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

RESPONSE DUE TO CION 17 JULY 2018

Ireland's National Programme

under Directive 2011/70/EC establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste 2018

1.0 Introduction

In 2011 the Council adopted Directive 2011/70/EC (the Directive) establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste. Article 15(4) of the Directive requires Member States to notify the Commission concerning the content of their national programme for spent fuel and radioactive waste management. A derogation in relation to spent fuel is available to Ireland under Article 15 (2) of the Directive, as Ireland does not have any spent fuel or plans to develop nuclear power, spent fuel is not covered in this programme.

Ireland's first national programme was reported to the Commission under Article 15(4) of the Directive in 2015.

This document is a revision of this first programme reflecting developments since this time, in particular:

- International Atomic Energy Agency International Regulatory Review Service (IRRS) Recommendations

In 2015 Ireland hosted an IRRS Mission. This mission examined all aspects of Ireland's regulatory regime including radioactive waste. The recommendations of the mission are reflected in strengthened legislation in this area, and continued Government commitment to ensure appropriate management of radioactive waste. Among the recommendations of the IRRS mission was that 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. This has been provided for in revised radiological protection legislation.

- Transposition of Basic Safety Standards Directive

Irish legislation to transpose Council Directive 2013/59/Euratom strengthens existing provisions in relation to radioactive waste management including providing that the regulator can compel undertakings to make arrangements for the disposal of disused sources. It also provides that the Minister will make financial provision for the recovery and disposal of orphan sources.

- Change in responsible Government Minister

Since Ireland's original programme was submitted to the European Commission a new Government was formed and Departmental configurations altered, responsibility for the radiation protection portfolio now lies with the Department of Communications, Climate Action and Environment (DCCAE).

- Issues raised by the Commission on the first report.

The European Commission raised a number of issues on Ireland's original national programme. This revised programme aims to address these.

Ireland's national programme will be regularly updated and revised as necessary as required by Article 11(2) of the Directive in the light, inter alia, of:

- technical and scientific progress as appropriate
- recommendations, lessons learned and good practises from peer reviews.

The Irish national programme is the responsibility of DCCAE which is the Government Department with policy responsibility in the area of nuclear safety and radiological protection. These responsibilities include implementing national policies and programmes in relation to nuclear matters. DCCAE is supported in its implementation of policy by the Environmental Protection Agency (EPA) which is the Irish regulator for radiological protection.

2.0 Background

Ireland currently meets its electricity requirements from a combination of thermal and renewable energy sources. Ireland has chosen not to develop a nuclear power industry and the Government has no current plans for a change of policy in this respect. Factors informing the formation of this policy include concerns about public health and safety, environmental protection and security, as well as concern at the continued absence of an acceptable solution to the problem of the long-term management of the large quantities of radioactive waste produced by nuclear power stations.

The Irish Government formally adopted a national policy on radioactive waste management for Ireland in late 2010. Implementation of radioactive waste policy is overseen by a high level interdepartmental government committee and the National Implementation Committee (NIC).

One of its key initiatives was the reduction of Ireland's inventory of disused radioactive waste sources held by licensees at multiple locations throughout the country. Substantial progress has been achieved on this objective through a co-ordinated and phased Inventory Reduction Programme.

3.0 Key Policies and Objectives

Ireland is responsible for the management of radioactive waste generated on its territory. The key Government policies on radioactive waste management have the objective to maintain this status through the prohibition of the importation of radioactive waste from third countries and the minimisation of domestic generation of low-level radioactive waste. Ireland currently has no high-level or medium-level radioactive waste on its territory. This general policy is implemented through the adoption of the following principles and activities:

- Polluter Pays Principle

Undertakings responsible for radioactive waste are legally obliged to pay for its disposal, this is facilitated through take back arrangements with suppliers of sources. This policy is enshrined in legislation in Regulation 17(1) of the Ionising Radiation Regulations 2018.

- Inventory Reduction Programme

In the past number of years the Government has facilitated a programme to reduce the amount of disused radioactive sources in Ireland. This has seen a reduction from approximately 3,000 disused sources in 2011 to 16 sources in 2018. This, coupled with the requirement for undertakings to have take-back arrangements for sources has meant that the amount of radioactive waste in Ireland is negligible and consists of legacy sources only. Nonetheless, efforts are ongoing at reducing still further the amount of waste and on managing this waste appropriately prior to disposal.

