



GEISLAVARNIR RÍKISINS

ICELANDIC RADIATION PROTECTION INSTITUTE

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

**National report from Iceland
to the 2nd review meeting,
15 – 24 May 2006**

Icelandic Radiation Protection Institute
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Section A: Introduction

Iceland deposited an instrument of accession to the Joint Convention on 27 January 2006. There were no declarations or reservations attached to the instrument of accession. The Convention entered into force for Iceland on 27 April 2006.

Iceland is a country that has no nuclear industry, no research reactor or other facility generating radioactive substances. Therefore many of the requirements of the Joint Convention do not apply to Iceland. There is no nuclear fuel or high level waste on Icelandic territory.

The total amount of radioactive waste in Iceland is very low, due to the small size of the country, with a population of only about 300 thousand and requirements to have disused sealed sources sent back to the foreign supplier or to a foreign waste management facility.

Radioactive waste in Iceland originates mainly from the use of radioactive sources in medicine but also from uses in research, education and industry. The very low activity and volume of radioactive waste produced in Iceland does not justify a national final waste depository.

The first legislation in Iceland on radiation protection was passed in 1962 and has been revised periodically. The legislation covers all relevant radiological safety issues. The latest revision took place in 2002, Act 44/2002, with the aim of harmonizing the Icelandic legislation in the field of radiation protection and its implementation with the Directives of the European Union in the field of radiation protection and their implementation. Iceland is not a member of the European Union and the the Directives of the European Union in the field of radiation protection have no legal bearing in Iceland.

The present report is the first Icelandic national report and is presented to the Second Review Meeting to the Convention that takes place 15 – 24 May 2006 at IAEA in Vienna. The report was prepared by the regulatory authority, the Icelandic Radiation Protection Institute, at the request of the Ministry of Foreign Affairs in Iceland.

The aim of this national report is to demonstrate that Iceland meets its obligations of the Join Convention. The report is laid out according to the requirements and headings contained in the IAEA Information Circular INFCIRC/604 of July 2002.

Since this is the first report submitted by Iceland, it welcomes this opportunity to present the status of radioactive waste management in Iceland and to participate in a constructive dialogue on ways for improvement.

Section B: Policies and Practices

Iceland has no nuclear reactors and no nuclear fuel processing facilities.

Radioactive waste management policy

Radioactive waste is regulated within the framework of the Act on Radiation Protection and regulations on radiation protection based on the Act. These are Regulation 809/2003 on radiation protection in use of open sources and Regulation 811/2003 on radiation protection in use of sealed sources

Radioactive waste management policy in Iceland is based on the practical needs of the country. The very low activity and volume of radioactive waste does not justify a national final waste depository. Therefore the requirement is that disused sealed sources be returned to the country of origin or, disposed of in another legal way accepted by the regulatory authority unless they can be stored under secure conditions until decayed.

Radioactive waste management practices

Sealed sources, open sources, categorization of radioactive waste.

The normal procedure for a disused source is for it to be returned to the country of origin. Some sources that have been taken out of usage are however kept by their licensed owners in an interim storage. If no use is foreseen and/or the storage conditions do not meet the requirements set by the radiation protection Act and regulations (e.g. with regard to safety and the security of the source(s)), then the regulatory authority can send the source for disposal at the owner's expense. The following users have a limited set of sources in an interim storage:

- (i) The University Hospital of Iceland (Radium needles, total activity 19.2 GBq; see Annex 1)
- (ii) The University of Iceland stores a collection of sources, most low activity. Some of these sources were given to the University for storage before the establishment of the Icelandic Radiation Protection Institute in 1962, others have been used for research or for teaching.
- (iii) The Icelandic Radiation Protection Institute stores a few low-activity sources for licensed owners, that have not been able to demonstrate the need for use of the source, adequate storage conditions or having a qualified contact person. Most of these sources are disused sources from schools where experiments involving radioactivity have been removed from the curriculum (a set of sources was returned to a school when such an experiment was introduced again, a source used for well logging has also been taken again into use).

