REPUBLIC OF ESTONIA
MINISTRY OF THE ENVIRONMENT

REPUBLIC OF ESTONIA
ENVIRONMENTAL BOARD

A.L.A.R.A.
As Low As Reasonably Achievable

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

5th Estonian National Report as referred to in Article 32 of the Convention

Sixth Review Meeting of Contracting Parties

Estonia

Tallinn

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Contents

Section A. Introduction

Estonia is a state in the Baltic region of Northern Europe with a population of 1.31 million. The territory of Estonia covers 45,227 km^2. Estonia is a Member State of the IAEA since 1992. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was adopted on 29 September 1997 in Vienna diplomatic Conference. Estonia signed the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management on 5 January 2001. Estonian Parliament ratified the convention on 19 October 2005. Estonia deposited the instrument of accession to the joint Convention on 3 February 2006. The convention entered into force on 4 May 2006.

Estonia is a member state of the European Union from 1st of May 2004. Thus, EU regulations in the field have been transposed to national legal and administrative framework in Estonia. When necessary, Estonian legislation is amended and modified to take into account the new EU regulations and their amendments.

This is the fifth National Report (the Report) from Estonia, which provides an update on previous reports under the terms of the Joint Convention. The report is structured in conformity with the "Guidelines regarding the form and structure of national reports" (INFCIRC/604/Rev.3) adopted at the Second Extraordinary Meeting of the Contracting Parties, 12–13 May 2014, held in Vienna, Austria. The comments, questions and remarks given to Estonia's last national report and Estonia's presentation given at the Fifth Review Meeting have incorporated. The Report pays attention on progress made in the areas identified as challenges during the Fifth Review Meeting:

1) Completion of the remediation activities at Tammiku to unrestricted site release.
2) Steps towards construction of the National disposal facility (design criteria and feasibility study) and planning for the decommissioning of Paldiski sarcophagi.
3) Human resources education in radiation protection in universities.

It also seeks to provide sufficient background where necessary to enable it to be read as a stand-alone document. The information contained in the Report were gathered and updated as at 1 October 2017, unless stated otherwise.

There are no nuclear power plants or facilities operating with nuclear fuel cycle in Estonia, neither are any activities related to nuclear fuel cycle performed. Therefore, the Section G of this Report concerning the safety of spent fuel management covering Articles 4-10 of the Joint Convention is not applicable to Estonia.

In Estonia, main source of radioactive waste is from decommissioning of facilities from past practices (from Soviet period) as well as the use of radioactive sources in industry, medicine and to a small extent from the use in education and research. Estonia has two shut-down nuclear submarine reactors from Soviet period, in long term safe storage stage in Paldiski (Paldiski site). Spent nuclear fuel was sent back to Russia. There is also a facility for interim storage for the low and intermediate radioactive waste in Paldiski site. Radioactive waste management facility, which was used in former Soviet Union, situates in Tammiku site and is currently under decommissioning.

Main developments since the Fifth Review Meeting are as follows:

In 2013 the Council Directive 2011/70/Euratom established a Community framework for the responsible and safe management of spent fuel and radioactive waste was transposed into Estonian legislation and one of the most relevant activities since the Fifth Review Meeting that can be highlighted is the national programme for radioactive waste management, which was approved by the Decree No. 688 of the Minister of the Environment on 21 of July 2015 and submitted to the European Commission on August 2015. The programme presents the sub-objectives of the described elements, measures and expected results until 2050. The programme is published on the website of the Ministry of the Environment.

Also, a feasibility study, related to the decommissioning of the reactor compartments of the former Paldiski military nuclear site and for the establishment of a radioactive waste repository was implemented in 2014-2015. The aim of it was to conduct of preliminary technical investigations and gathering the necessary data, which will enable to plan further decisions and activities, as well as to start environmental impact assessment process. The report is published on the website of the radioactive waste management company A.L.A.R.A. Ltd.

Additionally, Estonia hosted an Integrated Regulatory Review Service (IRRS) missioon in September 2016. The IRRS mission final report was presented to Estonia in November 2016. The IRRS mission covered all civilian facilities and activities in Estonia. The review compared the Estonian regulatory framework for safety against IAEA safety standards as the international benchmark for safety. A total of 50 recommendations and suggestions were made to improve the regulatory system. Estonia plans to include most of recommendations and suggestions into National Radiation Safety Development Plan 2018-2028, which is under preparation.

Due to the codification process of environmental law the General Part of the Environmental Code Act was approved by the Parliament on 16 February 2011 and it entered into force on 1 August 2014. As the activities related to radiation safety are organised by the Ministry of the Environment, the Radiation Act reviewed consistent with General Part of the Environmental Code Act. As a result, the new Radiation Act entered into force on 1 November 2016. While the purposes of the General Part of the Environmental Code Act are more general, such as the reduction of environmental nuisances to the maximum extent possible in order to protect the environment, human health, well-being, property and cultural heritage, it contains information regarding licence proceedigs and the extent of the state supervision. Based on this, the main legislature of radiation safety and as well as radioactive waste is covered mainly by these two acts. The Radiation Act provides basic safety requirements for the protection of people and the environment against the adverse impact of ionizing radiation, the rights and obligations of persons in using radiation, the requirements for radiation practices, the organisation of state supervision over compliance and the liability for failure to comply with the requirements provided in the Radiation Act. Radioactive waste management in particular is regulated in the framework of the Radiation Act. General Part of the Environmental Code Act and Radiation Act are further discussed in Article 19.

Activities related with decommissionning of radioactive waste management facility in Tammiku site started on 2006. In year 2006-2007 the environmental impact assessment was conducted to identify options to decommission the storage. The following option was chosen: retrieve the waste from the storage, decontaminate and dismantle the storage in order to release the facility site from regulatory control. During 2008-2011 all waste was retrieved from the storage and transported to the Paldiski

site. As the decommissioning activities in Tammiku site are ongoing, the Report will provide an update of situation and planned activities.

The structure of the Report is as follows:
1) Section B provides an overview about radioactive waste management policy and relevant activities in Estonia;
2) Section C provides scope of application;
3) Section D provides an overview about inventories of activities provided in Section B;
4) Section E presents an overview about Estonian legislative and regulatory system;
5) Section F presents an overviev about other general safety provisions e.g. human and financial resources, and emergency preparedness;
6) Sections H to J provide an article-by-article overview of safety of radioactive waste management (siting of proposed facilities, design and construction of facilities and safety assessment), transboundary movements of radioactive waste and management of disused sealed sources;
7) Section K provides an overview about the challenges identified during the Fifth Review Meeting and the efforts made and measures taken to address those challenges;
8) Section L, which includes Annexes A to D, i.e. matrix of current practice of radioactive waste management, inventory of radioactive waste in interim storage, references to Estonian national laws and regulations as well as national and international reports related to safety of spent fuel and radioactive waste.

The report is prepared by the Environmental Board in co-operation with the Ministry of the Environment, the radioactive waste management agency A.L.A.R.A. Ltd and the Environmental Inspectorate.

Based on the evaluation, it is the understanding of the Estonian authorities that:
1) the Estonian radiation and waste safety legislation fulfils the obligations of the Convention;
2) the Estonian regulatory infrastructure is in compliance with the Convention obligations;
3) the regulatory and licensing policies and the practical implementation of radioactive waste management comply with the Convention obligations;
4) improvements are foreseen to enhance safety, these are discussed in the Report.

It is concluded in the Report that Estonia meets all obligations of the Convention.

Section B. Policies and Practices

ARTICLE 32. REPORTING

1. *In accordance with the provisions of Article 30, each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address the measures taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address it`s:*
   - *i. spent fuel management policy;*
   - *ii. spent fuel management practices;*
   - *iii. radioactive waste management policy;*
   - *iv. radioactive waste management practices;*
   - *v. criteria used to define and categorize radioactive waste.*

1. Radioactive waste management policy

The Estonian radioactive waste management policy is based on national legislative drafting and international principles. The policy and practice for radioactive waste management is to collect, characterize, manage and store all Estonian radioactive waste under safe and secure conditions in dedicated storage facilities. Legal acts relevant to radiation protection and safety as well as radioactive waste management can be accessed from Annex C.

The activities related to radiation safety shall be organised by the Ministry of the Environment within the limits of its competence through the Environmental Inspectorate and the Environmental Board. Whereby, the intermediate storage and final disposal of radioactive waste shall be organised by the Ministry of Economic Affairs and Communications.

National Radiation Safety Development Plan (NRSDP) approved in 2008 by the Government provides priority areas, the radioactive waste management among others, for further development to achieve high-level radiation protection and safety, and to ensure optimized regulatory framework. The NRSDP sets goals for period 2008-2017 and to meet targets, action plan for radioactive waste management has elaborated and further improved. Under the NRSDP, the preparation of the National Programme on Management of Radioactive Waste started in 2009. National Programme for Radioactive Waste Management (NPRW) in effect was adopted in 2015 by the Minister of the Environment. The NPRW is a source document, which gives an overview of the legislation in force and directions for supplementing them. The programme describes the institutions, technical and financial resources, and research and development activities for safe radioactive waste management. It provides also sub-objectives, measures, and expected results of the field until 2050. The programme is regularly reviewed and updated. Long-term policy for safe management of radioactive waste is to establish radioactive waste disposal site by 2040. The decision in principle to establish the final disposal site of radioactive waste was made on the government level in April 2016. As the current NRSDP is valid till the end on 2017, the new NRSDP for 2018–2027 is in development process. The National Radiation Safety Development Plan for 2008-2017 and National Programme for Radioactive Waste Management are published on the website of the Ministry of the Environment. Both documents can be accessed from Annex D.

2. Criteria used to define and categorize radioactive waste

According to the definition given in the Article 56 of the Radiation Act, radioactive waste is any substances or items which contain or are contaminated with radioactive substances and the activity concentration of which exceeds the clearance levels established on the basis of Article 62 subsection 3 of Radiation Act and which are not intended to be used in the future.

Radioactive waste will be categorized by activity or specific activity, by half-life, by type of radiation and by heat generation as a result of radioactive decay. Categories are established by Regulation No 34 of 4 October 2016 of Minister of the Environment "The Classification of Radioactive Waste, the Requirements for Registration, Management and Transfer of Radioactive Waste and the Acceptance Criteria for Radioactive Waste". In conditioning and storing of radioactive waste, their producer has to take into account, beside their type, also physical, chemical and biological properties of radioactive waste. Radioactive waste categorization given in the Regulation No 34 of 4 October 2016 is presented in table 1.

3. Radioactive waste management practices

The information of radioactive waste management based on current practice and on National Radiation Safety Development Plan (NRSDP) is summarised in the matrix shown in Annex A.

In Estonia, there are two radioactive waste management facilities subject to the Convention: radioactive waste storage facility in Paldiski site and former radioactive waste storage facility in Tammiku site. Besides the radioactive waste interim storage facility in Paldiski site there are two PWR reactor compartments in the sarcophagi on the site. Reactors were part of the former USSR nuclear submarine training centre (Training centre). Both, Paldiski site and Tammiku site are under administration of the state-owned A.L.A.R.A. Ltd., responsible for radioactive waste management. A.L.A.R.A. Ltd. reports to the Ministry of Economic Affairs and Communications. Site locations are shown in Figure 1. Further description of the radioactive waste storage facility in Paldiski site is provided in chapter 3.1 of Section B while the information on Tammiku site and of two PWR reactor compartments in the sarcophagi is covered in chapter 3.2 of Section B of the Report.

Table 1 Categorization of radioactive waste

Type of radioactive waste	Description of radioactive waste	Type of storage facility
Exempt waste	Waste arising from radiation practice the activity and activity concentration or activity concentration in surface of which is lower than the clearance levels established under Article 62 (3) of the Radiation Act	Not restricted after release. Handled pursuant to the "Waste Act"
NORM (Naturally Occurring Radioactive Material – substances containing natural radionuclides) waste	Radioactive waste produced as a result of handling raw materials containing substances that contain natural radionuclides (Th-232 and U-238 and radionuclides belonging in their decay series), the specific activity of which is greater than clearance levels established under Article 62 (3) of the Radiation Act	Storage facility of NORM waste
Short-lived waste	Radioactive waste that contain radionuclides with less than a 100-day half-life and that decay below the clearance levels established under Article 62 (3) of the Radiation Act within up to 5 years	Storage room or interim storage facility
Low and intermediate activity short-lived waste	Radioactive waste that contains β- and γ-sources with half-life less than 30 years half-life and a limited amount of long-lived α-sources (no more than 4,000 Bq/g for one waste package and no more than 400 Bq/g averaged for total waste package amount)	Interim storage facility or disposal facility
Low and intermediate activity long-lived waste	Radioactive waste, which contains radionuclides with half-life higher than 30 years with the activity concentration higher than that for low and intermediate activity short-lived waste and which will generate less than 2 kW/m^3 heat energy during radioactive decay	Interim storage facility or disposal facility
High level waste	Radioactive waste, which generates more than 2 kW/m^3 heat energy during radioactive decay	Disposal facility

3.1 Radioactive waste management facility

The radioactive waste interim storage in Paldiski site is commissioned and in operation since the year 1997 and is intended to use for both decommissioning and institutional waste. The Paldiski site is operated by the A.L.A.R.A. Ltd. The interim storage accepts the low and intermediate activity long-lived waste. The capacity of interim storage is 1040 m^3. In the same site are facilities for treatment and conditioning of radioactiwe waste as well as initial storage area. To hand the radioactive material over to A.L.A.RA. Ltd, it is against the fee that covers interim storage and later disposal of the waste. When necessary, the A.L.A.R.A. Ltd provides the transport of radioactive material like disused sealed sources, material contaminated with radionuclides to the Paldiski site, mostly from medical use, research and industry. The radiation practice licence for activities in Paldiski site issued in 2016 for term up to 5 years and it covers radioactiwe waste management and interim storage, including data of radioactive waste package and waste package acceptance criteria; radiation safety requirements for transport of radioactive material; the requirements for radiation safety and radiation monitoring arising from the given radiation practice and its specific character, including workplace monitoring programme as well as environmental monitoring programme. Addition to this, the radiation practice licence includes conditions and monitoring programme for storage of the reactor compartments of which will be discussed below.

Figure 1 Radioactive waste management facility sites in Estonia

3.2 Facilities under decommissioning

3.2.1 Tammiku Radioactive Waste Storage

RADON-type storage facility for institutional waste in Tammiku commissioned in 1963 with capacity 200 m^3. In 1996, it was temporarily closed and the storage vaults were covered with concrete slabs and soil layer. In 2008, A.L.A.R.A. Ltd started the decommissioning process, after approval of the Environmental Impact Assessment Report by the Minister of the Environment in 2007. After analysis of several possible options, the following option was chosen: to retrieve all radioactive waste from Tammiku, to transport it to the Paldiski site, to condition and to store it in the interim radioactive waste storage. In the end, the area will be converted into a green field area. All cavities have to be filled, so they will be even with the surface. Decommissioning has two stages – the first, retrieval and transportation of the waste, and the second, the decontamination and dismantling of the facility.

