Roinn Cumarsáide, Gníomhaithe ar son na hAeráide & Comhshaoil
Department of Communications, Climate Action & Environment

CONVENTION ON NUCLEAR SAFETY

SEVENTH NATIONAL REPORT BY IRELAND

DEPARTMENT OF COMMUNICATIONS, CLIMATE ACTION AND ENVIRONMENT

August 2016

Table of Contents

A. INTRODUCTION

This report gives an outline of the national policy, State institutional framework and general legislation governing nuclear matters in Ireland. It also sets out measures adopted by Ireland to implement the relevant obligations of the Convention.

Overview of Ireland's policy on nuclear safety

While Ireland does not have a nuclear power industry, it recognises the right of States to determine their own energy mix. It is our expectation that, where a State chooses to develop a nuclear power industry, this will be done in line with the highest international standards with respect to safety and environmental protection.

Ireland has rejected the use of nuclear power for energy requirements and does not therefore have any nuclear installations, research reactors or fuel storage/recycling facilities. Ireland's policy priorities concentrate on improving nuclear safety and radiological protection and on emergency preparedness. This involves close contact with regulatory authorities in other countries. Ireland also participates in a number of IAEA, NEA and EU committees and working groups on a range of issues relating to nuclear safety.

Responsibility for nuclear policy is vested in the Minister for Communications, Climate Action and Environment who has responsibility for:

- Implementing national policy in relation to nuclear and radiation matters.
- The transposition into national legislation of all relevant EU and other international legal instruments.
- Input to the national nuclear emergency plan.
- Representation at EU, IAEA and other international organisations.

Policy in the area of nuclear safety and radiation protection is a process of continual improvement and modifications are regularly required to adapt to changing circumstances.
The national position in relation to nuclear safety and radiation protection was laid out in a policy position paper in 2015 which is available from the following link:
http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/Environment/EnvironmentalRadiation/FileDownLoad,42543,en.pdf

Ireland's commitment to the Convention on Nuclear Safety

The Convention on Nuclear Safety (CNS) is important to Ireland. It recognises that nuclear safety is a matter for all of us. While specific safety provisions remain, in the first instance, a matter for each country, the potential transboundary impact of a nuclear accident means that nuclear safety in any one country is a matter of concern to all others, whether or not they have chosen to develop a nuclear energy industry of their own. The risks to human health and the environment that a nuclear accident carries, and the possible transboundary consequences mean that international cooperation is essential to provide assurance, including to the public, that the right measures are in place and that they are effectively implemented.

The Fukushima Daiichi accident serves as a reminder on the continued importance that must be assigned to nuclear safety and its global nature. Ireland welcomes the European Union response to the accident which included stress tests and a new Nuclear Safety Directive that will result in strengthening of existing nuclear safety arrangements in the Union.

Transparency and effective communications are an essential part of nuclear safety and emergency response. One aspect of this to which Ireland attaches particular importance is effective communication between governments and the CNS encourages States to provide appropriate information to the Competent Authorities of other States in the vicinity of a nuclear installation for emergency planning and response. Ireland places great importance on the CNS review process and looks forward to working with all other Contracting Parties to ensure the CNS is effective and that the co-operation developed between Contracting Parties to date continues to improve.

Structure of the report

The format of the Irish National Report follows the structure given in guidelines INFCIRC/572/Rev.5.

B. SUMMARY

The main developments since the last national report are:

- In 2014, Ireland ratified the Amendment to the Convention on the Physical Protection of Nuclear Material. [Article 7(1)]
- Finalisation of *National Policy Position on Nuclear Safety and Radiation Protection*. – referred to earlier. [Article 8]
- Review of the National Emergency Plan for Nuclear Accidents (NEPNA) [Article 16(3)] in light of lessons identified from the response to the Fukushima accident and to other non-nuclear emergencies (to be completed Q4 2016).
- Completion of a successful IRRS peer review mission in 2015.
- In May 2016, Ireland participated in the international INEX-5 nuclear emergency exercise that was organised by the OECD Nuclear Energy Agency (NEA) Working Party on Nuclear Emergency Matters (WPNEM).
- Merger of the Radiological Protection Institute of Ireland (RPII) with the Environmental Protection Agency (EPA) in 2014. [Article 8(1)]

Challenges identified at last RM

Three challenges were identified in the country review report for Ireland at the sixth peer review meeting. The challenges identified included the following:

- Moratorium on replacement/recruitment of staff in the public service
- Merger of the RPII with the Environmental Protection Agency
- Preparation and hosting of IRRS mission in 2015

Moratorium on replacement/recruitment of staff in the public service

The embargo on the recruitment of staff in the public and civil service has now been lifted.

The EPA develops a workforce plan which it submits to the relevant Government Department annually. As part of this process, permission was sought and granted in 2016 for an additional staff member in the area of radiological protection.

Merger of the RPII with the Environmental Protection Agency

The responsibilities of the EPA were extended in August 2014 following its merger with the Radiological Protection Institute of Ireland (RPII). The merger dissolved the RPII, the body

previously responsible for all matters pertaining to ionising radiation, and transferred all of RPII's functions, assets, and liabilities to the EPA. The staff of the RPII was transferred to the EPA upon the merger and provide the radiological protection and nuclear safety competence in that field in a new Office of the EPA (Office of Radiological Protection (ORP)).

Preparation and hosting of IRRS mission in 2015

A summary of Ireland's International Regulatory Review Service mission is provided below on page 7.

Address future safety related activities and programmes planned or proposed for the period until the next National Report

The following planned measures where identified at the sixth peer review meeting. Specifically:

- Move to graded approach to authorisation
- Address lessons learned from emergency drills and exercises
- Address actions taken to improve transparency and communication with the public

Move to graded approach to authorisation

In 2012 a high level model for graded authorisation was developed that would allow for alternative forms of authorisation, such as registration or notification only, to be used in addition to the "one size fits all" licensing system currently in operation. This new tiered system of authorisation would better reflect the risk associated with different uses of ionising radiation throughout Ireland without compromising on radiation safety. The implementation of such an approach will be considered under the transposition of the Euratom Basic Safety Standards (BSS) Directive into Irish law.

Address lessons learned from emergency drills and exercises

Details of Ireland's emergency exercises and drills are provided under Article 16(3). As noted on page 41, lessons learned from emergency drills and exercises have been taken into account in the review of Ireland's National Emergency Plan for Nuclear Accidents (NEPNA).

Address actions taken to improve transparency and communication with the public

The EPA has many communication channels with Interested Parties, including licensees, public bodies, private organisations and the general public. These include the EPA website, Twitter, Memoranda of Understanding, bi-lateral meetings and participation on national committees. In addition, the EPA has established a stakeholder panel on nuclear emergency planning which includes industry representatives from farming, food production, animal feed, retail and consumer agencies.

Following the merger of the RPII and the EPA, the EPA website was updated to include dedicated radiation pages (http://www.epa.ie/radiation/). These pages provide details of all the work performed by the EPA and include all EPA publications and data (monitoring reports, assessments, online gamma dose rate measurements, etc.). The EPA remains committed to communicating with the public about all its activities. In addition, a dedicated website on nuclear emergencies is being established. This will include a 'dark site' which will be available to use during an actual emergency and is capable of handling a large number of users.

Annually, the EPA publishes an Inspection and Licensing Activities and Annual Inspection Programme, which provides details of the processes, key trends and priorities associated with its radiological licensing and inspection programme.

To communicate quickly and easily with the general public and media, the EPA established a dedicated twitter account in September 2014 for nuclear and radiological information (@EPARadiation). This was used extensively to communicate information during the IRRS Review mission.

The EPA develops an annual communications plan which is informed by the priorities set out in the current Strategic Plan. This Communications Plan acts as a framework to highlight the main communications activities planned for the year ahead while also allowing for a degree of flexibility to accommodate changes that may occur throughout the year. The Plan identifies key communication actions for the EPA when dealing with the public, media and external agencies and organisations.

Summary of Ireland's International Regulatory Review Service Mission

In September 2010 Ireland applied to host an international peer review (Integrated Regulatory Review Service (IRRS)) mission and, in an exchange of letters, 2015 was agreed between the

IAEA and Ireland with a follow up mission foreseen for 2018. The purpose of the peer review was to review Ireland's regulatory framework for radiation safety and involved the key Government Departments and Agencies including the Department of Environment, Community and Local Government (DECLG), the EPA, the Department of Health (DoH), and the Health Service Executive (HSE). The review compared Ireland's regulatory framework for safety against IAEA safety standards as the international benchmark for safety. The mission was also used to exchange information and experience between the IRRS team members and Ireland's counterparts in the areas covered by the IRRS.

The IAEA worked closely with Ireland to ensure the scope of the review mission was sufficient to address all areas of interest. It was agreed that the mission would cover all relevant facilities and activities regulated in Ireland and also included medical exposures and public exposure to radon. In addition, the IAEA agreed to strengthen the radioactive waste expertise on the mission team as this was an area of particular interest to Ireland.

The IRRS project had a number of different phases including raising awareness, staff training, stakeholder engagement, self-assessment, a series of pre-meetings with the IAEA and then the actual mission itself. The timelines for the various phases are shown in Figure 1.

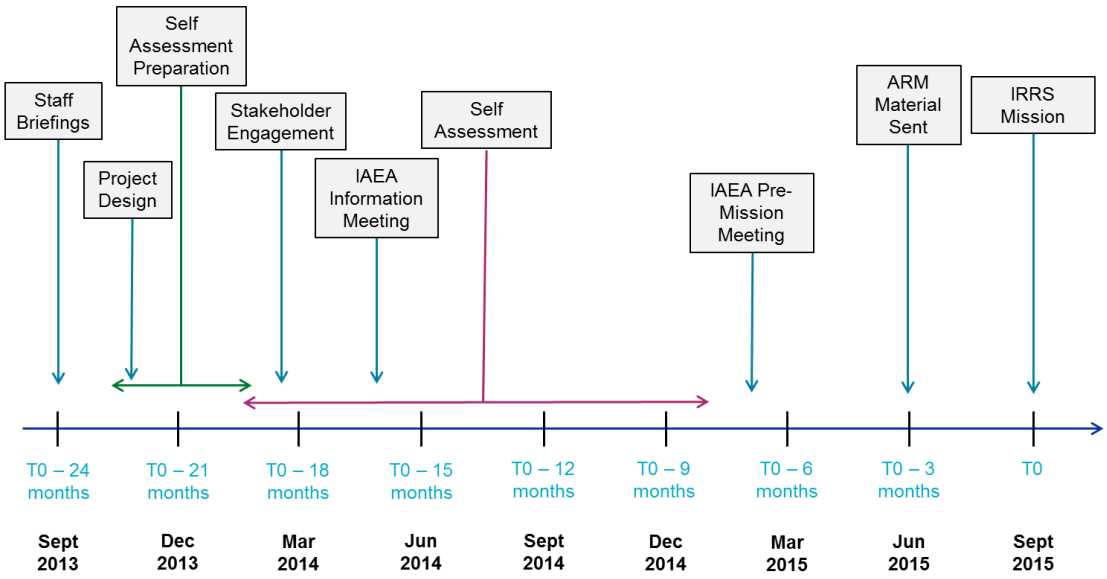

Figure 1. IRRS mission to Ireland key milestones

As the EPA had a central role in the preparation for the IRRS mission, staff briefings on the mission commenced in September 2013. The EPA prepared a project plan for the IRRS mission that outlined timelines and assigned responsibilities. The project plan was published on the EPA website (http://www.epa.ie/pubs/conferencesandevents/RPII_Project_Plan_IRRS_mission.pdf).

All key organisations involved in the IRRS received regular updates from the EPA on the progress towards the 2015 IRRS mission. The briefings included presentations, website articles, weekly information updates, IRRS themed information posters, etc. The IAEA also provided an IRRS information meeting to EPA staff and Government in 2014.

The self-assessment phase was a critical and intensive part of the project where Ireland evaluated itself against the international standards using an extensive computer-based questionnaire supported by the IAEA. The self-assessment task was undertaken by EPA, HSE and DECLG staff in addition to their routine work and took almost 18 months to complete. The self-assessment identified gaps and issues that need to be addressed, as well as identifying practices including regulatory methods/procedures/practices that work well and that Ireland should maintain. The output of the self-assessment consisted of 40 completed questionnaires covering over 1500 questions based on the international standards, 235 supporting documents, 54 pieces of legislation, summary reports of the self-assessment and the analysis of strengths, good practices and challenges identified for each of the modules included in the scope of the mission. This output of the self-assessment work was sent to the IRRS review team three months in advance of the mission. This advanced reference material (ARM) formed the core of the evidence that the actual mission assessed and verified in 2015.

The IRRS review mission took place from 30th August to 9th September 2015. In accordance with the agreed scope for the mission, the IRRS team interviewed staff from EPA, HSE and DECLG during the first week, using the ARM as the basis for their discussions. The IRRS team held formal meetings with senior Government officials from Departments of Environment and Health during which various policy issues were discussed. The IRRS team accompanied EPA inspectors on site visits to an industrial irradiation facility, a radiopharmaceutical manufacturer and a private radiotherapy centre. The team also witnessed a clinical audit of a public hospital carried out by the HSE and visited the National Emergency Coordination Centre.

