Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

National Report for Ireland

Introduction

There are no nuclear power stations and no nuclear fuel cycle activities in Ireland. There are 2.5 tonnes of natural uranium in storage on the campus of a university, which was previously incorporated in a sub-critical assembly. This material is stored in the building in which it was previously used. Other than in relation to these uranium sources, the application of the Convention is limited to radioactive waste arising from the medical, industrial and research applications of radioisotopes.

Radioactive waste categorisation

In the absence of nuclear power or nuclear fuel cycle facilities, no high level radioactive waste is produced in Ireland. Furthermore although no formal system of categorisation has been undertaken, radioactive waste in the form of disused sealed and unsealed radioactive material arising from medical, industrial and research/educational applications would all be categorised as either intermediate or low-level, depending on the activity and activity concentration of the material in question.

Regulatory infrastructure

Under Irish legislation (1) all activities involving radioactive sources, save those which meet the criteria for exemption specified in the legislation, require a licence from the Radiological Protection Institute of Ireland. The Institute is empowered to attach conditions to these licences including conditions relating to the management of radioactive waste. Inspectors from the Institute carry out inspections to assess compliance with the conditions. The Institute maintains a database of all licensees, which includes an up-to-date inventory of all radioactive material in storage in the country.

Management of disused sealed radioactive sources

Since the licensing system was introduced in 1977, activities involving sealed radioactive sources are permitted only if the licence applicant can satisfy the Institute that an agreement has been made with the supplier or manufacturer of the source to take it back when no longer required. A report published by the Institute in 1994 (2) found that there are approximately 7600 sealed sources, with an associated activity of 4737 gigabecquerels, which were acquired before 1977, or which were acquired from suppliers which have ceased trading . These sources are held on the premises, mostly factories, in which they were previously used. Disused sources must be held under licence and are subject to inspections by the Institute. It is a condition of licence that the legal owner of the source nominates a named individual to take responsibility for its safety. The appendix provides an updated list all the significant disused sources in storage other than those incorporated in disused lightening preventers (see below)

<u>Radioactive waste storage facility</u>

While all the sources referred to above are held in secure locations, it would be clearly preferable to have them all placed in a dedicated storage facility. This would help ensure longer term security and remove the ever present risk that a source will be inadvertently disposed of with other scrap material, particularly if the legal owner is placed in receivership or if the premises, where it is held, is sold. The Institute, in co-operation with its parent Government Department, the Department of Environment and Local Government, is actively investigating potential sites for such a storage facility, with the objective of establishing such a facility as soon as possible.

The radioactive waste store may be operated by a commercial enterprise or by a Government Agency or Department. In either case its operation would be subject to regulatory control by the Institute.

Surveillance of disused sealed sources

In addition to inspections by the Institute, it is a condition of the licence that all sealed sources, whether in use or not, must be leak tested every two years or more frequently if recommended by the manufacturer. A visual check of disused sources must be carried out and recorded at quarterly intervals by the person responsible for their safety.

Radium sources

Radium sources, in the form of needles and tubes, were previously used in three Irish hospitals for the treatment of cancer. However, in common with the practice in other countries, these sources have been replaced by less hazardous radionuclides, including, in particular caesium-137 and iridium-192. The medical radium sources have been removed to the UK by the UK based supplier of the caesium sources. The radium sources which still remain in the country and which are listed in the appendix were mainly used for a range of educational purposes and as check sources for radiation monitors.

Lightening preventors incorporating radium

In addition to the radium sources referred to in the appendix there are 21 lightening preventors incorporating radium sources. Currently seven of these devices, each with an activity of 27 megabecquerels, are in storage on the premises of the company which was responsible for removing them from the buildings on which they were previously located The intention is to return these, and ultimately, the devices still in use, to the supplier. While these sources are not strictly speaking sealed sources in that the radionuclide is not encapsulated, for the convenience they have been categorised as such. The installation of these devices was popular in Ireland in the 1970s. However, in the absence of any demonstrated benefit over conventional Faraday rods, the Institute no longer permits their importation.

Management of unsealed radioactive material

Radioactive waste in unsealed form arises from the use of radionuclides in hospitals and in educational and research establishments.

The licences which the Institute issues in respect of unsealed radioactive material include annual limits on the quantity of each radionuclide which the licensee intends to use. This places an upper limit on the quantities of radioactive waste that may be produced. The licence also includes conditions relating to disposal which are being amended to take account of the OSPAR Convention to which Ireland is a signatory.

Liquid waste which meets the licence requirements and which is soluble/miscible in water may be disposed of to the sewers. Technetium generator cores are returned to the supplier.

A survey of radioactive waste disposal practice in Ireland has been carried out by the Institutes predecessor, the Nuclear Energy Board (3). This survey found that 99% of unsealed radioactive waste material disposed of is disposed of to the sewer. The rest was disposed of to landfill sites or incinerated. It also found that 97% of the total activity discharged to the sewage system involved the short lived radionuclide technetium 99m. An updated survey is under consideration at present.