The storage facility was filled with waste in amount of 110 m^3 with mass about 97 tons. In September 2008 ALARA Ltd got the radiation practice licence for retrieval of radioactive waste from the storage facility and for transport of the radioactive waste to the Paldiski site for management and storage. By the end of September 2011 the first stage was completed. All waste was retrieved and transferred to Paldiski. At the same year the company applied for the radiation practice licence in order to continue with the second stage of decommissioning. The radiation practice licence was issued in 2012 for term up to 5 years. In 2013-2017 the radiological survey and based on its results, the decontamination works were done. Based on the radiation practice licenece the following data were collected by the A.L.A.R.A. Ltd and provided to the Environmental Board for assessment: map of distribution of radioactive contamination, radiological characterization of the facility, results of radioactivity analysis, map of distribution of radioactive contamination after decontamination and environmental monitoring data. Decontamination of the remaining concrete structure has been completed up to now, the resulting amount of a waste from it (low active building rubble) was ca 14 m^3 (11,2 tons). This waste was also transported to the Paldiski site for treatment and stoarge. To release of radioactive waste storage of Tammiku site from under regulatory control, the clearance conditions and clearance levels has to meet requirements stated in Regulation No 43 of 27 October 2016 “Clearance Levels for Radioactive Substances and Materials Contaminated with Radioactive Substances Resulting from Radiation Practices, and the Requirements for Their Clearance, Recycling and Reuse”. The next step is preparation radiation safety assessment report for decontaminated facility to evaluate its accordance with clearance criteria in order to move into process of dismantling of the concrete structure of the facility. According to the decommissioning time schedule and taken into account current state, the decommissioning activities in facility site will continue up to year 2022. According to the Estonian legislation the site will remain under environmental surveillance.

3.2.2 The former USSR nuclear submarine training facility

The former USSR nuclear submarine training facility, with 2 PWR reactor compartments (see Table 2 for characteristics) at the Paldiski site is in the process of deferred decommissioning. In 1994, based on the Agreement between the Republic of Estonia and the Russian Federation, before the site was given to by the Estonian authorities, the reactors were defueled and the spent nuclear fuel was shipped to Russia.

Table 2 Characteristics of the reactors in Paldiski site

Description	**Unit 1**	**Unit 2**
Reactor type	PWR/BM-A	PWR/BM-4
Thermal power	70 MW	90 MW
Fuel enrichment	20%	20%
First criticality	April 1968	February 1983
Last criticality	January 1989	December 1989
Refuelling and maintenance	1980 – 1981	never
Operating time	~ 20,000 h	~ 5,300 h
Encasement (submarine hull segment) – diameter – length	7.5 m ~ 50 m	9,5 m ~ 50 m

During the period 2005-2007, a number of activities have been undertaken on the site under the EU Phare project 632.03.01 “Safe long-term storage of Paldiski sarcophagi and related dismantling activities”. The main objective of the project has been to guarantee the safe storage of the reactor compartments for a period of at least 50 years. By that time, Estonia should have a specific radioactive waste disposal facility, which could accommodate waste arising from decommissioning of the reactor compartments. The storage of reactor compartments is covered with radiation practice licence for Paldiski site discussed earlier. A feasibility study, related to the decommissioning of the reactor compartments of the former Paldiski military nuclear site and for the establishment of a radioactive waste repository was implemented in 2014-2015. The study covered the following topics:

1) overview of the applicable international and national requirements;
2) different strategies of the reactor compartments decommissioning;
3) final disposal options, taking into account both existing (including reactor compartments in Paldiski) and possible future radioactive wastes;
4) cost calculations for decommissioning of Paldiski reactor compartments, handling and final disposal of radioactive waste;
5) communication strategy.

Depending decommissioning strategy, the volume of radioactive waste, generated during decommissioning process, varies in rather big range. However, using the strategy proposed by the study, would be result of about 987 m^3 of conditioned waste, about which 650 m^3 will be suitable for disposal in a subsurface intermediate depth type facility (reactors, shielding tanks - activity concentration of more than 4000 Bq/g) and 337 m^3 will be disposed in a near-surface type facility

(steam generators, pumps, etc.). The details of feasibility study are covered in the final report "Preliminary Studies for the Decommissioning of the Reactor Compartments of the Former Paldiski Military Nuclear Site and for the Establishment of a Radioactive Waste Repository. Final Report. December 28, 2015", which is published on the website of A.L.A.R.A. Ltd. This report can be accessed from Annex D.

Section C. Scope of Application

ARTICLE 3. SCOPE OF APPLICATION

1. *This Convention shall apply to the safety of spent fuel management when the spent fuel results from the operation of civilian nuclear reactors. Spent fuel held at reprocessing facilities as part of a reprocessing activity is not covered in the scope of this Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.*
2. *This Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this Convention shall not apply to waste that contains only naturally occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or it is declared as radioactive waste for the purposes of this Convention by the Contracting Party.*
3. *This Convention shall not apply to the safety of management of spent fuel or radioactive waste within military or defence programmes, unless declared as spent fuel or radioactive waste for the purposes of this Convention by the Contracting Party. However, this Convention shall apply to the safety of management of spent fuel and radioactive waste from military or defence programmes if and when such materials are transferred permanently to and managed within exclusively civilian programmes.*
4. *This Convention shall also apply to discharges as provided for in Articles 4, 7, 11, 14, 24 and 26.*

As Contracting Party to the Joint Convention, Estonia declares that:

1) airborne and liquid discharges from radioactive waste management facilities are included in the scope of this Convention;
2) waste that contains only naturally occurring radioactive materials is not radioactive waste for the purpose of the Convention;
3) there is no radioactive waste from military of defence programmes;
4) there is no spent fuel and thus no reprocessing of it.

However, waste that contains only naturally occurring radioactive materials is managed identical to the radioactive waste described in this report, as this kind of waste is covered by the legislative and regulatory system mentioned in Section E.

Section D. Inventories and Lists

ARTICLE 32. REPORTING

2. *This report shall also include:*
   i. a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features;
   ii. an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;
   iii. a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features;
   iv. an inventory of radioactive waste that is subject to this Convention that:
   (a) is being held in storage at radioactive waste management and nuclear fuel cycle facilities;
   (b) has been disposed of; or
   (c) has resulted from past practices.

This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides;

v. a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities.

The information about radioactive waste management facility in Estonia and an inventory of radioactive waste that is subject to this Convention is described in Table 3.

Table 3 Radioactive waste management facility

Owner	Ministry of Economic Affairs and Communications
Location	Paldiski, 50 km West of Tallinn
Purpose	Treatment, conditioning and interim storage of low and intermediate activity long-lived waste
Inventory	Most of the current waste in Estonia originates from D&D projects. 50% of the overall waste volume is characterized and is assessed to have an activity *ca* 900 TBq. Uncharacterized waste is mostly low active and its contribution to overall activity is is small. Most of activity is concentrated in spent sealed sources of Sr-90, Cs-137, Co-60 and Pu-Be, which account for only ca 10 % of the total amount of waste. The total volume of the waste is about 920 m^3, from it 500 m^3 is stored in interim storage and 420 m^3 in storage area.
Essential Features	Sorting, compaction, cementation and packaging of solid of long-lived radioactive waste with low or medium activity Storage area for conditioned waste
Remarks	Detailed information on inventory see Annex B

Facilities under decommissioning are listed and status of decommissioning activities are described in Section B under chapter 3.2.

Section E. Legislative and Regulatory System

ARTICLE 18. IMPLEMENTING MEASURES

Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.

The necessary legislative, regulatory and other measures to fulfil the obligations of the Convention in terms of legislative, regulatory and administrative activities are described mainly in Articles 19 20 and detailed in the relevant Articles of this report.

ARTICLE 19. LEGISLATIVE AND REGULATORY FRAMEWORK

1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.
2. This legislative and regulatory framework shall provide for:
i the establishment of applicable national safety requirements and regulations for radiation safety;
a system of licensing of spent fuel and radioactive waste management activities;
ii. a system of prohibition of the operation of a spent fuel or radioactive waste management facility without a licence;
iii. a system of appropriate institutional control, regulatory inspection and documentation and reporting;
iv. the enforcement of applicable regulations and of the terms of the licences;
v. a clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and of radioactive waste management.
3. When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.

1. National legislative and regulatory framework

The parliament of the Republic of Estonia is responsible for establishing regulatory requirements. The coordinator of legislative drafting is the Ministry of Justice, who stands for the systematic development of law and supports the formation of quality legislative drafting. In accordance with Article 6 of the Regulation of the Government No 186 of 10.12.2009 “Statute of the Ministry of Environment” (as amended on 1 March 2017), area of government of the Ministry of Environment includes ensuring radiation protection, compiling related strategic documents and draft legislation. The Ministry of Environment through the Environmental Board and Environmental Inspectorate manages radiation protection related actions according to the Article 25 of the Radiation Act.

Based on Article 5 (2) 3) of the Minister of the Environment No 13 of 20.05.2014 “Statute of the Environmental Board” (as amended on 01 October 2016), the Environmental Board participates, where necessary and within its mandate, in the drafting of environmental legislation, also in the development of environment-related strategies, programs and plans, and is responsible for their implementation to the extent set forth in legislation; based on Article 5 (2) 44) the Environmental Board tables proposals to the Ministry of the Environment to supplement legislation.

Based on Article 7 11) of the Regulation of the Government No 12 of 31.03.2008 “Statute of the Environmental Inspectorate” (as amended on 14 July 2014), Statutes of the Environmental Inspectorate, the Environmental Inspectorate analyses the effect of legislation in its area of activity and tables proposals for their improvement, participates in the preparation and coordination of new draft legislation.

Radiation safety requirements are developed mainly in the cooperation between the Ministry of the Environment (including subdivisions Environmental Board, Environmental Inspectorate), Ministry of Social Affairs (Health Board, hospitals), Ministry of Interior (Police and Border Guard Board, Rescue Board, Security Police Board), Ministry of Finance (Tax and Customs Board), Ministry of Economic Affairs and Communications (radioactive waste management company A.L.A.R.A. Ltd.). The Estonian legislative and regulatory system implements all legislative requirements with regard to the Treaty Establishing the European Atomic Energy Community (Euratom). Radiation safety and protection requirements have been transposed to the Radiation Act from the Council directive 96/29/Euratom laying down basic safety standards for the protection of the health of workers and the public against the dangers arising from ionizing radiation. By 6 February 2018, Estonia as a European Union Member State needs to transpose requirements from the Council directive 2013/59/Euratom that lays down basic safety norms for protection against hazards from ionising radiation. Therefore, the requirements for radiation safety and protection will be reviewed within the national legislation.

In Estonia, the legislation for radiation protection framework was established in 1997, when the first Radiation Act entered into force. In 2004, Estonia joined the European Union. The process required preparation of several amendments to the Radiation Act, which were necessary to comply with the relevant European Atomic Energy Community (EURATOM) Directives. Therefore, a new version of the Radiation Act entered into force in 2004. Since then, several amendments have been issued. Substantial amendments were made also in 2011 during the transposition of the Directive 2009/71/EURATOM establishing a Community framework for the nuclear safety of nuclear installations. Amendments involved emergency preparedness and responsibilities, radioactive waste management and supervision. The codification of environmental law also created a need to draft a new amendment of Radiaton Act. The codification process of environmental law started in 2011 and the new Radiation Act was drafted. The content of the new draft Radiation Act remains largely unchanged compared to the last version. However, a number of changes specifying the content and the structure have been made. In the new Radiation Act, processes related to the proceeding of applications of radiation practice licence are clarified to minimize administrative burden to applicants and administrative authorities. Also, the Act determines that in case of high risk radiation practice licences or if the holder of a radiation practice licence has more than ten exposed workers, designation of a radiation safety specialist is mandatory. Requirements of training a radiation safety specialist is described in the regulation of Minister of the Environment in force on 28 November 2016 “Requirements of providing radiation safety training to exposed workers and radiation safety specialists”. The new Radiation Act entered into force on 1 November 2016. The Radiation Act and its 17 regulations, as in force on 1st of October 2017, is given in Annex C.

There are two other regulatory acts that are important regarding national radiation safety:

1) The Emergency Act and its implementing regulations deal with emergency preparedness;
2) Environmental Impact Assessment and Environmental Management System Act and its implementing regulations state conditions of environmental impact assessment.

The Radiation Act provides two measures to assess the national radiation protection system: preparation of the national radiation safety development plan and state audit of radiation safety. The Ministry of the Environment issued the "National Radiation Safety Development Plan 2008 – 2017" (NRSDP), which was approved by the Government of the Republic on 17 April 2008. The NRSDP is a ten-year program for developing and enhancing radiation safety in Estonia. Its objectives are to minimize radioactive waste, improve emergency preparedness, optimize the use of radiation in medicine and raise public awareness. Pursuant to Article 29 (2) of the Radiation Act, the Ministry of the Environment organizes at least after each ten years the state audit of radiation safety. In addition to that, Estonia had its first international audit in July 2005 (IAEA RaSSIA mission) and the second international audit took place in September 2016 (IAEA IRRS mission). The IAEA RaSSIA mission report is published on website of the Environmental Board while the IAEA IRRS mission report is published on the website of the Ministry of the Environment. Both reports can be accessed from Annex D.

In August 2015, the Minister of the Environment approved the National Action Plan for Radioactive Waste Management. The plan describes the institutions, technical and financial resources, and research and development activities for safe radioactive waste management. The action plan provides sub-objectives, measures, and expected results of the field until 2050. The need for the preparation of a national action plan for radioactive waste management arises from both the NRSDP and the Council Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.

2. Radioactive waste management

General requirements for managing of radioactive residues, radioactive waste and radioactive emissions are described in Chapter 3 Division 4 of the Radiation Act. Radioactive waste manangement includes pre-processing, conditioning of radioactive waste, transportation thereof at the management facility, storage, decommissioning, intermediate storage or final disposal and other activities related to radioactive waste. Whereby, the intermediate storage and final disposal of radioactive waste shall be organised by the Ministry of Economic Affairs and Communications.

The Environmental Board may decide that the requirements of Radiation Act shall not apply to radioactive substances generated during radiation practices and the holder thereof if the substances has so low activity or activity concentration that the processing and storing thereof as radioactive waste is not necessary for radiation safety. The decision can be made on the basis of a reasoned application of a holder of radioactive substances. Under the circumstances where the radioactive substances generated during radiation practices are cleared from radiation safety requirements, the Waste Act shall apply.

