REPUBLIC OF ESTONIA
MINISTRY OF THE ENVIRONMENT

REPUBLIC OF ESTONIA
ENVIRONMENTAL BOARD

6th Estonian National Report on Compliance with the Obligations of the Convention on Nuclear Safety

as referred to in Article 5 of the Convention

9th Review Meeting

Environmental Board
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Chapter 1 Introduction

Estonia is a state in the Baltic region of northern Europe with a population of 1.33 million. The territory of Estonia covers 45 339 km^2. Estonia is a Member State of the IAEA since 1992. The Convention on Nuclear Safety came into force for Estonia on the 4th of May 2006. Estonia is a member state of the European Union from the 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.

The present report is the 6th Estonian National Report to the 9th Review Meeting of the Convention on Nuclear Safety. The Report provides an update on previous reports under the terms of the Convention on Nuclear Safety. The report is structured in conformity with the "Guidelines regarding national reports under the Convention on Nuclear Safety" (INFCIRC/572/Rev.6). The majority of the comments, questions and remarks received from other Contracting Parties during the 8th review cycle, as well as the challenges identified in the draft Country Review Report of the 8th Review Meeting, have been incorporated into this Report. This Report gives an overview of the national policy, state institutional framework, legal regime and the implemented administrative and technical measures related to nuclear safety and emergency preparedness. It also sets out measures adopted by Estonia to implement the relevant obligations of the Convention.

Based on the INFCIRC/572/Rev.6 the reporting on Articles 7, 8 and 16 is applicable for Contracting Parties with no nuclear installations planned or in operation, reporting on activities covered by Articles 9, 10 and 15 is encouraged. There are no nuclear power plants or facilities operating with nuclear fuel cycle in Estonia, neither any activities related to nuclear fuel cycle. Therefore, this Report presents information on activities covered by Articles 7, 8, 9, 10, 15 and 16 of the Convention on Nuclear Safety. The Vienna Declaration on Nuclear Safety outlines the principles for implementing the objectives of the Convention related to states with nuclear installations. These principles are not addressed in this Report since Estonia has no nuclear installations.

Estonia's interest in nuclear safety is primarily related to the safety of nuclear installations in the neighbouring countries and to the implications that accidents at such installations, should they occur, may have on the health of the population and on the environment. The foreign nuclear power plants close to borders of Estonia are Loviisa NPP in Finland (103 km), Leningrad NPP in Russia (79 km) and Ignalina NPP in Lithuania (215 km, under decommissioning since 2009). Therefore, Estonia is, according to Article 16, obliged to "take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency". As nuclear emergency preparedness is a direct obligation for Estonia in relation to the Convention, this item is dealt in greater detail in the Report.

The Report pays attention on progress made in the areas identified as suggestions and challenges during the 7th Review Meeting and challenges identified in the draft Country Review Report of the 8th Review Meeting:

1) Implementation of the National Radiation Safety Development Plan (NRSDP) 2018-2027, including the relevant IRRS findings related to appropriate steps for the preparation and

testing of emergency plans.
2) Ensuring that Estonia has cooperation agreements related to emergency preparedness and response with its neighbouring countries
3) Relevant training of the staff remains a challenge.
4) Ensuring that the inspectors who carry out inspections of licensees with radiation sources/generators have sufficient time and training noting that they also involved with non-radiation related activities in the Environmental Inspectorate.

The following are the major developments in the field since the 8th review cycle:
1) The National Radiation Safety Development Plan for the period of 2018-2027 was approved.
2) On the 20th of April 2021, a Nuclear Energy Working Group was formed to define the country's positions regarding the use of nuclear energy.
3) The Estonian Environmental Board, formed by merging the Environmental Board and the Environmental Inspectorate, has been the regulatory body since the 1st of January 2021. The new authority retains the same tasks and responsibilities as previous government authorities, such as authorization, review and assessment, inspection, and enforcement of radiation practices. The Radiation Act was amended to allow the consolidation of the two authorities into a single regulatory body.
4) In 2022, a four-year national project EST9007 "Enhancing the Effectiveness of the Legislative, Regulatory, and Organizational Infrastructure and Technical Capabilities of Radiation Protection and Nuclear Safety" was launched under the IAEA Technical Cooperation Programme. One of the tasks of the project is to develop an online learning programme with various modules for various licence holders and organizations involved in radiation protection and safety.
5) In 2021, the Minister of the Environment adopted a new regulation outlining the conditions for exemption and clearance of radioactive substances used or generated in radiation practices, as well as the requirements for exemption and clearance applications. Clearance and exemption levels are the same as stated in 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, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom.
6) A new national register for exposed workers has been introduced since the beginning of 2022.
7) The Environmental Board of Estonia signed a bilateral Memorandums of Understanding with the Radiation and Nuclear Safety Authority of Finland in 2019 and with the State Environmental Service of Latvia in 2020 for cooperation and exchange of information on radiation and nuclear safety and regulatory matters, which includes cooperation in preparedness for and response to nuclear or radiological incidents and emergencies, taking into account international standards.
8) The Emergency Act was amended in July 2021 in order to improve the cooperation of the governmental authorities. The updated risk assessment of a nuclear or radiological emergency was adopted by the Environmental Board in January 2021, and the updated National Nuclear and Radiological Emergency Response Plan was adopted in February 2022.

The Report seeks to provide sufficient background where necessary to enable it to be readable as a stand-alone document. The information contained in the Report was gathered and updated as on the 30th of July 2022, unless stated otherwise.

Estonia is a Contracting Party for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention). Handling of radioactive waste shall be reported to the review meeting of that Convention accordingly. Estonia does not have a policy for spent fuel management, as there is no nuclear fuel in Estonia. There is, however, the former nuclear submarine training centre together with two reactor compartments in Paldiski (the *Paldiski site*), but spent fuel was removed from the reactors and taken back to Russia already in 1995. Consequently, reporting about the Paldiski site and its developments will be presented in the reports to the Joint Convention and not to the Nuclear Safety Convention. Annex A to this Report gives a brief overview of the shut-down nuclear submarine reactors in the Paldiski site.

In 2011 the requirements of the European Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations were brought into Estonian legislation by amending the Radiation Act. Based on discussion with the European Commission, the Paldiski site and a radioactive waste storage located on the same site do not directly fall within the scope of Directive 2009/71/Euratom. Therefore, Estonia must implement the requirements of this directive at a general level. The Radiation Act was amended with relevant definitions, requirements of passing a principle decision by the *Riigikogu* (Parliament of Estonia) on establishment of a nuclear installation, obligations of the licence holder of nuclear installations and quality assurance requirements to ensure nuclear safety. Although, Section 79 of the Radiation Act lays down that a radiation practice licence for the operation of a new nuclear facility can be applied for after the *Riigikogu* has adopted a decision on commissioning of a nuclear facility, relevant nuclear legislation will be required, if Estonia decides to start using nuclear energy. The "Estonian National Energy and Climate Plan 2030" and the "Analysis of Opportunities for Increasing Estonian Climate Ambition" have proposed nuclear energy after 2030 as one possible solution to increase Estonia's energy security and achieve climate goals. On the 5th of November 2020, Estonian Government adopted a decision to establish a Working Group of Nuclear Energy (NEWG) to define the nation’s positions towards the issue. NEWG was established by the Ministry of the Environment with the decree of the minister on the 20th of April 2021. Article 7 of this Report provides more thorough information on the work of the Nuclear Energy Working Group.

The structure of the Report is as follows:

1) Chapter 2 presents an article-by-article review of Estonian legislative and regulatory system, regulatory body, responsibility of the licensee, radiation safety and protection requirements and emergency preparedness;
2) Chapter 3 presents the suggestions and challenges identified during the Forth Review Meeting and the efforts made and measures taken to address them;
3) Summary includes main developments since previous National Report and planned activities to improve safety;
4) Chapter 4 includes Annexes A to D providing brief overview of the shut-down nuclear submarine reactors in the Paldiski site, reference to Estonian national laws and regulations, national and international reports related to safety and compilation of treaties signed by Estonia.

