

# **Peer Review of the RPII's Environmental Monitoring Programme 2009**

## **Foundation Document**

### **G. Emergency Preparedness and Response**

#### **1. Introduction**

The Chernobyl nuclear accident in 1986 has had a major influence on the work of the RPII and its predecessor, the Nuclear Energy Board (NEB). Public concern over the dangers posed by radioactivity resulting from Chernobyl led to a strengthening of the NEB, including increased staffing and laboratory facilities. The initiative to develop the National Emergency Plan for Nuclear Accidents (Department of the Environment, Heritage and Local Government, 2005) also has its roots in the aftermath of the Chernobyl accident.

In more recent years attention has turned to preparedness for potential emergencies resulting from radioactive sources in Ireland. This is reflected by the prominent role defined for the RPII in licensee's emergency plans and in a draft Protocol for Multi-Agency Response to Radiological/ Nuclear Emergencies (National Steering Group on Major Emergencies, 2008), part of a Framework for Major Emergency Management.

In all of these plans, the RPII has a number of important responsibilities relevant to its environmental laboratory and monitoring programme. A fundamental role is the requirement to maintain the systems, procedures and expertise necessary to facilitate a rapid assessment of environmental contamination. Whatever the source, the RPII must be prepared to analyse a potentially unlimited range of sample matrices and to identify and then determine the activity concentrations of a wide range of radionuclides.

Given the importance of agriculture to the Irish economy, there is also an economic imperative to maintain such a capability so that, in the event of an actual or perceived incident, levels of radioactivity in Irish foodstuffs can be assessed and compared to EU or international action levels. For these reasons maintenance of a national laboratory capable of measuring a range of artificial radionuclides in food and environmental samples is seen to be of national strategic importance.

#### **2. Related Legislation**

National and European legislation relevant to the RPII Environmental Monitoring Programme is outlined in Supplementary Document A.

It is noted that the Radiological Protection Act, 1991 specifically assigns to the RPII the following general function: "to assist in the planning and implementation of measures to deal with radiological emergencies" (7.—(1) (e)).

It is also noted that the general requirements defined in Section 7 of the Radiological Protection Act, 1991 for monitoring of food, drinking water and the environment (7.—(1) (a)) and individuals (7.—(1) (b)); and for dose assessments as required by the Ionising Radiation Order (S.I. No. 125 of 2000) for compliance with European Union Basic Safety Standards would continue to apply, and indeed gain prominence, in the event of an emergency. The general requirement concerning advice and information to Government and the public (7.—(1) (c)) is also of particular relevance in relation to emergency preparedness and response. Depending on the circumstances of the emergency, the requirement to provide a service for certification of radioactivity levels in foodstuffs (8.—(c)) to support the food and agriculture industry would be vital in maintaining export markets.

The RPII has been established as the National Competent Authority for the IAEA Emergency Conventions (IAEA, 1986a and IAEA, 1986b) and for ECURIE (European Community Urgent Radiological Information Exchange), the technical implementation of the Council Decision 87/600/Euratom on Community arrangements for the early notification and exchange of information in the event of a radiological or nuclear emergency (European Commission, 1987a). Both systems require exchange of emergency information, including monitoring data, in the event of an emergency and during exercises.

### **3. Emergency Plans**

The National Emergency Plan for Nuclear Accidents (NEPNA) (Department of the Environment, Heritage and Local Government, 2005) provides a framework for the multi-agency, national response to a large scale radiological incident. It is intended specifically to cater for a radiological emergency or crisis such as that arising from a major accident at a nuclear installation abroad with the potential to result in radioactive contamination reaching Ireland. The RPII has been assigned a key role in NEPNA covering early warning; technical assessment of the incident; technical advice on countermeasures; and monitoring of the environment and the food chain. An overview of the Plan and the RPII's responsibilities is provided in Annex 1.