The relevant general regulation for radioactive waste management, beside the Radiation Act, is the Regulation No 34 of 4 October 2016 of the Minister of the Environment „The Classification of Radioactive waste, the Requirements for Registration, Management and Delivery of Radioactive Waste and the Acceptance Criteria for Radioactive Waste“. It specifies the requirements for radioactive waste management and sets the following:

1) Definitions;
2) Classification of radiactive waste;
3) Requirements for radioactive waste pre-treatment and storage;
4) Requirements for radioactive waste treatment and conditioning;
5) Requirements for radioactive waste treatment storage in producer premises;
6) Requirements for interim storage facility of radioactive waste;
7) Requirements for radioactive waste package;
8) Acceptance criteria for waste package;
9) Delivery of radioactive waste;
10) Registration, accountancy and reporting of radioactive waste.

The Regulation No 60 of 24 November 2016 of the Minister of the Environment “The Specified Requirements for the Application for Radiation Practice Licence, the Format of the Application and Radiation Practice Licence and the Format of Characterising Radiation Sources That are Used to Keep Records of Nuclear Materials” specifies the requirements for:

1) data of radioactive waste and emissions for waste producers;
2) data for radioactive management in interim storage facility and final disposal;
3) safety assessment of interim storage facility and final disposal of radioactive waste;
4) data of closure of final disposal of radioactive waste.

3. System of licensing

Article 2 of Radiation Act sets that the Administrative Procedure Act shall apply to the administrative procedure provided for in Radiation Act, taking account of the specifications provided for in this Act. Chapter 5 of the General Part of the Environmental Code Act shall apply to the proceedings of environmental licences, hereinafter radiation practice licence, issued for radiation practices provided for in this Act, taking account of the specifications provided for in this Act. The licensing system for radiation practices is prescribed in Chapter 4 of the Radiation Act. According to the definition given in Article 4 of the Radiation Act, radiation practices are any activities which increase or may increase the exposure of people to radiation emanating from artificial or natural sources of radiation. Radiation practices *inter alia* include:

1) production, processing, use, possession, holding, storage, transportation, including import and export, and interim storage or final disposal of radioactive substances;
2) use of any electrical equipment emitting ionizing radiation and operating at a potential difference of more than 5 kilovolts;
3) operation of nuclear facilities.

The Article 68 of the Radiation Act sets forth the activities for which a radiation practice licence is required:

1) exploitation, closure and decommissioning of any facility of nuclear fuel cycle;

2) production, use, storage and transportation of radioactive substances and products containing it, including for import and export;
3) use and storage of electrical radiation apparatuses;
4) management and transportation of radioactive waste;
5) activities related to the presence of increased natural exposures in the case of which the exposure caused by natural radionuclides is important from the radiation safety point of view.

The scope of the application is described under the Article 42 1) and 3) of the General Part of the Environmental Code Act and Article 70 1) of the Radiation Act. In order to obtain a radiation practice licence, an applicant shall submit an application to the Environmental Board with the following information and documents:

1) the name and personal identification code or registry code of the applicant;
2) the address and contact details of the applicant and of the contact person;
3) the clearly formulated substance of the application;
4) the requested term of validity of the licence;
5) the purpose and reasons of the planned activity;
6) the characteristics of the planned activity;
7) the preferred manner of delivery of the environmental licence and the contact details required for delivery;
8) the date of submission of the application and the signature of the applicant;
9) the plan of the location of the activity and the site map of the installation;
10) data which characterise the radiation source and technology used and the equipment;
11) data on radioactive waste or emissions generated during radiation practices, the management thereof and waste packaging compliance criteria and radioactive waste storage premises;
12) management plan of radiation source after the termination of use of the radiation source;
13) upon application for a licence for management, interime storage and final disposal of radioactive waste, data on the management or methods of final closure of storage facilities;
14) radiation safety assessment, which gives an overview of the aspects of radiation practices which are related to the protections of people and safety of radiation sources, including of the protective and safety measures used, and of the potentially assessed doses of exposed workers and members of the public both under normal working conditions and in the cases of accidental and existing exposure situations, to which data on measures adopted to ensure radiation safety are appended;
15) emergency response plan to accidental exposure in the case of radiation practices involving high risk which is based on the assessment of potential exposures;
16) data on financial collaterals required for management of radioactive source, equipment containing thereof after termination its use and radioactive waste;
17) description of the radiation safety quality management system;
18) data on exposed workers and their professional training;
19) radiation work rules, which must contain activities for the use of a radiation source, discontinuation of the use thereof and activities related thereto depending on the specific character of the radiation work;
20) plan for radiation monitoring and data on the equipment used for radiation monitoring.

The application of the radiation practice licence, application to amend radiation practice licence and other necessary documents can presented in paper or digital format. The application is signed in writing or digitally, accordingly, and by the legal person of the applicant. According to the Article 5

(6) of the Administrative Procedure Act, in administrative procedure, electronic operations shall be equal to written operations. In determining the terms of the licence, and in amending or revoking of the licence, the Environmental Board proceeds from the specific radiation practice, based on the main principles of radiation safety. The terms of the licence shall be weighted and justified based on the Radiation Act and the Administrative Procedure Act.

The data and documents to be submitted when applying for the radiation practice licence are specified in Regulation No 60 of 24 November 2016 of the Minister of the Environment, "The Specified Requirements for the Application for Radiation Practice Licence, the Format of the Application and Radiation Practice Licence and the Format of Characterising Radiation Sources That are Used to Keep Records of Nuclear Materials". The Regulation No 60 of 24 November 2016 describes formal requirements:

1) for entry and proceeding of the radiation practice licence application;
2) open proceedings for granting or amending a radiation practice licence;
3) for amending of the radiation practice licence;
4) for documents of application of radiation practice licence and the forms of application of radiation practice licence;
5) for forms of a radiation practice licence and application.

The granting of a radiation practice licence can be subject to additional conditions needed to ensure safety. Pursuant to the Regulation No 60 of of 24 November 2016, the issuer of a licence reviews the data and documents submitted by the applicant and, if needed, checks their conformance to the actual situation. If the issuer of the licence imposes a deadline for the applicant to remedy deficiencies or submit specifying data on the materials of the application, the deadline for the processing the application will be extended by the time of remedying the deficiencies or submitting specifying data. If the applicant fails to do so by the term given, the issuer of the licence will return the application without review within 5 days after the deadline. To obtain the licence the the process of an application can proceed up to 90 days.

According to the Article 34 of the Radiation Act depending of the category of radioactive sources or the extent of risk connected with radiation practices, difference is made between:

1) low risk radiation practices during which an exposed worker incurs or may incur an effective dose of up to one millisievert per year;
2) moderate risk radiation practices during which an exposed worker incurs or may incur an effective dose of up to six millisieverts per year;
3) high risk radiation practices during which an exposed worker incurs or may incur an effective dose exceeding six millisieverts per year.

In addition radiation practices involve high risks if a radiation practice licence is applied for:

1) radiation practices related to high-activity sealed sources;
2) operation of nuclear facilities;
3) exploitation, closure and decommissioning of any facility of nuclear fuel cycle;
4) interim storage or final disposal of radioactive waste.

A radiation practice licence for moderate risk and high risk radiation practices remains valid for up to 5 years. Since the Radiation Act does not provide for the extension of the radiation practice licence, a new licence needs to be applied for the continue radiation practice.

Pursuant to Article 71 of the Radiation Act the provisions of open procedure are applied to the procedure of granting and amending radiation practice licences, if a radiation practice licence is applied for the following activities:

1) exploitation, closure and decommissioning of any facility of nuclear fuel cycle;
2) management and transportation of radioactive waste;
3) activities related to the presence of increased natural exposures in the case of which the exposure caused by natural radionuclides is important from the radiation safety point of view.

The Environmental Impact Assessment and Environmental Management System Act states, that environmental impact shall be assessed upon applying for development consent or for amending development consent whereby the proposed activity which is the reason for applying for or amending the development consent potentially results in significant environmental impact. Activities with significant environmental impact include also:

1) construction, dismantling or decommissioning of a nuclear power station or other nuclear reactors, except research installations for the production and conversion of fissionable and fertile materials, whose maximum power does not exceed 1 kilowatt continuous thermal load;
2) production or enrichment of nuclear fuel, processing or handling or final disposal of used nuclear fuel or disposal of used nuclear fuel for over ten years on a site other than the place of generation thereof;
3) handling high level waste, final disposal of radioactive waste or disposal thereof for over ten years on a site other than the place of generation.

The issuer of the radiation practice licence may refuse to issue the radiation practice licence at the following cases:

1) the planned practice is not best practice for economic, social or other benefits with regard to potential health detriment caused by the radiation practice;
2) the practice for which the radiation practice licence is applied involves or may involve a risk to national or international security;
3) the applicant for radiation practice licence has no exposed workers with required professional training;
4) the location applied for radiation practice or other terms and conditions do not allow for compliance with radiation safety requirements;
5) the applicant for a radiation practice licence does not prove the existence of the collateral in the amount and on the requirements determined by the issuer of radiation practice licences.

The issuer of the radiation practice licence may revoke the radiation practice licence at the following cases:

1) the holder of a licence does not ensure existence of a financial collateral;
2) the holder of a licence has repeatedly failed to ensure compliance with radiation safety principles, obligations and the requirements provided for in the licence involving a serious risk of radiation;
3) the holder of a licence, its representatives or employees have purposefully and in bad faith prevented the Environmental Inspectorate and its representatives from controlling the practice of the holder of the licence.
4) at the request of the holder of a licence;
5) the holder of a licence dies and the activity permitted under the licence is related to the person

of the holder of a licence or the passive legal capacity of the holder of a licence terminates without legal succession;
6) it becomes evident that the holder of a licence has knowingly given false information in the application for the licence or submitted a forged document;
7) if the public interest or the interest of a third party cannot effectively be protected by amending the licence;
8) the holder of a licence does not fulfil the requirements provided by the licence or law and the revocation of the licence is demanded by an overriding public interest or the holder of a licence has been penalised for such offence.

4. System of the inspection and enforcement

The Environmental Inspectorate as stated in Article 112 of the Radiation Act carries out state supervision of radiation safety. The radiation safety inspections of the Environmental Inspectorate are carried out either based on the work plan, in the course of control raids, or as a response to complaints. The Environmental Inspectorate, which is granted a right to withdraw licences and suspend operations in unsafe situations, has direct access to all premises, buildings, etc., for inspection purposes.

Inspections are carried out on the basis of:
1) general legal requirements, including the Radiation Act taken into account recommendations of the International Atomic Energy Agency (IAEA) and EU directives;
2) the terms and conditions laid down in the radiation practice licence;
3) check-lists, which have been developed for various sectors on radiation practices and are used for quality control and harmonization purposes.

The following in-house documents have been composed to aid the inspection process: guidelines for drafting the work plan; guidelines for conducting inspections, including radiation practice inspection; check-lists for the inspection of various types of radiation practices. Basic features of an inspection of the holder of the radiation practice licence include verification of the data and conditions specified in the radiation practice licence. Where relevant, the data submitted in the application for radiation practice licence is checked stated in the Article 70 of the Radiation Act.

According to the Statutes of the Environmental Inspectorate, in the cases provided in law, the Environmental Inspectorate is an extra-judicial body that conducts misdemeanor proceedings and pre-trial proceeding of crimes.

The Environmental Inspectorate has the right to suspend unlawful activities damaging or dangerous to the environment, as well as lawful activities related to the use of natural resources if such activities endanger the life, health or property of people. Regarding radiation safety, the responsibility of Environmental Inspectorate is to implement measures provided by law for the prevention of illegal activities and implementation of mandatory environmental protection measures. Upon identification of practice not compliant with the Radiation Act, the Environmental Inspectorate initiates administrative or misdemeanor proceedings according to the procedure set forth in the Administrative Procedure Act (Articles 2 and 8) and the Code of Misdemeanour

Procedure (Articles 1, 8, 9 and 10).

Pursuant to Article 7 of the Law Enforcement Act, in the performance of state supervision a law enforcement agency shall adhere to the following proportionality principles:

1) out of several suitable and necessary state supervision measures a law enforcement agency shall apply the one which will presumably harm a person as well as the public the least;
2) applies only such a state supervision measure that is proportional, taken into account the goal pursued by the measure and the situation requiring urgent implementation;
3) applies a state supervision measure only as long as its goal has been achieved or can no longer be achieved.

Pursuant to Article 8 of the Law Enforcement Act, in the performance of state supervision a law enforcement agency shall act purposefully and efficiently, and within the limits of lawful discretion shall apply state supervision measures flexibly. Inspectors of the Environmental Inspectorate have the right to apply enforcement measures (conduct proceedings in environmental violations, precepts, suspension or termination of illegal activities, penalty payment, substitutive enforcement etc.) if violation is found.

Penalties in case of radiation practice are imposed on the basis of the rates set forth in Articles 117-121 of the Radiation Act and the Code of Misdemeanor Procedure (Article 55 (2)). Liability and the rates of fines arise out of the Radiation Act.

ARTICLE 20. REGULATORY BODY

1. *Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19, and provided with adequate authority, competence and financial and human resources to fulfill its assigned responsibilities.*
2. *Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate steps to ensure the effective independence of the regulatory functions from other functions where organizations are involved in both spent fuel or radioactive waste management and in their regulation.*

In Estonia, policy shaping (Ministry of the Environment), implementation of policies (Environmental Board) and environmental supervision (Environmental Inspectorate) are separate from each other. This contributes to independence from pressures from various sectors. From the perspective of the Environmental Board, independence is also furthered by the fact that radiation safety issues are within the mandate of the Environmental Board, not subordinated to the Ministry of Social Affairs or the Ministry of Economic Affairs and Communications, which would implicate a more robust economic pressure on decision-making in the field of radiation safety.

According to the Radiation Act Article 25 the activities related to radiation safety shall be organised by the Ministry of the Environment within the limits of its competence through the Environmental Inspectorate and the Environmental Board. The Environmental Board is authorized to fulfil the obligation of the regulatory authority in the country and the Environmental Inspectorate is provided an authorization to carry out regular inspections of the radiation practices. Both regulatory bodies as governmental institutions have separate budgets to fulfil their obligations which cannot be

influenced by political circumstances.

According to Radiation Act Article 61 (4) the interim storage and final disposal of radioactive waste shall be organised by the Ministry of Economic Affairs and Communications. The Radiation Act and its administration belong to the responsibility of the Ministry of Environment, which as such, is independent from the Ministry of Economic Affairs and Communications. The latter elaborates, manages and implements the state`s economic policy and economic development plans, in a number of fields.