The report is prepared by the Environmental Board in cooperation with the Ministry of the Environment. The main conclusions of the Report are the following:

1) Estonian nuclear and radiation regulations fulfil the obligations of the Convention;
2) Estonian regulatory infrastructure is in compliance with the Convention obligations;
3) Estonian regulatory and licensee practices comply with the Convention obligations;

4) Estonian radiological and nuclear emergency preparedness system has a high standard and complies fully with the Convention;
5) To introduce nuclear power, Estonia follows the IAEA guideline NG-G-3.1 (Rev.1) "Milestones in the Development of a National Infrastructure for Nuclear Power," and is currently conducting analysis before making a decision to launch a nuclear power programme.

Chapter 2 Article–by–article review

Article 7. Legislative and regulatory framework

1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations.
2. The legislative and regulatory framework shall provide for:
i. the establishment of applicable national safety requirements and regulations;
ii. a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a licence;
iii. a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences;
iv. the enforcement of applicable regulations and of the terms of licenses, including suspension, modification or revocation.

In summary, the following changes and developments have occurred since the 8th review cycle of the Convention on Nuclear Safety:

1) *Since the 1st of January 2021, the new regulatory body is the Estonian Environmental Board. The new authority continues with the same tasks and responsibilities as the previous Environmental Board and the Environmental Inspectorate. Licensing as well as inspection and enforcement systems were unaffected by the change in regulatory body.*

2) *The Minister of the Environment approved the National Radiation Safety Development Plan for the period of 2018-2027 (NRSDP 2018-2027) and its annexes (National Action Plan for Radioactive Waste Management, National Radon Action Plan) in early 2020. The NRSDP 2018-2027 covers areas such as infrastructure of radiation protection and nuclear safety, radioactive waste management, responding to accidental and existing exposure situations, radiation awareness and competence building, and issues regarding natural and medical exposures. The NRSDP 2018-2027 will be implemented based on action programmes, which are composed for periods of up to four years. The Minister of the Environment approved the second action programme for 2022-2025 in January 2022.*

3) *In 2022, a four-year national project EST9007 "Enhancing the Effectiveness of the Legislative, Regulatory, and Organizational Infrastructure and Technical Capabilities of Radiation Protection and Nuclear Safety" launched under a technical cooperation programme of the IAEA. One of the tasks of the project is to develop an online learning programme with various modules for various licence holders and organizations involved in radiation protection and safety.*

4) *In 2021, the Estonian Government established the Working Group of Nuclear Energy (NEWG) to clarify the nation's positions on the use of nuclear energy. NEWG follows the requirements of the IAEA guideline No. NG-G-3.1 (Rev 1) "Milestones in the Development of a National Infrastructure for Nuclear Power" when performing analyses.*

1. National legislative and regulatory framework

In Estonia, radiation safety activities are organised by the Ministry of the Environment within its area of competence through the Environmental Board by engaging other appropriate agencies and by taking inter alia into account field-specific operational experience, results of decision making procedures, development of relevant technology and scientific researches. Radiation safety requirements are developed mainly in collaboration between the Ministry of the Environment through the Environmental Board, the Ministry of Social Affairs (Health Board, professional societies), the Ministry of Interior (Police and Border Guard Board, Rescue Board, Estonian Internal Security Service), the Ministry of Finance (Tax and Customs Board), the Ministry of Economic Affairs and Communications (radioactive waste management agency A.L.A.R.A. Ltd).

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 legal framework of the European Atomic Energy Community (EURATOM). Therefore, a new version of the Radiation Act entered into force in 2004. After joining the European Union it became evident that environmental law needs a more consistent approach in Estonia. The codification process of the environmental law started in 2011 and the new Radiation Act was drafted. As a result of the codification process of the environmental law the General Part of the Environmental Code Act was approved by the *Riigikogu* (Parliament of Estonia) on the 16th of February 2011, it entered into force on the 1st of August 2014, and the latest amendments entered into force on the 6th of June 2022. The General Part of the Environmental Code Act contains general information regarding licence proceedings and the extent of the state supervision. The Radiation Act was reviewed and re-enacted in order to ensure its consistency with the General Part of the Environmental Code Act. The new Radiation Act entered into force on the 1st of November 2016. Main legislature of radiation protection and safety is covered by these two acts. The latest amendment to the Radiation Act, which was related to organizational changes in regulatory system, entered into force on the 1st of January 2021,. On the 17th of June 2020, the *Riigikogu* passed amendments to the law, which resulted in the merger of the Environmental Board and the Environmental Inspectorate on the 1st of January 2021. The General Part of the Environmental Code Act and its implementing regulations state requirements for the Information System for Environmental Decisions and the datasets of an environmental permit. 17 regulations relevant to radiation safety and protection have been issued pursuant to the Radiation Act and the General Part of the Environmental Code Act. The Emergency Act and its implementing regulations deal with emergency preparedness. The Environmental Board may apply special measures for state supervision provided for in the Law Enforcement Act, which also contains measures for intervention in emergency exposure situations. Environmental Impact Assessment and Environmental Management System Act and its implementing regulations state the conditions of an environmental impact assessment. Penal Code applies to the imposition of punishments for offences related to radioactive material. These are the main documents used by the Government and the Ministry of the Environment as a reference. Relevant legislation on radiation safety and protection as in force on the 30th of July 2022, is given in Annex B to this Report.

The Radiation Act is supported by a "National Radiation Safety Development Plan" (NRSDP) which is a ten-year programme for development and enhancement of radiation and nuclear safety in Estonia. The objectives of the NRSDP are to minimize radioactive waste; improve

emergency preparedness; optimize the use of radiation in medicine; reduce risks from natural radiation sources and to raise awareness among the Estonian public on radiation-related issues. The first NRSDP was adopted by the Government in 2008 and covered the period until the end of 2017. The NRSDP for the period of 2018-2027 and its annexes (National Action Plan for Radioactive Waste Management (NPRWM), National Radon Action Plan) were approved by the Decree of Minister of the Environment in early 2020 (NRSDP 2018-2027). NRSDP 2018–2027 includes an analysis of the legal and regulatory framework and infrastructure, and based on the results of the analysis, identifies development needs for a ten-year period in various areas. The strategic objectives of the NRSDP 2018-2027 are the following:

1) Functioning of the radiation safety infrastructure is improved.
2) Radiation safety awareness and competence building are ensured.
3) The risks associated with radioactive waste and its management are reduced.
4) Preparedness for the prevention and resolution of radiation events is ensured.
5) The risks from natural sources of radiation are reduced.
6) Radiation safety and justified use of medical exposure are ensured.

The NRSDP 2018-2027 will be implemented based on action programmes, which are composed for periods of up to four years. Action programme for 2018-2021 was approved together with the NRSDP 2018-2027. The second action programme was composed for years 2022-2025 and the third one will cover the years 2026-2027. The Minister of the Environment approved the second action programme for 2022-2025 in January 2022. The NRSDP will be reviewed and updated as often as needed, taking into account technical and scientific achievements and expert recommendations, best experiences and practices. Changes are officially initiated with the Decree of the Minister of the Environment, which announces the intention to edit the NRSDP. Ministry of the Environment sends the Decree to all relevant authorities, who have a possibility to participate in this process and give their input. Depending on the content and volume of the changes, strategic environmental assessment might be launched when the final version of the updated NRSDP draft is composed. During this process, the NRSDP is also put on public display. The National Radiation Safety Development Plan for 2018-2027 with Annex I National Programme for Radioactive Waste Management and with Annex II National Radon Action Plan are published on the website of the Ministry of the Environment and are available to the public.

Pursuant to Subsection 29 (2) of the Radiation Act, the Ministry of the Environment organises State radiation safety audits at least every ten years and immediately when an emergency exposure situation occurs at a nuclear facility. In September 2016 Estonia hosted the IAEA IRRS mission and its follow-up mission in March 2019. From the 24th of March to the 1st of April 2019, Estonia hosted the IAEA ARTEMIS mission. Reports are publicly available on the website of the Ministry of the Environment. The reports are listed in Annex C to this Report. During the period of 2020-2022 Estonia has had one international audit. From the 22nd of March to the 30th of March 2022 Estonia hosted the IAEA pilot Advisory Mission on Radiation Protection and Safety in Medical Exposure. The final report of this mission is planned to be published on the website of the Environmental Board. In addition, the Ministry of the Environment is responsible for organizing topical peer reviews at least every six years, if applicable, which is a requirement of the Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations.