The IRRS team consisted of 10 senior regulatory experts from nine IAEA Member States, three IAEA staff members and one IAEA administrative assistant. The IRRS review team carried out the review in the following areas:

- responsibilities and functions of the Government;
- the global nuclear safety regime;
- responsibilities and functions of the regulatory body;
- the management system of the regulatory body;
- the activities of the regulatory body including the authorization, review and assessment, inspection and enforcement processes;
- development and content of regulations and guides;

- emergency preparedness and response;
- occupational radiation protection,
- patient protection,
- public and environmental exposure control including radon, transport, waste management and decommissioning.

In addition, policy issues were discussed, including: radioactive waste management policy and the role of the Regulatory Body, and the integration of radiation protection regulation with environmental protection regulation.

The IRRS team presented a draft of their mission report at the close out meeting on 9th September. The report was finalised and presented to Ireland in February 2016. The report sets out the review team's assessment of Ireland's compliance with the IAEA's Fundamental Safety Principles and Safety Requirements. The Team's high level conclusions were that:

- The EPA is an effective and independent regulatory body;
- Ireland actively participates in the global safety regime;
- The EPA benefits from experienced, technically competent and well-motivated staff;
- Ireland needs to implement an effective and independent legal and regulatory framework for the regulation of patient protection, and;
- The radioactive waste management policy approved by Government should be fully implemented.

The report also includes a series of explicit recommendations, suggestions and good practices. Details of all the findings are provided in Appendix 1. A summary of the key numbers associated with Ireland's IRRS mission are shown in Figure 2.

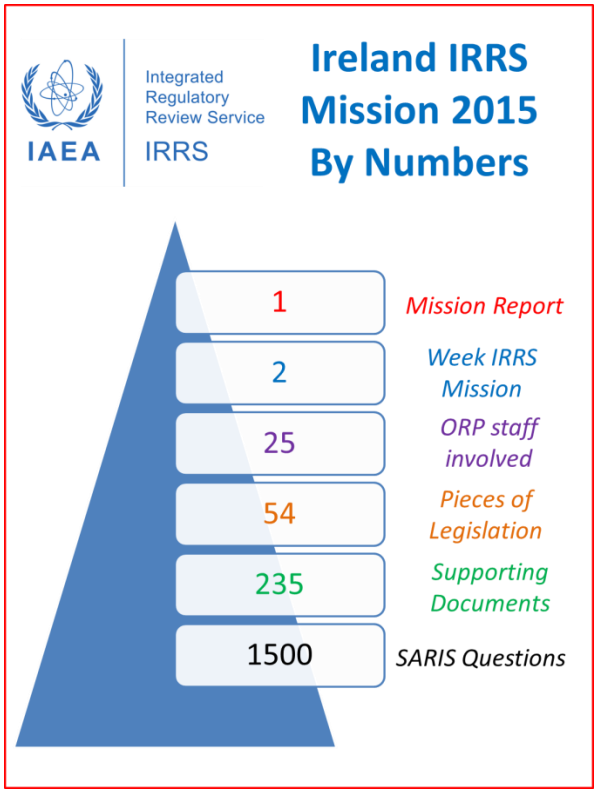

Figure 2. Key numbers from Ireland's IRRS mission

IRRS Implementation

Development of an Action Plan that takes account of the IRRS findings as well as any other significant issues identified during the self-assessment is currently on-going. Some examples of how the IRRS findings will be addressed are outlined in the following paragraphs.

The recommendations and suggestions on the Emergency Preparedness and Response module will mostly be addressed in the revision of the National Emergency Plan for Nuclear Accidents (NEPNA). This will include provisions to formalise the role of stakeholders in emergency preparedness and response and will also encompass the mission's suggestion to increase the national measurement capacity to cope with widespread, long-lasting contamination environmental monitoring capacity for emergencies. In addition, the EPA will include the oversight of licensees' emergency exercises for Emergency Preparedness Category III sites in future annual work programmes. Other recommendations on this module will be addressed by the transposition of the new Euratom BSS Directive.

The need for substantial revision of the regulation of patient protection will be addressed in the transposition of the new Euratom BSS, including nomination of a new and independent competent authority for the regulation of patient protection. This will complete the regulatory framework in Ireland and ensure the protection of all people in Ireland whether they are workers, members of the public or patients.

As part of the thematic module on control of chronic exposures, the IRRS team recommended that the Government review and revise the specific regulations addressing radon in workplaces to enhance their effectiveness. In addition they suggested that Ireland consider a plan of how to determine workplaces with the highest level of radon. These issues will be addressed as part of Ireland's on-going work under the National Radon Control Strategy and with the radon exposure control aspects of the new Euratom BSS.

In general, the transposition of the new BSS represents an opportunity to address IRRS recommendations and suggestions that will require new or amending legislation.

IRRS Transparency Arrangements

All key organisations involved in the IRRS project received regular updates from the EPA on the progress towards the 2015 IRRS mission. The briefings included presentations, website articles, weekly information updates, IRRS themed information posters, etc. As part of the 'raising awareness' phase of the IRRS project, the EPA created a public webpage (http://www.epa.ie/radiation/lic/irrs/) to provide background information and updates on the mission preparations and status. After the mission, Ireland made public the IRRS report as soon as it was finalised by the IAEA (http://www.epa.ie/pubs/conferencesandevents/irrsmissionreportfinal.html).

The EPA also used the @EPARadiation twitter account to provide regular updates on Ireland's IRRS peer review mission. This included regular tweets on all preparatory activities and updates during the 10 day mission.

Summary of Ireland's response to the Fukushima Daiichi accident and follow-up actions

All follow-up actions identified in the previous National Report have been completed.

The National Emergency Plan for Nuclear Accidents abroad (NEPNA) is currently being updated taking into account lessons learned from Ireland's Fukushima response (page 41).

Challenges identified by the Special Rapporteur to the 6th Review Meeting

As Ireland has no nuclear facilities, only two of the challenges identified by the Special Rapporteur to the 6th Convention on Nuclear Safety Review Meeting in 2014 are applicable:

- *Challenge 2*: How to achieve harmonized emergency plans and response measures?

- *Challenge 4*: How to improve regulator's independence, safety culture, transparency and openness?

Challenge 2: How to achieve harmonized emergency plans and response measures?

In 2013, the EPA completed a review of Ireland's response to the Fukushima Nuclear accident as undertaken by the EPA. The findings from the review have been incorporated in the EPA's response plan and other follow-up actions are completed or underway.

Ireland recognises that international cooperation on emergency exercises is essential. Irish authorities regularly participate in international exercises such as those in the INEX series and the ConvEx exercises coordinated by the IAEA. EPA also participates in the ECURIE Level 3 exercises coordinated by the European Commission. In addition, annual bilateral notification exercises are held with the UK.

In May 2016, Ireland completed the international INEX-5 nuclear emergency exercise that was organised by the OECD Nuclear Energy Agency (NEA) Working Party on Nuclear Emergency Matters (WPNEM). The EPA will identify and share with the international community lessons learned from this exercise.

In 2013 Ireland participated in the review commissioned by the EC of current off-site nuclear emergency preparedness and response arrangements in EU member states and neighbouring countries (http://ec.europa.eu/energy/en/content/review-current-offsite-nuclear-emergency-preparedness-and-response-arrangements-eu-and). The EPA coordinated Ireland's participation in the review which included the completion of detailed surveys on national arrangements, provision of supporting documentation on these arrangements and participation in a series of stakeholder meetings to develop recommendations.

There is a dedicated emergency preparedness section on the EPA website (http://www.epa.ie/radiation/emerg/). These pages provide background information on emergency planning in Ireland for the public and licensees. In addition, the EPA use the @EPARadiation twitter account as a method of communicating quickly and easily with the general public and the international EP&R community.

Ireland has adopted the HERCA WENRA approach for better cross-border coordination of protective actions during the early phase of a nuclear accident in Europe (http://www.herca.org/docstats/HERCA-WENRA%20approach%20for%20better%20cross-

border%20coordination.pdf). This approach is designed to achieve a harmonised approach to the early emergency response plans in the event of a nuclear accident with impact on territories of other European countries.

All of these activities will allow Ireland to identify best international practices and approaches in emergency plans and response measures.

Challenge 4: How to improve regulator's independence, safety culture, transparency and openness?

The EPA's radiation safety inspection activities are formally accredited to the ISO 17020 standard (Requirements for the operation of various types of bodies performing inspection), which provides for openness and transparency, as well as, continuous assessment and improvement. In addition, EPA actions to improve its transparency and communication with the public are outlined in Article 8(1).

Details of the measures put in place by the EPA to minimize possible occurrences of conflicts of interest are outlined in Article 8(2).

Ireland hosted an IRRS peer review mission in 2015. This process allowed Ireland to compare the Regulatory body and infrastructure with relevant international standards and best practices. This has identified a number of issues which when rectified will help to improve Ireland's infrastructure.

For its 2016 annual inspection programme, the EPA is placing an increased emphasis on the assessment of licensees' radiation safety culture during its inspections. In support of this new focus, the EPA held a workshop on safety culture in April 2016 for all approved Radiation Protection Advisers [Qualified Experts]. The workshop included discussions on how the concept of safety culture has been used to enhance safety in the nuclear and other sectors as well as exploring what a good radiation safety culture would look like in applications involving industrial and medical uses of ionising radiation.

Details on the actions taken to improve transparency and openness were outlined earlier in the Summary Section.

Changes to the National Radiation Regulatory Body

As noted in Article 8(1), there was a major change in the radiation regulatory infrastructure in Ireland in 2014 when the Radiological Protection Institute of Ireland (RPII) was merged with the Environmental Protection Agency (EPA). The functions, assets, liabilities and staff of the RPII, the body previously responsible for all matters pertaining to ionising radiation, were transferred to the EPA.

The date for Ireland's IRRS peer review mission was chosen to occur after the merger to allow review of the new arrangements. The IRRS review team concluded that the EPA is an effective and independent regulatory body and benefits from experienced, technically competent and well-motivated staff.

C. REPORTING ARTICLE BY ARTICLE

Article 4 Implementing Measures

These measures are set out in this Report.

Article 5 Reporting

The submission of this National Report fulfils this obligation.

Article 6 Existing Nuclear Installations

Ireland has no nuclear installations and therefore nothing to report under this Article.

Article 7 Legislative and regulatory framework

Article 7 (1) Establishing and maintaining a legislative and regulatory framework

The legislative framework governing nuclear safety and radiation protection in Ireland is the Radiological Protection Act 1991 (No. 9 of 1991), as amended by Section 26 of the Energy (Miscellaneous Provisions) Act, 1995 (No 35 of 1995) and by the Radiological Protection (Amendment) Act 2002 (No. 3 of 2002). Following the merger of the RPII and the Environmental Protection Agency in August 2014, the functions and responsibilities of the RPII were transferred to the EPA by the Radiological Protection (Miscellaneous Provisions) Act 2014 (No. 20 of 2014). Other main legislation relevant to nuclear matters is as follows:-

- The Radiological Protection Act 1991 (Ionising Radiation) Order 2000 (S.I. No. 125 of 13 May 2000), hereinafter referred to as the Ionising Radiation Order.
- European Communities (on the supervision and control of certain shipments of radioactive waste and spent fuel) Order (S.I. No. 86 of 2009);
- European Communities (Radiological Emergency Warning to Public) Regulations 1993 (S.I. No. 209 of 1993);
- European Communities (Medical Ionising Radiation Protection) Regulations, 2002 (S.I. No. 478 of 2002), as amended;
- The Radiological Protection Act 1991 (Control of High-activity sealed radioactive sources) Order 2005 (S.I. No 875 of 2005)
- The Radiological Protection Act 1991 (Licensing Application and Fees) Regulation, 2007 (S.I. No. 654 of 2007) setting out the application provisions and the schedule of application and licence fees payable for licences issued by EPA

- Commission Regulation (Euratom) No 302/2005 of 8 February 2005 on the application of Euratom safeguards which equally apply in Ireland
- The Radiological Protection Act 1991 (Nuclear Safety) Order 2011 (S.I. No. 390 of 2011).
- The Radiological Protection Act 1991 (Responsible and Safe Management of Radioactive Waste) Order 2013 (S.I. No. 320 of 2013).

In March 2000, Ireland became the 25th State to ratify the Joint Convention on the Safety of Radioactive Waste and the Safety of Spent Fuel Management, thus triggering the entry into force of the Convention.

Ireland ratified the Convention on the Physical Protection of Nuclear Materials (CPPNM) in 1991 and is subject to the terms of this Convention. The Radiological Protection (Miscellaneous Provisions) Act 2014 (No. 20 of 2014) gives effect to the Amendment to the CPPNM done at Vienna on 8 July 2005. Ireland deposited an instrument of ratification of the Amendment with the Director General of the IAEA on 22 September 2014.

Also relevant is the Freedom of Information Act, 1997 which contains an amendment to Section 36 of the Radiological Protection Act 1991. The amendment deals with confidentiality.

Article 7 (2) (i) National safety requirements and regulations

The Ionising Radiation Order implements Council Directive 96/29/Euratom and sets out basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation. The EPA's licensing system is based upon these legal requirements and the day to day responsibility for implementing the system has been delegated to the Radiation Protection Regulation unit within the EPA's Office of Radiological Protection (ORP). Inspections undertaken by the EPA are designed to ensure compliance with both the legislative requirements as set out in the Ionising Radiation Order, S.I. No. 875 of 2005 and licence conditions. It is also an objective of the programme to assess the level of radiation protection in place at each licensed facility and to encourage licensees to strive to attain best practice in relation to radiation protection.