The status, areas of activity and tasks as well as the management of the organizations are set forth in the Statutes of the Environmental Board (Regulation No 13 of 20 May 2014 of Minister of the Environment, last amendment 01.10.2016) and the Statutes of the Environmental Inspectorate (Regulation No 12 of 31 March 2008 of the Minister of the Environment, last amendment 14.07.2014).

The Environmental Board and the Environmental Inspectorate are required to prepare an annual activity report on its development plan, which is submitted to the Ministry of the Environment. The activity report of the Ministry of the Environment, in turn, is forwarded to the Ministry of Finance that coordinates the reporting of the development plans of all ministries.

The State Audit Office in their sectoral audits in turn, inspects the activities of the Environmental Board and the Environmental Inspectorate.

1. The Environmental Board

The Environmental Board was established in 2009. The mission, vision, core values and management system of the Environmental Board proceed from the tasks vested in the Environmental Board by legislation. The area of activity of the Environmental Board is set forth in the Article 5 (1) of the Statutes of the Environmental Board: “The area of activity of the board is national environmental and nature conservation protection and use as well as the implementation of radiation safety policies, programs and action plans.” According to its statutes, the Environmental Board has the following duties in the field of radiation safety:

1) to participate in the development and implementation of the radiation protection policy, development plans and programs;
2) to advise the regulatory authorities in radiation protection;
3) to perform licensing of radiation practices;
4) to evaluate the radiation safety of existing and applied radiation practices;
5) to organise the assessment of population doses and doses to critical groups arising from radiation practices;
6) to maintain the registries related to radiation safety (state registry of the doses of radiation workers; registries of the radioactive sources, nuclear material and radioactive waste);
7) in cooperation with the Environmental Inspectorate to execute regulatory supervision of the radiation practice licences;
8) to organize the monitoring of radionuclides in air, soil, water and food, radioactivity in the environment and to analyze the results;

9) to perform laboratory analyses related to radiation safety;
10) to perform assessment of public exposures;
11) to secure functioning of the early-warning system pursuant to the provisions of legal acts and to the conditions established by international conventions and treaties and timely warning in the case of a radiation emergency;
12) to serve as a contact point for EURATOM and IAEA;
13) to serve as a national data centre (NDC) in the exchange of information in the framework of the CTBT agreement;
14) to participate in international cooperation, to prepare and to participate in international projects in the field of radiation safety;
15) to participate in the preparation of emergency situation management plans, in the testing of these plans and in the management of possible emergency cases.

Organizational structure of the Environmental Board is given in Figure 2. The tasks and management of each structural unit of the Environmental Board, including the Radiation Safety Department, are defined in the statutes of each structural unit, approved by the General Director of the Environmental Board. By 22nd June 2017 there were 386 positions in the Environmental Board, 16 of them working in the Radiation Safety Department. The number of employees in the Radiation Safety Department has decreased by one over the last three years due to the state reform. The Radiation Safety Department is divided into two bureaus: the radiation protection bureau and the radiation monitoring bureau (see Figure 3 for the structure).

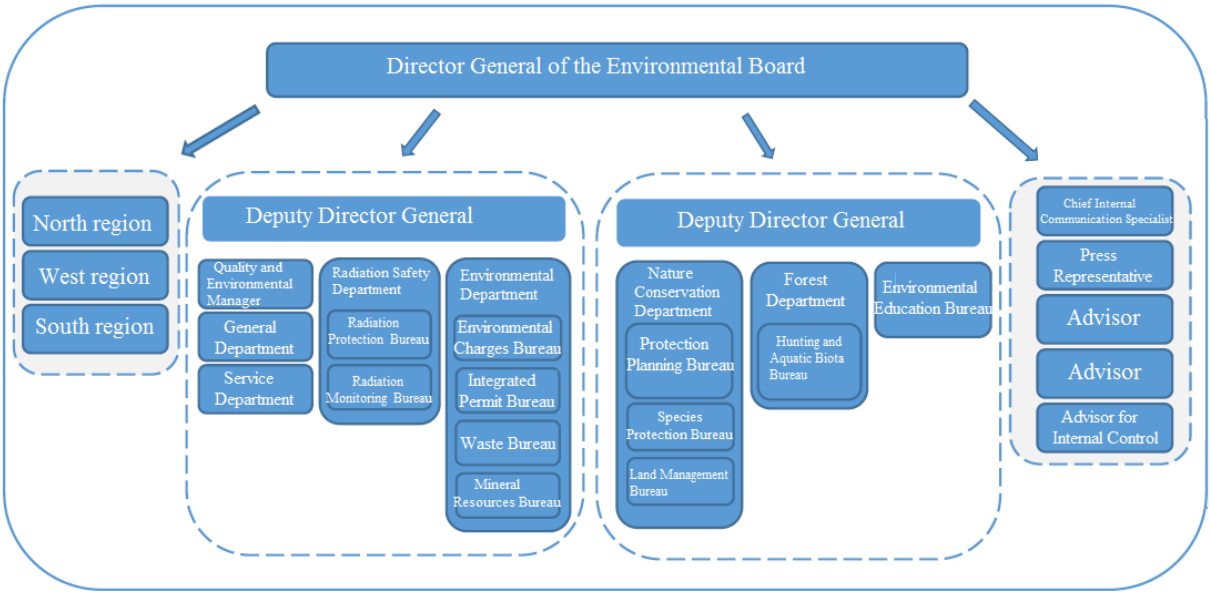

Figure 2 Organizational structure of the Environmental Board

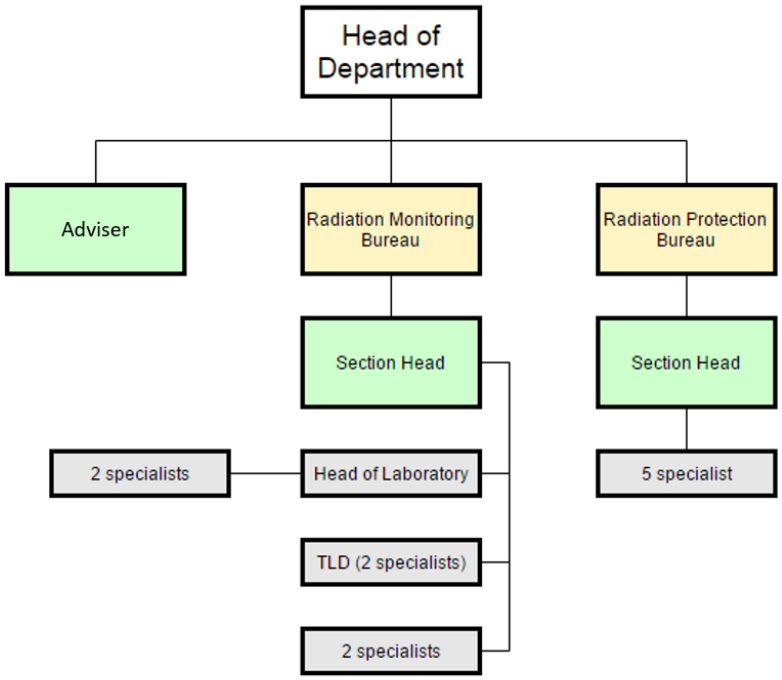

Figure 3 Structure of the Radiation Safety Department of the Environmental Board

1.1 Competence and resources

A variety of measures is applied to develop and maintain competence of employees. The performance of employees and their various competences are evaluated during annual performance review. As a result of the performance review interviews, training needs are identified which the human resource manager consolidates in the training plan of the Environmental Board. Performance reviews are conducted and competences are evaluated by direct supervisors. The results of performance reviews (incl. competence evaluation) are integrated in the information system for work plans. The management approves the annual training plan and allocates funds for this from the budget. The Ministry of the Environment gives to the organizations within its scope of administration, including the Environmental Board, the absolute budgetary amount. It is in the competence of the Environmental Board to allocate the budget within the organization. The budget is prepared through the activities planned in work plans (both the anticipated working time of employees and costs of work equipment are taken into account). Over the past three years the budget of the Radiation Safety Department has remained unchanged. The budget is sufficient to fulfill the obligations of the regulatory body.

In order to give a basic knowledge to new employees the Radiation Safety Department has carried out two one-week lasting training courses. Specialists from the Radiation Safety Department of Environemntal Board upon request train the inspectors from other national authorities as well. Additionally, Estonia uses an opportunity to train staff under the IAEA Technical co-operation programme since 1992. The participation in the IAEA's Technical co-operation programme is continuously relevant, with regard to develop competences.

2. The Environmental Inspectorate

Pursuant to the Environmental Supervision Act, environmental supervision in Estonia at the state level is executed by the Environmental Inspectorate. Environmental Inspectorate coordinates and executes supervision of all areas of environmental protection and the use of natural resources, as well as conducts proceedings in environmental violations.

Areas of supervision include: fisheries, forest protection, hunting requirements, protection of shores, classic nature protection, CITES (Washington Convention or Convention on International Trade in Endangered Species of Wild Fauna and Flora), extraction of mineral resources, waste management, protection of ambient air and ozone layer, protection of water, hazardous substances and chemical safety, radiation issues, integrated pollution control, maintenance and excavation works. The main legal acts regulating environmental supervision are the Environmental Supervision Act, Law Enforcement Act, Code of Misdemeanor Procedure, Radiation Act and Statutes of the Environmental Inspectorate.

The structure of the Environmental Inspectorate is presented in Figure 4. As of 22nd June 2017, the Inspectorate has a total of 175 employees, 116 of them inspectors. At the local office level, there are 15 inspectors involved in radiation supervision (planned inspections, resolving complaints, misdemeanors). They also oversee adherence to the requirements of legislation for environmental protection in other fields.

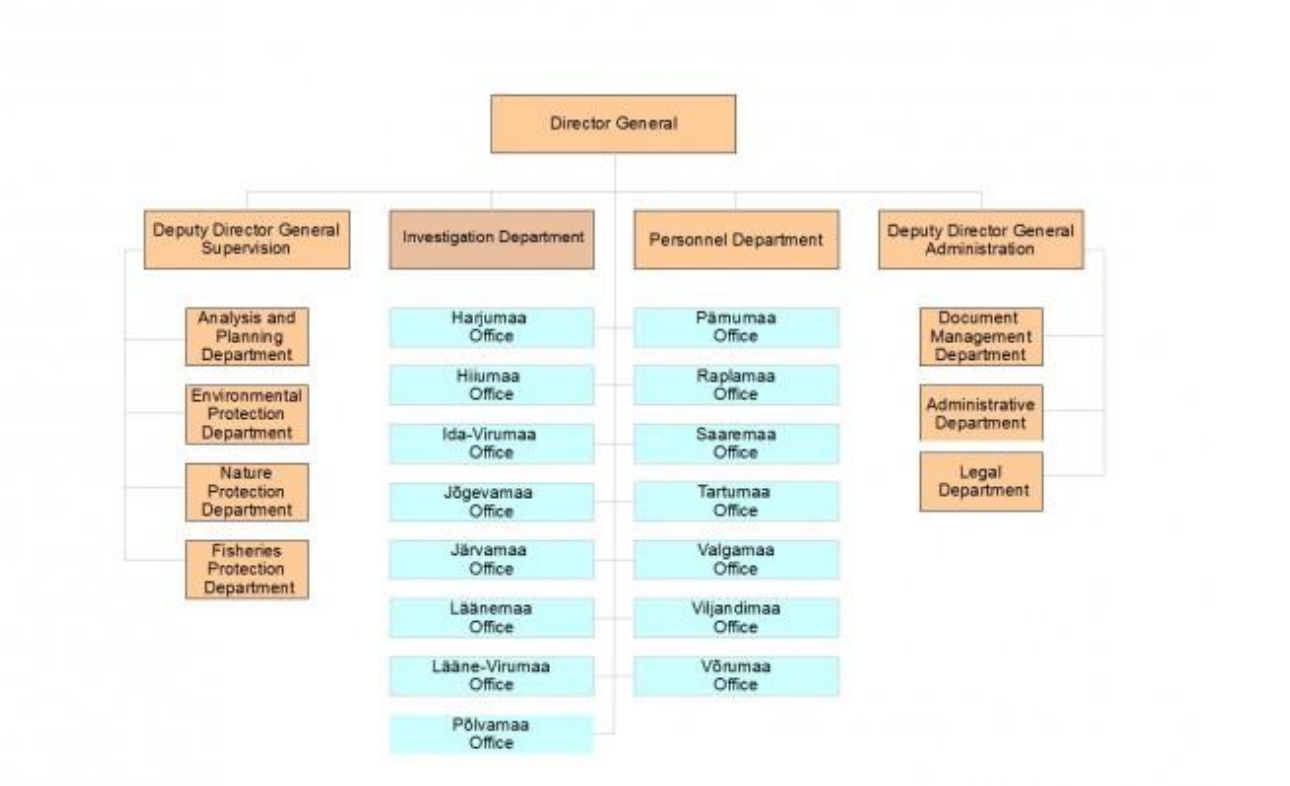

Figure 4 Organizational structure of the Environmental Inspectorate.

2.1 Competence and resources

The Environmental Inspectorate does not have inspectors who are involved solely in the radiation practice supervision. The environmental protection department has a chief inspector who deals with the coordination of the supervision activities, trainings, risk evaluation and quality management.
The competence of inspectors is developed through training. Internal trainings take place on a regular basis (1-2 times a year) and are organized in cooperation with the Radiation Safety Department of the Environmental Board. There have not been any changes in numbers of inspectors of radiation supervision in the last three years. As the Environmental Inspectorate executes supervision in all areas of environmental protection, there are no separate financial resources planned for areas of radiation protection. The Environmental Inspectorate does not have special resources to carry out radiation surveillance. If necessary, external technical support is gained from the Radiation Safety Department of the Environmental Board. Supervision results are publicly available. They are published in press releases, briefings and in the yearbooks of the Environmental Inspectorate. Information about the work schedule and supervision results can also be obtained upon request by contacting the Environmental Inspectorate. Additionally, Estonia uses an opportunity to train staff under the IAEA Technical co-operation programme since 1992. The participation in the IAEA's Technical co-operation programme is continuously relevant, with regard to develop competences.

Section F. Other General Safety Provisions

ARTICLE 21. RESPONSIBILITY OF THE LICENCE HOLDER

1. *Each Contracting Party shall ensure that prime responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.*
2. *If there is no such licence holder or other responsible party, the responsibility rests with the Contracting Party which has jurisdiction over the spent fuel or over the radioactive waste.*

Radiation Act provides that the responsible party shall manage the practice so that it meets all radiation safety requirements prescribed in the Act and ensures that the holder of radiation practice licence has sufficient funds to cover the expenses of management radioactive substances, radiation sources containing radioactive substances and radioactive waste. Radiation Act article 66 sets the oppurtunity for the Environmental Board to order a holder of a radiation practice licence to submit a new application for a radiation practice licence for closure of final disposal facility on the basis of the information provided. Requirements for closing of final disposal facilities shall be established by a radiation practice licence.