2019 IAEA IRRS follow-up mission concluded that Estonia needs to consider to ensure that there is sustainable provision of education and training in radiation safety. The implementation of this recommendation is incorporated into the NRSDP 2018-2027. Due to the fact that the responsibilities of authorities involved in ensuring radiation safety are different, the levels of

knowledge required by the staff of these bodies may be defined differently. In Estonia, there are no training courses on specific radiation topics for employees of regulators. Mostly the Environmental Board provides the training upon request for other government institutions. Occupationally exposed workers have limited access to the training events because they do not take place frequently. The training is offered by training companies, including qualified radiation experts. The training provided under the IAEA Technical Cooperation will be used to alleviate the problem. The NRSDP 2018-2027 has identified the need for online courses. The advantage of the online course is that it can be completed as soon as a person gets to a new job. As the number of people in need of a course varies from year to year, it is appropriate to use the online course in particular for training. In 2022, the national project EST9007 "Enhancing the Effectiveness of the Legislative, Regulatory, and Organizational Infrastructure and Technical Capabilities of Radiation Protection and Nuclear Safety" launched under IAEA technical cooperation programme. The project will last from 2022 to 2025. The project will enhance the effectiveness of the legislative, regulatory and organisational infrastructure and technical capabilities on radiation protection and nuclear safety in Estonia. As a result of the project the national legal and regulatory framework will be improved and number of services available to persons authorized to perform radiation activities ensuring radiation safety and protection will be increased. During the project, legislation and regulations will be drafted concerning the establishment of final disposal for radioactive waste. The focus will be on developing legislation and regulations for the selection and characterisation of the final disposal site. The second task of the project is to draft an e-learning programme on the basics of radiation protection. During the project, modules and their content are created and e-learning platform is selected. At the end of project, the user group will be given a pre-version of the e-learning programme for testing. The online course on introduction to radiation protection should be established by 2027.

According to the Radiation Act's Subsection 30 (1), the Environmental Board and the Health Board shall promote, within their area of competence, radiation awareness, use of good practice and compliance with radiation safety principles, and issue radiation and nuclear safety guidelines and information materials which are published on the website of the Environmental Board and the Health Board.

Legislative drafting, amendments to the legal acts, radiation safety policy planning and making changes to these documents is coordinated with all relevant authorities and stakeholders. In addition, in the drafting phase, usually their input is being asked. For more challenging tasks, dedicated working groups are established from relevant governmental authorities and stakeholders. Members of the public and private companies have the possibility to participate during the public display procedure. All draft versions of legal acts and national policy planning documents are put on public display. Public engagement and participation are one of the key elements in decision making in Estonia. The Government has adopted a Good Practice of Engagement. In environmental matters it is also regulated with the General Part of the Environmental Code Act's Section 28.

In the international context, Estonia has signed, ratified/approved several treaties, agreements and conventions, the listing of which is given in Annex D to this Report.

2. System of licensing

In comparison with the 8th review cycle of the Convention on Nuclear Safety, there have been no modifications in the licensing system for radiation practices. The regulatory body has remained the same. The Environmental Board, through its Climate and Radiation Department, is the one who issues authorisation of radiation practices. Article 8 of this Report describes the structure and functions of the Environmental Board and its departments as they relate to the Convention on Nuclear Safety.

The licensing system is described further below.

Radiation Act consists of 11 chapters, the relevant chapters to this Report are described subsequently. The system of licensing of radiation practices is prescribed in Chapters 3–6 (Sections 32 – 99) of the Radiation Act. The use of radiation source requires a radiation practice licence (hereinafter *licence*), which is granted by the Environmental Board upon application. A radiation source is defined as a device, a radioactive substance or an installation capable of emitting ionizing radiation or radioactive substances. According to the definition given in Section 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. Such activities are, *inter alia*:

1) production, processing (processing means chemical or physical operations on radioactive material including mining, conversion, enrichment of fissile or fertile nuclear material and reprocessing of spent fuel), use, possession, holding, storage, transportation, including import and export, and intermediate 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 Section 68 of the Radiation Act sets forth the activities for which a radiation practice licence is obligatory:

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 importation and exportation;
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.

Commencement of radiation practices or performance of radiation works which require a radiation practice licence without a radiation practice licence is prohibited.

The Subsection 36 (1) of the Radiation Act states, that a radiation source may be installed, repaired and maintained only by a person holding a radiation practice licence issued for the specified activity.

The Section 41 of the Radiation Act describes the conditions for transport of radioactive substances and devices containing radioactive substances. Radioactive substances and devices containing radioactive substances in which the activity or activity concentration of radionuclides exceeds the exemption level shall be transported by road, railway and air and waterway pursuant to the procedure provided for in legislation concerning hazardous loads.

Transportation over the state border shall comply with international agreements in force in respect of the Republic of Estonia and based on Estonian legislation.

The Subsection 96 (2) of the Radiation Act describes the activities in the case of which natural radiation sources may cause exposures to workers or members of the public in excess of the effective dose limits established for members of the public. Activities, in the case of which natural radiation sources may cause a significant increase of the exposure of workers and members of the public, are following:

1) extraction of rare earths from monazite;
2) production of thorium compounds and manufacture of thorium-containing products;
3) processing of niobium/tantalum ore;
4) oil and gas production;
5) geothermal energy production;
6) TiO2 pigment production;
7) thermal phosphorus production;
8) processing of zircon and zirconium;
9) production of phosphate fertilizers;
10) cement production and maintenance of clinker ovens;
11) operation of coal-fired power plants and maintenance of central heating boilers;
12) phosphoric acid production;
13) primary iron production;
14) tin, lead and copper smelting;
15) operation of groundwater filtration facilities;
16) mining of ores other than uranium ore.

If, during performing work which involve increased natural radiation, a worker receives or may receive an effective dose that is higher than the upper annual limit of the effective dose of members of the public established under the Radiation Act, such activities are deemed to be radiation practice and a radiation practice licence needs to be applied for.

Under the Radiation Act nuclear facilities are subject to the authorization by the Environmental Board. According to the Section 79 of the Radiation Act, it is clearly stated that the licence to operate a nuclear installation can be applied only after the *Riigikogu* has adopted a decision on commissioning of a nuclear facility.

Radiation practice licence is required for all activities involving ionizing radiation, except in the cases specified in subsection 68 (2) of the Radiation Act. This subsection provides exemptions to the use of a radiation source for which radiation practice licence is not required. The Regulation No 40 of the Minister of the Environment "Conditions for exemption and clearance of radioactive substances used or generated in radiation practices, and requirements for applications for exemption and clearance" (hereinafter *Regulation No 40 of the Minister of the Environment*) provides the conditions and levels of exemption and clearance of radioactive substances used or generated in the radiation practices, and the procedure for application for exemption and clearance. The regulation was issued in 2021 and transposes the requirements for exemption and clearance based on the Council Directive 2013/59/EURATOM, and replace the previous regulations on same subject based on requirements of Council Directive 96/29/Euratom. The new regulation sets out more clearly the proceedings of the applications for exemption and clearance of radioactive substances and specifies the amount and content of the data to be provided in the application.

Upon exemption and clearance of radioactive substances from the implementation of the requirements of the Radiation Act, the following conditions shall be taken into account:

1) the effective dose incurred by members of the public from radiation practices related to the use of artificial radionuclides is 10 μSv or less in a year;
2) the effective dose incurred by a member of the public from radiation practices related to the use of naturally occurring radioactive materials is 1 mSv or less in a year;
3) in assessing the effective dose, the maximum potential effective doses through significant exposure pathways shall be taken into account.

