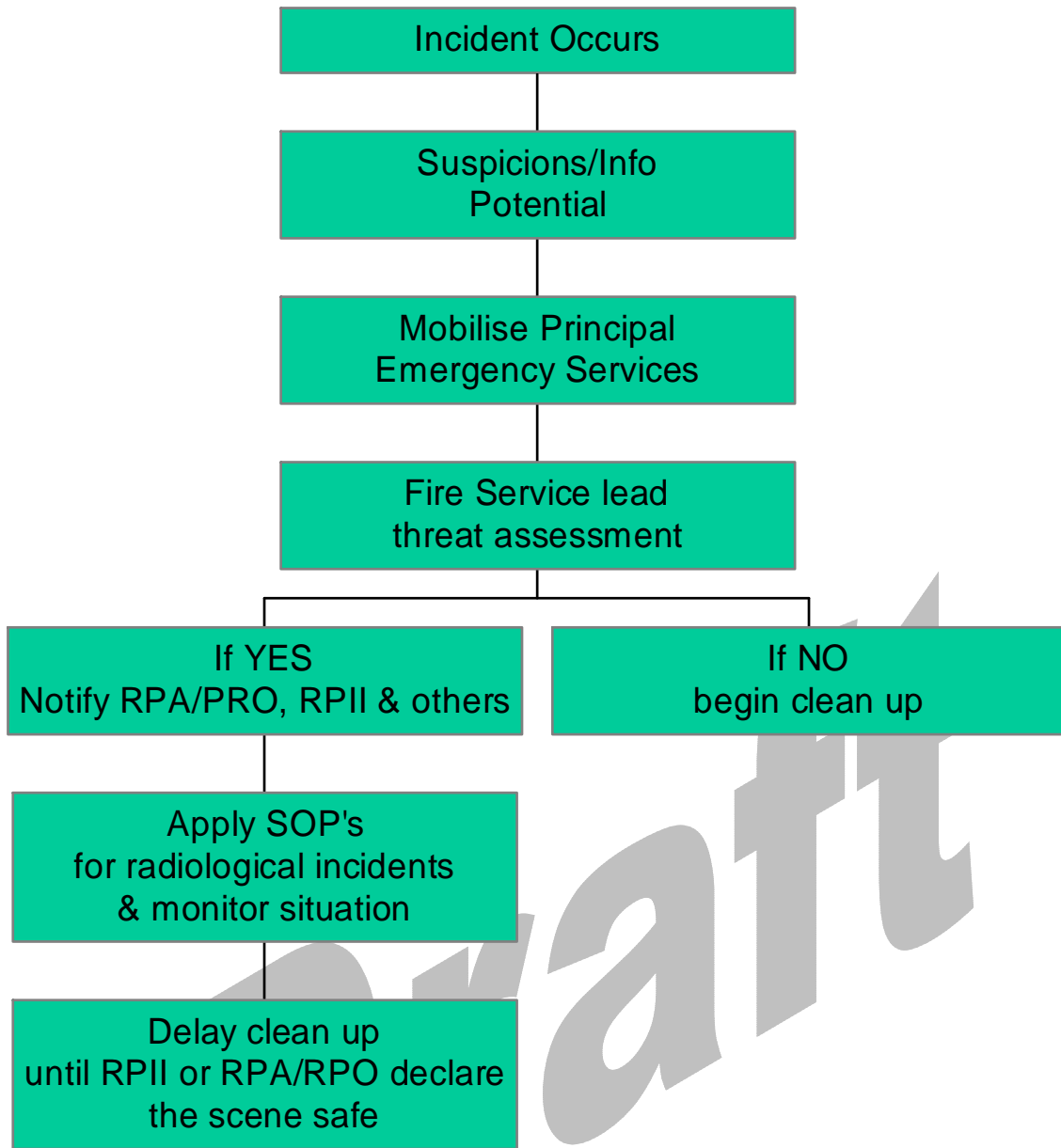
#### **4.9.4 RADIOLOGICAL PROTECTION INSTITUTE OF IRELAND (RPII)**

The main source of radiological protection advice for an accident involving a licensed radioactive source will be the licensee (RPA or RPO). The licensee should be immediately consulted for information on the source type, size and location and for radiation monitoring.

The RPII will provide supplementary advice and will be the main source of radiological protection advice in the event of a radiological emergency not involving a licensed radioactive source.

- To liaise with licensee's RPA/RPO on radiological protection issues (including source integrity and hazard posed by source);
- To respond/ send a radiological assessment team to principal and secondary sites where appropriate; To undertake monitoring to inform/ confirm if radiation present where appropriate (e.g., where no licensee or during clean-up phase);
- To assist with assessment of the actual or potential consequences of any incident, as per figure 1 below;
- To advise on protective measures;
- Notify international organisations if appropriate.