Exemptions from the requirements of the Icelandic Act on Radiation Protection with respect to specific and total activity of material handled are covered under Article 7 of the Act and corresponding guidelines, GR-04:01. These are based on the Schedule to

and text of Annex I of EU Council Directive 96/29 Euratom of 13 May 1996. The directive has no legal standing in Iceland, but it was used as a reference to ensure consistency in requirements with EU countries. Practices may also be exempt if doses will under all circumstances not exceed prescribed values.

Buyers of sealed sources are required to ensure that an imported source can be returned before a licence is granted to import and use a radioactive sealed source.

Section C: Scope of Application

The report does not apply to the safety of spent fuel management since Iceland has no nuclear facilities.

Iceland has not declared waste that contains only naturally occurring radioactive material as radioactive waste for the purpose of this Convention.

Iceland has no military or defence programmes that produce radioactive waste.

Section D: Inventories and Lists

Iceland is a non – nuclear country and has therefore no spent fuel facilities subject to the Convention.

Disused sources are stored, under the control of the Regulatory Authority, on the users' premises until decayed or shipped to a foreign radioactive waste management facility. The Regulatory Authority takes care of disused sealed sources for which safe management may not be guaranteed. This consists mainly of radioactive smoke detectors, small amounts of thorium or uranium salts as well as other sources of low activity and volume.

The inventories of the radioactive waste stored on 1 January 2006 on the Regulatory Authority's premises and on the users' premises are listed in Annex 1.

The competent authority operates a database of all radioactive sources in Iceland. The content of the database used is similar to the content of the database proposed to be used in the EU for high activity sources.

Section E: Legislative and Regulatory system

The legislation in Iceland for radiation protection including radioactive waste was established in 1962 and has been revised periodically. The legislation covers all relevant radiological safety issues. The latest revision took place in 2002, Act 44/2002 on radiation protection, with the aim of harmonizing the Icelandic legislation in the field of radiation protection and its implementation with the Directives of the European Union in the field of radiation protection and their implementation. Iceland is not a member of the European Union and the Directives of the European Union in the field of radiation protection have no legal bearing in Iceland.

The regulatory body and the competent authority is the Icelandic Radiation Protection Institute which is under the auspices of the Minister of Health and Social Security. The Institute's role is to implement safety measures against radiation from radioactive substances and radiological equipment. The Institute in its present form was established under the Act on Radiation Protection of 1985.

Act on Radiation Protection of 18 April 2002.

The Act on Radiation Protection of 18 April 2002 constitutes the legal basis for regulating the use of ionizing and non – ionizing radiation, radiation protection requirements, medical use of radiation, emergency planning, waste management and discharges to the environment.

The objective of the Act is to ensure adoption of the necessary safety measures to protect against radiation from radioactive materials and radiological equipment and to limit the detrimental effects of such radiation. An effort shall be made to ensure that all exposure to radiation resulting from any practice covered by this Act shall be as low as reasonably achievable, taking into account economic and social factors.

The objectives of the Act shall be attained through specific measures, for example, the inspection of radioactive materials and radiological equipment, studies and research, monitoring of radioactive substances in the environment, measures against radiological emergencies, and through education and guidelines on radiation protection.

The Act applies to:

- safety measures against ionising radiation in respect of any practices that could cause a risk of radiation exposure to persons, for example, the production, import, export, delivery, possession, installation, use, handling and disposal of radioactive substances and radiological equipment;
- safety measures against ionising radiation in practices that result in increased levels of natural radiation in the environment;

- safety measures against ionising radiation from radioactive substances and radiological equipment insofar as this is not governed by other legislation pursuant to international conventions;
- monitoring and research in respect of radioactive substances in the environment and foodstuffs;
- radiological aspects of measures concerning radiological and nuclear emergencies.

The Icelandic Radiation Protection Institute is an institute under the auspices of the Minister of Health and Social Security. The Institute's role is to implement safety measures against radiation from radioactive substances and radiological equipment.