For exemption or clearance of radioactive substances the applicant must submit an application to the Environmental Board. The Environmental Board decides upon application that the exemption or clearance of radioactive substances is or is not an optimal course of action. Practices may also be exempted or cleared from regulatory control if the activity or activity concentrations of the radionuclides concerned exceed the exemption or clearance levels set out in Annexes to the Regulation, provided that the dose criteria to the member of public for exemption or clearance are met and, on the basis of a radiation safety assessment, exemption or clearance is the best solution taking into account economic, social and environmental impacts. In this case the radiation safety assessment shall be prepared by a radiation expert, medical physics expert or any other person competent in the field of radiation safety.

According to the Subsection 34 (1) of the Radiation Act, radiation practices are divided into the following risk categories depending on the risk presented by the radiation practice or the radiation source:

1) low risk radiation practices during which an exposed worker incurs or may incur an effective dose of up to 1 mSv per year;
2) moderate risk radiation practices during which an exposed worker incurs or may incur an effective dose of up to 6 mSv per year;
3) high risk radiation practices during which an exposed worker incurs or may incur an effective dose exceeding 6 mSv per year.

In addition to the provisions of Subsection 34 (1), a radiation practice is of high risk if the radiation practice licence is applied for:

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

The Administrative Procedure Act and the General Part of the Environmental Code Act apply to the administrative procedure and to the proceedings of radiation practice licences issued for radiation practices provided for in the Radiation Act, taking into account the specifications provided for in the Radiation Act. In determining the terms of the licence, and in amending or revoking of the licence, the Environmental Board proceeds from the specific radiation practice, taking into account the main principles of radiation safety. When granting of a radiation practice licence, it can be subject to additional terms to ensure safety. The terms of the licence shall be weighted and justified based on the Radiation Act and the Administrative Procedure Act. According to Section 76 of the Radiation Act a radiation practice licence is issued, in the case of moderate and high risk radiation practices, for a term of up to five years. For low risk radiation practices the licence is issued for an unspecified term. Since the Radiation Act does not provide for the extension of the radiation practice licence, a new licence needs to be applied for to continue radiation practice.

Section 70 of the Radiation Act describes the scope of the application. 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) data which characterize the radiation source and technology used and the equipment;
2) data on radioactive waste or emissions generated during radiation practices, the management thereof and waste packaging compliance criteria and radioactive waste storage premises;
3) recovery plan of radiation source after the termination of use of the radiation source;
4) upon application for a licence for management, intermediate storage and final disposal of radioactive waste, data on the management or methods of final closure of repositories for radioactive waste;
5) 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;
6) in the case of moderate and high risk radiation practices, dose constraints on annual equivalent or effective doses of exposed workers and effective doses of members of the public upon proposed radiation practices under normal working conditions;
7) emergency response plan to emergency exposure in the case of radiation practices involving high risk which is based on the assessment of potential exposures;
8) financial collaterals required for recovery of radioactive sources, equipment containing thereof and radioactive waste;
9) description of the radiation safety quality management system;
10) data on exposed workers and their professional training;
11) 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;
12) plan for radiation monitoring and data on the equipment used for radiation monitoring.

A radiation safety assessment is composed to evaluate the effective dose of the workers. The radiation safety assessment should cover the following information: 1) description of a radiation source and a radiation procedure, duration, frequency and location, covering stages from the installation of the radiation source to its cessation of use; 2) measures to control of exposure, which includes description of design, personal and collective protective equipment, local rules, training and competence; 3) dose estimation in normal working conditions for exposed workers and for the member of public; 4) identification of the possible accidents and dose estimation in accident conditions for exposed workers and for the member of public. In conclusion, a risk category is defined and, where appropriate, control measures for dose reduction are set out.

An application for a radiation practice licence together with the annexes thereto shall be submitted to the issuer of licences through the Information System for Environmental Decisions and the application shall be certified by a digital signature.

The data and content of the documents to be submitted when applying for the radiation practice licence are specified in Regulation No 60 of the Minister of the Environment, “Detailed requirements for applications for radiation practice licences, lists of data of applications and radiation practice licences, and lists of data characterizing radiation sources used to keep lists

of nuclear materials" (hereinafter *Regulation No 60 of the Minister of the Environment*). The Regulation No 60 of the Minister of the Environment describes formal requirements:

1) for proceedings for the application of the licence (applying, amendment and open proceedings);
2) for the content for the application of the licence;
3) for the forms for the licence.

Pursuant to the Regulation No 60 of the Minister of the Environment, 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. The licensing procedure ensures a graded approach, taking into account the different levels of risk of the radiation practice, resulting in different requirements for the content and amount of data, the application review and evaluation process, and the terms of the licence, including the validity of the radiation practice licence. The Environmental Board has issued internal guidelines for the proceeding of the applications for radiation practices, which sets out rules for a graded approach to the proceedings. In addition, the Environmental Board has issued radiation and safety guidelines and information materials which are published on the website to promote radiation awareness, use of good practice and compliance with radiation safety principles as well to assist the completion application forms. At present, the Environmental Board is conducting an analysis for introducing notification system for certain radiation practices.

According to Subsections 75 (1 and 2) of the Radiation Act, in addition to the requirements in Section 53 of the General Part of the Environmental Code Act, the radiation practice licence shall set out the following:

1) number and date of issue of the radiation practice licence;
2) name of radiation practice;
3) data on and description of radiation sources;
4) methods of management of radioactive waste, maximum quantities and management and storage facilities thereof;
5) maximum quantities of radioactive emissions, and modes of release thereof into the environment;
6) requirements for radiation safety and radiation monitoring arising from radiation practice and the specific character thereof;
7) risk level of the radiation practice;
8) existence of financial collateral.

The licence issued for radiation practice related to high-activity sources contains in addition the following information:

1) radiation protection competence of the workers, including training of them;
2) requirements for the radiation source, container of the radiation source and additional equipment and their maintenance;
3) management of disused sources until delivery thereof to a manufacturer, another person holding the radiation practice licence or radioactive waste storage facilities.

A radiation practice licence and the decision on issue thereof shall be prepared via the Information System for Environmental Decisions and signed digitally.

A holder of a radiation practice licence shall submit an application to the issuer of licences via the Information System for Environmental Decisions if the holder intends to:

1) commission new or additional radiation sources;
2) change the data of the radiation source indicated in the radiation practice licence or terminate the use thereof;
3) deliver the radiation source to another person or dispose of it as radioactive waste;
4) change the radiation practice, method of management, maximum quantities or storage facilities of produced radioactive waste determined in the radiation practice licence;
5) change the location, facilities or premises where the radiation practice is carried out;
6) employ a new radiation safety specialist;
7) otherwise significantly change the radiation practice described in the licence.

Upon receiving an application to amend the radiation practice licence, the Environmental Board reviews the data and documents submitted by the applicant and, if needed, checks their conformance to the actual situation pursuant to the Regulation No 60 of the Minister of the Environment. Where a change is critical from the perspective of radiation safety, the Environmental Board may require that the holder of the licence submits an application for a new radiation practice licence. The specialists of the Environmental Board have access to all premises during the licensing process.

The provisions of open procedure are applied to the procedure of granting and amending radiation practice licences (pursuant to Section 71 of the Radiation Act) if a radiation practice licence is applied for the following activities:

1) exploitation, closure and decommissioning of any facility of nuclear fuel cycle;
2) 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;
3) management and transportation of radioactive waste.

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-activity radioactive waste, final disposal of merely radioactive waste or disposal thereof for over ten years on a site other than the place of generation.

According to Sections 47 and 48 of the General Part of the Environmental Code Act, when an application for an environmental permit complies with the requirements established by legislation, the issuer of the environmental permit, in the event of open proceedings, immediately publishes a notice on the submission of the application. The notice must be

published in the official online publication *Ametlikud Teadaanded*[1] and in the local newspaper or county newspaper. The notice must be published in at least one national newspaper where the activity permitted in the environmental permit may result in a significant regional or national environmental nuisance. An application for an environmental permit and the draft administrative decision to be made thereon are displayed to the public by the issuer of the permit in accordance with the procedure provided for in the Administrative Procedure Act in at least one public building or place of the rural municipality, city or another settlement of the location of the proposed activity or at the seat of the issuer of the environmental permit or at the location of the proposed activity. The issuer of the permit determines the location of the display, taking into account the possible extent and scope of the environmental nuisance of the proposed activity. As the environmental information must be available to everyone, the Environmental Board publishes all applications for environmental permits, draft decisions and related materials on its website. Within the time limit set by the issuer of a licence, everyone has the right to submit to the issuer of the licence positions and questions on the publicly displayed application for the licence or draft administrative decision to be made thereon. The time limit must not be shorter than two weeks as of informing of the display.