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**FIGURE 1** On-site incident flow chart

## **5 LINKING NEPNA AND MAJOR EMERGENCY PLANS**

### **5.1 Introduction**

A National Emergency Plan for Nuclear Accidents (NEPNA) has been prepared under SI 125 of 2000. The D/EHLG and the RPII Website ([www.rpii.ie](http://www.rpii.ie)) provide full information on NEPNA. When an accident occurs abroad which requires activation of NEPNA, a region affected (or likely to be affected) will be determined and this fact will be communicated from the lead Government Department, the D/EHLG, to all Local Authorities in the designated region. The message will be in the following format:

“This is the D/EHLG. A nuclear accident has occurred at (location). The NEPNA has been activated. Your Local Authority are requested to act as lead agency and to activate the Local (or Regional) Coordination arrangements of your Major Emergency Plan. A full situation report will be forwarded to your Coordination Centre at XX hours. Please have your local (or Regional) CC confirm to the National Emergency Co-ordination Centre at what time it is meeting.”

### **5.2 Notification of Nuclear Incidents Abroad**

The rapid notification of radiological incidents, which occur abroad, are provided by regularly tested and updated international systems operated by the International Atomic Energy Agency (in Vienna) and the European Commission (in Luxembourg). These provide a 24-hour connection to the Garda Síochána’s national contact point. Once alerted, the Garda Síochána notifies key staff in the relevant Government Departments and Agencies. Ireland also has a Bilateral Agreement with the UK to receive immediate notification of any nuclear incidents in that jurisdiction.

### **5.3 Detecting Radioactive Contamination in Ireland**

A national network of permanent monitoring stations, which continuously check the level of background radiation across the country, is operated by the Radiological Protection Institute of Ireland (RPII), with the support of Met Éireann, Local Authorities and the Department of Defence. If the network detects elevated radiation levels, it automatically alerts the RPII’s duty officer, who will assess the situation.

The Emergency Response Co-ordination Committee (ERCC) established under NEPNA will advise local authorities in the first instance of the actual situation pertaining in the event of a release of radioactivity, and will endeavour to confirm the actual radiation levels with those predicted for given scenarios.

#### **5.4 Protecting and Informing the Public**

Significant protective measures are available to limit the risk to the Irish population. It is envisaged that restrictions on the consumption of certain foodstuffs would remove the most significant radiation dose risks. Short-term measures such as staying indoors may be needed as well. It is anticipated that if radioactivity released into the atmosphere as a result of an accident at an overseas nuclear facility reached Ireland, the nature of any such contamination would be such that a relatively small increase in radioactivity levels over normal background levels would be expected over a wide area. This is due to Ireland's distance from the nearest nuclear facilities.

Radio and television media will be used to regularly update the public with information during an emergency. The public will be encouraged by Government and the RPII to follow the simple advice given and to:

#### **“GO IN, STAY IN, TUNE IN”**

Announcements will be made telling the public when the plume has passed and it is no longer necessary to remain indoors. It is unlikely that anyone will be advised to stay indoors for more than 6 hours. Once inside close the doors, windows and turn off any powered ventilation systems that might bring in air from the outside, air conditioners, for example. You do not need to block up chimneys, or passive vents, or put wet towels under the doors. It is not considered that access of air through these is likely to pose any significant risk. Once the plume has passed over, the public will be advised of this by radio and television announcements, and can re-open doors and windows and go outside again.