- Enhanced enforcement

The EPA as the regulatory authority responsible for the safe management of radioactive waste and disused sources has been granted enhanced powers under the Ionising Radiation Regulations 2018 to enforce compliance with legislative and licensing requirements for the safe management of waste and disused sources. It is expected that these powers will result in a further and ongoing reduction in the number of disused sources being stored in the medium or long term.

- National Radioactive Waste Storage Facility

Ireland will proceed with the commissioning of a National Radioactive Waste Storage Facility in 2019 following a process for developing a plan for the design, siting and construction of an appropriate facility. This plan will include the end of life phase and decommissioning of the facility.

- Operational Protocol for the recovery and management of Orphan Sources

Ireland has in place an Operational Protocol for the recovery and management of Orphan Sources. This Protocol was reviewed as part of the IRRS Mission to Ireland and found to be fit for purpose. This Protocol will be reviewed periodically to ensure that it remains effective. The next review is scheduled for 2020.

- Financial Provision for Waste Management

The Department of Communications, Climate Action and Environment (DCCAE) has put in place a Radioactive Waste Management Fund (See Section 5.4) to address any waste management requirements such as the discovery of orphan sources or the disposal of radioactive waste where the polluter has not been identified or has an inability to pay. This fund has been set out in legislation in Regulation 77 of the Ionising Radiation Regulations 2018.

4.0 Implementation of Ireland's national waste policy on radioactive waste management

As described above, Ireland has adopted a "cradle to grave" management principle for all radioactive sources. This is implemented through a newly revised licensing system and a legislative requirement for take-back arrangements to be in place with the original overseas supplier or manufacturer of the sources. Unless justified, the practice of replacement of radioactive sources by non-radioactive alternatives is required.

In implementing this policy, Ireland follows the principles of:

- minimisation of the generation of radioactive waste in any form
- avoidance of the importation of radioactive waste in any form.

Ireland has no nuclear facilities, no defence research reactors, no civilian research reactors and no spent fuel or reprocessing facilities. Transboundary movement of radioactive waste consists of the repatriation of disused sealed sources to suppliers or manufacturers in other Member States. As Ireland has no nuclear facilities, by definition, all of the radioactive waste arising nationally falls into the IAEA's low level waste category, and no formal waste categorisation process beyond that is deemed of value in that context. However, for inventory management purposes sources are categorised in terms of 'half-life bands'.

Ireland uses radioactive materials in the form of sealed and unsealed sources in support of its industrial, medical and education sectors There are also small amounts of naturally occurring radioactive materials that are produced and also discharged as a result of Ireland's exploitation of natural resources. In practice, radioactive waste in unsealed form arises from the use of radionuclides mainly in hospitals and in a few educational and research establishments. The unsealed sources are either imported from the relevant overseas suppliers or in the case of short-lived sources are generated on the main hospital sites e.g. technetium generator.

In general, authorised liquid discharges from the medical sector are via the foul sewer system to waste water treatment plants and then discharge into the sea; there are no discharges into drinking water sources. Ireland is a contracting party to the OSPAR Convention for the Protection of the

Marine Environment of the North-East Atlantic, and monitors and reports discharges to the environment in line with the requirements of the Convention.

The management of radioactive waste is regulated by licence and overseen by the EPA and as provided for by the Radiological Protection Acts 1991 - 2018 and subsidiary legislation. In practice, existing licences are not closed until all licensed activities have been ceased, facilities have been decommissioned and all radioactive sources have been repatriated or disposed of in a manner approved by the regulatory authority, or a successor licensee has been established to carry on the licensed activity. In this way continuity of responsibility is enforced. An overview of Ireland's Radioactive Waste Management Plan is outlined in Table 1.

It is considered that Ireland's policy instruments are well established and based on international best practice and that further research, development and demonstration activities are not required to ensure the continued successful implementation of these policies.

Table 1 Overview of Ireland's Radioactive Waste Management Plan

Type of Liability	Long-Term Management Policy	Funding of Liabilities	Current Practice / Facilities	Planned Facilities
Spent Fuel	n/a	n/a	n/a	n/a
Nuclear Fuel Cycle Wastes	n/a	n/a	n/a	n/a
Application Wastes	Discharge to sewers (unsealed) or stored under licence	Polluter pays principle applies	Discharge to sewers (unsealed) or stored under licence	n/a
Decommissioning	n/a	n/a	n/a	n/a
Disused Sealed Sources	Return to original supplier or overseas for recycling/reuse	Polluter pays principle applies	Return to original supplier, exported for recycling/reuse or stored under licence	National Radioactive Waste Storage Facility

4.1 Graded Approach to Regulation

Ireland has introduced a new graded approach to the licensing of radioactive sources in the Radiological Protection (Amendment) Act 2018. The new graded approach to authorisation of practices involving the use of radiation sources will provide a new system of registration for lower-risk activities resulting in a reduction of the regulatory, financial and administrative burden for such

practices. It will also allow for a more efficient use of the Environmental Protection Agency's regulatory resources.