In June 2018, an amendment of the General Part of the Environmental Code Act and the Radiation Act entered into force about submission of an application for a radiation practice licence, together with the annexes and issue a radiation practice licence and the decision via the Information System for Environmental Decisions. The digitally signed application for an authorization of radiation practice, shall be submitted and formalized through the Information System for Environmental Decisions, which is an online system. Automated data processing is used to maintain the database and the data is stored in a digital form. The purpose of maintenance of the Information System for Environmental Decisions is to facilitate and simplify the application and the processing of different kind of environmental permits and radiation practice licences, the performance of monitoring, reporting duties and other duties related to the permit or licence as well as the retention, use and availability of collected data and to ensure the safety and physical protection of radiation sources and nuclear material. The Information System for Environmental Decisions is established by Regulation No 20 of the Minister of the Environment "The environmental decisions information system and its statutes" pursuant to the General Part of the Environmental Code Act. Data exchange is provided with the following databases, *inter alia*:

1) the commercial register –data on the right of representation of a legal person;
2) the system of address details – address data;
3) e-State Treasury – data on the state fee paid.

The Environmental Board is responsible for maintaining several the registries related to radiation safety. Estonia has a register of the radiation sources and nuclear material since 1997. As the register was technologically obsolete and without any technical support, the Environmental Board started the development of a new register in order to meet today's requirements in 2017. Decision was made to develop the register together with proceedings of applications of radiation practice licences and reporting thereof into Information System for Environmental Decisions to keep the data in the same database as well as to simplify the

[1] https://www.ametlikudteadaanded.ee/eng/index
Ametlikud Teadaanded is an official online publication of the Republic of Estonia, which publishes notices, invitations, summons and announcements (hereinafter *notice*) that must be published according to an Act or a regulation of the Government of the Republic or a regulation of a minister and is not subject to publication in another publication. Everyone has the right to access notices published on the website of *Ametlikud Teadaanded* without charge until termination of publication. The access to archival data is provided in case of justified interest.

maintenance of the data. The Information System for Environmental Decisions is in use for the authorization of radiation practices, for reporting data on compliance with obligations and the requirements provided for in the licence and in the Radiation Act, and for the register of radiation sources and nuclear material since the first half of 2018. The Environmental Board collects and analyses the inventory reports of radiation sources as well as data on compliance with obligations and the requirements provided for in the licence and in the Radiation Act. The data related to radiation practices are not publicly available based on Public Information Act, General Part of the Environmental Code Act and Radiation Act.

3. System of the inspection and enforcement

Compared to the 8th review cycle of the Convention on Nuclear Safety, there has been an organizational change in the inspection and enforcement system. The Environmental Board, through its Supervision Department, has been the regulatory body for inspection and enforcement since the 1st of January 2021. The Supervision Department is in charge of overseeing all aspects of the environment, including radiation safety and protection, as well as enforcing governmental coercive actions against offenders. Article 8 of this Report describes the structure and functions of the Environmental Board and its departments as they relate to the Convention on Nuclear Safety.

The inspection and enforcement system is described further below.

The main legal acts regulating supervision over radiation safety are the Environmental Supervision Act, the Penal Code, the Code of Misdemeanour Procedure, the Law Enforcement Act, the Administrative Procedure Act and the Radiation Act. Pursuant to the Environmental Supervision Act, the Environmental Board executes environmental supervision in Estonia at the state level. The Environmental Board coordinates and executes supervision of all areas of environmental protection and the use of natural resources, as well as conducts proceedings in environmental violations. The Environmental Board has access in a potential situation of danger or in a case of suspicion to all premises, buildings, etc., for inspection purposes and has granted a right to withdraw licences and suspend operations in unsafe situations. The Environmental Board has the right to suspend unlawful activities damaging or dangerous to the environment, if such activities endanger the life, health or property of people.

Chapters 9 and 10 of the Radiation Act (Sections 112 – 122) establish the requirements for state supervision and liability conditions. The Environmental Board exercises state supervision over radiation safety, supervision measures and defines the misdemeanours related to radiation practices and radiation sources.

Regarding radiation safety, the responsibility of the Environmental Board is to implement measures provided by law for the prevention of illegal activities and implementation of mandatory environmental protection measures. Upon identification of a practice not compliant with the Radiation Act, the Environmental Board initiates administrative or misdemeanour proceedings according to the procedure set forth in the Penal Code (Sections 1, 2, 3), the Administrative Procedure Act (Sections 2, 8), and the Code of Misdemeanour Procedure (Sections 1, 8, 9, 10). Pursuant to Section 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, and
3) applies a state supervision measure only as long as its goal has been achieved or can no longer be achieved.

Pursuant to Section 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 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. Fines in case of radiation practice are imposed on the basis of the rates set forth in Sections 117–121 of the Radiation Act and the Code of Misdemeanour Procedure (Subsection 55 (2)). According to Section 122 of the Radiation Act, the Environmental Board shall conduct extra-judicial proceedings for misdemeanours specified in Chapter 10 of the Radiation Act, as well as pre-trial proceedings for crimes. According to Subchapter 3 of the Penal Code, engaging in radiation practices without a radiation practice licence, violating requirements for handling radiation sources, or violating requirements for handling radiation sources through negligence is punishable by a monetary penalty or imprisonment if it endangers human life or health or threatens the quality of water, soil, or ambient air, or individuals of animal or plant species.
The inspections are carried out either based on the annual work plan, in the course of control raids, or as a response to complaints. The annual work plan is approved by the Director General of the Environmental Board. For scheduled inspections, the time of inspection is agreed upon, for complaints the inspection visits could be announced or unannounced, control raids are unannounced.

The work plan for inspections of facilities connected to radiation practices is developed using a graded method based on risk assessments of radiation practices. The selection of sites is based on the field of activity of radiation practice, the validity of the radiation practice licence, the conditions provided for in the licence and the data on compliance therewith, which data are available in the Information System for Environmental Decisions. The findings of prior inspections, which can be found in the object control database, are also considered. High-risk radiation practices are advised to be checked annually. The inspection of moderate and low-risk radiation practices is risk-based (taking into account the previous monitoring results and potential risks). According to the work plan, inspections are recommended to be performed with a frequency of at least once every three years for a moderate risk radiation practice and once every five 5 years for a low risk radiation practice. The aim of control raids is to check the situation unannounced, i.e., whether or not radiation practice occurs at the site. Depending on the subject of the complaint, consideration should be given to whether an announced or unannounced inspection is necessary. Scrap metal dealers and manufacturing enterprises are among the other sectors of environmental inspections that demand additional examination when it comes to potential activities related with radiation sources.

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. If applicable, the information given in the application for a radiation practice licence will be examined. In particular, the following features are checked:
1) the number and the data of equipment, installation and placement of the radiation source in the premise;

2) quality control and maintenance of the equipment;
3) marking of the radiation source and the premises;
4) individual dose monitoring;
5) personnel radiation safety training records;
6) personal protection equipment;
7) radiation safety measures;
8) monitoring of control and supervised areas;
9) radiation safety quality management system;
10) radiation safety instructions and an emergency response plan.

During inspections, the Environmental Board has the authority to inspect the full radiation safety quality management system described in the Radiation Act. If necessary, the licensee should be consulted on how to implement radiation protection and safety requirements in the best way.

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

The Environmental Board maintains the object inspection database system (hereinafter *object inspection database*), which goal is to process and analyse data relating to supervision proceedings, and notices submitted on environmental use. The object inspection database contains *inter alia* inspection documents and results of the inspections. The object inspection database is established with the Regulation No 46 of the Minister of the Environment "Establishment of the object inspection database system and its statutes" pursuant to the Environmental Supervision Act.