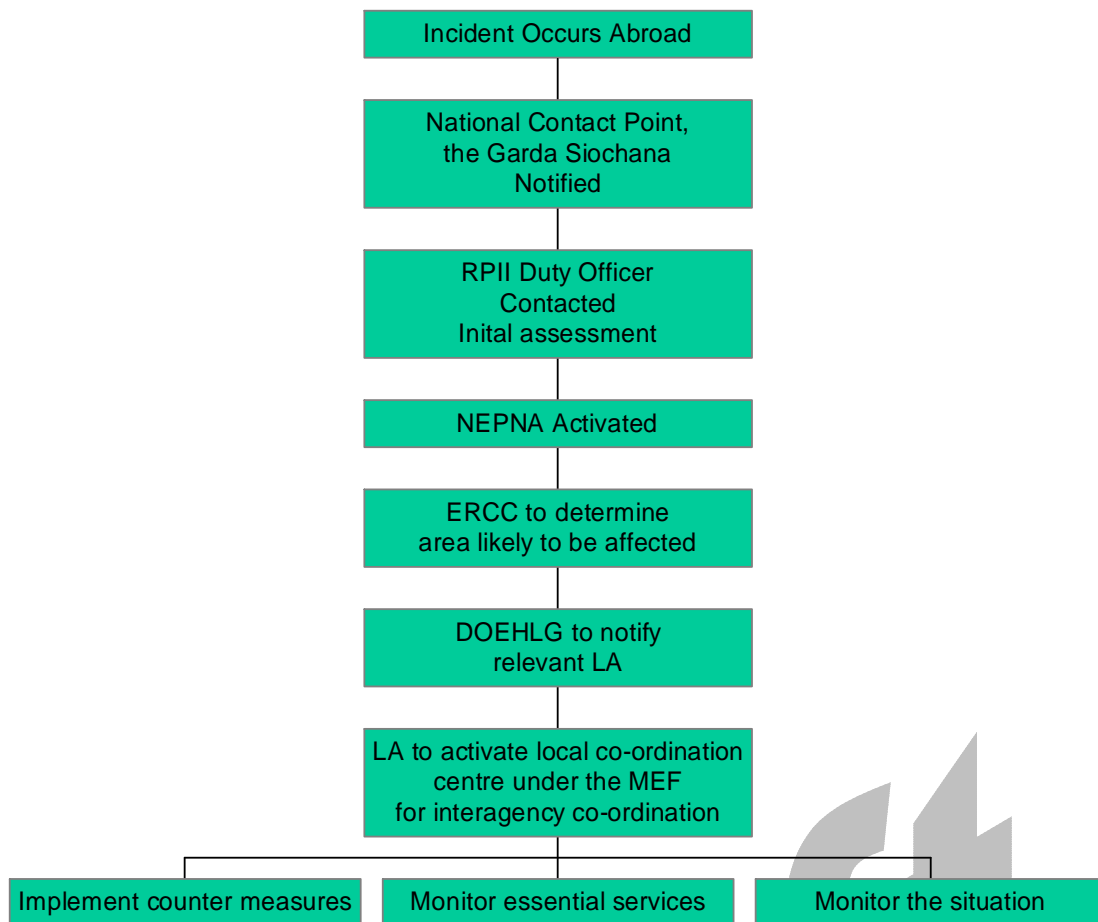
### **5.5 Evacuation**

Evacuation would not be recommended in Ireland in the event of a nuclear accident abroad, even for one in the UK, irrespective of rainfall and wind direction. Wylfa in North Wales, the nearest UK nuclear plant to Ireland, is 110 km from the Irish coastline, which is well beyond the internationally accepted maximum distance of 30 km for considering evacuation. Evacuation could expose people to a greater radiation dose, as they would be outdoors or in vehicles, rather than availing of the comforts and facilities of their homes.

### **5.6 Drinking Tap Water**

Provisions are in place for sampling and testing of water supplies. It is generally envisaged that it will be safe to drink tap water. Any contamination that found its way into reservoirs or rivers would be likely to be enormously diluted by the volume of water present in the reservoir or river, and would not pose a significant risk.

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**FIGURE 2** NEPNA flow chart

### 5.7 Implementation of Counter Measures

The NEPNA identifies three potential counter measures viz: staying indoors; restriction on consumption of foodstuffs; measures to reduce contamination of agricultural foodstuffs. When decisions are made under NEPNA to implement specific countermeasures, these will be notified to relevant local authorities, with a request to implement these in consultation with other public services. Local authorities will be requested to report routinely on progress with implementation of counter measures. Local authorities where counter measures are not required will be so notified. Even where counter measures are not proposed for an area, the local authority may be requested to monitor and report on events connected with the emergency (e.g. self-evacuation or population movements).

## **5.8 Maintaining Emergency and Vital Public Services**

In addition to roles in co-ordinated implementation of countermeasures, the public services provided by the Garda Síochána, the HSE and Local Authorities may be affected by a Nuclear Accident. Part of the function of the Local (or Regional) Co-ordination Group will be to liaise with the ERCC regarding predicted radiation levels, to monitor the situation locally and to consider the potential implications on service delivery and to make arrangements considered necessary to maintain emergency and vital public services in their functional area.

It is anticipated that if radioactivity released into the atmosphere as a result of an accident at an overseas nuclear facility reached Ireland, the nature of any such contamination would be such that a relatively small increase in radioactivity levels over normal background levels would be expected over a wide area. This is due to Ireland's distance from the nearest nuclear facilities. While precautionary advice to stay indoors may be given to the public, the dose rates experienced outdoors even while a radioactive plume is passing would be expected to be low, comparable to background radiation. Thus, it is envisaged that the dose levels that would be experienced following a nuclear accident/ incident abroad would not require the use of any specific personal protective equipment by emergency services personnel in performing their normal functions, nor is it envisaged that any special precautions need to be taken by responding emergency service personnel.

Detailed information on measures to protect emergency services personnel and the public who might be exposed to elevated radiation levels arising from local emergencies is given in Sections 1.10 and 1.11 of Appendix 1 of this Protocol.

## **5.9 Roles of the Principle Response Agencies in NEPNA**

The relevant roles of the PRAs and the related parent Departments identified below have been extracted from the NEPNA (2005). The Departments referenced include, Department of the Environment, Heritage and Local Government, Department of Health & Children and the Department of Justice, Equality & Law Reform. For

information on the full extent of organisations roles, and the roles of other relevant Departments, refer to the NEPNA plan itself.

### **5.9.1 Department of the Environment, Heritage and Local Government (D/EHLG) and bodies under its aegis**

1. Co-ordinate the response to the emergency from all Government Departments and Agencies via the Emergency Response Co-Ordination Committee (ERCC), and chair this body.
2. Provide the link between the Emergency Response Co-ordination Committee and the Government, and the local authorities.
3. Arrange with local authorities for the collection of drinking water samples and the forwarding of them to laboratories for monitoring, as directed by the RPII.
4. Arrange for the control of water supplies.