The RPII also has responsibilities for the radiological aspects of emergency preparedness and response in relation to incidents beyond the scope of NEPNA. For example the RPII has been assigned a prominent role in the emergency plans of licensees. A role for the RPII is also defined in a draft Protocol for Multi-Agency Response to Radiological/ Nuclear Emergencies (National Steering Group on Major Emergencies, 2008) which has been prepared as part of a Framework for Major Emergency Management. This protocol covers emergencies arising from potentially dangerous sources located in Ireland such as unshielded or damaged sources; major spills from sources; or fires, explosions or fumes involving a radioactive source.

These responsibilities include provision of advice in relation to preparedness and technical support in the event of an incident. This may include: on-site

measurements; laboratory analysis; confirmatory measurements and assessment of environmental contamination; and assessment of population exposure.

#### **4. Aims and Objective**

The aims and objectives of the RPII Monitoring Programme are laid out in the Overview of the Peer Review.

All of the aims and objectives are relevant to emergency preparedness and response. Of particular relevance however are:

- To maintain the capacity to facilitate a rapid assessment of environmental contamination in the event of a nuclear or radiological incident so that effective countermeasures to protect the Irish public can be implemented
- and to support the Irish food and agriculture industry through the rigorous assessment of the radioactivity status of Irish foodstuffs. It is envisaged that the latter aim would be achieved through extension of the current service which is offered on request to certify the radioactivity of food and drinks required by producers exporting to certain markets outside of the EU.

#### **5. RPII Emergency Preparedness and Response Responsibilities Relating to Environmental Monitoring/ Assessment**

RPII emergency preparedness and response responsibilities in relation to environmental monitoring include the following:

- Maintenance of a national laboratory for the measurement of levels of radioactivity in the food, drinking water and environmental samples, including air filters.
- Maintenance of the National Radioactivity Monitoring Network comprising the national gamma dose rate monitoring network, the air sampling network and the rainwater collection network.
- Contribution to the technical assessment of the consequences of an emergency
- Liaison with universities and other organisations to maximise the use of analytical resources in the event of a nuclear accident
- Provision of certification of radioactivity levels in foodstuffs and other products
- Participation in emergency exercises

It is noted that Ireland is located at a significant distance from the nearest nuclear facility (the Wylfa NPP which is approximately 110km from Dublin). Therefore it is highly unlikely that urgent countermeasures could ever be justified on radiological

grounds<sup>1</sup>. It is recognised that the most significant pathway by which the Irish public might conceivably be exposed following an accident at an overseas nuclear facility is through contaminated of the food chain. The primary focus of emergency preparedness with regard to overseas nuclear installations, therefore, is to address actual or perceived contamination of Irish foodstuffs.

It is noted also that even in the event of a relatively minor incident in the UK there could be very significant demands placed on the RPII to provide independent measurements in Ireland both for public reassurance and in order to provide an accurate assessment on the actual impacts (if any) in Ireland.

On this basis it is expected that the likeliest requirements for monitoring are:

- Characterisation of deposited activity
- Reassurance measurements
- Assessment of doses to special groups
- Certification of exports

It is recognised that in the event of an emergency the demands on RPII analytical resources would be enormous and greater than our capacity to deliver. It is important, therefore, to have in place clear policies and procedures regarding prioritisation of samples, counting requirements (radionuclides, reporting levels, counting times, etc), strategy for screening samples, reporting, etc.

These policies and procedures should address inter alia:

- The changing demands in the different phases of an accident.
- External demand demands that might be placed on the organisation. It is important to have in place clear policies and agreements to manage these demands.
- Sample receipt and holding.
- Assessment strategies to make best use of available staff and technical resources.
- Reporting, interpretation of data and release of results.
- The best use of additional support for preparation and analysis of certain samples which might be available from research laboratories in universities and institutes of technology.

The RPII has accreditation for a number of its radiological measurements (see Foundation Document A. In the event of an emergency, the sample preparation, analysis and authorisation procedures would continue to conform to the requirements for accreditation. This may be particularly important in relation to analysis of food samples for which accreditation is a requirement from the

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<sup>1</sup> The RPII has recommended intervention levels for sheltering and administration of stable iodine in Ireland (Smith et al, 2007).

designation of the RPII as an Official Agency (Food Testing Laboratory) in the Food Safety Authority of Ireland Act, 1998.