Environmental protection inspectors are independent in their activities and make decisions on a case-by-case basis. In order to ensure consistency in enforcement actions across similar non-compliances with regulatory requirements and to ensure traceability of the enforcement action, a set of internal guidelines for imposing penalties was established by the Environmental Board. The following in-house documents have been composed to aid the inspection process:
1) a strategy plan of inspection (indicates obtaining inspection equipment, human resources and continuous training of inspectors as main priorities);
2) guidelines for drafting the work plan;
3) guidelines for conducting inspections;
4) check-lists for the inspection of various types of radiation practices;
5) guidelines for imposing penalties and penalty matrix.

Quality control of inspector`s decisions is carried out by the chief inspector annually, including assessment of inspection protocols and discussion of necessary improvements, and results are discussed directly with inspectors. In addition, enforcement decisions are reviewed by the Legal Department of Environmental Board. The Environmental Board limits itself with recording shortcomings and pointing out non-conformances if they do not cause disturbances in radiation practice and there is no threat to workers and members of the public. Although the Environmental Board has developed a general set of internal guidelines for imposing penalties and a penalty matrix that cover different ranges of fines and cessation of activities, there is no criteria for determining conditions and deadlines for taking corrective actions in response to a

non-compliance discovered during inspection. The non-compliances are described in inspection report and deadline for corrective action is assigned by inspector on a case by case basis. In recent years, violations of conditions of radiation practice licences have been mostly discovered in radiation practices with low and moderate risk.

4. Consideration of nuclear power

The "Estonian National Energy and Climate Plan 2030" and the "Analysis of Opportunities for Increasing Estonian Climate Ambition" have proposed nuclear energy after 2030 as one possible solution to increase Estonia's energy security and achieve climate goals.

On the 5th of November 2020, Estonian Government adopted a decision to establish a Working Group of Nuclear Energy (NEWG) to define the nation's positions towards the issue. NEWG was established by the Ministry of Environment with the decree of the minister on the 20th of April 2021. NEWG is chaired by the Secretary General of the Ministry of the Environment. Members of the working group are high-level representatives of the following ministries: Ministry of the Environment, Ministry of Finance, Ministry of Justice, Ministry of Economic Affairs and Communications, Ministry of Social Affairs, Ministry of Education and Research, Ministry of Foreign Affairs, Ministry of the Interior, Ministry of Defence.

The work of the NEWG is led by the Ministry of the Environment due to its leading role in the development of radiation protection and safety policy, including nuclear safety, and as a contact point for the IAEA. The Ministry of Economic Affairs and Communications is responsible for the energy policy and therefore strongly represented in the NEWG.

The Nuclear Energy Working Group adheres to the International Atomic Energy Agency guideline NG-G-3.1 (Rev.1) "Milestones in the Development of a National Infrastructure for Nuclear Power" (hereafter *IAEA Milestone Approach*) (Figure 1), analysing all 19 nuclear energy infrastructure issues described in the document. As of July 2022, the NEWG is analysing Phase 1 activities by conducting various studies of the infrastructure needs to introduce nuclear energy. By the end of Phase 1 the country should be ready to make a knowledgeable decision to introduce a nuclear power programme. In the end, it has to answer the question of whether and why nuclear energy would be the best option for the country. The first phase will include a thorough analysis of the effects of nuclear energy deployment. Studies and investigations are carried out on the basis of available data to determine whether and where in Estonia it is possible and expedient to consider the locations of a nuclear power plant and spent fuel disposal site, as well as to identify potential sites for nuclear power plant and spent fuel disposal site, from which candidate sites are chosen. If it is decided that a nuclear power plant and spent fuel disposal facility should be established in Estonia, a national special planning document must be prepared to select the location of the nuclear power plant and spent fuel disposal facility.

In its analysis, the NEWG is focusing only on small modular reactors and Estonia has excluded the possibility of constructing a traditional nuclear power plant in the country. Annual electricity consumption in Estonia is about 8.44 TWh. Since already today a great proportion of it is produced by renewables, it is estimated that in 2030s, in order to compensate the phasing out from fossil fuels, Estonia would need additionally around 600 megawatts of base load electricity production that would not be dependent from climatic conditions.

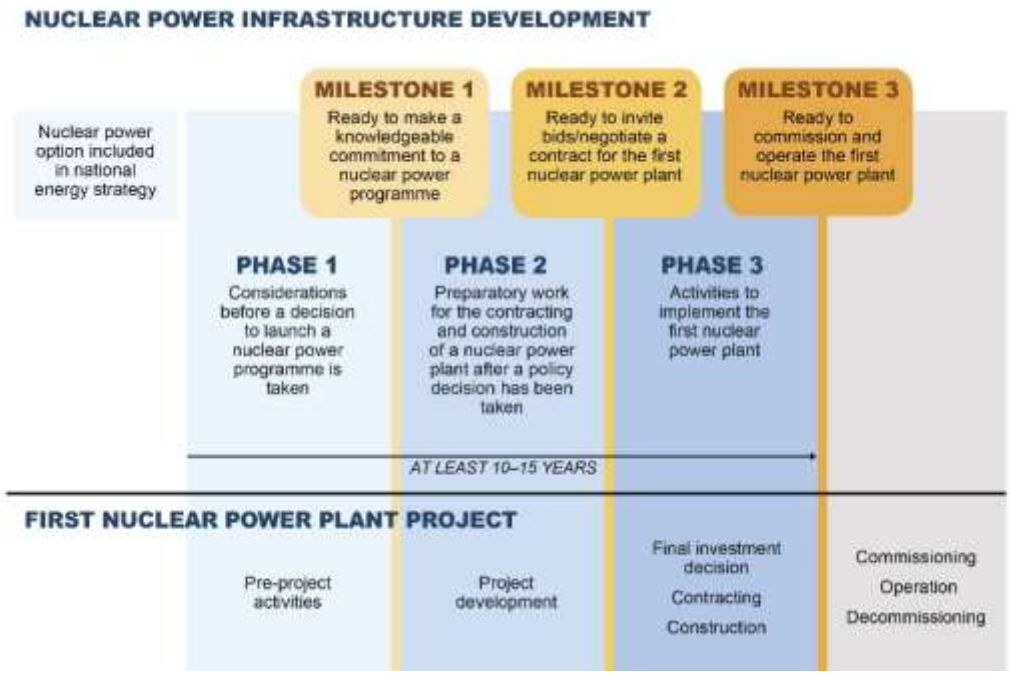

Figure 1. Three phases of preparation for the deployment of nuclear energy by the IAEA Milestone Approach.

The NEWG's responsibilities are as follows:

1) to provide an overview of the country's energy needs and ensuring energy security in terms of nuclear energy, the possibilities of nuclear energy and its suitability for the existing electricity network;
2) to give an overview of the development directions of the energy economy of the neighbouring countries in the perspective of nuclear energy and the possibilities of co-operation to achieve climate neutrality; to analyse the technologies under development and the projects to be implemented, their safety and waste management together with an assessment and overview of the reactor types suitable for Estonia and their development stage;
3) to analyse the possibilities for the development of the nuclear power plant, including whether it should be done by the state or the private sector, and what are the possibilities for cooperation;
4) to provide an overview of the obligations (administrative, related to international agreements, financial, etc.) that would entail the construction of a nuclear power plant for the state and their possible differences based on the developer of the nuclear power plant (state or private developer);
5) to analyse the possibilities of waste management generated at the nuclear power plant and the solutions for the subsequent closure of the plant (incl. to provide an estimate of the costs of final disposal and an overview of the possibilities for financing them);
6) to map out the current state of sectoral legislation, competencies, know-how and the existing workforce, and identify development needs with a possible indicative timetable and costs;
7) to map out the need for expert assessments, analyses and studies, together with a possible indicative timetable and costs;
8) if necessary, to involve experts (including a consultant) in its work and form sectoral expert groups to achieve the set objectives, which include representatives of ministries,

universities, interest groups, and professional associations with competence in a specific field;

9) to agree on a communication strategy;
10) to submit conclusions and proposals to the Government of the Republic regarding the conditions and possibilities for the introduction of nuclear energy. The first interim report and an overview of the results of the group's work will be presented no later than in September 2022;
11) to prepare a final report in accordance with the IAEA Milestone Approach, submit an audit report to the IAEA (Integrated Nuclear Infrastructure Review (INIR) mission) and the Government together with recommendations on whether and under what conditions a nuclear power plant could be built in Estonia.