The use of a graded approach to regulation is in line with international best practice in the field of radiological protection, and addresses the recommendation made by the IRRS Mission to Ireland in 2015 to introduce a graded approach to the regulatory control of radiation sources. These regulations provide for a graded system of regulation commensurate with the magnitude and likelihood of exposures resulting from the activity, including any waste generated from that activity, and commensurate with the impact that regulatory control may have in reducing such exposures or improving radiological safety.

The EPA's radiation inspection activities are formally accredited to an ISO Standard which provides for openness and transparency in addition to continuous assessment and improvement. Inspectors from the EPA carry out routine inspections to assess compliance with legislative requirements and licence conditions and members of the National Crime Prevention Office undertake security audits of facilities holding HASS in addition to facilities holding large numbers of radioactive sources.

4.2 Licensing System

Key aspects of the licensing system which is central to implementing the overall policy on radioactive waste are as follows: -

- The licensing system in Ireland for sealed and unsealed sources has been in operation since 1977. As part of that system, information has been gathered and maintained on all licensable sources and held in a database. This database provides a useful tool in the "cradle to grave" management of sources.

- Licensees are required, as a prerequisite to licence issue, to have an agreement with the source supplier or manufacturer to take back sources ("take back agreement") when they become disused. The EPA looks for written evidence from the supplier or manufacturer that the source will be accepted back when no longer required before issuing a licence.

  Licensees are obligated, as part of the licensing process, to carry out a risk assessment in relation to all sources in their custody including waste management at hospitals for example.

Such licensees are also obligated to develop safety procedures to manage the risks identified and to keep doses as low as reasonably achievable. Such risk assessments and safety procedures must be reviewed and updated periodically.

- Licence conditions attached to a licence granted pursuant to an order or regulations made under Section 30 of the Radiological Protection Act 1991 are such that failure to comply with them constitutes a criminal offence.

- Legal requirements for the management of radioactive waste include the following: -

    - All sealed sources must be leak tested not less than once every two years or as recommended by the manufacturers and reported to the EPA;
    - Licensees are required to appoint an approved Radiation Protection Adviser (RPA) from a Register of persons approved to act as RPAs and maintained by the EPA;
    - Licensees wishing to transfer sources between sites must comply with the international transport regulations and any licence conditions that the EPA may consider important to impose;
    - Licensees are required to provide adequate training for persons managing radioactive waste;
    - Undertakings licenced to hold or use radioactive sources are required to keep an inventory of all radioactive sources and waste products including the locations and quantities of sealed and unsealed radioactive sources and radiation generators, and of the dates and method of transfer or recycling or disposal. Licensees are obliged to inform the EPA of any changes in the inventory of radioactive waste for which they are responsible, and to have their licence amended accordingly.
    - Undertakings licensed to hold or use HASS sources are required to make adequate provision, by way of a financial security or any other equivalent means appropriate for the sources in question, has been made for the safe and secure management of sources when they become disused sources, including cases where the undertaking becomes insolvent or ceases its activities.

4.3 Operational Protocol

An Operational Protocol (attached at Appendix 1) was approved by Government in 2011, setting out the arrangements to manage the safe interim storage of an orphan radioactive source or a source identified for seizure, pending its ultimate disposal. There have been very few incidents involving orphan sources due to the combination of a well-established licensing system, take back arrangements and a comprehensive inventory of sources. Where orphan sources have been identified, and seized, they have been taken into the safe custody of existing licensees. The number of such sources that have been discovered is very low, and the EPA has dealt with them in consultation with the DCCAE on a case-by-case basis, and their disposal has been funded by the State through the Radioactive Waste Management Fund.

4.4 Enhanced Enforcement

Ireland has introduced new enforcement powers for the regulatory authority to encourage an increased culture of compliance with safety requirements. Under the Ionising Radiation Regulations 2018, EPA inspectors can issue "enforcement notices" to compel compliance with regulations, licence conditions or instructions from the regulatory authority, and such conditions are enforceable through the Irish Courts. It is anticipated that these new powers will assist the EPA in promoting increased compliance with waste management requirements, and an improved processing time for the repatriation of disused sources.