#### Local Authorities (including Civil Defence)

1. Provide in accordance with pre-determined arrangements in their Major Emergency Plans for the accommodation and welfare of persons displaced by the emergency and for the provision of food and rest facilities for personnel responding to the emergency.
2. Ensure that the Fire Brigade and other local emergency services fulfil their normal functions.
3. Arrange to have an effective Civil Defence Organisation available to undertake the following functions:-
  - (a) Monitoring of radiation levels, as required, throughout the county.
  - (b) Monitoring of radiation levels on ships, aircraft, vehicles, individuals and their personal effects at seaports and airports, as requested.
  - (c) The collection of samples of soil, vegetation, food-stuffs etc. for analysis.
  - (d) Assisting, where required, in implementation of control measures.

### Radiological Protection Institute of Ireland

1. Provide an on-call emergency service for the receipt and rapid assessment of information concerning nuclear accidents received by the designated national contact point.
2. Provide advice to the Emergency Response Co-ordination Committee (ERCC) on the potential consequences of a nuclear accident and on protective measures to be taken.
3. Install, operate and maintain the national radioactivity-monitoring network.
4. Coordinate the collection of environmental, foodstuffs, water and other samples and arrange for their analysis.
5. Liaise with Irish universities and laboratories<sup>10</sup> to maximise the use of their resources in the event of a nuclear accident.
6. Assist the Department of the Environment, Heritage & Local Government in the organisation of exercises of the NEPNA.
7. Provide field teams with such advice as may be required in the event of a nuclear accident.

### Met Éireann

1. Provide the meteorological data required for the assessment of the radiological consequences of the nuclear accident.
2. Provide facilities for the gamma dose rate monitoring and the air and rainwater sampling systems.
3. Provide the RPII with an analysis, using suitable computer models, predicting the spread of radioactive plumes from the site of the release of radioactive materials.
4. Collect and dispatch air and rain samples from weather stations and headquarters to the RPII.

### **5.9.2 Department of Justice, Equality & Law Reform and bodies under its aegis**

- 1 Participate in national co-ordination at ERCC

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<sup>10</sup> RPII, University and Laboratory Plans should include specific arrangements for such liaison.

### The Garda Síochána

1. Ensure that the Garda Communications Control Centre, Harcourt Square, Dublin 2 acts as the initial communications point for the receipt of information about nuclear accidents.
2. Notify the RPII Duty Officer on receiving notification of a nuclear or radiological accident.
3. Notify, at the request of the RPII Duty Officer, all members of the ERCC and the duty officers of key Government Departments.
4. Participate in local co-ordination structures;
5. Monitor public reaction to the incident;
6. Provide such assistance as may be required within their competence to assist in the implementation of countermeasures.

### **5.9.3 Department of Health and Children and bodies under its aegis**

1. Participate in national co-ordination at ERCC

#### HSE

1. Participate in national co-ordination at ERCC
2. Monitor situation to determine what health concerns may arise for the public and ensure that appropriate measures for their alleviation are provided where appropriate.
3. Assist the Local Authorities in the provision of public information at local level.
4. Arrange for the stocking and plan for distribution of medicines, in case this should be necessary.
5. Provide for the issue of medical advice.
6. Arrange for the provision of services at designated hospitals.

### **5.9.4 Food Safety Authority of Ireland**

1. Arrange for the collection of samples, transmission to the RPII laboratory for analysis and the seizure and destruction of contaminated milk and other foodstuffs at points of distribution to the consumer.
2. Arrange for the collection of samples of food imports at points of entry by Environmental Health Officers, in liaison with Customs and Excise officials.

### **5.9.5 Department of Agriculture**

1. Participate in national co-ordination at ERCC
2. Provide information/ advice to farming community on actions to be taken.
3. Arrange for the collection of agricultural produce, as appropriate, for monitoring for radioactivity levels by the RPII.
4. Collaborate with the RPII in the assessment of potential radioactivity levels in agricultural produce and identification of areas possibly requiring protective actions to be taken.
5. Collaborate with the RPII in the certification of the radioactivity levels in agricultural produce, including live animals and foodstuffs, for export or for movement in and out of intervention storage.
6. Control, seize and, if necessary, destroy contaminated agricultural produce (up to the point of distribution to consumers).
7. Restrict the movement of livestock, as appropriate.

### **5.10 Consumption of Contaminated Food Stuffs**

In the event of a nuclear reactor accident abroad the consumption of contaminated foodstuffs is potentially the most significant mode of radiation exposure for people in Ireland. This form of exposure can be almost totally prevented by introducing appropriate controls on the distribution and consumption of foodstuffs.

For example, in the region close to Chernobyl it has been shown that one of the main reasons that many children developed thyroid cancer was from drinking contaminated milk immediately following the accident. While this increase in childhood thyroid cancers was seen at distances of more than 350 km from the Chernobyl reactor site the consequences could have been reduced or even prevented if the population had been informed not to drink the local milk.

## **APPENDIX 1**

### **ADVICE ON IONISING RADIATION FOR EMERGENCY SERVICES PERSONNEL**

#### **A1.1 Introduction to Ionising Radiation**

Ionising radiation is a constant presence in our lives; in the air we breathe, in the food and water we eat and drink. Radiation is naturally present in everybody. The unique properties of radiation have beneficial uses in industry and medicine. It is estimated that, on average, a person in Ireland receives an annual radiation dose of 3950  $\mu\text{Sv}$  from all sources of radiation. By far the largest contribution (just under 86%) comes from natural sources. Man-made radiation contributes around 14% of the average annual dose and is dominated by the use of radiation in medicine (13.7%). Doses from other man-made sources account for less than 0.5%.