According to the Article 32 of the Radiation Act the holder of a radiation practice licence has the general obligations to:

1) comply with the radiation safety principles;
2) ensure radiation safety and physical protection of the radiation sources in the holder's possession and to verify at least annually that the radiation source or the equipment containing thereof is present at the place of use or storage and in apparently good condition;
3) ensure the safety of the radiation source by correct installation and placement of the radiation source in the premises, mark the radiation source and the premises and use protective equipment;
4) keep records of every radiation source and radioactive waste for which the holder is responsible, the location and transfer thereof, take annual inventories of radiation sources and radioactive waste;
5) prepare the rules necessary for carrying out radiation works and instructing exposed workers and ensure updating of these rules upon commissioning of new technology or equipment;
6) organise health surveillance of exposed workers;
7) ensure regular control and calibration of measuring instruments used and be responsible for their fitness for use and professional use thereof;
8) at the request of competent authorities, prove the legality of possession of radioactive substances or radiation apparatuses containing radioactive substances;
9) ascertain that the recipient has an appropriate radiation practice licence before transfer of radiation sources;
10) manage radiation sources after the use thereof is terminated pursuant to the management plan submitted in the application for the licence;
11) ensure that radioactive waste is managed in such a manner that the estimated harmful effect on future generations will not exceed the effect permitted by this Act or legislation established on the basis thereof;

12) cover all expenses incurred in radioactive waste management;
13) ensure that the activity and quantities of generated radioactive waste and emissions are as low as possible;
14) alleviate the consequences of accidental exposure situations;
15) immediately inform the Environmental Board and the Emergency Centre of loss, theft or unauthorised use of radiation sources and of any incidents or accidents which took place during radiation practices and resulted in unintentional exposure of workers or members of the public;
16) control the integrity of radiation sources after each incident if it may have damaged the radiation source and, if necessary, inform the Environmental Board of this incident and the measures implemented;
17) during procurement procedures for radiation sources, prefer manufacturers who agree to include a clause in the contract of sale regarding return of the radiation source to the producer.

Upon high risk radiation practices, a holder of a radiation practice licence which includes radioactive waste management is obliged to:
1) prepare a response plan to accidental exposure situations;
2) ensure that a recognized radiation expert has approved the design documentation of the facilities of radiation practices and the commissioning of new radiation sources.

According to Radiation Act article 39 in the case of radiation practices related to radioactive waste management it is additionally required for a holder of a such radiation practice licence to do the following:
1) ensure safety of the radioactive waste management facilities during the entire of use thereof;
2) organise the management of radioactive waste if this is necessary for modifying the properties of the radioactive waste prior to the release thereof into the environment, or the conditioning and interim storage and final disposal thereof;
3) take into account other risks and various stages of generating radioactive waste and interaction of radioactive waste when planning activities and in the course of activities;
4) transfer radioactive waste management facility within five years from the generation thereof at the latest.

To enhance radiation safety, the Radiation Act authorizes the Environmental Board to establish requirements to a radiation practice licence. According to the Radiation Act, the organization engaged in radiation practice is required to take any measures to render harmless radioactive wastes arising from its operation. Rendering radioactive waste harmless means any measure needed to treat, isolate or dispose of the waste, or to restrict its use so that it does not endanger human health or the environment. The state has the secondary responsibility in case when a producer of radioactive waste is incapable of fulfilling its management obligation. There are two options for the management of such radioactive waste, either to return the sealed source to the supplier/manufacturer or to deliver it to the radioactive waste management facility against the fee. Chapter 6 of the Radiation Act gives to the regulatory body the right to demand financial collateral from the applicant to ensure that the funds necessary for safe storage of the radioactive source or waste are immediately available.

According to the Radiation Act article 67 after closure of radioactive waste disposal facilities, the Environmental Board shall:

1) preserve the documents concerning the location and design of the radioactive waste disposal facilities and the inventory of radioactive waste for an indefinite time;
2) organise radiation monitoring and control the restriction of access, if necessary;
3) organise intervention if, based on monitoring results or upon inspection, release of radioactive substances into the environment is established.

ARTICLE 22. HUMAN AND FINANCIAL RESOURCES

Each Contracting Party shall take the appropriate steps to ensure that:

i. qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility;

ii. adequate financial resources are available to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning;

iii. financial provision is made which will enable the appropriate institutional controls and monitoring arrangements to be continued for the period deemed necessary following the closure of a disposal facility.

According to the Article 48 of the Radiation Act, a holder of a radiation practice licence is required to ensure that exposed workers receive radiation safety training and instructions which take into account the nature of work and the conditions at workplace. In addition, in case of high risk radiation practice or if the holder of a radiation practice licence has more than ten exposed workers, designation of a radiation safety specialist is mandatory. Radiation safety specialist is a person with technical competence in the issues connected to relevant radiation practices who may be designated the person in control of compliance with radiation safety requirements at the undertaking by the holder of radiation practice licence. Requirements of training a radiation safety specialist is described in the Regulation No 57 of 28 November 2016 of Minister of the Environment "Requirements of providing radiation safety training to exposed workers and radiation safety specialists". When applying the radiation practice licence, the applicant has to submit data on exposed workers and their professional training. Data on exposed workers includes copy of document which ensures that the worker has a professional training and/or the worker has received radiation safety training. If radiation safety specialist is required, application also has to include the job description of a radiation safety specialist. Designation of a radiation safety specialist does not release the holder of a radiation practice licence of the responsibility to ensure radiation safety.

All exposed workers must be instructed before starting work. In case of a moderate or high risk radiation practice the reinstruction has to be done at least once a year. Additionally, exposed workers involved in the radiation activities with moderate or high risk, have to be trained before starting work. The holder of a radiation practice licence shall arrange the participation of exposed workers and radiation safety specialists in in-service training and at least once every five years. The periodic in-service training of an exposed worker includes of at least 4-hours and for a radiation safety specialist at least 20-hours of lectures and practical work.

The financial arrangements are adequate for ensuring the long-term safety of the Paldiski and Tammiku facilities as these are state properties, and as such, the financial situation is and will be secure also in the future until all the facilities are fully decommissioned. The owner of the Paldiski

site is Ministry of Economy and Communication. Each year the agreement will be made between Ministry and radioactive waste management organization A.L.A.R.A. Ltd for manage and decontaminate the Paldiski site. The agreement will be financed of resources of state budget. Thus the financial capacity to maintain and if necessary improve the safety of facilities for radioactive waste management in accordance with the regulatory requirements is ensured. The availability of adequate financial resources is assured also in the future.

The staff and financial arrangements of the A.L.A.R.A. Ltd. are adequate for radioactive waste management, including for the long-term safe storage of the reactor compartments at Paldiski and decommissioning and remediation of Tammiku radioactive waste management facility. The staff members are adequately trained, according to the requirements stated above. As sites under decommissioning are state properties, the financial situation is and will be secure, also in the future until all the installations are fully decommissioned.

ARTICLE 23. QUALITY ASSURANCE

Each Contracting Party shall take the necessary steps to ensure that appropriate quality assurance programmes concerning the safety of spent fuel and radioactive waste management are established and implemented.

Principal obligation of holders of radiation practice licences include being responsible for radiation safety and guarantee the physical protection of the radioactive sources in the holder`s possession, also developing and implementing a radiation safety quality system. Article 70 (1) of the Radiation Act prescribes that an application for a practice licence shall include description of the radiation safety quality management system. Article 35 of the Radiation Act prescribes that a holder of a radiation practice licence is required to develop and implement a quality management system for radiation safety and other activities related thereto which ensures compliance with the requirements provided for in this Act and legislation issued on the basis thereof and the requirements determined in the radiation practice licence. Radiation safety quality management system must cover:

1) planned and systematic activities which objective is to ensure radiation safety;
2) analysis of duties, and skills required for and requirements for use of radiation sources which include, in particular, description of radiation practice, guidelines for radiation practice, workers' training procedure;
3) requirements for procurement, use and disuse of materials and equipment;
4) description of radiation safety procedures implemented during radiation practices;
5) procedure for controlling the functioning and improvement of the radiation safety quality management system.

This programme should describe the ways of assuring that all quality related activities will be performed in the properly controlled conditions, i.e. by properly qualified personnel using appropriate tools, equipment, methods and technological processes and under suitable environmental conditions, so that the required quality is attained and may be verified by inspection or test. Review and assessment of the relevant radiation safety quality system is carried out by the regulatory body at all stages of the licensing process, i.e. prior to and during the construction, operation, closure and decommissioning of radioactive waste storages and repositories. The regulatory body, through the requirements concerning the preparation and implementation of the radiation quality system, obliges the applicant/ holder of the radiation practice licence to plan,

perform, verify and document all their activities in an organized and systematic way. An effective radiation quality system, established and implemented by the licence holder, allows the regulatory body to obtain satisfactory confidence in the quality of facility's equipment and in the quality of all performed activities. The regulatory body confirms that the holder of the radiation practice licence has established and implemented and effective radiation quality system by document reviews and inspections of work.

The quality and environmental management systems of A.L.A.R.A. Ltd. are covering all aspects listed in the radiation practice licence for Paldiski and Tammiku facilities (management of radioactive and non-radioactive waste, handling of the radioactive emissions, transport of radioactive materials, radiation safety, radiation monitoring of workplace and exposed workers, environmental monitoring). The management system of A.L.A.R.A. Ltd. is certified accordingly to the ISO 9001 and ISO 14001. The quality assurance is guaranteed by implementing the set of regulations covering radiological protection of workers, physical safety, waste acceptance criteria, environmental monitoring and written work procedures.

ARTICLE 24. OPERATIONAL RADIATION PROTECTION

1. Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility:

- *i. the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account;*
- *ii. no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection; and*
- *iii. measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment*

2. Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:

- *i. to keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account; and*
- *ii. so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.*

iii. 3. Each Contracting Party shall take appropriate steps to ensure that during the operating lifetime of a regulated nuclear facility, in the event that an unplanned or uncontrolled release of radioactive materials into the environment occurs, appropriate corrective measures are implemented control the release and mitigate its effects.

During the operating lifetime, all radioactive waste management practices and the management facility itself shall implement the requirements of the Radiation Act and the regulations issued on its basis. The Radiation Act describes the principles of justification, optimiszationa and dose limitation. According to the Radiation Act Section 32, it is the obligations of holders of radiation practice licences to ensure that radioactive waste is managed in such a manner that the estimated harmful effect on future generations will not exceed the effect permitted by Radiation Act or legislation established on the basis thereof; ensure that the activity and quantities of generated radioactive waste and emissions are as low as possible. Before starting a radiation practice, the radiation licence applicant shall present the estimation of radioactive waste and discharges, as well as emergency

plan and actions/measures to prevent unplanned and uncontrolled releases of radioactive materials into the environment, and procedures taken in the event that an unplanned or uncontrolled release of radioactive materials into the environment occurs.

Based on the Radiation Act, the holder of a radiation practice licence shall organise monitoring of individual doses incurred by exposed workers and submission of monitoring data to a dose register. A holder of a radiation practice licence is required to ensure health surveillance of exposed workers of category A at least once per year. If exposure exceeding the established dose limits to exposed workers is ascertained, the holder of a radiation practice licence shall immediately refer the exposed workers to health surveillance. The national system for radiation dose control for exposed workers is based on the Regulation No 97 of 15 September 2016 of the Government "Effective Dose and Equivalent Dose Limits for the Lens of the Eyes, Skin and Extremities for Exposed Workers and Members of the Public." As prescribed in the abovementioned regulation, the limits of the effective dose are the following:
1) for exposed workers 20 mSv in one year;
2) members of the public 1 mSv in one year.

Workplaces shall be divided into the following areas depending on the type of premises and building in which the radioactive source is located, the category of the radioactive source, and the radiation risk category: controlled areas or supervised areas. Depending on the need, monitoring of controlled and supervised areas shall include monitoring of dose rates; monitoring of levels of radioactive contaminants in the air and on surfaces together with testing the properties of the radioactive waste, and determining their physical and chemical status. The holder of a radiation practice licence shall register the results of monitoring and shall preserve the results during the entire period of operation. The requirements for the premises, where radiation sources are located, the marking of such premises and the radiation sources, and the rules for the performance of radiation practices are established in Regulation No 52 of 16 November 2016 of the Minister of Environment "Requirements for the Rooms Where the Radiation Sources Are Situated and for Labelling of Rooms and Radiation Sources, Categories of Radiation Sources and the Activity Levels of Radionuclides."

A.L.A.R.A. Ltd has two radiation practice licences: one for radioactive waste management in the Paldiski site and the second for decommissioning activities in the Tammiku site. Both licences includes environmental monitoring programme. The content overview of the radiation practice licences are given in Section D. A.L.A.R.A. Ltd carries out on-site environmental monitoring which includes monitoring of upper groundwater aquifer (borehole) on a quarterly basis, grass on a semi-annual basis and soil on an annual basis at the Paldiski site and semi-annually at the Tammiku site.

The reported activity concentrations for the period from 2015 to 2016 for the Paldiski site are the following:
1) upper groundwater aquifer: tritium - bdl (less than 3 Bq/l), Sr-90 from less than 0.018 to 0.085 Bq/l, Cs-137 as well as for Co-60 less than 0.16 Bq/l;
2) grass: Cs-137 less than 0.8 Bq/kg, Sr-90 up to 1.6 Bq/kg;
3) soil: Cs-137 max 8,2 Bq/kg, Sr-90 less than 1,4 Bq/kg;

The monitoring programme also includes quarterly sampling of off-site sewage water at coastal outfall. Activity concentrations are stabilized, for Cs- 137 it is under 0.16 Bq/l, for H-3 under 3 Bq/l and for Sr-90 it is less than 0.015 Bq/l.
According to the radiation practice license for Paldiski site, A.L.A.R.A. Ltd has right to discharge the radioactive liquids, mostly originating from active laundry, decontamination activities etc through its sewage system. Prior to discharges the content of radionuclides have to be collected into the discharge tanks and analysed. The Environmental Board has also to be notified before each discharge event. No discharges have been occurred in 2015-2016, before that in January 2014 altogether 10,8 m^3 of liquids, containing ca 1,1 MBq of H-3, 2,1 MBq of Sr-90 and 50 KBq of Cs-137, were released.