The final report is expected to be ready by end of 2023 to be presented to the Estonian Government. The deadline for the draft final report is currently the first half of 2023, in order to request an IAEA Integrated Nuclear Infrastructure Review (INIR) mission in the second half of 2023.

In the meantime, by September 2022, the Government expects an interim report from the NEWG, to get an overview of work and analyses done.

As of July 2022, the following analyses and studies, to support NEWG work, are ongoing:

1. The preliminary site survey – the study's goal is to screen potential sites for the construction of a nuclear power plant and spent fuel disposal facility, using exclusion analysis. Different small modular reactors and their technical parameters are used as a reference to assess the location, with the worst scenarios chosen based on the parameters (maximum area, heaviest, etc.). The survey gathers information about potential sites' local environmental, geographical, and infrastructure aspects. An international procurement procedure was launched in this regard. The service provider contract was signed on the 3rd of June 2022, with a term of February 2023.
2. The study of nuclear security – the study will be carried out in cooperation with the Estonian Academy of Security Sciences and International Centre for Defence and Security. Outcome of the study is recommendations for the development of the national nuclear security policy and strategy. It gives an overview of roles and responsibilities in security field, assesses the need for join additional international instruments (or to supplement existing ones), and the need for development of competencies and human resources. The study must be completed by the end of 2022.
3. A study that will analyse human resources, develop a human resource development plan, and provide an overview of the regulatory framework appropriate for Estonia's nuclear programme. The procurement procedure has begun. The research must be finished by the end of 2022.
4. A study that will analyse the existing legal framework in Estonian, make recommendations for improving it, and draft the nuclear law. The procurement procedure has begun. The study must be completed by the end of 2022, with a draft nuclear law due in March 2023.

As Estonia does not have competence or experience to run a nuclear energy programme, cooperation and advice from IAEA and countries with experience and knowledge is crucial.

Article 8. 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 7, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.
2. Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy.

In comparison with the 8th review cycle of the Convention on Nuclear Safety, there has been a change in the legal and regulative framework concerning the regulatory body. Since the 1st of January 2021, the new regulatory body is the Estonian Environmental Board as a result of merging the Environmental Board and the Environmental Inspectorate. The new authority continues with the same tasks and responsibilities as the previous Environmental Board and the Environmental Inspectorate, including authorization, review and assessment, inspection and enforcement of radiation practices.

1. Establishment of the regulatory body

According to Section 25 of the Radiation Act, radiation safety activities are organised by the Ministry of the Environment through the Environmental Board within its area of competence, taking into account field-specific operational experience, results of decision-making procedures, development of relevant technology, and scientific researches, among other things. From the point of view of ensuring radiation safety, independence is made possible by the fact that radiation safety matters fall under the purview of the Ministry of the Environment and not the Ministry of Social Affairs or the Ministry of Economic Affairs and Communications, which would lead to stronger economic pressure on decision-making in the field of radiation safety. The Ministry of Economic Affairs and Communications elaborates, manages and implements the state's economic policy and economic development plans in a number of fields, including energy. The Ministry of Social Affairs is responsible for protection of public health and healthcare arrangements. Each ministry's status, areas of responsibility, tasks, and management are outlined in its statutes.

The Environmental Board is in charge of carrying out regulatory functions and responsibilities for radiation safety. The Environmental Board is in charge of evaluating applications and issuing radiation practice licences as well as activity licences for qualified radiation experts, conducting radiation monitoring, and managing the emergency notification and early warning system, and supervising the fulfilment of radiation practice licence conditions and the obligations of holders of radiation practice licences. It also has the authority to impose sanctions and penalties, as set out in the legislation, for violations of regulatory requirements. The Environmental Board has the legal right to make independent regulatory judgments and decisions free from any influences that might jeopardize safety, such as pressures brought on by shifting political or economic conditions, pressures from other government agencies, or

pressures from other organizations. The status, areas of activity and tasks as well as the management of the organization is set forth in the Statute of the Environmental Board (Regulation No 47 of the Minister of the Environment). The Environmental Board has its own budget based on the annual national Fiscal Act. The Ministry of Environment coordinates and executes supervisory control of the activities of the regulatory body.

According to the National Audit Office Act, the State Audit Office exercises economic control in order to assure the *Riigikogu* and the public that the funds of the public sector are used legally and effectively. The State Audit Office in their sectoral audits in turn, inspects the activities of the Ministry of the Environment and the Environmental Board.

There is no advisory body in Estonia in the domain of radiation protection but authorities have a chance to use the services of qualified radiation experts and universities.

2. The Estonian Environmental Board

The Environmental Board was established in 2009 as a result of a merger of several environmental authorities in Estonia, including the former Estonian Radiation Protection Centre, established in 1996. On the 17th of June 2020 the *Riigikogu* (Parliament of Estonia) passed amendments to the law merging the Environmental Board and the Environmental Inspectorate into one agency on the 1st of January 2021. The merged authority bears the name of the Estonian Environmental Board (hereinafter as *Environmental Board*). The aim of merging the Environmental Board and the Environmental Inspectorate was to simplify communication with the state for the citizens, to organise services more efficiently, and to reduce bureaucracy. The new authority continues with the same tasks and responsibilities of the previous Environmental Board and the Environmental Inspectorate, including authorisation, review and assessment, inspection and enforcement of radiation practices.

The Environmental Board's task is to implement state policies on environmental use, nature conservation and radiation safety, and to monitor the fulfilment of the laws and norms established for the protection of the natural environment. It is also involved in the development and updating of legal acts and other official documents regulating the environmental field. The services offered by the Environmental Board are divided into three main areas – environmental resource management area, wildlife area and supervision area, which are headed up by deputy directors. The organizational structure of the Environmental Board is given in Figure 2. The Climate and Radiation Department of the Environmental Board handles the review, assessment and issuance of applications for radiation practice licences, and the Supervision Department of the Environmental Board is responsible for the implementation of supervision and enforcement measures.