The EPA has produced guidance documents and code of practices for licensees which are available on its website (http://www.epa.ie/radiation/lic/regs/)

The most significant new piece of new legislation that will be enacted in the coming years will transpose the Euratom Basic Safety Standards Directive by February 2018. This project is being

led by the Department of Communications, Climate Action and Environment (DCCAE) and as part of the transposition process a consultation process with interested parties will be undertaken in the latter half of 2016.

Article 7 (2) (ii) System of licensing

All practices involving sources of ionising radiation other than exempted sources are subject to control by licence issued by the EPA in accordance with the requirements set out in the Ionising Radiation Order. This Order covers both site specific emergency plans, which must be prepared by undertakings (when directed to do so by the EPA) licensed to carry on defined categories of practices, and the National Emergency Plan for Nuclear Accidents. This provides a framework for the national response to an event with widespread radiological impact. Additionally, the Ionising Radiation Order places legal requirements on all licensees regarding notification of incidents.

The Irish licensing system was first established in 1977 with the passage of the Nuclear Energy (General Control of Fissile Materials, Radioactive Substances and Irradiating Apparatus) Order 1977. The current regulations are provided by the Ionising Radiation Order. The growth in the total number of licensees is shown in Figure 3.

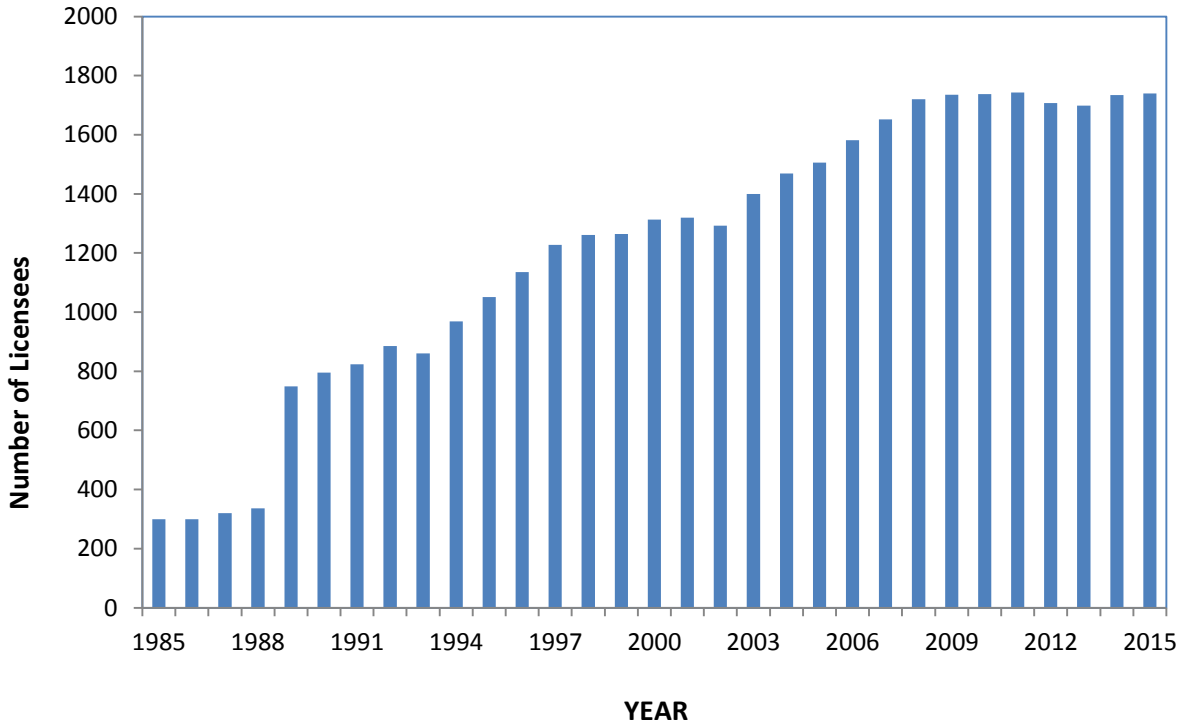

Figure 3. Number of licensees (1985-2015)

On the 1st January 2016 there were 1740 active licences across six sectors, as illustrated in Figure 4. The dental sector makes up 56% of the licences issued, followed by the veterinary and industrial sectors at 17% and 15% respectively.

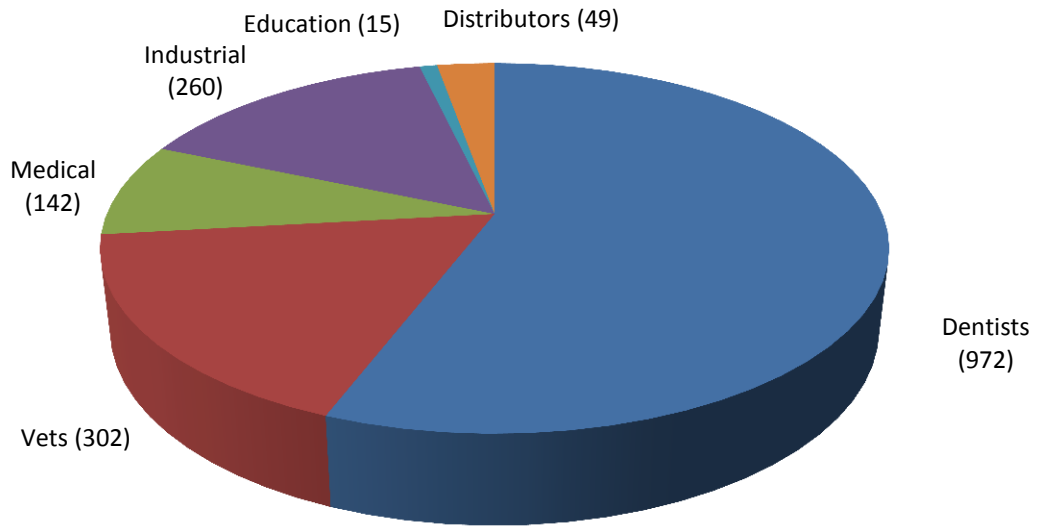

Figure 4. Licensees by Sector (1st January 2016)

From a radiological risk point of view licensees can be grouped into one of three categories – High, Medium and Low. In accordance with S.I. No. 654 of 2007, the criteria which determine the category a licensee falls into, reflecting the level of risk associated with the activities carried out, are based upon consideration of the following:

- The number of practices licensed and the level of complexity of the practice(s);
- The type, size, number and complexity of the radioactive source or irradiating apparatus;
- The security and safety measures required;
- The complexity of radiation protection measures required;
- The potential for doses arising to workers or members of the public;
- Consequences of an accident.

Table 1 provides examples of the types of licensable activities that fall into each of the three risk categories.

Table 1. Examples of licensable activities

Risk Category	Example activities
High	Radiotherapy; non-destructive testing - industrial radiography; use of HASS sources; product sterilisation; radiopharmaceutical manufacturing.
Medium	Nuclear medicine; medical diagnostic X-ray services; use of fixed and portable gauges (sealed sources); distribution of radioactive sources; educational & research purposes.
Low	Dental radiography; veterinary radiography; cabinet X-ray (security screening & quality control testing); bone densitometry; laboratory-based gas chromatography.

Table 2 details the breakdown of licensees within each of the three categories for each licensing sector. The only sectors which have licensees in the High risk category are the industrial and medical sectors.

Table 2. Distribution of licensees by risk category

Sector	Low	Medium	High
Dental	972	0	0
Distribution	22	27	0
Education & Research	0	15	0
Industrial	158	85	17
Medical	26	103	13
Veterinary	301	1	0
Total	1479	231	30

Currently all users of sources of ionising radiation must hold a licence from the EPA and, in addition to adhering to statutory requirements laid down in the Ionising Radiation Order, comply with the licence conditions pertaining to the activities for which the licensee is licensed for. While the EPA adopts a graded approach in terms of reviewing and assessing different types of licence applications, and applying licensing conditions that reflect the nature and risk of the licensed activities, in practice the current licensing system is a one size fits all. However, for new licence applications that fall into the High Risk Category, the EPA will usually carry out a site visit at some stage of the building process in advance of issuing a new licence.

The current licensing system does not provide for involvement of the public or interested parties when applications for new licences are being assessed by the EPA, the majority of which are typically for new dental or veterinary X-ray equipment. Given the nature of the activities currently licensed throughout Ireland, this is not considered a problem and was not raised as an issue requiring action by the IRRS review team during its mission to Ireland in 2015.

In preparation for the transposition of the 2013 Euratom Basic Safety Standard (BSS) Directive (Council Directive 2013/59/EURATOM), which must be enacted in Irish legislation by February 2018, the EPA is working on the development of a new graded authorisation system which will provide for different levels of authorisation, such as notification and registration, in addition to the current system of licensing. This new tiered system of authorisation will better reflect the risk associated with different uses of ionising radiation throughout Ireland without compromising on radiation safety. For example, it is expected that low risk activities such as dental radiography or the use of cabinet X-ray units will move to a more simplified registration system, whereas high risk activities such as radiotherapy and non-destructive testing will remain at licensing. The transposition of the Euratom BSS will provide the necessary legal basis to allow the EPA to introduce a graded approach to authorisation.

As well as adhering to statutory requirements laid down in the Ionising Radiation Order, each sub-category of licensee must also adhere to specific licence conditions pertaining to the activities for which the licensee is licensed for. Failure to comply with a licence condition is an offence which could lead to prosecution. In addition, the custody and/or use of a source of ionising radiation in the absence of a licence issued by the EPA is also an offence that can lead to a prosecution.

The regulatory function comprises 11 whole time equivalent members of staff. In addition, a radiotherapy expert from the UK acts as an external consultant assisting with inspections of radiotherapy facilities. This external expert is a warranted EPA inspector and assists inspections in accordance with EPA's ISO 17020 Quality Management System, though in all cases the responsibility for determination of conformity of the facility being inspected will remain with the EPA inspector.

Inspectors are engaged in all regulatory activities in addition to inspection, including licensing, drafting guidance documentation, accreditation activities, provision of advice to Government, radioactive waste management, management of Radiation Protection Advisor (RPA) registers, approval of courses, international representation, regulator/stakeholder liaison, policy and technical advice for legislation development.

In 2014 the EPA work commenced on the development of a new online licensing system to manage all its radiological protection licensing and inspection activities. This new system, which was launched in March 2015, allows applicants to apply online, through a secure web portal, for a new licence, and renew or make amendments to an existing licence. The whole application process is now paperless and all licences are issued electronically. This has provided for improved efficiencies for both EPA licensees and internal staff and is consistent with the Irish Government's strategy (*eGovernment 2012 – 2015)* to ensure that Public Bodies across Ireland improve how technologies are utilised to improve the quality of service delivery to their customers. The system was further expanded in March 2016 to provide for the management of all aspects associated with EPA inspection activities so that all inspections are planned and announced through the web portal, and licensees are able to respond to inspection findings online.

Article 7 (2) (iii) System of regulatory inspection and assessment

The EPA and its inspectors are provided with significant enforcement powers under the Radiological Protection Act 1991 and the Ionising Radiation Order including powers of entry and seizure. Prosecutions can and have been taken against individuals and companies involved in unlicensed activities and against non-compliant licensees. Fines have been imposed by the courts on individuals and companies which have been prosecuted. In addition, the EPA has the power to issue directions and enforcement notices.

The EPA has the resources to undertake typically 150 – 220 radiological inspections per year and the number of inspections undertaken in a given year is based upon a risk analysis. Table 3 details the breakdown of inspections planned for 2016 within the different risk categories. It is clear from the table that the High risk category has been prioritised, with 73% of licensees within this category scheduled to be inspected in 2016.

Most inspections are announced in advance but a number of unannounced inspections also take place each year. Inspections can also arise outside of the normal annual programme where incidents are investigated.

Table 3. Inspections planned for 2016

Risk Category	No. of Licensees	No. of licensees to be inspected	No. of Inspections Planned
High	30	22	29
Medium	231	117	121
Low	1479	12	12
Total	1740	151	162

The EPA is committed to ensuring the highest standards in all activities it undertakes. In fulfilment of this commitment all inspection activities are carried out within the framework of an ISO 17020 quality management system. This ensures that inspections are carried out to best international standards and ensures consistency between both inspections and inspectors. In particular the system provides for inspection planning, training of new and experienced inspectors, the conduct of inspections as well as post inspection follow up and review.

It should be noted that inspections are not viewed as the only means of enforcement. In particular, the EPA has incorporated the statutory Radiation Protection Advisor (RPA) requirement into its licensing requirements on a phased basis and this is seen as a significant step forward in enhancing radiation safety and compliance in all relevant sectors.

Each year the EPA publishes an annual inspection report on its website which provides a detailed overview of its radiological licensing and inspection activities. The report explains how the annual inspection priorities and programme are developed and includes a review of the previous year's inspection programme findings together with details of the programme and high level objectives for the forthcoming year.

Article 7 (2) (iv) Enforcement of applicable regulations and terms of licences

The EPA and its warranted inspectors have various enforcement powers under the Radiological Protection Act 1991. EPA inspectors also have powers under the European Communities (Carriage of Dangerous Goods by Road and Use of Transportable Pressure Equipment) Regulations 2011 to 2015 to issue fixed penalty notices for various offences under the ADR as specified in the regulations.