The biological effects of radiation doses can be divided into two types, deterministic effects and stochastic effects. Deterministic effects only occur if a threshold dose is exceeded in a short period of time, deterministic effects include skin burns and radiation sickness. These effects are only observed at high doses levels and the severity of the effect is greater for a higher dose. It is important to note that for emergency responders, other hazards (e.g., fire) will probably represent a much greater health risk than radiation. Stochastic effects are assumed to have no threshold, but the probability of them occurring increases with increasing dose. An example of a stochastic effect is cancer, and it is assumed that radiation exposure may result in an increased lifetime risk of cancer. However, given likely exposure levels it is very unlikely that a radiological emergency would result in any detectable increase in cancer among the public or responders.

Radioactive materials present hazards to humans in two forms - internal and external.

- Radiation emitted from radioactive substances outside the body may give rise to an external hazard to body tissue/organs. In this case the longer the time spent near the source and the closer the person is to the source, the higher the radiation dose that will be received.



- Radioactive substances may contaminate external clothing or the surface of the body, giving rise to a surface contamination hazard.
- Radioactive substances may be incorporated into the body through inhalation or ingestion giving rise to an internal hazard. The dose received will depend on the characteristics of the material and how much of the material gets into and stays inside the body.

### **A1.2 Typical Protective Measures**

The type of hazard will determine which protective measures will be effective.

Protection from an external radiation hazard can be achieved through:

- Shielding (keeping solid materials/forms of construction between the source and the person),
- Maintaining an appropriate distance from the radioactive substance (radiation strength is proportional to distance squared), and
- Limiting the time personnel are permitted to be in the vicinity of the source so as to keep exposure levels below the maximum recommended dose levels (See Section 1.8 of this Appendix).

For the internal hazard, protection is best achieved through preventing inhalation - respiratory protective equipment (including simple facemasks and high-efficiency particulate air filter masks) as well as breathing apparatus are effective. Controls on consumption of potentially contaminated foodstuffs or water will prevent ingestion also. Where the hazard is surface contamination, then a person may be decontaminated by removal of outer clothing and showering.

### **A1.3 Licensing of Radioactive Sources and Substances**

The Radiological Protection Institute of Ireland (RPII) is the statutory body charged with regulating the use of radioactive substances and radiation sources. The RPII operate a licensing system, using internationally accepted rules and regulations. This system provides, among other things, that areas where ionising radiation is used should be under the control of the licensee's Radiological Protection Officer (RPO) and should be marked off clearly from other areas.

Given that involvement in fire provides one of the main possibilities for emergency services personnel to come into contact with radiation sources, RPII licences generally require the licensee to inform the chief fire officer of the relevant local authority of the location and nature of radioactive substances.

It is helpful for emergency services personnel to know the location of stores of radioactive materials and to be advised and assisted by the responsible Radiological Protection Officer of the licensee, who will have suitable radiation monitoring equipment also. If assistance is not available from the relevant RPO, the Radiological Protection Institute of Ireland's assistance should be sought by the emergency services.

Staff in premises would be aware normally of the presence of, or use of, ionising radiation in any given establishment, and stores where radioactive materials are kept are readily identifiable usually. General advice, although useful, should not be relied upon solely. It is desirable that there would be a degree of familiarity among emergency services personnel with premises holding radioactive substances. It is desirable to gain specific knowledge by visiting establishments using sources of radiation, meeting the relevant RPO and discussing appropriate methods for dealing with emergencies, including fires.

Staff in premises may also be designated as "Classified Workers" with respect to Radiation under S.I. No. 125 of 2000, as follows:

*Designated Radiation Workers (Category A):* workers who are liable to receive an effective dose greater than 6 mSv (6000  $\mu$ Sv) in a year or more than 3/10 of the dose limits for the lens of the eye, skin or extremities.

*Designated Radiation Workers (Category B):* workers who are liable to receive an effective dose greater than 1mSv (1000  $\mu$ Sv) in a year but are not classified as category A workers.

*Non-Designated Workers:* Those who are not at risk of occupational exposure even though they may work in Departments using radiation.

#### A1.4 Identifying Radiation Hazards

Ionising radiation – that is the radiation generated by radioactive substances and x-ray machines – may be encountered by emergency services personnel in medical, veterinary, educational or industrial establishments. Emergency services personnel should be familiar with the international marking of nuclear/ radioactive materials.



However, in situations where there are no markings or other normal indicators, the physical characteristics that may alert responding emergency services personnel to the presence of high levels of radiation at an emergency scene may include the following:

- **Persons presenting with symptoms consistent with radiation sickness** - symptoms include skin burns with no apparent cause, skin reddening and, in severe cases, vomiting.
- **Heat emitting material** - material that seems to emit heat without any sign of an external heating source.
- **Glowing material/particle** - if the material is strongly radioactive, then it may emit a radio-luminescence.