The Act establishes a general framework on which specific regulations concerning radiation protection are based. Pursuant to the Act, 5 regulations on radiation protection and use of radiation have been issued by the Ministry of Health. These are on radiation protection in use of open and sealed sources, in use of diagnostic radiology and limits of exposure of workers and public due use of ionizing radiation.

Details regarding regulation of radioactive waste are found in the relevant regulations and further developed by the regulatory body through guidelines and requirements in licences.

Regulatory body.

As defined in the Act on Radiation Protection, the regulatory body (the competent authority) is the Icelandic Radiation Protection Institute which is an institute under the auspices of the Minister of Health and Social Security. The institute's role is to implement safety measures against radiation from radioactive substances and radiological equipment. The institute regulates matters concerning radiation protection, nuclear safety and security, nuclear and radiological emergency preparedness and radioactive waste.

The Icelandic Radiation Protection Institute is responsible for:

- monitoring and supervising the implementation of this Act and its implementing rules and regulations;
- any inspections and research deemed necessary pursuant to this Act and its implementing rules and regulations;
- monitoring workers' exposure to ionising radiation, and maintaining a dose register of the results of the dose estimates for every worker;
- regular assessment of the total ionising radiation exposure of the general public from practices under this Act;
- regular assessment of patients' exposure to ionising radiation from practices under this Act;
- monitoring and researching radioactive substances in foodstuffs and the environment;
- courses in radiation protection for workers who work with radiation, as well as dissemination of information to the general public and the mass media;
- research in the field of radiation protection;

- the radiological part of measures concerning radiological and nuclear emergencies, including the operation of emergency response and radiation measuring systems, and other measures relating thereto.
- collaborating with foreign institutions in relation to radiation protection and nuclear issues;
- other factors pertaining to the implementation of this Act, and other projects in the field of radiation protection in accordance with further decisions thereon by the Minister.

The Minister may request the Institute to address certain matters or projects relating to its duties under this Act.

The production, import, ownership, use, storage, delivery or disposal of radioactive substances, whether pure, mixed with other substances or installed in equipment, are subject to licensing by the Icelandic Radiation Protection Institute. The granting of licences is subject to conditions set out by the Institute, including provisions governing the handling of radioactive substances at the end of their use.

A licence is not required in respect of radioactive substances if their total content or concentration per mass unit is under the exemption limits as determined by the Icelandic Radiation Protection Institute. The exemptions limits determined are consistent with the Schedule to and text of Annex 1 of the EU Council Directive 96/29 Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general population against the dangers arising from ionising radiation.

Section F: Other General Safety Provisions

Article 21: Responsibilities of the licence holder.

The prime responsibility for the safe management of radioactive sources including radioactive waste management rests with the owner of the installation (the license holder) according to the Act on Radiation Protection. This includes the responsibility to ensure that disused sealed sources are handled in a safe manner and returned to the manufacturer/supplier or disposed of in another legal way accepted by the regulatory authority. According to paragraph 12 of the Act, *the storage and disposal of radioactive substances shall always take place in accordance with the rules set by the Icelandic Radiation Protection Institute. The same applies to other waste, equipment or packaging which contains or is contaminated by radioactive substances.* The paragraph also states that *the Icelandic Radiation Protection Institute shall be notified when an instrument or equipment capable of producing ionising radiation is finally taken out of use. For as long as equipment contains radioactive substances or is capable of producing ionising radiation, it shall be kept in safe storage, and shall be safeguarded in accordance with the rules established by the Minister pursuant to Section 10, paragraph 4. The Radiation Protection Institute is authorised to demand the disposal or removal of radioactive substances and radiological equipment no longer in use. If the Institute's demands on disposal or removal are not met within a specified deadline, the Institute may carry out such actions at the owner's expense.* If the licence holder is in financial difficulties or out of business then the authority may take responsibility for safe disposal of the source.

Article 22: Human and financial resources:

The Icelandic Radiation Protection Institute has a total staff of currently 11 persons. The income of the Institute is made up of a grant from the Icelandic Government and from licence and other fees paid by users of its services. Most of the technical staff members of the Institute hold higher university degrees.