In accordance with the Radiological Protection Act, where an inspector is of the opinion that there is or may be a danger to any individual, land, building or other property arising from a radioactive substance, nuclear device or irradiating apparatus or arising from levels of activity or ionising

radiation in excess of the specified levels the inspector shall have the power by direction, to order persons to perform or refrain from performing any act if, in his/her opinion, the performance of such act (as the case may be) is necessary in order to prevent or alleviate the escalation of the danger.

There is a range of enforcement instruments available to the EPA inspectorate from 'soft' actions to 'hard' actions including:

- Raising non compliances during routine inspections and follow up until there is satisfactory closure
- Letter of censure/warning letter
- Issuing a direction
- Issuing an enforcement notice
- On the spot fines in relation to certain transport matters
- Seizure of relevant items such as radioactive sources/orphan sources
- Revocation of a licence
- Prosecution (and subsequent penalties/fines)

Regarding implementation of corrective actions identified during an inspection, the Inspection Report is issued to licensee management within four weeks of the date of the inspection and this includes a response date of four weeks by which the licensee must provide a written response to the report. If this is not provided then the inspectors follow up in accordance with the EPA's Radiological Enforcement Policy.

To date more than 50 prosecutions have been carried out for a range of offences including unlicensed custody of sources of ionising radiation, failure to adhere to a licence condition, unlicensed export of a radioactive substance (involving an inadvertent shipment of radioactive waste in general hospital waste to the UK) and obstructing an inspector. Where the EPA achieves a successful prosecution it issues a press release.

Article 8 Regulatory body

Article 8 (1) Establishment of the regulatory body

Legal foundations and statute of the regulatory body

The EPA is a State sponsored body established under the Environmental Protection Agency Act, 1992. Following the merger of the RPII and the EPA in August 2014, the functions and responsibilities of the RPII transferred to the EPA under the Radiological Protection (Miscellaneous Provisions) Act 2014 (No. 20 of 2014).

Mandate, mission and tasks

The EPA carries out the following duties in relation to radiological protection/nuclear safety:

- provision of advice to the Government, the Minister for Communications, Climate Action and Environment, the Minister for Housing, Planning, Community and Local Government, and other Ministers on matters relating to radiological safety;
- provision of information to the public on any matter relating to radiological safety which the Agency deems fit;
- maintenance and development of a national laboratory for the measurements of levels of radioactivity in the environment, and assessment of the significance of these levels for the Irish population;
- provision of an instrument calibration service for those who work with ionising radiation;
- control by licence the custody, use, manufacture, importation, transportation, distribution, exportation and disposal of radioactive substances, irradiating apparatus and other sources of ionising radiation;
- assisting in the development of national plans for emergencies arising from nuclear accidents and acting in support of such plans;
- provision of a radioactivity measurement and certification service;
- preparation of codes and regulations for the safe use of ionising radiation;
- carrying out or promoting research in relevant fields;
- monitoring developments abroad relating to nuclear installations and radiological safety generally, and keeping the Government informed of their implications for Ireland;
- co-operating with the relevant authorities in other States and with appropriate international organisations;
- representing the State on international bodies;
- acting as the competent authority for Ireland under International Conventions on nuclear matters.

The EPA has also been made the national competent authority for the purposes of the IAEA Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, the Convention on Early Notification of a Nuclear Accident and the Convention on the Physical Protection of Nuclear Material.

Organisational Structure

The EPA is managed by a full-time Executive Board consisting of a Director General and five Directors. Its activities are organised into five Offices, with each Director responsible for an Office: the Office of Environmental Sustainability, the Office of Environmental Enforcement; the Office of Evidence and Assessment; the Office of Radiological Protection; and the Office of

Communications and Corporate Services. The ORP has functional responsibility for, among others, radiation safety regulation, radioactive waste regulation and radiation emergency preparedness. The EPA organisation structure is shown in Figure 5.

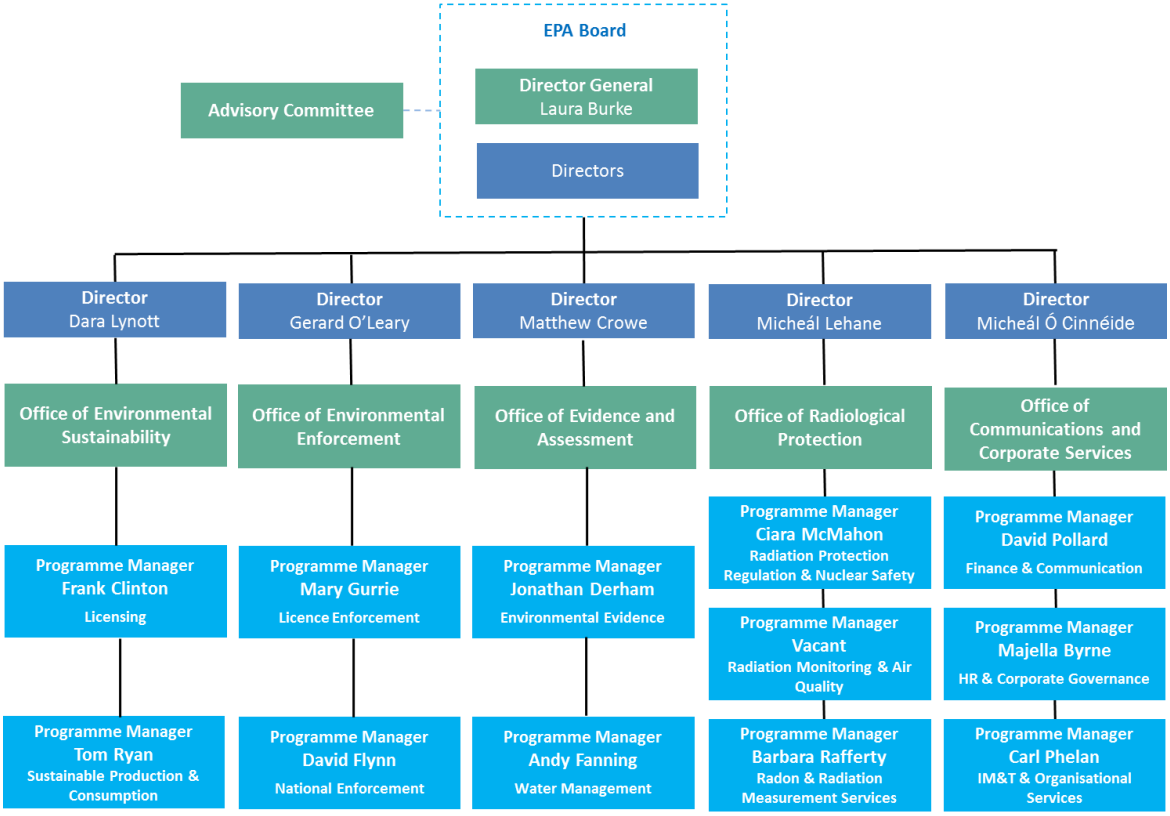

Figure 5. Organisation Chart for the EPA

In June 2016, the EPA had 370 staff (357.6 whole-time equivalent). Of this, there are 31 staff (28.5 whole-time equivalent) working in the ORP. Overall the scientific/technical role dominates the ORP's workforce at 77% supported by 23% of staff in administrative roles.

Advisory committees

The work of the EPA is further supplemented by a statutory advisory committee which provides advice to the EPA Board, in addition to a number of thematic advisory committees which advise the EPA in the carrying out of its functions. These include the Radiation Protection Advisory Committee, the Communications Advisory Committee and an Internal Audit Committee.

The Radiation Protection Advisory Committee is made up of 12 members. The members are nominated on the basis of their knowledge and experience by 12 organisations from a broad range of fields relevant to the radiological protection functions of the EPA. Additional criteria for nomination are excellence and reputation in their own field, as well as the contribution that they can make to the scientific reach of the group as a whole. Some members are selected from

outside Ireland to bring an international perspective to the work of the group. The current membership is drawn from the fields of Radiotherapy, Nuclear Medicine, Diagnostic Radiology, Public Health and Public Exposure, Environmental Radioactivity, Nuclear Safety, Education, Consumer Protection, Radiation Research, Workplace Safety, Dentistry, Veterinary, and Radon.

The Communications Advisory Committee advises the Board and the EPA on matters of public communications. This includes advice on the strategic direction of EPA communications activities, on the annual communications programme and on any other matter that may be referred to it by the Board.

The Internal Audit Committee (IAC) has an independent role in the provision of assurance to the EPA Board on internal control, risk management, efficiency & effectiveness, audit and assurance matters, as part of the systematic review of the control environment and governance procedures of the EPA. The IAC operates under an agreed charter and is obliged to prepare a formal annual report for the EPA's Director General for submission to the Board.

Development and maintenance of competence

The EPA operates a Performance Management Development System (PMDS) for all staff where their contribution to the successful delivery of the annual work programmes and ultimately the EPA's strategic plan is managed. This ensures that the work of all staff is strategically aligned to the overarching aims of the organisation. As part of the PMDS programme, all staff meet with their line manager at the start of the year to agree and document their individual work programme for the year. During this meeting, training and development needs are identified and where possible these are addressed though either in-house or external training opportunities. Half way through the year a mid-year review meeting is held between the staff member and their technical manager where progress on both the agreed work plan and the training & development programme are reviewed. Towards the end of the year an end of year review meeting is held to review whether the objectives of both the work and training & development plans were met during the year.

All new radiological inspectors joining the EPA must follow a comprehensive, documented training programme which ensures that they have both the technical knowledge and expertise, and over time the necessary experience, to ensure their effective independence in decision making. New inspectors are supported at all times by a mentor who they can consult with whenever they need advice or support in terms of decision making.

One of the requirements of the ISO 17020 standard is that the inspection body must have procedures in place to be able to assess the on-going competence of all its inspectors. To address this requirement a programme of inspection witnessing has been developed. Under this programme each inspector is witnessed by his or her technical manager carrying out a series of inspections at least once every two years. The competency assessment covers the entire range of activities associated with inspections, from the planning stages, through the actual inspection itself and finally the inspection reporting.

Quality management system

In 2009 the then RPII became the first regulatory authority in Europe engaged in radiation protection inspections to receive the certificate of accreditation under ISO 17020 from the Irish National Accreditation Board (INAB). This accreditation is now held by the EPA. It certifies that the EPA operates to the highest standards in carrying out its inspections, including inspection planning, follow-up and review, as part of an overall quality system that is subject to international peer review.

Development and maintenance of human resources

The EPA implements a performance management and development system (PMDS) for all staff which includes a module on training and staff development. Training is organised either on an individual basis or in groups depending on the nature of and demand for the training. Training contracts are awarded to trainers who have a good reputation and experience in their field. Where Ireland does not have a large experience base in a given topic (e.g. reactor technology) training is often obtained abroad. Feedback is sought by the EPA's Human Resources department on the quality of training provided by third party trainers. This feedback is sought both from staff attending the courses and from HR personnel in other organisations.

The EPA decided to involve as many staff as possible in the IRRS Review mission so as to provide staff with an excellent development opportunity. In total, there were 25 ORP staff members involved, representing more than 80% of the total ORP staff complement.

In July 2013, as part of ongoing collaboration with the UK's nuclear regulatory bodies, a member of staff from the RPII participated as an Expert Reviewer to assess the UK's Office for Nuclear Regulation's (ONR) responses to findings identified during IAEA IRRS missions to the UK in 2006 and 2009, and to review the ONR's Action Plan developed following a self assessment carried out in 2013.

The role of the EPA in emergency response includes the provision of technical advice and monitoring whereas emergency response coordination/incident management is provided by the Lead Government Department/Principal Response Agency. Hence, training for EPA staff is on these technical roles. All staff in the ORP are assigned an emergency role based on their skills and experience. Assignments are decided by the manager responsible for emergency planning and approved by the ORP Senior Management Team. The training needs for different roles are set down in the EPA response plan and 3-year staff training programmes are developed based on this. These programmes include a range of delivery methods including participation in drills and exercises, on-the-job training by colleagues, attendance at internationally-organised training courses, participation on relevant international committees and meetings on public communication, emergency planning/response and emergency monitoring, and organisation of internal/national training delivered by the EPA, national and international experts.

For example, in May 2015 the EPA organised a workshop on the HYSPLIT atmospheric dispersion model which was delivered by an expert from the US National Oceanic Atmospheric Administration (NOAA). The training was attended by EPA staff and other members of the HYSPLIT User Group in Ireland. This training allowed Ireland's HYSPLIT users to share knowledge of the model and operational experience.

The EPA (and formerly the RPII) has collaborated over many years with the IAEA, across a range of areas of mutual interest including radiation safety, radon, environmental radioactivity and emergency preparedness and response. This has been achieved through the provision of experts for IRRS and EPREV review missions and technical support missions, for consultancy meetings to prepare new standards and lecturers and officers for meetings run by the IAEA. In addition, one staff member was seconded to the IAEA to assist in the preparation of the Comprehensive Fukushima report. These activities have been undertaken by a number of EPA staff and the experience has proven extremely beneficial in terms of staff development and competence building.

Openness and transparency of regulatory activities

The EPA develops an annual communications plan which is informed by the priorities set out in the current Strategic Plan.