In the event of an emergency, a RPII Technical Assessment Team (TAT) is responsible for characterising the radiological situation and making recommendations on protective actions. The results of monitoring, possibly used in conjunction with environmental modelling, would be vitally important. Procedures for the use of monitoring data in technical assessment are being incorporated into the TAT handbook being developed by RPII.

It is noted that a fundamental, inter-agency review of the NEPNA emergency sampling strategy is currently planned by the ERCC<sup>2</sup>, coordinated by the RPII (McMahon, 2009). The full range of monitoring activities available, or potentially available, in Ireland is being considered. These include:

- laboratory-based monitoring
- in-situ monitoring (including permanent monitoring stations)
- mobile monitoring
- in-vivo monitoring

Included in the review are the range of sample types required for analysis, and sampling locations, points in the food production system, density and frequency. Arrangements for sample collection are also being developed separately. It is noted that the acquisition of a mobile monitoring station by RPII was encouraged by an Article 35 verification visit in 2007 (European Commission, 2007).

## **6. Issues for Consideration by the Peer Review Group**

The terms of reference are laid out in the Overview of the Peer Review. Of particular relevance to emergency preparedness and response are:

- Aims and Objectives of the Programme, specifically consideration of the capacity of the RPII to fulfil its statutory obligations and national and international commitments regarding emergency preparedness and response.
- Emergency Response Capability, consideration of the capacity of the RPII to respond effectively in the event of an emergency, particularly with regard to the national strategic importance of maintenance of a national laboratory capable of measuring a range of artificial radionuclides in food and environmental samples.
- Need to maintain skills and expertise so as to allow RPII to respond effectively to a future incident or accident.
- Future Needs and Scope for Innovation, specifically comment on the most effective and economical means of maintaining necessary systems, procedures and expertise. In particular the Po-210 incident in London brought into sharp focus for many laboratories the requirement for the capacity for

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<sup>2</sup> Emergency Response Coordination Committee. Includes representatives of all Government departments and agencies which have been assigned a role in NEPNA.

improvisation and for provision of technical support in an unspecified way. Opinion is sought on options for developing the organisational infrastructure to maintain the necessary skills and expertise and to facilitate this capacity for improvisation.

- Need to develop appropriate policies and procedures so as to make best use of technical and staff resources in an emergency.

Suggestions for changes or improvements to comply with international best practice would be welcome. The opinion of group on best practice for emergency monitoring in the Irish context is also sought.

## References

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McMahon, C., 2009. Review by RPII of Emergency Environmental Monitoring for the National Emergency Plan for Nuclear Accidents (NEPNA). RPII Internal Document (draft).

RPII, 2008. Manual for Emergency Procedures Radiation Monitoring. RPII Internal Document.

Smith, K., McGinnity, P., McMahon, C., Colgan, P.A., Hone, C., 2007. RPII advice note: Intervention levels for urgent countermeasures in Ireland. RPII Internal Document.

## **Annex 1: National Emergency Plan for Nuclear Accidents**

The National Emergency Plan for Nuclear Accidents (NEPNA) provides a framework for the multi-agency, national response to a large scale radiological incident. It is intended specifically to cater for a radiological emergency or crisis such as that arising from a major accident at a nuclear installation abroad with the potential to result in radioactive contamination reaching Ireland.

The National Emergency Plan for Nuclear Accidents will be put into immediate effect if a major event affecting Ireland occurs. The objectives of any response will be to:

- Minimise radiation exposure to the population
- Provide clear and consistent instructions to the public
- Prevent loss of life or injury
- Minimise environmental damage
- Minimise direct economic loss
- Maintain long term confidence in the food supply and environment
- Facilitate recovery

The Plan has been prepared in accordance with Article 37 of SI 125 of 2000 under which the Department of the Environment, Heritage and Local Government has the lead responsibility for coordinating the emergency response arrangements among other government departments and agencies. All government departments and agencies having responsibilities within the Plan are required to have written sub-plans demonstrating how they will carry out their responsibilities and to participate in a Emergency Response Coordination Committee (ERCC).

Under NEPNA, the RPII has special responsibilities for radioactivity monitoring and for the provision of advice on the potential consequences of any accident or emergency and on the measures to be taken.