The reported activity concentrations for the period from 2015 to 2016 for the Tammiku site are the following:
1) upper groundwater aquifer: maximum results for tritium were 12 and 36 Bq/l, all other results were less than 3 Bq/l, Sr-90 maximum 2.86 Bq/l, Cs-137 as well as Co-60 less than 0.14 Bq/l;
2) grass: Cs-137 from 1,1 to 15.5 Bq/kg, Sr-90 from 1,0 to 16.7 Bq/kg;
3) soil: Cs-137 from 1,3 to 21 Bq/kg, Sr-90 from less than 0.49 to 1.3 Bq/kg; Ra-226 from 22 to 73 Bq/kg. Soil samples have been taken also from reference areas (ca 0,5 km from the site), activities for Cs-137 vere from 4,4 to 25 Bq/kg, Sr-90 from less than 0.6 to 1.6 Bq/kg and for Ra-226 from 20 to 49 Bq/kg.

The Environmental Board carries out independent monitoring around radioactive waste management facilities. It covers fish, seaweed, seawater, mushrooms and berries. Sampling is generally conducted on annual basis. The results are published in annual environmental radiation monitoring reports. For the period from 2015 to 2016 the activity concentrations of Cs-137 vary: in the seawater from 20 Bq/m^3 to 21 Bq/m^3, for fish from 2.8 to 2.9 Bq/kg, for seaweed from 7.7 Bq/kg to 8.0 Bq/kg and for berries and mushrooms from less than 0.17 up to 42 Bq/kg. There have been no measurements of sea sediments. Because the decontamination and decommissioning of the facility can cause the discharges to the environment and the most probable pathways include water, the water samples from wells (both the Tammiku and the Paldiski site) are sampled on a quarterly basis. At the Tammiku site the maximum result for tritium was 38 Bq/l in 2016. All other measurement results were under 12 Bq/l.

ARTICLE 25. EMERGENCY PREPAREDNESS

1. Each Contracting Party shall ensure that before and during operation of a spent fuel or radioactive waste management facility there are appropriate on-site and, if necessary, off-site emergency plans. Such emergency plans should be tested at an appropriate frequency.
2. Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of a radiological emergency at a spent fuel or radioactive waste management facility in the vicinity of its territory.

The national legal framework for emergency preparedness, including nuclear and radiological emergency, is based on the Emergency Act (passed on 8 February 2017). The Act provides the legal bases for crisis management, including analyzing of risks, preparing for emergencies and responding to emergencies as well as ensuring the continuous operation of vital services. This Act

also regulates the declaration of, the response to and the termination of state of emergency situations and the use of the Defence Forces and the National Defence League in responding to emergencies, performing rescue operations and ensuring security. A number of regulations specifying important requirements of the Act have been passed by the Government and by the Minister of the Interior. In Estonia emergency preparedness system is coordinated by and under the responsibility of the Minister of Interior.

Obligation to keep the public informed about the emergency and a pending risk of an emergency is provided by the Radiation Act and the Emergency Act. Details about the quality and contents of the information is provided in the corresponding regulation. Arrangements are in place to inform the public of the emergency, its consequences and of any countermeasures that are to be implemented to reduce doses to the population. According to the Regulation No. 112 of 22 June 2017 of the Government „ The requirements and the procedure for coordinating the resolution of an emergency, cooperation between authorities and persons involved in the resolution, informing the public, interdepartmental exchange of information and mass evacuation “:

1) The Environmental Board shall inform the public about impending risk of a radiological emergency and about occurrence of a radiological emergency.
2) The Rescue Board shall keep the public informed about the response to a radiological emergency.

National Development Plan for Radiation Protection 2008-2017 includes also the requirement to conduct joint emergency exercises at least once per year. Emergency Act requires to prepare several emergency plans, including plan to response a radiological emergency and elaborates on the content of these plans. Emergency Act also sees to conduct complex crisis management exercises at least once in four years to test these plans.

4–14 September 2016, IAEA carried out an Integrated Regulatory Review Service (IRRS) Mission to Estonia. The Mission ascertained that the regulatory requirements regarding emergency response plans and procedures for licencees are established. Pursuant to the Radiation Act, one of the main obligations of the radiation practice licencee is to prepare an emergency plan and to test it in accordance with the requirements and frequency established by the radiation practice licence. The emergency response plans are reviewed by the Environmental Board in the licensing process. By granting the radiation practice licence the Environmental Board also approves the emergency response plan. The training programme, trainings and exercises are evaluated by the Environmental Board during the pre-authorization inspection based on the documentation provided by the licencee. The Environmental Board is notified according to the on-site emergency response plan during the exercises. The Environmental Board may also be involved in the on-site emergency response plan testing.

The Ministry of the Interior has developed “Requirements on conducting trainings on national and regional level and documenting the results”. The requirements request preparation of training plan, evaluation report and action plan for implementation of lessons learnt. These requirements also apply to radiological emergencies.

According to Article 32 of Radiation Act upon high risk radiation practices, a holder of a radiation practice licence is obliged to prepare a response plan to accidental exposure situations which is

based on the assessment of potential exposures. The holder of radiation practice licence must immediately inform the Environmental Board and the Emergency Centre of loss, theft or unauthorised use of radiation sources and of any incidents or accidents which took place during radiation practices and resulted in unintentional exposure of workers or members of the public.

A.L.A.R.A. Ltd has the emergency preparedness plan, which describes actions in the case of a radiation emergency situation in the radioactive waste management facility. Radioactive waste management practice is defined according to the legislation as a high-risk radiation practice. Conditions for testing and updating of emergency response plan are set in radiation practice licence of A.L.A.R.A. Ltd, issued in 2016 for Paldiski site. The company shall test the plan once per year and update it regularly.

ARTICLE 26. DECOMMISSIONING

Each Contracting Party shall take the appropriate steps to ensure the safety of decommissioning of a nuclear facility. Such steps shall ensure that:

i. *qualified staff and adequate financial resources are available;*
ii. *the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied;*
iii. *the provisions of Article 25 with respect to emergency preparedness are applied; and*
iv. *records of information important to decommissioning are kept.*

Not applicable. In 1994, before the Paldiski Site was taken over by Estonian authorities, the reactors were defuelled and the spent nuclear fuel was shipped to Russia based on Agreement Republic of Estonia and Russian Federation. Thus 2 PWR reactor compartments in Paldiski site are not considered as nuclear facility.

Section H. Safety of Radioactive Waste Management

ARTICLE 11. GENERAL SAFETY REQUIREMENTS

Each Contracting Party shall take the appropriate steps to ensure that at all stages of radioactive waste management individuals, society and the environment are adequately protected against radiological and other hazards.

In so doing, each Contracting Party shall take the appropriate steps to:

i. *ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed;*
ii. *ensure that the generation of radioactive waste is kept to the minimum practicable;*
iii. *take into account interdependencies among the different steps in radioactive waste management;*
iv. *provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;*
v. *take into account the biological, chemical and other hazards that may be associated with radioactive waste management;*
vi. *strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;*
vii. *aim to avoid imposing undue burdens on future generations.*

Estonian legislation together with the National Radiation Safety Development Plan for 2008–2017 and its implementation plan provide the policy, principles and also strategy for radioactive waste management. As set in Radiation Act Article 32 it is the obligation of the holder of a radiation practice licence guarantee the safe management of radioactive waste and radioactive emissions created in the course of radiation practices and shall make sure that:

1) radioactive waste is managed such that the estimated harmful effect on future generations of such practices will not exceed the effect permitted by the Act or legislation established on the basis thereof;
2) the activity and quantities of created radioactive waste and emissions are as low as possible;

In addition to the general obligations provided for in Article 32 of this Act, a holder of a radiation practice licence is required to do the following in the case of radiation practices related to radioactive waste management:

1) ensure safety of the radioactive waste management facilities during the entire of use thereof;
2) organise the management of radioactive waste if this is necessary for modifying the properties of the radioactive waste prior to the release thereof into the environment, or the conditioning and intermediate storage and final disposal thereof;
3) take into account other risks and various stages of generating radioactive waste and interaction of radioactive waste when planning activities and in the course of activities;
4) transfer radioactive waste to a radioactive waste management facility within five years from the generation thereof at the latest.

Classification of radioactive waste and the detailed requirements for registration, management and transfer of radioactive waste are described in Regulation No 34 of 4 October 2016 of the Minister of the Environment “The Classification of Radioactive Waste, the Requirements for Registration,

Management and Transfer of Radioactive Waste and the Acceptance Criteria for Radioactive Waste." The latter sets the requirement that the holder of a radiation practice licence shall collect and store:

1) different type of radioactive waste and waste with different physico-chemical properties separately;
2) untreated radioactive waste separately from the conditioned waste;
3) radioactive waste separate from corrosive, oxidising, explosive and highly flammable substances;
4) the biological radioactive waste frozen, placed in a suitable solution or treated in some other suitable manner;
5) used sealed radiation sources in their own or in another suitable radiation shield;
6) sharp solid radioactive waste separately in a suitable container marked "sharp radioactive articles";
7) unconditioned wet solid radioactive waste in at least two layer storage containers in order to prevent the leakage of radioactivly contaminated liquid;
8) unconditioned liquid radioactive waste in a container surrounded by absorbent material in an amount that ensures that the liquid contained in the container is coupled to twice the amount of liquid.

The Regulation No 43 of 27 October 2016 of the Minister of the Environment "Clearance Levels for Radioactive Substances and Materials Contaminated with Radioactive Substances Resulting from Radiation Practices, and the Requirements for Their Clearance, Recycling and Reuse" establish the clearance levels of materials containing slightly radioactive substances generated in the radiation practice or devices and facilities contaminated by radioactive substances and waste and emissions, as well as conditions for their recycling, recovery or discharge in the environment. The regulation describes requirements for:

1) general clearance and establish general clearance levels;
2) the clearance levels and conditions for radioactive materials generated as a result of radiation practice;
3) clearance levels and requirements for buildings connected with radiation practice;
4) clearance levels and requirements for radioactive material and radioactive metal waste connected with radiation practice;
5) discharge of radioactive emissions in the environment;
6) application in order to release radioactive substances or items contaminated by radioactive substances.

ARTICLE 12. EXISTING FACILITIES AND PAST PRACTICES

Each Contracting Party shall in due course take the appropriate steps to review:

i. *the safety of any radioactive waste management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility;*
ii. *the results of past practices in order to determine whether any intervention is needed for reasons of radiation protection bearing in mind that the reduction in detriment resulting from the reduction in dose should be sufficient to justify the harm and the costs, including the social costs, of the intervention.*

The radioactive waste management facilities at Paldiski site and Tammiku site existed before the first Radiation Act was put into force in 1997. Consequently, this law did not regulate the original design of the installations and the initial constructions.

Radioactive waste management facility at Paldiski site is situated in the territory of the former Soviet Navy Nuclear Training Facility (Training facility). The Training facility once contained two nuclear submarine mock-ups, both equipped with working PWR type nuclear reactor. In the territory of Training facility were also two waste storages for liquid and solid waste respectively and several auxiliary buildings and facilities. In 1994 the spent fuel was removed from reactors and transported to Russia for reprocessing. Shortly after that the submarine mock-ups were dismantled, except the reactor compartments, which were put on long term safe storage. In 1995 the ownership of the site was transferred from the Russian Navy to Estonian government (represented by AS A.L.A.R.A. Ltd). In 1997 the radioactive waste interim storage was established at the same site. From 1996 to 2006 all remaining waste at former Training facility was collected, conditioned and properly stored, unnecessary buildings (or parts of them) decontaminated and demolished. The site infrastructure was refurbished according its changed functions and needs. All the radioactive waste related to decommissioning activities from former Training facility placed under safe and secure conditions in above mentioned established radioactive waste faclity in Paldiski site. Since adopting the Radiation Act the radioactive waste management facility at Paldiski site has been continuously modernised with a view to safety enhancement. Status of the situation and overview of activities in Paldiski site are described in Section B under Article 32.

In 1963, the radioactive waste management facility for LILW was established at Tammiku, 12 km south of Tallinn. The facility consisted of one storage tank and one storage vault, the RADON-type near surface storage. In the mid-1980's, reconstruction began in order to upgrade this facility in accordance with then current USSR criterion on safe management of radioactive waste, but this work remained incomplete due to a lack of resources. The near surface storage facility for solid LILW in Tammiku was intended for institutional waste from Estonian non-military applications. Since 1995 the facility is managed by the Ltd A.L.A.R.A. By 1995, approximately 55% of the total volume (200 m^3) of Tammiku´s solid waste storage vault was filled with unpacked and unsorted waste, the total activity being 76 TBq. Spent sealed sources 90Sr and 137Cs made up the main part of the waste. However, a clear overview of the waste stored in the facility was lacking and clearance works were very complicated. Until 1996 it served as a central storage facility for the waste generated from the use of radionuclides in Estonia. In 1996 it was temporarily closed and

covered with concrete slabs and soil layer as a result of an accident with radioactive sources in 1994. Several studies has carried out since then on radiological safety assessement of the facility. According to assessments the facility did not comply with modern safety requirements established for radioactive waste storage facilities. The storage tank was made of concrete and it was demolished in year 2001. The near surface storage facility is made of concrete as well and today is covered by a shelter building of corrugated sheet iron. In 2005 the feasibility study was carried on retrival and conditioning of radioactive waste of Tammiku site. In 2006 A.L.A.R.A. Ltd started with environmental impact assessment process for decommission radioactive waste facility in Tammiku site. Status of the situation and overview of activities in Tammiku site are described in Section B under Article 32.

The radiation practice in both sites are licenced and safety assessments have been performed. The Estonian authorities have carried out regular inspections and reviewed and enforced safety procedures in connection with licence applications.

ARTICLE 13. SITING OF PROPOSED FACILITIES

Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed radioactive waste management facility:

i. *to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime as well as that of a disposal facility after closure;*
ii. *to evaluate the likely safety impact of such a facility on individuals, society and the environment, taking into account possible evolution of the site conditions of disposal facilities after closure;*
iii. *to make information on the safety of such a facility available to members of the public;*
iv. *to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.*

In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 11.

ARTICLE 14. DESIGN AND CONSTRUCTION OF FACILITIES

Each *Contracting Party shall take the appropriate steps to ensure that:*

i. *the design and construction of a radioactive waste management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;*
ii. *at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a radioactive waste management facility other than a disposal facility are taken into account;*
iii. *at the design stage, technical provisions for the closure of a disposal facility are prepared;*
iv. *the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.*

ARTICLE 15. ASSESSMENT OF SAFETY OF FACILITIES

Each Contracting Party shall take the appropriate steps to ensure that:

i. *before construction of a radioactive waste management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;*
ii. *in addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following closure shall be carried out and the results evaluated against the criteria established by the regulatory body;*
iii. *before the operation of a radioactive waste management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).*

Legal foundation of siting of a proposed facility lies in the Radiation Act and as well as in regulation No. 34 of 4 October 2016 of the Minister of the Environment "The Classification of Radioactive Waste, the Requirements for Registration, Management and Transfer of Radioactive Waste and the Acceptance Criteria for Radioactive Waste." Specific site is required to be in accordance with the Environmental Impact Assessment and Environmental Management System Act and Planning Act.