As described earlier (Article 7(2) (iii); page 22), a report on the EPA's radiological inspections activities is published annually. In addition an annual Radiation Protection Advisers [Qualified Expert] (RPA) liaison workshop is hosted by the EPA where it meets all approved RPAs to update them on new developments in regulatory and licensing procedures and to share regulatory information and seek feedback from them. In addition, regulatory staff present reviews of

inspection findings to the annual scientific meeting of the Irish Association of Physicists in Medicine.

The EPA use twitter as a method of communicating quickly and easily with the general public. The @EPARadiation twitter account delivers between 500 to 1500 visitors to the EPA website each month, with typically 10 to 50 tweets posted per month. The @EPARadiation account was used extensively to provide regular updates on Ireland's IRRS peer review mission in 2015. This included regular tweets on all preparatory activities and updates during the 10 day mission. Figure 6 shows examples of tweets sent during the IRRS mission.

Figure 6. Example of tweets sent during Ireland's IRRS mission in 2015

The EPA's website provides details of the radiation protection work performed by the EPA, including publications and data (monitoring reports, assessments, online gamma dose rate measurements, etc.).

Article 77 of the Euratom BSS includes a specific requirement on transparency. In transposing the Directive, Ireland will look to further improve transparency in its regulatory activities.

Developments with respect to Financial Resources

The EPA's income is made up of grants from the Exchequer and Earned and Other Income which includes Environmental Licensing and Enforcement, recovery of Emissions Trading Unit Costs, Regional Laboratory services and income from Radiological activities. In 2015, the EPA's income

of €57.991m[1] was made up of a grant of €43.079m from the Exchequer, and included earnings of €1.157m from Radiological Activities that included licence charges, instrument calibration, product certification, radon measurement and related services.

The on-going financial, human resource, and research and development requirements of the EPA are ensured through the normal annual budgeting and workforce planning processes exercised between the Department of Communications, Climate Action and Environment and agencies under its aegis.

Article 8 (2) Status of the regulatory body

The Environmental Protection Agency is an independent public body established in July 1993 under the Environmental Protection Agency Act, 1992 reporting to the Department of Communications, Climate Action and Environment. The responsibilities of the EPA were extended in August 2014 following its merger with the Radiological Protection Institute of Ireland (RPII) under the Radiological Protection (Miscellaneous Provisions) Act 2014. Appropriate coordination between the Department and the EPA is underpinned through a Service Level Agreement which is regularly reviewed and updated.

The publication of an Annual Report and Accounts is the primary means by which the EPA reports on its activities. The EPA Act requires that the EPA present to the Minister a report on its activities during the year and that copies of the report will be laid before the Houses of the Oireachtas as soon as possible after the end of the financial year, but not later than six months thereafter.

There are also other lines of communication with Governmental authorities including appearing before the Joint Parliamentary Committee on the Environment each year where the EPA has to account for, and respond to questions on, its annual programmes of work. These proceedings are broadcast. For specific programmes, staff of the EPA participate on Inter-Departmental working groups and taskforces that are chaired by Government Ministers or Senior Officials e.g. the High-Level Group on Radioactive Waste and the Government Taskforce on Emergency Planning.

All decisions on radiological licence applications or amendments to existing licences have been delegated by the EPA Board to, and are made solely by, staff from the Radiation Protection Regulation programme who report monthly to the Board on these activities. There is no requirement to consult with any external bodies, thus eliminating the possibility of any external influences on the licensing decisions. Where applications are received for new technologies or a

[1] This figure does not include the Net Deferred Retirement Benefit Funding of €7.469m.

previously unlicensed activity which is new or novel, the EPA may set up a licensing review panel comprising of staff from the Radiation Protection Regulation Unit, to review the application and make a recommendation on whether a licence can be issued. This ensures that licensing decisions are not made on the basis of just one individual's review of the application.

For inspection activities, the EPA ensures independence through accreditation as a Type A inspection body to ISO 17020:2012. As part of this standard, the EPA must be independent of those organisations being inspected and no inspection related activities can be influenced by any stakeholder. For inspections of radiotherapy facilities the EPA does not have the necessary in-house technical expertise for all items covered within the scope of the inspection. In order to address this skill deficit it engages the services of a UK-based expert in radiotherapy who must comply with the requirements of the ISO 17020 standard in terms of training, independence and impartiality. The use of a technical expert, who is not associated with any licensable activities in Ireland, rather than an Irish-based expert, ensures that there are no conflicts of interest in relation to any inspection findings.

The EPA has developed an enforcement policy, approved by the Board, which sets out the procedures for determining which enforcement actions are followed in various situations where serious non-compliances are identified during the course of inspections or other regulatory activities. By adhering to the procedures set out in this policy, the EPA ensures that all enforcement decisions taken by staff are objective in nature. While staff will make a recommendation as to whether a particular enforcement action is taken, the final decision is a matter reserved for the EPA Board.

The EPA has a number of measures in place to minimise possible occurrences of conflicts of interest. These include the following:

- All inspectors are required to adhere to an inspector's code of conduct;
- All staff are required to adhere to the EPA's Code of Conduct for Directors and Staff of the EPA which explicitly deals with potential conflicts of interest;
- Sections 37 and 38 of the EPA Act, 1992 explicitly requires Directors and Staff of the EPA to declare and disclose any interests that could be likely to influence them in relation to any matter coming before the Agency or in the exercise of any function of the Agency and;
- The EPA maintains a Risk Register which is used to manage risk in areas where there may be potential conflicts of interest.

Article 9 Responsibility of the licence holder

Stringent regulatory controls are in place to protect workers from exposure to harmful levels of ionising radiation. The Safety, Health and Welfare at Work Act, 2005, requires employers to identify hazards in the workplace, assess the risk to health and safety from these hazards, and put in place measures to eliminate or reduce the risk. The primary Irish legislation governing the protection of workers and members of the public from ionising radiation is the Radiological Protection Act, 1991, and its supplementary legislation - particularly the Ionising Radiation Order. These regulations explicitly make the licence holder responsible for all aspects of radiation protection relating to the sources of ionising radiation for which they are licensed. The EPA is responsible for implementing this legislation.

All users of ionising radiation are required to hold a licence from the EPA, unless exempted by the legislation. In terms of workforce protection, conditions that licensees must adhere to include:

- Maintaining records of all radioactive materials and irradiating apparatus
- Keeping records of worker doses, disposals, incidents, faults, and other relevant information involving the licensed items
- Ensuring that any changes to licensed facilities (e.g. new X-ray equipment; relocation of materials or equipment) are submitted by the Radiation Protection Adviser (RPA), or Radiation Protection Officer (RPO) for authorisation by the EPA
- Developing and maintaining a Radiation Safety Manual/Radiation Safety Procedures
- Notifying the local Fire Officer of the location and nature of all sealed and unsealed radioactive sources
- Carrying out an assessment of the potential radiation hazards prior to acquiring a licensable item
- Ensuring proper labelling of all radioactive materials and irradiating apparatus
- Making sure that all licensed items are subject to routine maintenance in accordance with the manufacturers' instructions, with appropriate quality assurance testing as recommended by the RPA/RPO.

In addition, licensees must also take all measures necessary to ensure the best possible protection of members of the public and must provide to the EPA, when requested, documents setting out how these measures are ensured.

Currently there are no formal provisions for ensuring that licensees maintain open and transparent communication with the public, but given the nature of the activities currently

licensed throughout Ireland, this is not considered a problem and was not raised as an issue requiring action by the IRRS review team during its mission to Ireland in 2015.

Article 10 Priority to safety

The EPA's annual inspection programme is an essential component of the EPA's regulatory processes which ensures that all sources of ionising radiation are held and used safely and securely. It takes a risk based approach to developing its annual inspection programme, investing greatest resources in those activities with the highest risks. When planning the annual inspection programme account is taken of the following:

- Radiological risk associated with each category of licensee;
- Date of most recent inspection for each licensee;
- Number of licensees within each category;
- Reported incidents during the year;
- Issues related to individual licensees;
- Matters that may have arisen during the year;
- Deferred inspections from previous years, where relevant;
- Recommendations from all inspectors or other relevant personnel;
- A policy direction from the Board of the EPA.

For its 2016 annual inspection programme, the EPA is placing an increased emphasis on the assessment of the radiation safety culture of licensees during its inspections. In support of this new focus, the EPA held a workshop on safety culture in April 2016 for all approved Radiation Protection Advisers [Qualified Experts]. The workshop included discussions on how this concept has been used effectively to enhance radiation safety in the nuclear sector as well as exploring what a good radiation safety culture would look like outside the nuclear sector in applications involving industrial and medical uses of ionising radiation.

As described under Article 7(2)(ii), the use of an authorisation model that takes a risk-based or graded approach will be considered under the transposition of the Euratom BSS Directive into Irish law.

In accordance with the requirements of Article 19 of the Ionising Radiation Order, all undertakings [licensees] are required to appoint in writing a Radiation Protection Adviser (RPA) and to notify the EPA of the appointment. The appointed RPA has a number of statutory functions including advising the licensee on:

- the examination and testing of protective devices and measuring instruments,

- the prior critical examination of plans for installations from the point of view of radiation protection,
- the acceptance into service of new or modified sources from the point of view of radiation protection,
- the regular calibration of measuring instruments and the regular checking that they are serviceable and correctly used,
- the implementation of the requirements for controlled and supervised areas.
- appropriate quality assurance programmes including quality control measures to be taken for irradiating apparatus, nuclear devices and radioactive substances, and
- the estimation of doses for Category A workers.

The name of the appointed RPA is listed on Schedule 3 of the licence issued to each licensee. To date, all licensees in the medical, dental, educational sectors and licensees engaged in higher risk activities in the industrial sectors such as non-destructive testing and sterilisation, have appointed an RPA.

Article 20 of the Ionising Radiation Order requires the undertaking [licensee] to ensure that sufficient and appropriate training in the field of radiation protection is provided for exposed workers, apprentices and students. In practice this training is provided either by external course providers, the appointed RPA or the Radiation Protection Officer (employee of the licensee) and the scope of inspections carried out by EPA inspectors includes a section on on-going radiation protection.

Article 11 Financial and human resources

Article 11 (1) Financial resources

EPA licence conditions specify that adequate provision must be made, by way of a financial security or any other equivalent means appropriate to high activity sealed sources (HASS), for the safe management of HASS when they become disused sources. A documented financial costing for the safe management of HASS is required with all licence applications/amendments for HASS. This costing shall be signed by the General Manager or equivalent of the company concerned. In addition, a written guarantee from the General Manager or equivalent of the company concerned to cover the cost of management/disposal is required to accompany all licence applications/amendments. This guarantee covers the return or disposal of HASS, including all packaging, transport and return fees even in the event of the applicant/licensee

becoming insolvent or going out of business. Any changes in the financial arrangements have to be confirmed in writing to the EPA on an annual basis.

Article 12 Human Factors

Ireland has no nuclear installations and therefore nothing to report under this Article.

Article 13 Quality Assurance

Ireland has no nuclear installations and therefore nothing to report under this Article.

Article 14 Assessment and Verification of Safety

Ireland has no nuclear installations and therefore nothing to report under this Article.

Article 15 Radiation protection

Ionising radiation in the workplace is regulated by the Ionising Radiation Order. The Order applies to all practices which involve a risk of exposure to ionising radiation. Under this Order the EPA has responsibility for licensing and regulating sources of ionising radiation. The Order deals with licensing requirements including:

- Workplace arrangements
- Workplace classification
- Controlled and supervised areas
- Radiation safety procedures
- Classification of exposed workers
- Appointment of Radiation Protection Advisers
- Information and training
- Monitoring of the working environment
- Dose monitoring of personnel
- Approval of dosimetry and radiation measurement services
- Special medical surveillance of exposed workers
- Protection of apprentices, students and outside workers
- Protection of the public

- Control of radioactive substances, nuclear devices and irradiating apparatus.

Any undertaking wishing to carry out an activity involving a source of ionising radiation must apply to the EPA for a licence prior to commencing the activity. The application must include details of the applicant, the types and sizes of sources and the nature of the activities to which the application refers and be supported by a risk assessment and a set of radiation safety procedures. For activities which have not been previously licensed the application must be supported by a justification. Where an application is successful, the EPA will issue a licence for a period of one to four years, depending upon the nature of the activity. In addition the EPA attach conditions to each licence which the licensee must comply with. Failure to comply with a condition of a licence is a prosecutable offence.

In terms of ensuring ALARA within the emergency plans, to date this has been done at the planning stage. Various emergency scenarios have been examined (this work is still ongoing) and the projected radiation dose to a representative person (both total and by exposure pathway) have been modelled and assessed to determine the dose levels and which pathway(s) contribute the majority of the dose. This information is then used to prioritise the allocation of resources for development and testing of preparedness arrangements, as well as in delivery of training to EPA and other response staff so that it is clear which protective actions are the priority.

Dose limits for occupational exposure are set out in Schedule 2 to the Ionising Radiation Order. The limit on effective dose for an exposed worker is 20 mSv in a period of 12 months. The current limits on equivalent dose for an exposed worker in a period of 12 months are as follows:

- Lens of the eye - 150 mSv (this will reduce to 20 mSv when the Euratom BSS is transposed into Irish legislation)
- Skin - 500 mSv (averaged over any area of 1 cm^2)
- Hands, forearms, feet and ankles - 500 mSv

Discharge Authorisation

The practice of liquid radioactive waste disposal relates mainly to the medical sector in Ireland. It is a condition of EPA licences granted in the medical sector, where unsealed sources are used, that there is annual reporting of the quantities discharged. This data is collated annually by the EPA and is available to the OSPAR Commission as part of Ireland's reporting requirements under the OSPAR Convention.