#### A1.5 Monitoring Radiation Levels

It is important for the on-site co-ordinator to arrange for radiation levels to be monitored at any incident where the presence of a radioactive substance or source is known or suspected. Until it has been established via monitoring that the radioactive source has remained intact and properly shielded, the amount of time spent by emergency services personnel in the vicinity of a radioactive source should be minimised. The examination of the accident area using a suitable radiation monitor is necessary, so that radioactive sources, if present, may be located and removed. If available, the licensee's Radiation Protection Officer or Radiation Protection Advisor may be able to undertake monitoring in the first instance. The RPII should be notified

also as soon as possible in the event of such an accident being encountered and requested to send an assessment team.

Because of the relatively few circumstances in which emergency services are likely to be faced with a radiation hazard, and the availability of monitors at licensed sites, the purchase of special radiation monitoring instruments by the emergency services is not, in general, considered warranted, bearing in mind also the ongoing calibration and upkeep requirements and the training involved in their use.

Where there is information arising of specific radiation hazards at an emergency, emergency service responders operating in the vicinity should be adequately monitored. A significant risk could arise also, in the aftermath of a fire or other emergency where personnel may be engaged in investigating/ examining fire damaged premises. In general, advice on the appropriate equipment and procedures to be used should be sought from the RPII or the Radiological Protection Officer responsible at the site before examination of site is carried out.

#### **A1.6 Radiological /Nuclear Scenarios**

Three potential scenarios involving radiological/nuclear emergencies are envisaged within the terms of this protocol. Preparation to deal with emergencies in this range of scenarios will in all likelihood enable the principal emergency services to deal with other variants of these scenarios, which may arise. The three scenarios are:

- i. Incidents involving a licensed radioactive source at a site
- ii. Incidents involving transportation of licensed radioactive sources
- iii. Nuclear accident abroad, resulting in the activation of the National Emergency Plan for Nuclear Accidents (NEPNA)

Other scenarios where the radioactive source involved in the emergency is not a licensed source, will require the same actions and precautions to be taken by the emergency service responders. The main difference is that information will not be immediately available on the type/size of the source.

Further detailed information on these scenarios is provided in Hazard Record Sheets copies of which are included in distributed agency Circular. It is intended that these

Hazard Record Sheets should be included in Risk Assessment Reports prepared in the Major Emergency Regions.

### **A1.7 Radiation Sources and Radioactive Substances**

Materials which emit radiation may cause harm depending upon the type of material, the quantity involved and the presence or absence of shielding.

Generally, radioactive substances may be “sealed”, that is, contained in a capsule, which will allow the radiation out but keep the substance in. These capsules are usually very robust – all licenced sources must comply with International Standards Organisation Standard 2919, and will withstand high temperatures for short periods. On the other hand, some radioactive substances may be “unsealed”, that is not confined to a capsule but possibly stored in a bottle, or other package or in an open container in a specially designated laboratory. Some sources do not fall neatly into these categories and are dealt with under the heading “Miscellaneous Sources”.

#### **A1.7.1 Sealed and Unsealed Sources**

Sealed sources are normally stored in specially designed armoured containers, which are resistant to fire. Occasionally, however, sealed sources may be shielded by being stored in tanks of water or pots of paraffin wax or of lead. In the event of a fire the water, wax or lead shielding may be lost, in which case persons standing in the vicinity of the assembly could sustain a significant radiation dose. Such situations are rare, since there are not many high activity sources stored under these conditions, but it is important to appreciate that unshielded sealed sources can cause serious injury if handled.

Unsealed or open sources of the type likely to be encountered in Ireland present less of a potential hazard to emergency responders than sealed ones. This is because there are no very large stocks of unsealed sources held by any licensee and because the small quantities that are held would probably be so dispersed and diluted during a fire that they would no longer contribute a significant radiation dose in any one area. Unfortunately, this very dispersal could present a contamination problem to investigation/ salvage workers and therefore careful monitoring, possibly followed by decontamination, may be necessary.

### **A1.7.2 Miscellaneous Sources**

Radioactive Gases – There are no circumstances at present in Ireland, where the use of breathing apparatus might be required by fire services because of the presence of radioactive gases. There are however small stocks of radioactive gas under pressure in cylinders in certain premises and there could be an explosion hazard in the event of a fire. The radioactive gas would quickly disperse and would not represent a radiation hazard, but an exploding cylinder is an obvious hazard.

Radioactive Solvents – In some establishments small concentrations of radioactive materials are used in solutions of flammable solvents such as toluene. This material, which has a flash point similar to that of petrol, may be accumulated in waste storage containers pending disposal and as such constitutes an obvious fire hazard. The fire risk arising from the toluene in the store far exceeds that associated with the contained trace of radioactivity. The use and accumulation of this material is discouraged and is less likely to be encountered in the future.

Flammable Wastes – Waste paper, tissues, cloths and other rubbish lightly contaminated with radioactive substances may need to be stored temporarily by licensees, prior to disposal. If this material should catch fire the radiation hazard to emergency responders would not be expected to be significant because of the low level of contamination of the waste materials.