According to the Environmental Impact Assessment and Environmental Management System Act Environmental impact is assessed upon applying for development consent or for amending development consent whereby the proposed activity which is the reason for applying for or amending the development consent potentially results in significant environmental impact. Article 6 of the Environmental Impact Assessment and Environmental Management System Act provides that significant environmental impact include also:

1) construction, dismantling or decommissioning of a nuclear power station or other nuclear reactors, except research installations for the production and conversion of fissionable and fertile materials, whose maximum power does not exceed 1 kilowatt continuous thermal load;
2) production or enrichment of nuclear fuel, processing or handling or final disposal of used nuclear fuel or disposal of used nuclear fuel for over ten years on a site other than the place of generation thereof;
3) handling high level radioactive waste, final disposal of merely radioactive waste or disposal thereof for over ten years on a site other than the place of generation.

Environmental impact assessment (EIA) procedure consist of program and report stages. The leading expert or an expert group will, on the basis of the compliant environmental impact assessment programme, prepare the environmental impact assessment report in which the leading expert or the expert group among other things:

1) describes the purpose of and the need for the proposed activity;
2) sets out a description of the proposed activity and reasonable alternatives therefor;
3) sets out a description of the environment potentially significantly affected by the proposed activity and reasonable alternatives therefor and assesses the state of the environment of the region;
4) evaluates the potential consequences associated with the proposed activity and reasonable alternatives therefor, e.g. water, soil or air pollution, waste generation, noise, vibration, light, heat, radiation and smell;
5) sets out a description of the methods to predict potential significant environmental impact of the proposed activity and reasonable alternatives therefor;
6) analyses the potential significant environmental impact of the proposed activity and its reasonable alternatives, including the indirect impact and combined impact with other types of activity on the state of the environment, impact on the health, well-being and property of persons, on plants, animals, soil, landscape, mineral resources, quality of air and water, climate, on protected natural objects;
7) assesses the potential effect of significant environmental impact and describes the measures to prevent or minimise the adverse environmental impact involved and assesses the potential efficiency of the measures;
8) compares the proposed activity with reasonable alternatives;
9) sets out an overview of the results of consultations upon assessment of environmental impact, involvement of the public and assessment of environmental impact in transboundary context;
10) submits information on sources used upon environmental impact assessment;
11) discusses the proposals, objections and questions submitted regarding the report
12) discusses minutes of the public consultation regarding the report

The implementation of the National Radiation Safety Development Plan (NRSDP) accompanying the National Programme for Radioactive Waste Management bases on its action plans which are issued for the term up to 2 or 3 years. As current NRSDP is for 2008-2017, the new NRSDP for next 10 years is under preparation. The decision in principle to establish the final disposal site of radioactive waste was made on the government level in April 2016. Additionally, the outcomes of the feasibility study in 2014-2015, related to the decommissioning of the reactor compartments of the former Paldiski military nuclear site and for the establishment of a radioactive waste repository, will be included into NRSDP.

Based on the outcomes of the feasibility study the suitable options for final disposal were chosen. It was found, that a significant fraction of the waste, currently stored in the Paldiski interim storage facility, as well as most of the waste, resulting of the reactor sections decommissioning, could potentially be disposed of in a landfill-type facility. Only the 52 ton iron-water shielding tank of one of the reactors could be, according to its radiological characteristics, disposed of in a Near Surface Repository or Intermediate Depth Repository. The final disposal site will be taken into use in 2040. Until the construction of the final disposal site, the radioactive waste is stored in Paldiski interim storage and the reactor compartments of the nuclear site are stored in a conserved form. If the construction of the final disposal site is delayed, it must be decided by 2037 whether it is necessary to take additional measures for the safe storage of the reactor compartments and radioactive waste, for example, to reconstruct the building. A thorough updating of law must also precede the construction of the final disposal site, since the current legal framework is insufficient on that matter. In addition to the Radiation Act and the regulations issued on its basis, the legislation concerning planning and constructing of constructions must also be changed with the aim of establishing the requirements for the construction of the final disposal site. Based on the results of feasibility study the environmental impact assessment procedure will follow up on radiation practice application for decommissioning of reactor compartments.

This initial process will make sure that all necessary steps are taken to implement fundamental principles and requirements for a disposal facility in compliance with national and international obligations and recommendations. Prior to siting, construction and commissioning of the Estonian disposal facility, the project should be subject to the environmental impact assessment according to the Estonian legislation which implements the European Council Directive 85/337/EEC and 97/11/EC. In addition, prior to the commissioning of a disposal facility the European Commission will be provided with general data relating to the disposal project making it possible for the Commission to assess whether the implementation of the project is liable to result in a radioactive contamination of the water, soil or airspace of another Member State as called for under the Article 37 of the Euratom Treaty.

ARTICLE 16. OPERATION OF FACILITIES

Each Contracting Party shall take the appropriate steps to ensure that:

i. *the licence to operate a radioactive waste management facility is based upon appropriate assessments as specified in Article 15 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;*
ii. *operational limits and conditions, derived from tests, operational experience and the assessments as specified in Article 15 are defined and revised as necessary;*
iii. *operation, maintenance, monitoring, inspection and testing of a radioactive waste management facility are conducted in accordance with established procedures. For a disposal facility the results thus obtained shall be used to verify and to review the validity of assumptions made and to update the assessments as specified in Article 15 for the period after closure;*
iv. *engineering and technical support in all safety-related fields are available throughout the operating lifetime of a radioactive waste management facility;*
v. *procedures for characterization and segregation of radioactive waste are applied;*
vi. *incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body;*
vii. *programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;*
viii. *decommissioning plans for a radioactive waste management facility other than a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body;*
ix. *plans for the closure of a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility and are reviewed by the regulatory body.*

The requirements for licence application is established with the Regulation No 60 of 24 November 2016 of the Minister of Environment „The Specified Requirements for the Application for Radiation Practice Licence, the Format of the Application and Radiation Practice Licence and the Format of Characterising Radiation Sources That are Used to Keep Records of Nuclear Materials“. Addition to this, the requirements of Regulation No 34 of 4 October 2016 of Minister of Environment “The Classification of Radioactive Waste, the Requirements for Registration, Management and Transfer of Radioactive Waste and the Acceptance Criteria for Radioactive Waste” as well as the Regulation No 43 of 27 October 2016 of the Minister of the Environment “Clearance Levels for Radioactive Substances and Materials Contaminated with Radioactive Substances Resulting from Radiation Practices, and the Requirements for Their Clearance, Recycling and Reuse” has to be followed. Among other documents, the applicant is required also to present the quality management of radiation safety. The content of the these regulations are prescribed in Section H and the legislative and regulatory system in Section E. Legal responsibilities of holder of the radiation practice licence are described in Section F. The modifications of the radiation practice licenece are subject to approval by the regulatory body and regulated through operational limits and conditions in accordance with the Radiation Act and requirements stipulated in the licences.

The radiation practice licence for activities in Paldiski site issued in 2016 for term up to 5 years and it covers radioactiwe waste management and interim storage, including data of radioactive waste package and waste package acceptance criteria; radiation safety requirements for transport of

radioactive material; the requirements for radiation safety and radiation monitoring arising from the given radiation practice and its specific character, including workplace monitoring programme as well as environmental monitoring programme. Addition to this, the radiation practice licence includes conditions and monitoring programme for storage of the reactor compartments. Based on radiation practice licence conditions A.L.A.R.A. Ltd has to elaborate clearance procedures for radioactive waste, to work out measurement methods for characterization of radioactive waste. These activities are currently underway. Necessary equipment has been purchased and characterization methods worked out and approved by the Environmental Board.

ARTICLE 17. INSTITUTIONAL MEASURES AFTER CLOSURE

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility:

i. *records of the location, design and inventory of that facility required by the regulatory body are preserved;*
ii. *active or passive institutional controls such as monitoring or access restrictions are carried out, if required; and*
iii. *if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary.*

A holder of a radiation practice licence shall collect and analyse data on the use of radioactive waste storage facilities and send such information to the Environmental Board for preservation. Radiation Act Article 66 sets the oppurtunity for the Environmental Board to order a holder of a radiation practice licence to submit a new application for a radiation practice licence for closure of disposal facilities on the basis of the information provided. Requirements for closing of disposal facilities shall be established by a radiation practice licence.

According to the Radiation Act Article 67 after closure of radioactive waste disposal facilities, the Environmental Board shall:

1) preserve the documents concerning the location and design of the radioactive waste storage facilities and the inventory of radioactive waste for an indefinite time;
2) organise radiation monitoring and control the restriction of access, if necessary;
3) organise intervention if, based on monitoring results or upon inspection, release of radioactive substances into the environment is established.

Section I. Transboundary movement

ARTICLE 27.TRANSBOUNDARY MOVEMENT

1. Each Contracting Party involved in transboundary movement shall take the appropriate steps to ensure that such movement is undertaken in a manner consistent with the provisions of this Convention and relevant binding international instruments.

In so doing:

i. a Contracting Party which is a State of origin shall take the appropriate steps to ensure that transboundary movement is authorized and takes place only with the prior notification and consent of the State of destination;

ii. transboundary movement through States of transit shall be subject to those international obligations which are relevant to the particular modes of transport utilized;

iii. a Contracting Party which is a State of destination shall consent to a transboundary movement only if it has the administrative and technical capacity, as well as the regulatory structure, needed to manage the spent fuel or the radioactive waste in a manner consistent with this Convention;

iv. a Contracting Party which is a State of origin shall authorize a transboundary movement only if it can satisfy itself in accordance with the consent of the State of destination that the requirements of subparagraph (iii) are met prior to transboundary movement;

v. a Contracting Party which is a State of origin shall take the appropriate steps to permit re-entry into its territory, if a transboundary movement is not or cannot be completed in conformity with this Article, unless an alternative safe arrangement can be made.

1. A Contracting Party shall not licence the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees South for storage or disposal.

2. Nothing in this Convention prejudices or affects:

i. the exercise, by ships and aircraft of all States, of maritime, river and air navigation rights and freedoms, as provided for in international law;

ii. rights of a Contracting Party to which radioactive waste is exported for processing to return, or provide for the return of, the radioactive waste and other products after treatment to the State of origin;

iii. the right of a Contracting Party to export its spent fuel for reprocessing;

iv. rights of a Contracting Party to which spent fuel is exported for reprocessing to return, or provide for the return of, radioactive waste and other products resulting from reprocessing operations to the State of origin.

The Chapter 2 of Radiation Act describes requirements for radiation practice licences for import, export and transit of radioactive waste. The provisions of this chapter also apply to import, export and transit of spent nuclear fuel. The Environmental Board reviews the application for transport and issues licence for transport. The Minister of Environment has issued the Regulation No. 33 of 3 October 2016 of the Minister of the Environemnt "Procedure Specifications for Processing Documents of Import, Export and Transit of Radioactive Waste Based on Country of Origin and Destination". This Regulation implements all obligations under Article 27 (Transboundary movement) of the Convention. The regulation is the Estonian implementation of Council Directive 92/3/EURATOM of 3 February 1992 on the supervision and control of shipments of radioactive waste between Member States and into and out of the Community. The Environmental Board has until now never received an application and consequently has never issued any licence for a transboundary movement of radioactive waste with Estonia as the country of origin or with Estonia as the country of destination. Since issuance of the above-mentioned regulation, there has also been no authorisation for transboundary movement of radioactive waste between EU-countries with Estonia as a country of transit.

Section J. Disused sealed Sources

ARTICLE 28. DISUSED SEALED SOURCES

1. Each Contracting Party shall, in the framework of its national law, take the appropriate steps to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.

2. A Contracting Party shall allow for reentry into its territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed sources.

Radioactive sealed sources are mainly used in medicine, industry and research institutions. Minor quantities are also used in service agencies. Radiation Act and its regulations implement all obligations under Article 28 of the Convention ensuring that the possession and storage of disused sealed sources take place in a safe manner.

Each radiation practice licence applicant has to present with licence application management plan of radiation source after the termination of its use (disused source). Disused source is a radiation source which is no longer used or no longer intended to be used for the purposes which comply with the radiation practice licence. Management plan of disused sources includes all the activities which are necessary to ensure safe management a radiation source upon termination of the radiation practices connected to the source. According to Article 98 the issuer of radiation practice licences may require that applicants for radiation practice licences have financial collaterals to manage safely disused sources and radioactive waste (hereinafter *collateral*). The issuer of radiation practice licences shall decide on the need for collateral within 20 days as of registration of an application for a radiation practice licence or the amendment thereof. The importance of ensuring safe management of disused sources or radioactive waste from the radiation safety point of view and the estimated cost of management shall be taken into account upon making the decision. The collateral must be only intended for management of disused sources and radioactive waste and it must be immediately availablere, when necessary. The amount of collateral shall be the estimated cost of management of disused sources or radioactive waste on the basis of the data submitted by the applicant of a radiation practice licence and it shall be determined by the issuer of the radiation practice licence. The availability of collateral shall be certified by a guarantee of an Estonian or international credit or financial institution accepted by the issuer of radiation practice licences. The issuer of radiation practice licences has the right to refuse to accept any issuer of guarantees if there are reasons to doubt the reliability of the guarantee issued by such issuer on the basis of the former activities, financial status or reputation of the issuer of the guarantee. Collateral must be valid up to the end of the management of disused sources or radioactive waste.

A holder of a radiation practice licence has the obligation to ensure radiation safety and physical protection of the radiation sources in the holder’s possession and to verify at least annually that the radiation source or the equipment containing thereof is present at the place of use or storage and in apparently good condition; ensure the safety of the radiation source by correct installation and placement of the radiation source in the premises, mark the radiation source and the premises and use protective equipment and keep records of every radiation source and radioactive waste for

which the holder is responsible, the location and transfer thereof, take annual inventories of radiation sources and radioactive waste. The Radiation Act states that a holder of a radiation practice licence is required to submit a report to the Environmental Board on the inventory of radiation sources and radioactive waste by 1 March of the year following the accounting year.

The Radiation Safety Department of Environmental Board maintains a register of radiation sources and nuclear materials with the aim of ensuring protection of people and the environment, safety and physical protection of radiation sources and nuclear materials. The register of radiation sources and nuclear materials contains data on radiation practice licences and holders thereof, and data charactering radiation sources and nuclear materials. For the purpose of ensuring protection of people and the environment, safety and physical protection of radiation sources and nuclear materials, the information in the register of radiation sources and nuclear materials is intended for internal use.