Environmental Monitoring

The EPA continues to monitor radiation in the environment with the aim of assessing the exposure of the population. The 2013 programme showed that liquid discharges from the nuclear fuel reprocessing plant at Sellafield remain the dominant source of artificial radioactivity in the Irish Sea and that the consumption of seafood continues to be the main way in which the public is exposed to this radiation source. The radiation doses to typical consumers of seafood were below 1 microsievert (μSv), and this represents only a small fraction of the average annual dose (4,037 μSv) to a person in Ireland from all sources of radioactivity.

Levels of ambient gamma dose rate are continuously measured at 15 stations and levels of radioactivity in air are measured at 11 stations around the country. Overall levels of artificial radioactivity in the Irish environment during 2014 were broadly in line with levels reported in recent years. The levels of radioactivity in milk, drinking water and mixed diet were also low and consistent with levels measured in previous years, and provide confirmation that the levels of artificial radioactivity in the environment do not constitute a risk to health and are very small when compared with the dose received as a result of natural background radiation.

The European Commission (EC) completed a Euratom Treaty Article 35 (National monitoring network for environmental radioactivity) verification visit to Ireland in September 2014. The EC noted that the national environmental radioactivity monitoring programme in Ireland is in compliance with the requirements of Article 35 of the Euratom Treaty. They also noted that the facilities necessary to carry out continuous monitoring of levels of radioactivity in air, water and soil are adequate.

Article 16 Emergency preparedness

Article 16 (3) Emergency preparedness for Contracting Parties without nuclear installations

Ireland's Emergency preparedness is divided into three main areas, i.e.,

- Site emergency planning. These plans relate to licensees' responsibilities in the keeping of sources or of disused sources or their transport.
- Local/regional emergency planning. These plans relate to the response to major emergencies at the local and regional level by the emergency services (Police, Fire Service, Ambulance, and Coast Guard) and their associated agencies.
- National emergency planning - designed to cater for a widely dispersed radiological emergency or crisis such as that arising from a major incident at a nuclear installation abroad resulting in radioactive contamination reaching Ireland. Certain elements of the

national emergency response would also come into play in the case of a local emergency depending on the extent of the emergency.

Site emergency planning

Undertakings licensed to carry on certain defined categories of practice, such as transportation of radioactive materials, industrial radiography, industrial irradiation, nuclear medicine and radiotherapy are required, under the Ionising Radiation Order, to prepare detailed emergency plans when directed to do so by the EPA. These plans must be based on risk assessment and must address potential risks to workers, intervention personnel (e.g. fire services) and where appropriate members of the public. These plans must address issues such as resources, consultation with relevant stakeholders, emergency procedures, training, exercises and review. The Ionising Radiation Order requires that undertakings submit the plans to the EPA. It also requires that undertakings immediately notify the EPA of an emergency and to inform the local emergency services of the circumstances with respect to the emergency. A multi-agency protocol has been prepared by the DECLG to assist inter-agency emergency response by fire, ambulance and police services to local radiological incidents. It should be noted that Ireland does not have any sources equivalent to Threat Categories I or II as defined for the purposes of IAEA Safety Requirements GS-R-7.

Major Emergency Plans

In Ireland, Major Emergency Plans are in place in all local authority areas and may be activated by any one of the Principal Response Agencies: the Local Authorities, An Garda Síochána (Police), the Health Service Executive and the Coast Guard. Major emergencies include those resulting from fires, transport accidents, hazardous substances incidents and severe weather. The Major Emergency Plan of each agency sets out that agency's response, as well as its contribution to the combined response of all agencies. In September 2006, the current Framework for Major Emergency Management was launched by Government and following from this all Major Emergency Plans were updated. As part of the Major Emergency Development Programme, a series of inter-agency protocols to underpin the multi-agency response to different categories of emergency was developed, including a Protocol for Multi-Agency Response to Radiological/Nuclear Emergencies. This protocol was prepared under the aegis of the National Steering Group on Major Emergencies, with the assistance and co-operation of the DECLG and the EPA.

The aim of the protocol is to enable the Principal Response Agencies and their Principal Emergency Services to work together and to respond effectively and safely and to assist them in

working, if necessary, with the EPA and others to successfully manage emergencies that may have a radiological/nuclear dimension. The protocol outlines the arrangements for emergencies such as spills, fire and transport accidents. The protocol was drafted based on information 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 uses the advice given in the IAEA's "Manual for First Responders to a Radiological Emergency". The Framework for Major Emergency Management makes provision for linking the local and regional level co-ordination arrangements of the principal response agencies with the "National Emergency Plan for Nuclear Accidents" (NEPNA).

A national protocol for responding to CBRN incidents (malevolent Chemical-Biological-Radiological-Nuclear events) was completed by the Government Taskforce on Emergency (GTF) Planning in 2011. The protocol covers acute incidents where the location of the potential contamination is known and contained. There is a Government Taskforce on Emergency Planning CBRN (Chemical, Biological, Radiological and Nuclear) incidents subgroup. The role of the CBRN subgroup is to review and enhance Ireland's national protocol for responding to a malign CBRN incident. In 2013, the EPA carried out work on five new modules (decontamination, medical support, communications/public information, sampling/laboratory testing and transportation) to further enhance the national protocol. The EPA also participated in the development of a joint risk assessment aide memoire to be used by first responders in CBRN incidents and also in the development of a list of experts that can be called upon when needed.

Each Department and Agency involved in the sub-group is also formalising arrangements for contacting additional international experts within their areas of responsibility in the event of a CBRN incident.

National Emergency Plan for Nuclear Accidents (NEPNA)

In accordance with the Ionising Radiation Order, the Minister must prepare a plan referred to as the "National Emergency Plan for Nuclear Accidents". The NEPNA is intended specifically to cater for a widely dispersed radiological emergency or crisis resulting in radioactive contamination.

The NEPNA sets out a framework for a coordinated national response to an event where the response is beyond the resources or capabilities of any individual Government Department or public authority and as such requires the political and strategic involvement of Government. The main elements of the NEPNA cover:

- mechanisms for raising the alarm;
- the roles of Ministers of the Government and other public authorities/agencies;

- procedures for mobilisation of the resources and expertise from across the State;
- effective coordination at both political and official levels so as to ensure that all State resources are distributed to good effect and that gaps in the response arrangements are not allowed to develop;
- arrangements for effective communication with the public.

Incidents occurring in Ireland and affecting only a limited area may not initially fall under the scope of the NEPNA, but if required some or all of the arrangements provided in the NEPNA may be invoked as part of the emergency response. Such incidents include accidents involving nuclear powered ships or ships transporting radioactive substances in waters close to the Irish coast (response co-ordinated by the Irish Coast Guard) and local dispersal of radioactive substances that may require a further scaling up of response, including further co-ordination with the EPA including activation of the NEPNA, if necessary.

The national response to a widespread radiation emergency or crisis is likely to involve mobilisation of the resources and expertise from a broad range of public authorities/agencies within the State. The NEPNA envisages that in the event of a major radiological emergency, a National Coordination Group (NCG) would be convened to coordinate the response. The NCG for nuclear accidents is made up of officials from key Government Departments and other public authorities and is chaired by the Department of Housing, Planning, Community and Local Government (DHPCLG). This NCG is responsible, inter alia, for providing advice on protective actions and for co-ordinating their implementation. In an emergency, the NCG would meet in the National Emergency Coordination Centre (NECC) which has been equipped to coordinate the national response to emergencies.

The EPA has in place an operation plan referred to as the "EPA Sub-plan", which describes the arrangements in place to fulfil its responsibilities under NEPNA. These responsibilities cover both emergency preparedness and emergency response. The responsibility for overseeing the preparation of internal EPA plans for the various aspects of response lies with the Radiation Emergency Preparedness unit.

NEPNA Review

NEPNA has it origin in the plan drawn up following an assessment of Ireland's response to the 1986 Chernobyl accident. There have been a number of revisions to NEPNA, reflecting changes in international good practice and the experience gained from response to accidents and exercises, including non-radiation emergencies. It is co-ordinated by the DHPCLG and was last

updated in 2005. The National Directorate for Fire and Emergency Management (NDFEM) section in the DHPCLG initiated a review of NEPNA in 2014. This is an important opportunity to update the NEPNA with lessons learned from key developments in emergency preparedness and response since 2005 including:

- the response to the Fukushima accident in 2011.
- lessons learned from the operation of the National Coordination Group (NCG) in dealing with other emergencies such as severe weather, flooding and the ash cloud event.
- the recently published review of current off-site nuclear emergency preparedness and response arrangements in EU member states and neighbouring countries undertaken by the EU.
- the two key hazard assessments which considered the risks to Ireland from nuclear accidents at the Sellafield nuclear reprocessing site and at the eight proposed nuclear power plants in the UK.
- review of local hazards in Ireland (as part of the development of the local incidents plan)
- outcomes from the PREPARE project (see page 52)

The review of the NEPNA is following a Systems Approach with a continuous improvement cycle that incorporates five stages:

1. Risk Assessment
2. Mitigation
3. Planning/ Preparedness
4. Response
5. Recovery

The NEPNA review is in its final stages and will be completed by the end of 2016.

Notification of a nuclear incident

Early formal notification of a nuclear accident abroad would be received in Ireland through either or both of the following:-

- The European Community Urgent Radiological Information Exchange (ECURIE) arrangements, which have been set up within the European Union to implement Council Decision 87/600/Euratom providing for the early exchange of information in the event of a radiological emergency.
- The IAEA EMERCON arrangements, which are based on the 1986 Early Notification Convention.

The Irish National Contact Point (NCP) for both ECURIE and EMERCON is operated by the national police service, An Garda Síochána. The EPA is the national competent authority for both sets of arrangements. The EPA operates an on-call duty officer system, whereby a senior member of EPA staff is available 24 hours a day, 7 days a week to assess any alert and where necessary to activate the emergency response. On receipt of an alert notification, the NCP will immediately contact the EPA duty officer who will make an initial assessment of the situation. Where appropriate, the duty officer together with other key staff from the EPA and the DHPCLG will consider whether the NCG should be convened. In the event that the decision is taken to convene the NCG, arrangements are in place for the police to rapidly notify the appropriate key staff in the relevant Government Departments and public authorities.

In the event of an incident occurring at nuclear installations in the UK, arrangements have operated since 1992 whereby the UK Department of Energy and Climate Change (DECC) informs Ireland's DHPCLG and the EPA when it is notified of an incident on UK territory involving a release of radioactivity into the environment. This is regardless of whether the incident has any radiological significance for Ireland. There is also a bilateral agreement covering information exchange between the EPA and the UK's Office for Nuclear Regulation. This agreement covers both routine bilateral meetings between the two regulatory agencies and arrangements for rapid exchange of information in the event of an incident or accident. On 10th December 2004, Ireland and the Government of the United Kingdom and Northern Ireland signed a Bilateral Agreement on Notification in the Case of a Nuclear Accident or Radiological Emergency. This Agreement was designed to formalise the above-mentioned existing arrangements by ensuring that exchanges of information happen on agreed basis through specified channels.

Arrangements for the early detection of atmospheric contamination

As part of Ireland's emergency preparedness, the EPA operates a national monitoring network for the detection and measurement of radioactivity in the air and deposits on the ground (See Figure 7).

- A continuous gamma dose rate monitoring system operated at 15 strategic sites. These are carried out 24 hours a day and (hourly measurements) continuously fed back to the EPA with an alarm system. An additional 27 non-automated gamma sites can be activated if required.
- An air sampling system operates at 11 sites. Samplers are equipped with aerosol and gaseous iodine systems.
- A rainwater collection system operates at 6 sites.

In the event of an incident, further monitoring of environmental media soil and foodstuffs would be carried out. In recent years, the network has been updated to increase reliability, range of measurements and geographic coverage.