### **A1.7.3 X-ray Machines**

**No hazard from ionising radiation can arise provided the machine is switched OFF.** Power to x-ray and other similar machines should therefore always be cut off before the machine is approached in a fire situation.

## **A1.8 Transportation Accidents**

There is a possibility of a radiation hazard arising through aircraft, rail or road accidents, whether the situation involves a fire or not. To minimise the additional degree of risk associated with transport of radioactive substances, the International Atomic Energy Agency (IAEA) has laid down strict regulations for packaging of radioactive materials. These apply to the transport of radioactive substances in

Ireland by means of a condition attached to licences by the RPII. The regulations require, in the case of potentially hazardous quantities, the packaging to be of such a design that the containment provided by it will withstand severe accidents and fires. Tests are carried out to ensure that package designs comply with these requirements before the design may be put into service. It is therefore unlikely that the emergency services would encounter a radiological hazard as a result of a transport accident.

### **A1.9 Specific Protective Measures for Emergency Services Personnel**

- Female workers who may be pregnant should notify their superior officer and should be excluded from emergency duties at the scene.
- Follow standard safety and operational procedures for your professional area.
- Be visually identifiable, and ensure you are in the accountability system when within the Danger Area.
- Do not touch/ pick up/ hold any suspected radioactive items.
- 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.
- Minimize time spent within 10 metres of suspected dangerous radioactive materials/source.
- When dispersion of radioactive material (dust/smoke) and contamination are suspected or confirmed:
  - Use available respiratory protection equipment or cover mouth with a mask.
  - Keep hands away from mouth, do not smoke, eat or drink and wash hands regularly.
  - 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.
- Ensure your name and activities performed are recorded – for possible follow-up and dose reconstruction.
- Get monitored for radioactive contamination after being within danger area. If not immediately possible, shower and change clothing as soon as possible.

- Once emergency operations have ended, other activities (source recovery, cleanup, waste disposal, etc.) should follow occupational radiation protection guidance directed by RPO/RPA or RPII assessment Team.

As soon as possible the on-site coordinator should arrange to have work areas monitored and follow the additional Guidelines below where gamma dose rate is known, in addition to those guidelines above:

- If ambient dose rate in a particular area is greater than 100 mSv/h (100 000  $\mu$ Sv/h):
  - Perform only life saving actions;
  - Limit total time of staying there to  $\leq$  30 minutes;
  - Do not proceed into an area with an ambient dose rate of greater than 1000 mSv/h (1 000 000  $\mu$ Sv/h) unless approved by radiological assessment team.

#### **A1.10 Maximum Exposure Levels**

There are few situations in Ireland where it is envisaged that ionising radiation could become a hazard to emergency services personnel in the normal course of their duties.

It is conceivable that some radioactive sources currently in use or stored could marginally increase the degree of risk encountered by a fire-fighter during actual fire fighting but, by comparison with the risks normally associated with a fire situation, the danger from radioactivity would generally be negligible. While the type of PPE required will be determined mainly by hazards other than radiation, the protection provided by PPE from any radiation hazard will depend on the characteristics of the source and its status. If available, advice should be obtained from the licensee's Radiation Protection Officer or Radiation Protection Advisor in the first instance. In any case, following of the guidelines given in this protocol will provide protection. It should also be noted that standard fire fighting or other protective clothing (including gloves) will provide protection from certain types of radiation, as will respiratory protective equipment (including simple facemasks and high-efficiency particulate air filter masks).



It is not anticipated; therefore, that the radiation dose received by an emergency responder would exceed those laid down in law<sup>11</sup> for normal occupational exposures (20 mSv [20 000 µSv] in a 12-month period), in accidents involving the situations described above. Where available, self-reading dosimeters should be used to confirm actual dose rates. However, it is important to note that dosimeters will not measure the dose from inhalation, ingestion or skin contamination, so emergency services personnel with dosimeters should follow all the precautions set out in Section 1.9 above. Where alarming dosimeters are available, they should be set to alarm when pre-determined dose levels have been reached.

The following guidelines are given in the IAEA Manual for First Responders to a Radiological Emergency for exposure of emergency services personnel:

- Any emergency responder likely to receive a dose greater than the stated dose limits must volunteer for such exposure;
- Trainees or employees under 18 years of age, and pregnant or breastfeeding women should not be subjected to emergency exposures.
- The IAEA recommends that no dose limits should apply to life-saving interventions if and only if the benefit to others clearly outweighs the rescuers own risks. Table 2 below gives a list of tasks and corresponding exposures, which should guide emergency services operations. Otherwise, every effort should be made to avoid deterministic effects on health by keeping doses below 1000 mSv (1 000 000 µSv).