Disused radioactive sources must be returned immediately after discontinuing the use thereof to the manufacturer, transfer it to another holder of a radiation practice licence or to a radioactive waste management facility. The first option is preferred. In Estonia neither manufacturing nor re-manufacturing of sealed sources takes place. For use of high-activity radioactive source the licence applicant shall present with licence application a copy of documents which proves returning sources to supplier after termination of use the sources.

The Environmental Inspectorate exercises state supervision over radiation safety. All premises where radioactive sources are employed are inspected at least once in 5 years. Users of high-activity sealed sources are inspected once in a year.

If the owner of radioactive substances, equipment containing thereof or radioactive waste is unknown or the person responsible for them cannot be established or if the possession thereof is illegal or there is reasonable doubt in connection with that an accidental exposure situation can occur, the state shall take possession of the radioactive substances, equipment containing thereof and radioactive waste. Radioactive substances, equipment containing thereof and radioactive waste which possession is taken by the state shall be delivered for management to the radioactive waste management facility. If the owner of radioactive substances, equipment containing thereof and radioactive waste is unknown or the person responsible for them cannot be established, the state shall cover the costs related to taking the possession and management thereof. In the case of illegal possession of radioactive substances, equipment containing thereof or radioactive waste or if an accidental exposure situation may occur in connection therewith, the owner shall cover the costs related to taking the possession thereof by the state and management thereof.

Fixed monitors for vehicles and railway traffic have been installed to all major crossing points at the Estonian-Russian border and at the Tallinn Airport. In all crossing points the custom officers are equipped with portable monitors. Customs and Tax Board together with Security Police Board have procedures of conduct for cases when radioactive sources are discovered at the border. In general, if undocumented material is discovered: suspicious parcel is isolated and Security Police is notified. Common practice is, when radioactive material package arrives or when there is a suspicion on the radioactive material package, the Customs and Tax Board contacts the Environmental Board to find out information about the receiver of radioactive material package based on the custom documents.

Disused sealed sources can also enter into the recycling stream of scrap metal, therefore biggest scrap metal companies have installed fixed monitors at the gates of their installations.

In 2015 the Ministry of the Environment and radioactive management company A.L.A.R.A. Ltd conducted a campaign to collect radioactive sources. Similar campaigns has taken place in years of 2009, 2010 and 2012. The 2015 campaign ws held from May till August in 2015 about which scarp metal yards as well as public were informed. During campaign were collected radioactively contaminated material, smoke detectros containing radionuclide, check sources and other equipment containing radioactive material. The conclusions are published in the campaign's final report on website of the Ministry of the Environment. The campaign was financed by the Ministry of the Environment.

The national emergency response and preparedness system is described in Section F under article 25.

Section K. General Efforts to Improve Safety

The Report pays attention on progress made in the areas identified as challenges during the Fifth Review Meeting:

1. Completion of the remediation activities at Tammiku to unrestricted site release

All waste was retrieved and transferred to Paldiski in the Septemebr 2011. At the same year the company applied for the radiation practice licence in order to continue with the second stage of decommissioning. The radiation practice licence was issued in 2012 for term up to 5 years. In 2013-2017 the radiological survey and based on its results, the decontamination works were done. Based on the radiation practice licenece the following data were collected by the A.L.A.R.A. Ltd and provided to the Environmental Board for assessment: map of distribution of radioactive contamination, radiological characterization of the facility, results of radioactivity analysis, map of distribution of radioactive contamination after decontamination and environmental monitoring data. The waste as result of decontamination works was transported to the Paldiski site for treatment and stoarge. To release of radioactive waste storage of Tammiku site from under regulatory control, the clearance conditions and clearance levels has to meet stated in Radiation Act and its regulations. The next step is preparation radiation safety assessment report for decontaminated facility to evaluate its accordance with clearance criteria in order to move into process of dismantling of the concrete structure of the facility. According to the decommissioning time schedule and taken into account current state, the decommissioning activities in facility site will continue up to year 2022. According to the Estonian legislation the site will remain under environmental surveillance.

2. Steps towards construction of the National disposal facility (design criteria and feasibility study) and planning for the decommissioning of Paldiski sarcophagi.

A feasibility study, related to the decommissioning of the reactor compartments of the former Paldiski military nuclear site and for the establishment of a radioactive waste repository was implemented in 2014-2015. The aim of it was to conduct of preliminary technical investigations and gathering the necessary data, which will enable to plan further decisions and activities, as well as to start environmental impact assessment process. National Programme for Radioactive Waste Management (NPRW) in effect was adopted in 2015 by the Minister of the Environment. The NPRW is a source document, which gives an overview of the legislation in force and directions for supplementing them. The programme describes the institutions, technical and financial resources, and research and development activities for safe radioactive waste management. It provides also sub-objectives, measures, and expected results of the field until 2050. The programme is regularly reviewed and updated. Long-term policy for safe management of radioactive waste is to establish radioactive waste disposal site by 2040. The decision in principle to establish the final disposal site of radioactive waste was made on the government level in April 2016. The implementation of the National Radiation Safety Development Plan (NRSDP) accompanying the National Programme for Radioactive Waste Management is based on its action plans which are issued for the term up to 2 or 3 years. As current NRSDP is for 2008-2017, the new NRSDP for next 10 years is under preparation. Additionally, the outcomes of the feasibility study in 2014-2015 will be included into NRSDP.

3. Human resources education in radiation protection in universities.

Concerning training of the staff of regulatory body, the 2016 IRRS mission made a recommendation for improvement: the Environmental Board and Environmental Inspectorate should develop and implement a human resource plan to ensure the availability and competence of staff involved in regulatory functions. This recommendation will be incorporated into NRSDP 2018-2028.

4. Planned future actions

1) According to the Radiation Act, the Ministry of the Environment organizes at least after each ten years the state audit of radiation safety. Estonia had international audit in September 2016 (IAEA IRRS mission). Based on the results of the IRRS mission there will be made plan to fulfill requirements and suggestions. Some changes and clarifications can be made in internal guidance documents level, some need to improve legislation and some long-term goals will be set in the new NRDDP 2018-2027. IRRS follow-up mission is planned in to 2019.
2) As the current NRSDP is valid till the end on 2017, the new NRSDP for 2018–2027 is in development process.
3) Estonia has agreed bring into force the laws, regulations and administrative provisions necessary to comply with European Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation by 6 February 2018. Transposition of requirements of Council Directive 2013/59/Euratom into national legislation is ongoing.

Annex A. Matrix of current practice of radioactive waste management

Type of Liability	Long Term Management Policy	Funding of Liability	Current Practice/Facilities	Planned Facilities
Spent Fuel	N/A	-	-	-
Nuclear Fuel Cycle Wastes	No NFCW generated	-	-	
Applications Wastes	Central Interim Storage, then Disposal	Waste producers, Government	Central Interim Storage	Disposal facility
Decommissioning	-	Government	Decommissioning of the Paldiski site; Decommissioning of the Tammiku RWS	Disposal facility
Disused Sealed Sources	Return to supplier/Disposal	Owners, Government	Return to supplier/ Central Interim Storage	Disposal facility

Annex B. Inventory of radioactive waste in interim storage

Waste category	Volume, m^3	Distribution, %
LLW and ILW (short-lived waste)	878	95
LLW and ILW (long-lived waste)	18	2
NORM waste	24	3
Total	**920**	**100**

Annex C. References to Estonian national laws and regulations related to safety of spent fuel and radioactive waste

The Estonian legislation listed below as in force of 1 October 2017. The legislation is available in Estonian (and partly in English) at the web site of the Environmental Board www.keskkonnaamet.ee, the Ministry of Justice http://www.just.ee/23295, the electronic database of the State Gazette www.riigiteataja.ee (in Estonian), etc.

Acts:

1. Radiation Act, passed 8 June 2016 and enforced in 1 November 2016
2. General Part of the Environmental Code Act, passed on 16 February 2011 and enforced in 1 August 2014, in part 1 January 2015 and 1 August 2017, as amended in 19 June 2014, 20 June 2014, 18 December 2014, 11 February 2015, 18 February 2015, 19 February 2015, 8 June 2015, 10 May 2017 and 19 June 2017
3. Environmental Supervision Act, passed on 6 une 2001 and enforced in 6 June 2001, as amended in 16 June 2002, 13 November 2002, 11 December 2002, 17 December 2003, 14 April 2004, 21 April 2004, 13 April 2005, 12 October 2005, 08 February 2007, 27 January 2011, 10 October 2012, 25 August 2013, 19 February 2014, 19 June 2014
4. Emergency Act, passed on 8 February 2017 and enforced in 1 July 2017
5. Environmental Impact Assessment and Environmental Management System Act, passed on 22 February 2005 and enforced in 3 April 2005, as amended in 7 December 2006, 21 February 2007, 19 June 2008, 18 December 2008, 27 January 2010, 26 October 2010, 06 December 2011, 19 February 2014, 19 June 2014, 18 February 2015, 19 February 2015, 11 June 2015, 29 October 2015, 09 December 2015, 27 October 2016, 19 April 2017, 14 June 2017 and 19 June 2017.
6. Law Enforcement Act, passed on 23 February 2011 and enforced in 1 July April 2014, as amended 1 July 2014, 10 Januray 2015, 1 May 2015, 1 July 2015, 1 January 2016 and 12 December 2016.
7. Code of Misdemeanour Procedure, passed on 22 May 2002 and enforced in 1 September 2002, as the last amendment 6 July 2017.

Regulations of the Government:

1. Regulation No 95 of 15 September 2016: Intervention and Action Levels and Emergency Exposure Dose Limit
2. Regulation No 96 of 15 September 2016: The Bases for Calculation of Exemption Levels for Radionuclides and the Exemption Levels Below Which No Radiation Practice Licence is Required
3. Regulation No. 97 of 15 September 2016: Effective Dose and Equivalent Dose Limits for the Lens of the Eyes, Skin and Extremities for Exposed Workers and Members of the Public Regulations of the Minister of the Environment
4. Regulation No. 28 of 6 September 2016: Data Indicated in the Dose Card of an Outside Worker and the Procedure for Formalising Dose Cards and the Standard Format of Dose Cards of Outside Workers
5. Regulation No 43 of 27 October 2016: Clearance Levels for Radioactive Substances and Materials Contaminated with Radioactive Substances Resulting from Radiation Practices, and

the Requirements for Their Clearance, Recycling and Reuse.
6. Regulation No. 52 of 16 November 2016: Requirements for the Rooms Where the Radiation Sources Are Situated and for Labelling of Rooms and Radiation Sources, Categories of Radiation Sources and the Activity Levels of Radionuclides
7. Regulations No 54 of 18 November 2016: The Procedure for Monitoring and Estimation of Effective Doses of the Exposed Workers and Members of the Public, the Dose Coefficient Values for Doses Resulting from Radionuclide Intake and Radiation and Tissue Weighting Factors
8. Regulation No. 57 of 24 November 2016: Requirements for Radiation Safety Training of Exposed Worker and Radiation Safety Specialist
9. Regulation No. 45 of 27 October 2016: Curriculum for Training of Radiation Experts, Their Professional Skills Requirements, the Procedure for Application for the Certificate and the Standard Format of Applications and Certificates
10. Regulation No. 34 of 4 October 2016: The Classification of Radioactive Waste, the Requirements for Registration, Management and Transfer of Radioactive Waste and the Acceptance Criteria for Radioactive Waste
11. Regulations No 60 of 24 November 2016: The Specified Requirements for the Application for Radiation Practice Licence, the Format of the Application and Radiation Practice Licence and the Format of Characterising Radiation Sources That are Used to Keep Records of Nuclear Materials
12. Regulation No. 79 of 27 December 2016: Register of Radiation Sources and Nuclear Materials and the Statute
13. Regulation No. 33 of 3 October 2016: Procedure Specifications for Processing Documents of Import, Export and Transit of Radioactive Waste Based on Country of Origin and Destination
14. Regulation No. 41 of 20 October 2016: Statutes for the Maintenance of the State Dose Register of Exposed Workers
15. Regulation No. 13 of 20 May 2014: Statute of the Environmental Board
16. Regulation No. 12 of 31 March 2008: Statute of the Environmental Inspectorate
17. Regulation No. 186 of 10 December 2009: Statute of the Ministry of the Environment
18. Regulation No. 50 of 30 July 2002, as amended in 21 August 2003, 15 May 2008, 26 March 2010, 23 May 2013 and 01 January 2017: Establishment of National Environmental Monitoring Stations and Areas.
19. Regulation No. 112 of 22 June 2017: The requirements and the procedure for coordinating the resolution of an emergency, cooperation between authorities and persons involved in the resolution, informing the public, interdepartmental exchange of information and mass evacuation
20. Regulation No 108 of 22 June 2017: The list of events that could lead to an emergency and that are subject to a risk assessment and designates the authorities in charge of preparing an emergency risk assessment.

Regulations of the Minister of the Interior

1. Regulation No. 30 of 21 June 2017: The requirements for an emergency response plan and the procedure for the preparation thereof.
2. Regulation No. 28 of 19 June 2017: The requirements for an emergency risk assessment and the procedure for the preparation of a risk assessment

Annex D. References to Estonian national and international reports related to safety of spent fuel and radioactive waste and to reports on international review missions performed at the request of a Contracting Party

National Reports

1. National Report from Estonia. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. Fifth Review Meeting, May 2015, Environmental Board. http://www.keskkonnaamet.ee/public/kiirgus/3rd_JCReport_Estonia.pdf
2. Convention on Nuclear Safety. 3nd Estonian National Report on Compliance with the Obligations of the Convention on Nuclear Safety as referred to in Article 5 of the Convention. Sixth Review Meeting March/April 2014, Environmental Board http://www.keskkonnaamet.ee/public/ajutine/test/Convention_Nuclear_Safety_ESTONIA_2013.pdf

Other

1. National Development Plan for Radiation Protection 2008-2017, Tallinn, 2008. http://www.envir.ee/sites/default/files/korakik.pdf
2. National Programme for Radioactive Waste Management, Tallinn, 2015. https://www.envir.ee/sites/default/files/national_programme_radioactive_waste_estonia.pdf
3. Preliminary Studies for the Decommissioning of the Reactor Compartments of the Former Paldiski Military Nuclear Site and for the Establishment of a Radioactive Waste Repository. Final Report. December 28, 2015. http://www.alara.ee/docs/kodulehtPaldiskieeluuringudlopparuanneIngl.pdf

Referencec to the reports on international review missions performed at the request of a Contracting Party

1. Peer appraisal of the arrangements in the republic of Estonia regarding the preparedness for responding to a radiation emergency 26 September - 5 October 2011 http://www.keskkonnaamet.ee/public/Final_EPREV_Report_1.pdf
2. Integrated regulatory review service (IRRS) mission to Estonia, 4-14 September 2016. http://www.envir.ee/sites/default/files/irrs_estonia_final_report_2016-11-10_.pdf