### *Early warning*

- The RPII is the National Competent Authority for the EC (ECURIE) and IAEA (EMERCON) early notification systems. In addition arrangements are in place for receipt of direct notification of a nuclear emergency in the UK by the UK's Department of Trade and Industry.
- The RPII operates an on-call duty officer system, whereby a senior member of RPII staff is available 24 hours a day, 7 days a week to assess any alert and where necessary to activate the RPII's emergency response.

### *Operation of the National Radioactivity Monitoring Network*

- The RPII, with support from Met Éireann, Local Authorities and the Defence Forces, operates a national network of permanent monitoring stations (PMS) which are operational around the clock. The network consists of:
  - 15 automatic gamma dose rate monitors
  - 12 aerosol samplers (5 automatic, 7 requiring return of filter papers for analysis)
  - 11 rainwater collection stations.
- Data from the gamma monitors and five of the aerosol samplers are continuously fed back to a central computer at RPII
- This network would provide the first measurements in the event that a radioactive plume reaches Ireland.

### *Technical assessment and systems to support emergency response*

- The objective of technical assessment is to gather all of the available information relevant to emergency and to use this information to assess the radiological consequences for Ireland and to formulate advice regarding subsequent precautionary actions. The RPII will work with experts from Met Éireann and other specialist agencies (e.g. the Department of Agriculture, Fisheries and Food) as appropriate depending on the nature of the accident.
- The RPII has implemented a number of systems to support its emergency response procedures:
  - ARGOS Nuclear Emergency Decision Support System
  - RIMPUFF atmospheric dispersion model, driven by meteorological forecast data provided by Met Éireann. This model can predict the transport and dispersal of radioactive contamination up to distances of approximately 300 km
  - FDM (Food and Dose Module), a model for simulation of contamination of the food chain and assessment of doses following a nuclear or radiological emergency
  - Other systems for verification and backup (e.g. NRPB Emergency Data Handbook, HySplit atmospheric dispersion model)
- The RPII has also developed a web based Emergency Response Management Information System (ERMIS) to facilitate the efficient sharing of critical information within the RPII during an emergency or crisis.

### *Advice on countermeasures and participation in the ERCC*

- Under the NEPNA the RPII is required to provide technical advice on protective measures to minimise the radiation exposure to the Irish population.

*Maintenance of a national laboratory for the measurement of levels of radioactivity in the environment*

- The RPII's monitoring laboratory is responsible for the analysis of food, drinking water and environmental samples. In early phase of a nuclear emergency these measurements inform an accurate technical assessment of the consequences of the accident and the formulation of advice regarding potential protective actions. In the longer term testing of foodstuffs would be key to the implementation of effective foodstuff controls and the maintenance of agri-food markets.

*Liaison with other organisations to establish arrangements for the collection of environmental, foodstuffs and other samples*

- In the event of a major emergency or crisis a number of public authorities have responsibility for the collection of environmental and foodstuffs samples in accordance with the NEPNA.
- The RPII has developed an emergency sample collection manual, which describes how sampling should be carried out and provides a standard form for recording of the required information.

*Liaison with universities and other organisations to maximise the use of analytical resources in the event of a nuclear accident*

- In the event of a large-scale emergency, the demand for analysis of environmental and food samples would almost certainly exceed the RPII's capacity for analysis so liaison with other laboratories would be required.
- The possibility of establishing links with other laboratories that could prepare samples or carry out screening measurements is currently being investigated.

*Public and media communications*

- In the event of an emergency, the RPII will provide technical input to centralised dissemination of public and media information by all Government agencies involved in the NEPNA.

*Assistance in the development of national plans for nuclear/radiological emergencies*

- The RPII has a role to advise Government on a range of emergency preparedness issues including adequacy of an emergency monitoring strategy and capability.

*Provision of certification of radioactivity levels in foodstuffs and other products*

- The RPII provides a testing and certification service to exporters of Irish produce in accordance with Section 8 (i) of the Act

### *Emergency exercises*

- The RPII routinely participates in a range of international, national and internal exercises.