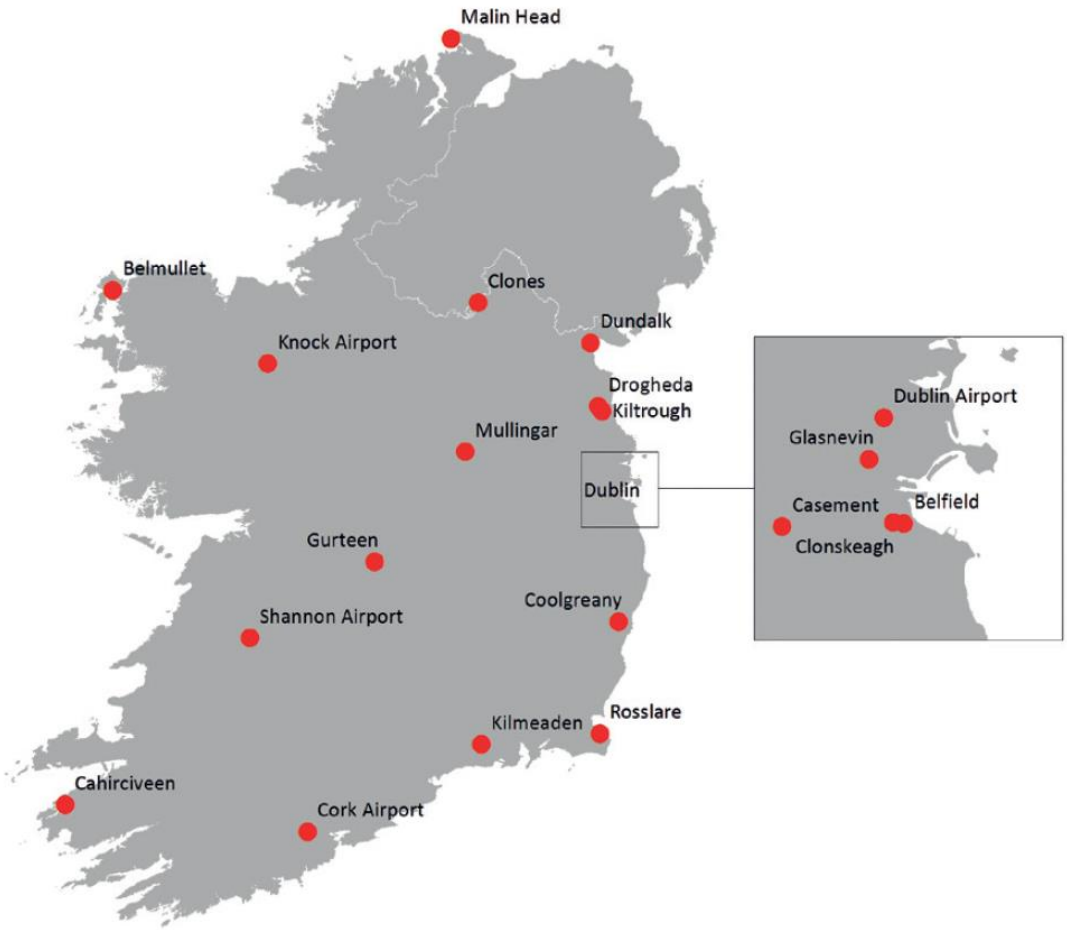

Figure 7. Map of permanent monitoring stations operated by the EPA

Ireland and the UK share the data from their national gamma dose rate monitoring stations, with data automatically exchanged on an hourly basis. In addition, the gamma dose rate data from the Irish national monitoring network are published on the EPA's website for public access (http://www.epa.ie/radiation/monassess/mapmon/).

Risk Assessments

One of the principal elements of the systems approach to emergency management is a risk or hazard assessment. Ireland has completed a number of key threat assessments which considered the risks to Ireland from nuclear accidents at the Sellafield Nuclear Reprocessing Site and at one of the proposed nuclear power plants in the UK.

The EPA completed a detailed assessment of the radiological impacts on Ireland of four severe hypothetical accident scenarios at the Sellafield nuclear fuel reprocessing plant in England. The four scenarios studied were those identified as having the greatest potential consequences for Ireland, in the 2012 Sellafield Probabilistic Risk Assessment (PRA) commissioned by DECLG[2]. This report will be published on the epa.ie website by the end of 2016. In addition, the Irish Government commissioned the Economic and Social Research Institute (ESRI) to carry out a study to assess the Potential Economic Impact on Ireland of a nuclear incident in north-western Europe. Developing estimates of the scale of economic losses that would arise in the event of a nuclear accident will be used to inform decisions related to whether it is in Ireland's interests to be a signatory to a number of international treaties and conventions concerning nuclear emergencies, remediation and liabilities, inform national positions on policy and legislative developments and help inform emergency management and mitigation policies.

Arrangements for assessing the potential impact of a nuclear accident/incident

Since 2000, the EPA has implemented the ARGOS (Accident Report and Guiding Operational System) decision support tool as its primary platform for handling environmental data in an emergency. ARGOS was originally developed by the Danish Emergency Management Agency (DEMA) in association with Prolog Development Centre Inc. Ongoing development and maintenance of the system is now managed by an international consortium consisting of representative agencies from Australia, Brazil, Canada, Denmark, Estonia, Faroe Islands, Ireland, Lithuania, Montenegro, Norway, Poland, Sweden and Turkey. The EPA is Ireland's representative on the ARGOS Consortium. The ARGOS system allows prognostic, measurement, agricultural and meteorological data to be viewed and overlaid in a geographic information system. The system is updated regularly so that any lessons learnt from exercises or emergency use can quickly be incorporated into operational systems.

The EPA also maintains the HYSPLIT atmospheric dispersion model (HYbrid Single-Particle Lagrangian Integrated Trajectory: HYSPLIT). This model, developed and maintained by the US National Oceanic Atmospheric Administration, does not include the capability to calculate radiation doses but it does allow long-range dispersion (on a global scale) modelling of radionuclides in air. The model also provides resilience in that more than one atmospheric dispersion model is available in an emergency. In 2013, Met Éireann (National Meteorological Service) customised HYSPLIT for use during an emergency response in Ireland. For the assessments of events in the vicinity of Ireland, the system uses high resolution meteorological data (2.5 km) produced by Met Éireann's operational numerical weather forecast system

[2]http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/Environment/EnvironmentalRadiation/FileDownLoad%2C31607%2Cen.pdf

HARMONIE. With the new arrangements, meteorological data are automatically available for the previous 30 days to provide information on the past evolution of a radioactive plume while the latest forecasts provide information on the future movement up to 48 hours ahead. The system is run in a secure environment at the Irish Centre for High-End Computing (ICHEC). Tracking the movement of radioactive material in the atmosphere over the global scale is likewise supported through use of the latest European Centre for Medium-Range Weather Forecasts (ECMWF) global analyses/forecasts on a slightly larger grid resolution compared to the HARMONIE model (15 km).

Since the new HYSPLIT system was designed to provide service to a range of users in Ireland, in 2013 the EPA established, and is chairing, a National HYSPLIT User Group. The group share experiences and resources related to HYSPLIT.

In 2003/04, the EPA developed an information management system to support its emergency preparedness and response. In the event of an accident the Emergency Response Management Information System (ERMIS) provides a means of processing, recording and disseminating incoming information during an emergency response. In addition to response management, the ERMIS platform can display dispersion model outputs and monitoring data. ERMIS includes staff and emergency contacts information that may be used during an emergency response. The platform also includes details of international emergency notification systems and other useful background information and emergency procedures. In 2016, the EPA re-developed ERMIS to run on Sharepoint. The new system is complete and undergoing final testing before becoming operational.

Public information

Measures to keep the public informed about a nuclear accident or emergency are addressed in the NEPNA. Arrangements are in place to inform the public of the accident, its consequences and of any countermeasures that are to be implemented to reduce doses to the population. This information would be issued through media channels: radio, television including social media, internet, press statements, press conferences and via national weather forecast broadcasts on television and radio. Regular updates of the situation would be given.

In Ireland, the EU Council Directive (89/618/Euratom) on informing the general public about the health protection measures to be applied and the steps to be taken in the event of a radiological emergency, is implemented by means of the European Communities Act, 1972 (Radiological Emergency Warning to Public) Regulations, 1993. The EPA is the Competent Authority for the purpose of these Regulations.

Measures are in place to keep the public informed about emergency planning arrangements. A detailed information booklet on the NEPNA was published in 2002 and updated in 2005. An information leaflet on the NEPNA was distributed to libraries and citizen information centres in 2006. This leaflet and other information on nuclear emergency preparedness are available on the websites of the DHPCLG[3] and the EPA. Public opinion is an important part of emergency preparedness and comments received from the public are taken into consideration as part of the planning process. Emergency planning developments are addressed and arrangements are published in the Annual Reports of the EPA and other statutory agencies such as local authorities update their emergency planning procedures including for nuclear emergencies on a regular basis. These are also published.

Also in 2008 a general public information and awareness campaign on emergency planning was launched by the Government. As part of the public information campaign on emergency planning a handbook was sent to all households in Ireland. The handbook gave basic information on what individual householders can do to improve their own emergency preparedness as well as information on emergency plans in place (including the National Emergency Plan for Nuclear Accidents). The handbook also gave guidance on where more detailed information can be obtained. It was printed in a bilingual format (English and Irish) and is available in CD format, in large print, in braille and an easy to read version. It is also available electronically in Polish, Chinese and Russian. The handbook can be downloaded from www.emergencyplanning.ie.

The DHPCLG is currently developing a new website (www.nuclear.ie) that will be dedicated to nuclear emergencies. This website will include a 'dark site' which will be available to use during an actual emergency and will be capable of handling a large number of users. This website is due to go live before the end of 2016.

The EPA has a dedicated emergency preparedness section on their website (http://www.epa.ie/radiation/emerg/). These pages provide background information on emergency planning in Ireland for the public and licensees. In addition, the EPA use the @EPARadiation twitter account as a method of communicating quickly and easily with the general public. This may be used to keep the public informed during an emergency response.

[3] http://www.housing.gov.ie/environment/environmental-radiation/national-emergency-plan-nuclear-accidents/national-emergency

Exercises of the emergency arrangements

Communication systems and arrangements for exchange of early notifications are tested regularly. A programme of testing of the ECURIE arrangements is coordinated by the European Commission. This includes tests of the duty officer contact arrangements and the exchange of simulated radiological data between Member States. Equivalent arrangements are in place to test the EMERCON notification system (USIE) coordinated by the IAEA.

Regular national exercises have taken place such as a national-level exercise in 2007 which concentrated on the development of a handbook for food and agriculture countermeasures following a nuclear accident, the 2008 ConvEx3 exercise where the Irish response focused on provision of advice to Irish citizens abroad and the INEX5 exercise in 2016 which focused on decision making and communications. It is recognised that international cooperation on exercises is essential. Irish authorities regularly participate in international exercises such as those in the INEX series and the ConvEx exercises coordinated by the IAEA. The EPA also participates in the ECURIE Level 3 exercises coordinated by the European Commission. The national level and main international exercises (routine notification exercises are not included) in which the EPA participated since 2013 are listed in Table 4.

Table 4. Main national and international exercises EPA has participated in since 2013

Year	Exercise (main focus)	National/International Exercise
2013	ConvEx2b (response to request for assistance following nuclear accident)	International (IAEA)
	ConvEx3 (use of USIE, preparation of press releases)	International (IAEA)
	Technical assessment exercise (test arrangements for atmospheric dispersion modelling)	National (EPA, Met Éireann)
	Response to stolen sources (communication to public, coordination with other national organisations)	Real event
	Table-top exercise on monitoring large scale cross border contamination in the aftermath of a nuclear accident	National (PREPARE project)
2014	Food & agriculture table top exercise (test use of the Irish Food and Agriculture Handbook)	National (DAFM, EPA)
	ConvEx2a (use of USIE – notification of incident and reporting results)	International (IAEA)
	ConvEx2b (requesting assistance following nuclear accident)	International (IAEA)
	ConvEx2d (use of USIE, technical assessment)	International (IAEA)
2015	ConvEx2a (use of USIE – notification of incident and reporting results)	International (IAEA)
	Technical assessment exercise (test arrangements for atmospheric dispersion modelling)	National (EPA, Met Éireann)
	Exercise Blackbird (UK-Ireland arrangements for the notification of a nuclear incident in the UK)	International (UK Department of Energy and Climate Change)

Year	Exercise (main focus)	National/International Exercise
2016	ConvEx2a (use of USIE – notification of incident and reporting results)	International (IAEA)
	Exercise Jackdaw (UK-Ireland arrangements for the notification of a nuclear incident in the UK)	International (UK Department of Energy and Climate Change)
	INEX 5 (communication and dealing with a nuclear accident which coincides with a natural disaster/ emergency)	International (NEA)
	ConvEx2b (requesting assistance following nuclear accident)	International (IAEA)
	Technical assessment exercise (test arrangements for atmospheric dispersion modelling) (*Planned*)	National (EPA, Met Éireann)
	ConvEx2d (use of USIE, technical assessment) (*Planned*)	International (IAEA)

In addition to participation in major national exercises, individual public authorities and agencies which have been assigned responsibilities under the NEPNA are required to routinely test their emergency arrangements. The EPA, for example, routinely tests its arrangements including: communications arrangements, duty officer arrangements, emergency laboratory procedures and technical assessment procedures. The Defence Forces and Civil Defence regularly test their arrangements for monitoring and sample collection.

In May 2016, Ireland completed the international INEX-5 nuclear emergency exercise. This exercise was organised by the OECD Nuclear Energy Agency (NEA) Working Party on Nuclear Emergency Matters (WPNEM). The INEX-5 objectives focused on communication and dealing with a nuclear accident in Europe affecting Ireland that coincided with a natural disaster/emergency (severe weather). INEX 5 was set up as a table top exercise with three levels of discussion for participants (prior to a radiological release, recognising/validating a release, and impacts to the radiological event from a catastrophic natural event). All Government Departments and Agencies with a role to play in the NEPNA participated in the exercise. In addition, representative industry stakeholders were invited to observe the exercise. A mock press conference was staged at the conclusion of the exercise. The EPA will submit an exercise evaluation report to the NEA in September 2016.

Review of Emergency Planning

In 2013 Ireland participated in the review commissioned by the EC of current off-site nuclear emergency preparedness and response arrangements in EU member states and neighbouring

countries. The EPA coordinated Ireland's participation in the review which included the completion of detailed surveys on national arrangements, provision of supporting documentation on these arrangements. The EPA also participated in a series of stakeholder meetings to develop recommendations.