Radioactive waste in the form of excreta from patients

The licence conditions are currently being revised to include the disposal of radioactive waste in the form of excreta from patients. Furthermore the radiation safety procedures, which as a condition of licence, hospitals are obliged to draw up, must include requirements to ensure that precautions are taken to prevent the spread of contamination, including contamination in

the form of excreta from patients. These include a requirement that patients who are being treated with high levels of radioiodine for thyroid ablation, or with other high activity radionuclides, are held in a specially designed unit until the level of radioactivity in both their bodies and in their excreta has decayed to levels at which they may be discharged. Instructions are also given to patients on how to prevent the spread of contamination and to limit doses to other persons with whom they may have contact.

The revised licence condition places an obligation on hospitals and clinics to keep records of radionuclide administrations to patients which will enable estimates of the quantities excreted to the sewers to be made, using established excretion factors. (See also below under Holding Tanks)

Holding Tanks

There are currently two hospitals in Ireland which are involved in radioiodine thyroid ablation treatments. One of these has installed a holding tank, but this has not yet been commissioned. All hospitals in Ireland which use significant quantities of unsealed radionuclides are connected to sewage systems which discharge to the sea, thus ensuring rapid dilution of the radionuclides discharged. In line with requirements of the OSPAR Convention, the Institute is reviewing the issue of installing holding tanks on both new and existing radionuclide treatment facilities. The Institute also requires that any licence application to use unsealed radionuclides for medical purposes, be accompanied by an estimation of doses to critical groups, e.g. medical staff; sewer workers; personnel who might be involved in the maintenance and operation of holding tanks, if installed, and the public.

Conclusion

This report provides a summary of radioactive waste management practice in Ireland. It will be noted that given the absence of nuclear power and nuclear fuel cycle facilities the quantities of waste to be managed are relatively small. The priorities are to minimise the production of radioactive waste, ensure that waste which has been produced is kept under surveillance and establish a central radioactive waste storage facility.

References

1 Radiological Protection Act, 1991 (Ionising Radiation) Order, 2000, S.I. no 125

2 D.M Fenton, C.P. Hone, F.J. Turvey, An Inventory of Disused Sealed Radioactive Sources in Ireland, RPII, 1994

3 N O'Donovan, C. Hone, F.J. Turvey, A Survey of Radioactive Waste Disposal in Ireland, NEB, 1988

Appendix

Inventory of disused radioactive sources in Ireland

Sealed Sources

Radionuclide	Total activity (Megabecquerels)	Number of sources
Americium-241	78188	62
Americium-241/Berylium	33818	11
Barium-133	1	2
Barium/Caesium	<1	1
Cadmium-109	629	5
Californium-252	<1	1
Californium-253	<1	1
Chlorine-36	<1	1
Cobalt-57	17944	73
Cobalt-60	17246	23
Caesium-137	376786	155
Curium-244	7400	2
Iron-55	2775	3
Iron-59	37	1
Gadolidium-153	147701	32
Tritium	13875	2
Mercury-203	1	2
Iodine-129	<1	1
Iridium-192	200	2
Krypton-85	61350	7
Manganese-54	<1	1
Sodium-22	4	2
Nickel-63	26009	112
Promethium-147	296095	9
Polonium-210	15	2
Plutonium-238	93240	3
Radium-226	347	42
Samarium-151	7770	3
Strontium-90	20259	40
Strontium-90+	143560	6
Thallium-204	571	10
Thorium-226+	<1	1
Thorium-232	1	1
Thorium-232 (nitrate)	<1	4
Uranium-238	925	6
Natural uranium	370	2
Yttrium-88	<1	2

Unsealed Sources

Silver-110M	37	1
Carbon-14	568	2
Calcium-45	37	1
Cadmium-109	37	1
Cobalt-57	3	1
Caesium-137	1	2
Tritium	593087	5

Iodine-125	2	1
Molbdenum-99	37	1
Sodium-22	4	1
Phosphorus-32	1000	1
Radium-226	unknown	3
Radon-222+	unknown	1
Sulpher-35	37	1
Strontium-90	189	1
Strontium-90+	5	2
Thorium-232	2	3
Thorium nitrate	<1	1
Uranium-238	5	9
Uranyl acetate	15	5
Uranyl nitrate	3	3
Tungsten-185	37	1
Zinc-65	37	1

The following unsealed sources in the form of uranium and thorium salts, which were previously used for educational/research purposes, have small but unspecified activities

	Number of sources
Uranium oxide	13
Uranium acetate	30
Uranium nitrate	13
Uranium sulphate	2
Thorium oxide	9
Thorium carbonate	2
Thorium sulphate	1