4.5 Inventory Reduction programme

The remarkable success of Ireland's Inventory Reduction Programme, which was recognised by the Joint Convention on Spent Fuel and Radioactive Waste Management as a "Good Performance", has resulted in a reduction in the number of disused sources from approx. 3300 to 16. A good example of the success of this programme is the educational sector detailed below

Disused Educational Sources

A disposal programme for disused sources held by secondary schools was undertaken and a tender seeking specialist waste disposal contractors to dispose of all unwanted schools sources was issued in 2013. Following a successful tender process, a source disposal programme commenced in June 2013 and is now complete. In total 1066 legacy disused school sources were recycled abroad as part of the source reduction programme in line with Government policy

Based on this successful programme, Ireland has revised its policy on the need for a National Radioactive Waste Disposal Facility.

Based on the small number of disused sources currently in Ireland, the lack of any medium or high-level waste, and the enforcement of policies to ensure that the number of disused sources and low-level waste generated remains at a *de minimis* level, it has been determined that a National Radioactive Waste Disposal Facility is no longer a requirement.

4.6 National Radioactive Waste Storage Facility

Ireland intends to proceed with the design and development of a National Radioactive Waste Storage Facility to ensure that future needs are catered for in terms of the storage of orphan sources and low-level radioactive waste. It is intended that the Environmental Protection Agency will develop a detailed technical specification covering the entire life-cycle of the proposed facility, and that the construction, operation and management of the proposed facility will be subject to Government tender. The financial provision for the facility will be provided for by DCCAE and is subject to commercial sensitivity and confidentiality.

The siting, design, construction, commissioning, operation, decommissioning and closure of the proposed National Radioactive Waste Storage Facility will be subject to licence in accordance with the Ionising Radiation Regulations 2018.

4.7 Cyclotron Waste – Routine Operation & Decommissioning

Type of Cyclotron

Ireland has one 16.5 MeV self-shielded PETtrace cyclotron. The self-shield is made up of a passive combination of materials ie polyethylene, lead, boronated water, lead and boronated water to moderate neutrons generated in the nuclear reaction in the target. The total shield thickness is approx. 80-100 cm. There is no concrete bunker as it is self-shielded and the cyclotron is positioned on a concrete plinth that is c.40 cm thick.

Operational Phase

Activated materials such as disused target foils, used post-irradiated O-16 and O-18, auxiliary cyclotron components, post-irradiated separation and purification columns and possibly some contaminated water from sonic baths used in target maintenance are generated as part of routine operations of the cyclotron. The licensee is permitted to store these materials until they have

decayed sufficiently (below the relevant exemption levels) to allow them to be handled as conventional waste and be disposed of either to the foul sewer or as part of routine waste streams. The O-18 is sent abroad under licence for recycling. It is anticipated that the operational phase will continue for at least 20 years.

Decommissioning

The decommissioning of the cyclotron will be a phased process involving removal, recycling and disposal of the cyclotron followed by decommissioning of the concrete plinth beneath the cyclotron.

The cyclotron will be left unused for a period of 1 year to allow for the decay of the short-lived activation products. Cyclotron components that are not activated will be recycled and disposed of as normal, conventional waste materials. Materials still active after the 1 year time period will be sent to the National Waste Storage Facility for secure storage until decay below relevant exemption levels and will then be disposed as conventional waste.

Once the cyclotron has been decommissioned, the concrete plinth directly beneath the cyclotron will be removed. It is estimated that a maximum of 1 m^3 of concrete may be activated. Concrete not activated will be disposed as conventional waste. Activated concrete will be sent to the National Waste Storage Facility for secure storage until decay below the relevant exemption levels and will then be disposed as conventional waste.

4.8 Industrial Sterilisation Facilities

Ireland currently has two licensed operational panoramic wet storage gamma irradiators (IAEA Category IV) and two licensed E-Beam irradiators operating at 10 MeV but with the capability to operate at 12 MeV..

Two panoramic wet storage gamma irradiators have been decommissioned within the last 10 years. During decommissioning of these units, the Co-60 sources were returned to the manufacturer under take-back agreements. There is no radioactive waste associated with the operation or the decommissioning of panoramic wet storage gamma irradiators.