Bilateral arrangements

Ireland has an agreement[4] with the UK that covers early notification of a nuclear accident or incident of radiological significance and the exchange of information concerning the operation and management of nuclear facilities or activities.

In the event of an incident from which a release of radioactive material occurs, or is likely to occur, and which has resulted or may result in a release that could have an effect or the risk of an effect outside a Party's territory and be of radiological safety significance to the territory of the other Party, the following information will be provided to the other Party:

- the time, exact location where appropriate, and the nature of the accident or incident;
- the facility or activity involved;
- the assumed or established cause and the foreseeable development of the accident or incident relevant to the transboundary release of the radioactive materials;
- the general characteristics of the radioactive release, including, as far as practicable and appropriate, the nature, probable physical and chemical form and the quantity, composition and effective height of the radioactive release;
- information on current and forecast meteorological and hydrological conditions, necessary for forecasting the transboundary release of the radioactive materials;
- the results of environmental monitoring relevant to the transboundary release of the radioactive materials;
- the off-site protective measures taken or planned, including measures taken or planned to inform the public; and
- the predicted behaviour over time of the radioactive release.

In addition to this Government to Government agreement, the EPA and the UK's Office for Nuclear Regulation (ONR) operate an Information Exchange Agreement which was renewed in February 2016.

[4]https://www.dfa.ie/media/dfa/alldfawebsitemedia/treatyseries/uploads/documents/treaties/docs/200403.pdf

PREPARE Research Project

The PREPARE Research Project was part of the European Commission's 7th Framework Programme, EURATOM for Nuclear Research and Training Activities. The full title of the project was "Innovative integrative tools and platforms to be prepared for radiological emergencies and post-accident response in Europe". It was a three year (February 2014 to 2016) collaborative project with 45 partners including the EPA. The EPA was involved in work package 3 (WP3) on the development of strategies, guidance and tools for the management of contaminated goods, taking into account the views of all stakeholders such as producers, processors, retail industries and consumers. There were 14 organisations from 11 countries (Belgium, Finland, France, Greece, Ireland, Norway, Portugal, Spain, Switzerland, The Netherlands and the United Kingdom) involved in this. Stakeholder panels were set up in 10 countries (the French panel included representatives from Switzerland) to discuss issues surrounding contaminated goods.

Ireland's national stakeholder panel focussed on agriculture and food because of their importance to Ireland's economy. The Irish national panel built on work carried out previously to customise the European handbook for managing the impact of potential nuclear or radiological accidents (abroad) on the Irish agricultural sector, on Irish production of safe food and on the safe disposal of contaminated matter. The panel included representatives from the organisations that customised the EURANOS food handbook for Irish conditions. Additional stakeholder groups from the Irish food industry were also invited to participate in the panel. The organisations who accepted invitations to participate are shown in Table 5.

Two panel meetings were held in 2014 in the NECC. A market research company was engaged to facilitate the meetings and fruitful discussions were held on issues surrounding the contamination of food, control measures that could be implemented to reduce radioactivity in food and the impact on trade if food was contaminated following a nuclear accident.

Table 5. Organisations participating in Ireland's stakeholder panel

Government Departments	• Department of Agriculture, Food & the Marine (DAFM) • Department of Housing, Planning, Community and Local Government (DHPCLG)
State Agencies	• EPA • Food Safety Authority of Ireland (FSAI)
Dairy Sector	• Irish Dairy Industries Association (IDIA) • Irish Dairy Board (IDB)
Farming Sector	• Irish Farmers Association (IFA)
Meat Sector	• Meat Industry Ireland (MII)
Crops Sector	• Teagasc • Irish Grain and Feed Association (IGFA)
Seafood Sector	• Sea Fisheries Protection Agency (SFPA)
Retail Sector	• Tesco • Musgrave Group
Consumer Sector	• Consumer Association of Ireland

There were a number of key issues identified during discussions that were taken into consideration during the current review of the NEPNA (see page 41).

Article 17 Siting

Ireland has no nuclear installations and therefore nothing to report under this Article.

Article 18 Design and Construction

Ireland has no nuclear installations and therefore nothing to report under this Article.

Article 19 Operation

Ireland has no nuclear installations and therefore nothing to report under this Article.

Appendix 1: IRRS Mission Recommendations, Suggestions and Good Practices

Area		R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
1.	**RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT**	R1	The Government should implement an effective legal framework for the regulation of patient protection. Meanwhile, the Government should, as a matter of urgency, put in place arrangements to carry out inspections and enforcement to ensure patient protection.
		R2	The Government should ensure that the legislation explicitly addresses the following issues in accordance with GSR Part 1: 1. Use of a graded approach in all regulatory activities; 2. Ensure legislation provides for appeals against the decisions of the regulatory bodies in relation to radiation safety and patient protection.
		R3	The Government should make appropriate amendments to facilitate the effective use of the 'Enforcement Notice' provisions in SI125/00.
		R4	The Government should ensure as a matter of urgency that the regulatory body for patient protection does not have responsibilities for or interests in providing medical exposure to ionizing radiation.
		S1	The EPA should consider requiring authorized parties to verify that products and services meet the authorized party's expectations and comply with any relevant regulatory requirement.
		R5	The Government should make formal provision for effective coordination among the EPA, the Irish Aviation Authority, and the Maritime Safety Directorate and between the EPA and the HSE.
		S2	The Government should consider implementing a legislative framework for the remediation of any contamination from past activities or events.

Area		R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
		R6	The Government should ensure that the radioactive waste management strategy including both short and long term storage of radioactive waste, unforeseen decommissioning, remediation and disposal of radioactive waste includes provisions for financial support.
2.	**RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY**	R7	The EPA should develop a strategic plan for ORP's succession management
		R8	The Government should urgently ensure that the regulatory body that is responsible for patient protection is adequately resourced.
		S3	The regulatory body should consider entering into written agreements with any external adviser to formalize the arrangements and to facilitate the management of any potential conflict of interest.
3.	**MANAGEMENT SYSTEM OF THE REGULATORY BODY**	R9	The EPA should assess gaps in the management system with regard to radiation safety due to the merger of RPII with the EPA, and prioritize actions to develop the management system further in line with GS-R-3 where appropriate.
		GP1	EPA's radiation safety inspection activities are formally accredited to an ISO standard, which provides for openness and transparency, as well as, continuous assessment and improvement.
		GP2	There is a documented system providing a link between the legislation mandating the organization and individual contribution to delivery of goals, including corporate values and behavioural expectations.
		S4	The EPA should consider assessing and documenting the competence requirements for individual roles in the ORP structure through the planned skills mapping exercise.
		R10	The EPA should further develop and document those processes and procedures relevant to radiation safety not already addressed.
		S5	The EPA should consider ensuring that post-merger ORP functions continue to be taken into account when establishing the audit schedule in the same way as other technical areas of the EPA.

Area		R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
4.	**AUTHORIZATION**	GP3	The EPA/ORP has established a web-based system that allows applications for a new radiological license to be made and for existing licenses to be renewed or amended by following clear step by step instructions on the information to be provided and documents to be uploaded in support of the application.
		S6	The EPA should consider developing further its graded approach by taking into account the interaction between all the elements of the regulatory control.
		S7	EPA should consider assessing the current provisions and co-operation arrangements regarding the import of radioactive sources and to make appropriate proposals, if needed, for establishing arrangements which provide for the Customs to verify systematically that the imported sources are appropriately licensed by the EPA.
		GP4	The systematic co-operation between the EPA and the police significantly supports EPA in the implementation of an integrated approach to safety and security of radiation sources
5.	**INSPECTION**	R11	The EPA inspection program should be extended to verify that the user's management system relating to the transport of radioactive material is implemented and followed correctly.
6.	**REGULATION AND GUIDES**	R12	The regulatory body should establish policies and processes regarding establishing and amending guidance documents and code of practices relating to radiation safety.
		S8	The EPA should consider the review, and revision if appropriate, of the means (radiological license condition, regulations or guides) of establishing its safety principles, requirements and associated criteria for radiation safety.
		R13	The Government should review the radiological protection regulations to ensure that all the requirements related to public exposure control are in compliance with GSR Part 3.

Area		R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
		GP5	EPA took the initiative to evaluate at the national level the need to install iodine holding tanks in both existing and future iodine ablation facilities. The evaluation reviewed existing practices in Ireland in relation to iodine-131 ablation discharges to the sewers (discharges leading to the highest potential dose) and made recommendations for a regulatory policy, based on international best practice and forecasts of future activity.
		R14	The Government should complement the regulatory framework regarding the: • Predisposal management of radioactive waste activities and facilities should be planned and safely carried out, including the radioactive waste produced during remediation and disused sealed sources and • all aspects of decommissioning of facilities, including the safe management of the resulting radioactive waste should be planned and carried out.
7.	**EMERGENCY PREPAREDNESS AND RESPONSE**	GP6	The nuclear and radiological emergencies are well integrated on national and regional levels in a framework for major emergency management system and a national emergency coordination system following the all hazards approach. EPA has a key role if a radiation emergency occurs.
		R15	The EPA should establish criteria for the radiological licensees of threat category III facilities for a clear definition and categorization of emergencies. This should also be reflected in the reporting requirements of the licensee.
		S9	The EPA in its role as Governmental advisor for protective measures for the public should consider defining Operational Intervention Levels for protective measures in radiation emergencies.

Area		R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
		GP7	The information to the public on emergency planning prior to an emergency is very efficient in reaching all sectors of the population in Ireland. In addition a coordination mechanism to inform the public in case an emergency has been established under the national emergency coordination group of the Government. The EPA has an important role in these activities for the information of the public.
		R16	The Government should make a formal arrangement for the involvement of stakeholders as part of the emergency management system.
		S10	The Government should consider mechanisms for increasing national measurement capacity to cope with a widespread, long-lasting contamination.
		S11	The EPA should consider finalizing the extension of its NEPNA sub plan to take account of the full resources of the EPA.
		S12	The Government should consider finalizing the revision of the National Emergency Plan for Nuclear Accidents as soon as possible to bring arrangements for the transition from an Emergency Exposure Situation to an Existing Exposure Situation in line with GS-R-2.
		R17	The EPA should establish a systematic oversight on emergency exercises of licensees in threat category III as appropriate including the requirement for the licensee to establish emergency exercise plans which will be evaluated by the EPA.
		R18	The EPA should establish a QA programme in the field of its EPR covering the areas not currently covered, and also the requirements for QA for the licensees in the field of EPR in line with a graded approach.
8.	**CONTROL OF MEDICAL EXPOSURES**	R19	The Government should revise the current regulatory framework to bring it in accordance with GSR Part 3 for the regulation of patient protection.
9.	**OCCUPTIONAL RADIATION PROTECTION**	S13	EPA should consider reviewing its requirements in relation to nomination and qualification of RPOs.

Area		R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
		S14	The EPA should consider extending the scope of the national dose register to enable individually monitored occupationally exposed workers to be unambiguously identified.
10.	**CONTROL OF CHRONIC EXPOSURES RADON**	GP8	The effectiveness of the national radon control strategy is maximized through this "top down" approach driven by Government, ensuring all stakeholders work together in a cohesive manner.
		S15	The Government should consider provisions to support remediation by owners of homes with high radon levels.
		R20	The Government should review and revise the specific regulations addressing radon in workplaces to enhance their effectiveness
		S16	The regulatory body should consider a plan of how to determine the workplaces with the highest radon levels.

Table of Acronyms

ARGOS	Accident Report and Guiding Operational System
CNS	Convention on Nuclear Safety
ConvEx	Convention Exercise (IAEA)
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organisation
DAFM	Department of Agriculture, Food and Marine
DCCAE	Department of Communications, Climate Action and Environment
DECC	Department of Energy and Climate Chance (UK)
DECLG	Department of Environment, Community and Local Government
DEMA	Danish Emergency Management Agency
DHPCLG	Department of Housing, Planning, Community and Local Government
DJEI	Department of Jobs, Enterprise and Innovation
ECURIE	European Community Urgent Radiological Information Exchange
EMERCON	Emergency Convention
EPA	Environmental Protection Agency
ESRI	Economic and Social Research Institute
EU	European Union
FSAI	Food Safety Authority of Ireland
HSE	Health Service Executive
HASS	High Activity Sealed Source
HYSPLIT	HYbrid Single-Particle Lagrangian Integrated Trajectory
IAEA	International Atomic Energy Agency
ICHEC	Irish Centre for High-End Computing
ICRP	International Commission on Radiological Protection
INAB	Irish National Accreditation Board
INEX	Internet Neutral Exchange Association
IRRS	International Regulatory Review Service
ISO	International Organization for Standardization
NCP	National Contact Point
NCG	National Coordination Group (for the National Emergency Plan for Nuclear Accidents)
NEA	Nuclear Energy Agency
NECC	National Emergency Co-ordination Centre

NEPNA	National Emergency Plan for Nuclear Accidents
ORP	Office of Radiological Protection
OSPAR	Oslo-Paris Convention for the Protection of the Marine Environment of the North-east Atlantic
PMDS	Performance Management and Development System
RIMD	Regulation and Information Management Division
RPA	Radiation Protection Advisor
RPO	Radiation Protection Officer
RPII	Radiological Protection Institute of Ireland
SI	Statutory Instrument
USIE	Unified System for Information Exchange in Incidents and Emergencies (IAEA)
WHO	World Health Organisation
WTE	Whole time equivalent