Article 23: Quality Assurance.

The Regulatory Authority is pursuing accreditation according to ISO 9000 Standard for its activities as well as to ISO 17025 Standard for its laboratory for environmental monitoring (measurements of gamma spectroscopy) The laboratory participates in international inter laboratory comparison studies.

Article 24: Operational Radiation Protection

All who have radioactive sources in interim storage hold a licence to own and use such sources and are subject to the term of the Icelandic radiation protection act, relevant regulations and regular inspections. This includes keeping the sources in a safe and secure storage, assuring that the doses to workers and the public are below the limits given in regulation (which is consistent with the recommendations of the

ICRP and EU directives) Furthermore the principle of ALARA must be applied (paragraph 13).

Releases from laboratories must be as low as reasonably achievable and within the limits set in regulation 809/2003 on radiation protection in the use of open sources. (this is based on publication *Application in the Nordic countries of International Radioactive Waste Recommendations*¹ and requires the total amount in a single release through a given route of disposal by a licensed user to be no more than 2.5 ALI and the total monthly release to be less than 25 ALI²). Since the laboratories apply the ALARA principle and store waste for decay whenever possible, the actual releases have in practice been far below these limits by all laboratories. The only exception is the medical use of radionuclides, for which the limits above do not apply.

The largest releases from medical use in Iceland are from the radioiodine thyroid ablation treatments. These releases are limited in number (~20 per year) and magnitude (typically 3 – 6 GBq/patient). Currently there is a study undergoing on estimating the possible doses from released radionuclides to sewage workers in Iceland.

Article 25: Emergency preparedness.

All who possess a licence to own and use radioactive substances in Iceland are required by the Icelandic radiation protection act (paragraph 11) to have an appropriate emergency preparedness system. Those who have radioactive sources in interim storage are all licensees and this requirement thus also applies to them.

There is no spent fuel or radioactive waste management facility in the vicinity of Iceland. An accident abroad in such a facility is thus unlikely to have a significant impact on health in Iceland, but the societal and economic impact can nevertheless be significant. The emergency preparedness is thus based on two main factors:

- (i) detection of any significant increase in radiation dose rate and concentration of radionuclides
- (ii) fast and efficient information exchange and assessment on real or assumed threats involving ionizing radiation.

The regulatory authority now operates a network of 4 gamma monitoring stations in cooperation with the Icelandic Meteorological office. The data from the stations are combined with meteorological data to aid assessment. Given the size of Iceland and the distance to other countries having spent fuel and radioactive waste management facilities, these 4 stations should be sufficient to detect a plume coming from another country. The location of stations and graphs showing the results for the last week can be accessed at the authority's web site:

<http://www.gr.is/gammastodvar/>

The regulatory authority also operates an automatic high-volume air sampling station in the network of the Comprehensive Test Ban Treaty Organisation (CTBTO). Aerosols are collected for 24 hours, the filters are then stored for 24 h to let short-

¹ Published jointly by the Nordic radiation protection authorities in 1986

² Finland also uses the same system of limitation in the *STUK Guide ST 6.2 Radioactive Wastes and Discharges* (1999).

lived natural radionuclides decay and then counted for 24 h. Even though these are not real-time results, they are very useful for assessing possible effects of suspected releases, which would result in low air concentration in Iceland, but which might nevertheless be of concern.

Article 26: Decommissioning

This article does not apply to Iceland

Section G. Safety of Spent fuel Management

This section containing articles 4 - 10 is not applicable to Iceland.

Section H. Safety of Radioactive Waste Management

Article 11. General Safety requirements.

Article 12. Existing facilities and past practices.

All those who have a licence from the regulatory authority to own and use radioactive substances are required to justify their use and thus keep their stock to the minimum necessary. The licensed user is responsible for that all those who handle waste must do it according to accepted procedures, which have to be based on accepted practices within radiation protection and in accordance with the Icelandic Act and regulations on radiation protection. Where appropriate (e.g. in medical use of radionuclides), the licensed user is responsible for that radiation safety issues are integrated with other safety issues that need to be taken into account (e.g. biological and chemical).