**TABLE 2**

<b>Tasks</b>	<b>Do Not exceed Levels</b>	<b>Comments</b>
<b>Life saving actions, such as</b> <ul style="list-style-type: none"> <li>• Rescue from immediate threat to life</li> <li>• Provision of first aid for life threatening injuries</li> <li>• Prevention/ mitigation of conditions that could be life threatening</li> </ul>	<b>1000 mSv</b> (1 000 000 µSv)	Every effort should be made to keep dose below this level while performing life saving actions.  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

<sup>11</sup> Schedule 2 of S.I. 125, 2000

		emergency.
<p><b>Actions to prevent severe health effects or injuries such as</b></p> <ul style="list-style-type: none"> <li>• Evacuation/ protection of public</li> <li>• Environmental monitoring of populated areas to identify where evacuation, sheltering or food restriction are warranted</li> <li>• Rescue from potential threats or serious injury;</li> <li>• Immediate treatment of serious injury;</li> <li>• Urgent decontamination of people</li> </ul> <p><b>Actions to prevent the development of catastrophic conditions such as:</b></p> <ul style="list-style-type: none"> <li>• Prevention or mitigation of fires etc</li> <li>• Apprehension of suspects</li> </ul>	<p><b>500 m Sv</b> (500 000 <math>\mu</math>Sv)</p>	<p>500 – 1000 mSv dose 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%.</p>
<p><b>Actions to avert a large collective dose, such as:</b></p> <ul style="list-style-type: none"> <li>• Environmental sample collection and analysis for environmental monitoring of populated areas;</li> <li>• Localised decontamination if required to protect the public</li> </ul>	<p><b>50 m Sv</b> (50 000 <math>\mu</math>Sv)</p>	<p>Exposure to 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 developing fatal cancer.</p>

Where it is suspected that emergency services personnel have been exposed to significant radiation, personnel should be put under the medical surveillance of an occupational health/ medical officer, and where available, with a record of the doses they may have received made available, as soon as possible after the emergency intervention.

### **A1.11 Protecting the Public**

The following measures should be implemented by the emergency services to protect the public who have been involved in a radiological emergency.

#### **A1.11.1 Members of the Public who are within what becomes the Danger Area when first responders arrive**

- 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).

- Instruct them not to handle, but to isolate and identify to a responder any possible radioactive item.
- 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.
- 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.
- 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).
  - Follow specific instructions on where to get information and/or medical/radiological assessment.

#### **A1.11.2 Members of the Public who may have left the Danger Area without registration**

Instruct them, if necessary via the media, on the following:

- Not to handle but to report to the Garda Síochána 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).

### **A1.11.3 Members of the Public outside the Danger Area**

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

- To remain inside building during the release (smoke).
- Not to eat any vegetables grown outside or drink rainwater, until otherwise advised.
- Not to allow children to play on the ground.
- To wash hands before eating.
- To avoid dusty areas or activities that will generate dust.
- To listen for and follow official instructions given via the media (TV or radio).

### **A1.11.4 Public Decontamination**

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 available monitoring results indicate a level of contamination, where possible the fire service should establish decontamination facilities.

**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 facility 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).**

Establish a decontamination facility outside the danger area as appropriate for the available resources and number of people to be decontaminated:

- Field decontamination for large numbers.
- Full decontamination for small numbers.

**Establish field decontamination** in an area with privacy and protection from the weather 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 privacy and provisions for taking a shower and immediately obtain clean clothing. Separate areas for males and females should be established/ operated.

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

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

Acquire bags to contain removed clothing, give a receipt for collected item(s), use tags for marking bags of contaminated clothing and bags for other items.

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## APPENDIX 2

### ACRONYMS USED IN THIS PROTOCOL

<b>ERCC</b>	Emergency Response Co-ordination Committee
<b>HSE</b>	Health Services Executive
<b>IAEA</b>	International Atomic Energy Agency
<b>ICRP</b>	International Commission on Radiological Protection
<b>mSv</b>	Millisievert (the scientific unit of measurement for radiation dose)
<b>µSv</b>	Microsievert (one thousandth of a millisievert)
<b>MEMF</b>	Major Emergency Management Framework
<b>NEPNA</b>	National Emergency Plan for Nuclear Accidents
<b>NSS</b>	Nuclear Safety Section (of DEHLG)
<b>PPE</b>	Personal Protective Equipment
<b>RDD</b>	Radiological Dispersal Devices
<b>RPA</b>	Radiation Protection Adviser
<b>RPII</b>	Radiological Protection Institute of Ireland
<b>RPO</b>	Radiation Protection Officer
<b>SIO</b>	Scientific Intelligence Officer
<b>TLD</b>	Thermoluminescent Detectors
<b>WHO</b>	World Health Organisation

### APPENDIX 3

#### Registry form for Persons involved in Radiological Incident

Date \_\_\_\_\_

Full Name: \_\_\_\_\_

Date of birth: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ Sex: .  M .  F  
Day Month Year

Nationality: \_\_\_\_\_ Place of birth: \_\_\_\_\_

ID type and number (if available) \_\_\_\_\_

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**<sup>12</sup>:  No  Yes Instrument type: \_\_\_\_\_

Model: \_\_\_\_\_ Background reading: \_\_\_\_\_ Personal survey measurements:  
< 1  $\mu$ Sv/h:  > 1  $\mu$  Sv/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: .  No  Yes Date: \_\_\_\_\_

**Remarks:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signature: \_\_\_\_\_ (full name)

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Organisation: \_\_\_\_\_

Telephone number: \_\_\_\_\_

**Provide the form to on-site coordinator or \_\_\_\_\_ (specify)**

<sup>12</sup> Should be managed as contaminated if not monitored or decontaminated.