The operation of E-Beam irradiators at MeVs greater than 10 MeV may entail the generation of short-lived activation products on the beam stop and possibly on the parts of the conveyor system directly in front of the beam. These activation products generally decay to BG levels within several hours up to a maximum of several days.

During the decommissioning of the E-Beam irradiators it is envisaged that all components will be monitored for activation products, and if active, these products will remain on-site under licence until decay below relevant exemption or clearance levels, and will then be disposed as conventional waste.

5.0 Key Performance Indicators

5.1 Inventory Reduction Programme

The bulk of disused sources have now been removed from the country for disposal or recycling, it is expected that through a combination of legislative requirements, enhanced regulatory enforcement and a policy prohibiting the importation of radioactive waste that this number will trend towards zero in the coming years (see Table 2).

Table 2 Current and Proposed Future Inventory Reduction Programme

Year	No. of Disused Sources
2011	**3300**
2018	**16**
2021	**~0**

5.2 National Radioactive Waste Storage Facility

Ireland will progress the design and development of a new National Radioactive Waste Storage Facility to house future waste and orphan sources according to the milestones detailed in Table 3.

Table 3 Milestones for the design and development of a National Radioactive Waste Storage Facility

Function	Responsible Body	Milestone
Design of technical specification	Environmental Protection Agency	Q1 2019
Issue of Tender to construct	Dept. of Communications,	Q3 2019

and operate NRWSF	Climate Action and Environment	
Award of tender for construction and operation of NRSWF	Dept. of Communications, Climate Action and Environment	Q4 2019
Construction of NRWSF	Successful Bidder	Q1 2020

5.3 Peer Reviews of Regulatory Framework

- Ireland strives to ensure that its regulatory framework takes account of international best practice and is peer reviewed to ensure that deficiencies or areas for improvement are identified and remedied.

- Ireland is a signatory to the Joint Convention on the Safety of Spent Fuel and on the Safety of Radioactive Waste Management and participates in its peer review process.
  Ireland reports on its performance on radioactive waste issues every three years in line with the Convention. Ireland participated in the 2018 Joint Convention Review Meeting and was commended on the success of its inventory reduction programme.

- Ireland invited the IAEA to conduct a full-scope IRRS mission in 2015 which examined Ireland's radiological regulatory framework including radioactive waste management. Ireland has revised its legislation and practices to address the recommendations made in that review and expects in Q3 in 2018 to issue an invitation to the IAEA to conduct a follow-up IRRS Mission .

- Ireland expects in Q3 2018 to invite ARTEMIS to conduct peer review mission in line with the requirements of Council Directive 2011/70/EURATOM.

- The French Radiation and Nuclear Regulator (ASN) performed an audit of the EPA's Quality Management System's and was considered as an internal audit according to the ISO 17020 standards. The results of the audit confirm that the EPA fulfils the requirements of the ISO CEI/17020: 2012 standards and that the management system is effectively implemented and maintained.

5.4 Financial Provision

Following the "polluter pays" principle, the costs for disposal of radioactive waste is, in the first instance, borne by the undertaking responsible for generating the waste. The Department of Communications, Climate Action and Environment (DCCAE) has put in place a Radioactive Waste Management Fund for the disposal of orphan sources (see Table 4). The profiled expenditure is based on historic data and is considered adequate to meet anticipated spend on the safe management and disposal of orphan sources. This fund has been established on a statutory basis in the Ionising Radiation Regulations 2018. The EPA's radiation regulatory functions are funded separately through an annual government vote. The costs for the development of the National Waste Management Storage Facility will be funded directly by DCCAE and the profiled expenditure will be revised accordingly.

Table 4 Radioactive Waste Management Fund

Year	2015	2016	2017	2018	2019	2020
Profiled Expenditure	€50,000	€50,000	€50,000	€50,000	€50,000	€50,000
Actual Expenditure	€0	€14,755	€0			

6.0 Transparency

DCCAE and the EPA waste management activities are subject to the requirements of the Freedom of Information Acts and Access to Information on the Environment Regulations.

7.0 Conclusion

The National Programme for Ireland has been compiled to comply with the requirements of Article 12 of Directive 2011/70/EC. There has been significant progress made on the source reduction programme over the past six years. During this time, Ireland has gone from having 63 licensees holding over 3,300 disused sources, with half-lives greater than ten years, to 16 remaining disused sources (representing a 99% reduction in total number of these sources). This reflects the on-going successful implementation of programmes and measures resulting from the Government's policy.