Article 13 – 16.

At present Iceland has no plans for constructing a waste management facility.. If any plans were considered necessary, Iceland would, beginning in the planning phase and continuing all through the project, take due account of its obligations according to the Joint Convention as well as applicable Icelandic legislation and regulations.

Section I: Transboundary Movement

The shipment of radioactive sources to and from Iceland is subject to the international requirements concerning transport of dangerous goods. The main method of transport is by air cargo.

Iceland does not import any radioactive waste and it is not the State of origin of any radioactive sources. The only transboundary movements involving Iceland are thus shipments of disused radioactive sources, normally sent to their State of origin. According to the radiation protection act and regulation 811/2003, an owner of a source needs to have the approval of IRPI before disposing of a source. Such an approval is only granted provided the requirements of Article 27-1 are met. Carriers operating between Iceland and other countries are subject to international regulations on the shipment of dangerous goods.. There has never been a shipment of radioactive

waste from Iceland to a destination south of latitude 60 degrees South and no such shipment would be allowed.

Section J: Disused Sealed Sources

Article 28.

The Ministry of Health has issued Regulation No. 811 of 20 October 2003 *on radiation protection in use of sealed sources*. The Radiation Protection Act of 2002 and this regulation implement the obligations under Article 28 of the Joint Convention ensuring that possession, storage and disposal of disused sealed sources takes place in a safe manner. It is the responsibility of the license holder to ensure that disused sealed sources are handled in a safe manner and returned to the manufacturer/supplier or disposed of in another legal way as stated in section F.

All facilities where sealed sources are used or stored are inspected by the regulatory authority every 2 – 4 years in order to ensure that the use and storage of these sources is in accordance with the legislative framework and requirements in license.

No manufacturing or remanufacturing of sealed sources takes place in Iceland.

In case of orphan sources, the procedure is for the regulatory body to take control of source, to ensure its safe storage and find the owner if possible.

A legal action may be taken towards the owner if circumstances warrant such an action. Orphan sources are very rarely identified in Iceland. There have only been a very few cases over the last years, and in all cases, involving, low activity sealed sources.

Section K: Planned Activities to Improve Safety

There is a general goal of the regulatory authority to continuously improve safety and enhance radiation protection in all activities involving ionizing radiation. With regard to radioactive waste it has been decided that inspections are focus more on waste aspects of practices using radioactive substances raising awareness among license holders on their responsibilities regarding radioactive waste arising from their activities. The regulatory authority is presently conducting a study on actual liquid discharges from medical sector including measurements of radioactivity in sewage. The regulatory authority is working towards full implementation of regulations similar to the EU Directive 2003/122/EURATOM of 22 December 2003 on the control of high-activity sealed radioactive sources and orphan sources

Annex – 1: Disused sealed radioactive sources in Iceland as of 1 January 2006

These are sealed sources kept in storage by licensed owners and subjected to regular inspections by the Icelandic Radiation Protection Institute.

The activity given is the nominal activity. For each radionuclide (apart from Ra-226) there are a couple of sources that contribute most to the total activity, with the sum of all the other sources being small in comparison. The activities of these dominant sources are given for each radionuclide.

Co-60

9 sources

Total nominal activity: 8 504 MBq

Largest sources: 6 900 MBq (February 1980) and 1 550 MBq (July 1991)

Am-241

4 sources

Total nominal activity: 2 974 MBq

Largest sources: 1 800 and 1 100 MBq

Am-241/Be

4 sources

Total nominal activity: 23 517 MBq

Largest sources: 2 x 11 000 MBq

Ra-226 (needles)

A total of 37 needles are stored at the Univeristy Hospital of Iceland

Their nominal activity ranges from 93 to 1 850 MBq.

Total nominal activity: 19 200 MBq

Cs-137

22 sources

Total nominal activity: 16 088 MBq

Largest sources: 2 x 4 625 MBq