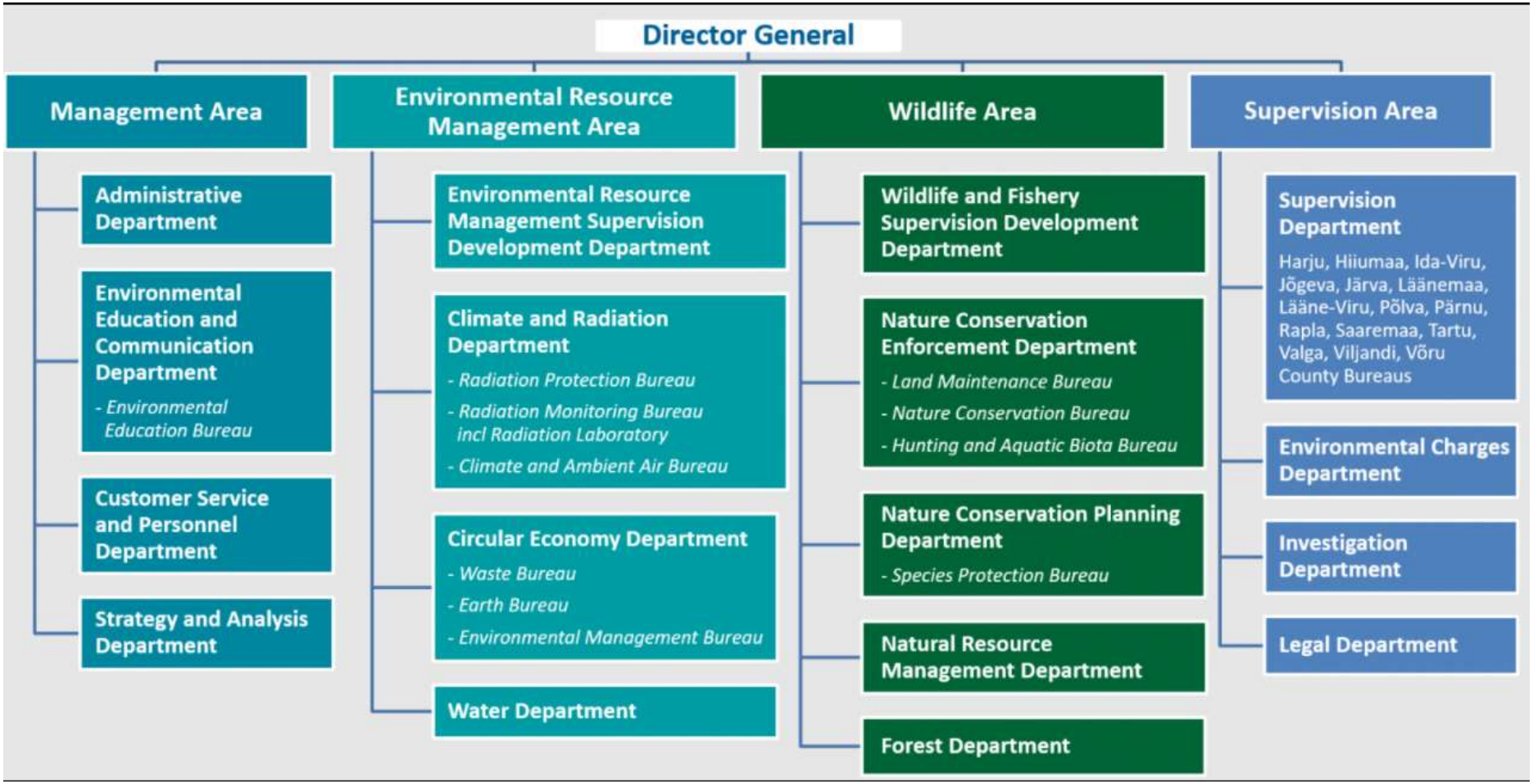

Figure 2. Organizational structure of the Environmental Board.

According to its statutes, the Environmental Board has the following duties:

1) provide and develop public services in its fields of activity;
2) organise environmental education and preventive activities through advice, training and involvement;
3) grant environmental protection permits, approvals, consents, prescriptions and take other decisions in the cases and in accordance with the procedure laid down in the legislation;
4) manage protected natural objects, plan and implement the protection of natural objects and assess the effectiveness of conservation;
5) organise activities related to forest management, reforestation and the protection of forest biodiversity;
6) conduct recreational fishing and hunting activities;
7) organise radiation safety and protection activities;
8) organise the collection, analysis, preparation and submission of data on environmental use, nature conservation and environmental inspection, and an assessment of the effectiveness of the implementation of environmental policy;
9) organise the prevention and remediation of environmental damage;
10) participate in the environmental impact assessment and strategic environmental impact assessment and carry out an ex-post assessment of the environmental impact assessment;
11) organise the calculation and allocation of environmental charges;
12) carry out state supervision, prevention and prosecution of offences and apply public coercion;
13) organise an on-call service in its field of activity;
14) participate in the development of emergency risk analyses and emergency preparedness plans, and perform crisis management tasks;
15) participate in the development of policies, development documents, and legislation by issuing opinions on the draft, and proposing amendments and additions;
16) develop cooperation with public authorities, local government entities, non-governmental organisations, the public and relevant foreign authorities, and international organisations;
17) provide paid services in the cases and in accordance with the procedure laid down by law;
18) carry out other functions arising from the law and legislation on the basis of it.

The tasks and management of each department of the Environmental Board are defined in the statutes of each department, approved by the General Director of the Environmental Board. In 2022, 540 employees were employed in the Environmental Board.

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 reviews. As a result of the performance review interviews, training needs are identified which the human resource manager consolidates into the training plan of the Environmental Board. Performance reviews are conducted and competences are evaluated by direct supervisors. During a performance review the following aspects are covered:

1) evaluation of competences (incl. a discussion between the employee and the employer to clarify development needs);
2) evaluation of task fulfilment;
3) setting of goals for the next period (tasks and training courses in the next period).

Based on the performance reviews, an individual work and training plan is compiled for each employee every year. 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).

The Environmental Board applies a process management model in its management system. Processes cover all the important activities of the organization and their continuous development is one of the principles of process management. The management system of the Environmental Board is adequately documented, although it is not described in a single document.

Opinions of and feedback from customers and various stakeholders are an important part of the management system of the Environmental Board. Regular meetings with major partners, e.g. the Estonian Council of Environmental NGOs, advisory council of customers, other public authorities, local municipality governments, and sectoral unions associations are organised to consolidate discussions and opinions. A customer feedback system in the form of an e-mail survey has been introduced. Results are analysed and reports are available to the entire organization in the Intranet. The Environmental Board has set up an advisory council of customers comprised of representatives of entrepreneurs from different sectors who deal with the services of the Environmental Board on a day-to-day basis. This is an advisory body that discusses problems associated with the services of the Environmental Board and shapes joint standpoints regarding the development of services. Information about the advisory council and its minutes are available on the public web page[2].

In 2021, the Environmental Board's Yearbook 2020 was published, which is publicly available[3]. Since the Environmental Board and the Environmental Inspectorate were still operating as separate institutions in 2020, the annual overview reflects the activities of both institutions. The book presents the most important trends and events of the year, as well as of the results and statistical summary of supervision.

2.1 The Climate and Radiation Department of the Environmental Board

The Climate and Radiation Department consists of three bureaus located in the administrative area of Environmental resource management of Environmental Board (Figure 2). In relation to the Convention on Nuclear Safety, this section describes the functions of this Department in relation to radiation protection and safety.

According to its statutes, the Climate and Radiation Department has the following duties in the field of radiation protection and safety:
1) implement action plans in the field of radiation;
2) participate in the development and implementation of the radiation protection and safety policy, development plans and programs;

[2] https://keskkonnaamet.ee/kliendinoukojad
[3] https://keskkonnaamet.ee/keskkonnaametist-uudised-kontakt/organisatsioon/aastaraamat-2020#keskkonnaj%C3%A4relevalve

3) cooperate with public authorities, local authorities and non-governmental organisations to implement environmental policies;
4) draw up instructions and verify compliance with them;
5) perform licensing of radiation practices;
6) evaluate radiation safety of existing and applied radiation practices;
7) prepare the certificates of the radiation expert;
8) organise the assessment of population doses and doses to critical groups arising from radiation practices;
9) maintain the registries related to radiation safety (state registry of the doses of exposed workers; registries of the radioactive sources and nuclear material);
10) organise monitoring of radionuclides in air, soil, water and food, radioactivity in the environment, and analyse the results;
11) perform laboratory analyses related to radiation safety;
12) perform assessment of public exposures;
13) ensure the operation of an early warning system against transboundary radiological hazards;
14) organise public engagement and information, including disclosing and regularly updating information in the field on the website of the Environmental Board and in other information channels;
15) serve as contact point with the European Atomic Energy Community and the International Atomic Energy Agency;
16) cooperate internationally in its field, organise the fulfilment of obligations arising from conventions and external agreements, projects;
17) draw up risk analyses and response plans for radiological emergencies and manage the resolution of emergencies arising from radiological hazards;
18) exercise national supervision in the implementation of the safeguards referred to in Chapter 8 of the Radiation Act;
19) represent the Environmental Board on matters in its field in committees, councils and working groups;
20) provide paid services to ensure radiation safety and protection related to its operational activities.

The Climate and Radiation Department employs 18 people in the field of radiation safety. This figure was unaffected by the formation of a new regulatory body. The budget is sufficient to meet the obligations of the regulatory body.

2.2 The Supervision Department of the Environmental Board

Pursuant to the Environmental Supervision Act, environmental supervision in Estonia at the state level is executed by the Environmental Board. The Environmental Board 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.

As of January 2022, the Supervision Department has a total of 145 employees, which includes inspectors and heads of bureaus. This figure was unaffected by the formation of a new regulatory body.

Radiation safety supervisions are carried out by Supervision Department County Bureaus. According to the annual inspection plan, planned inspections are carried out by two inspectors from the Supervision Department's Harju and Tartu County Bureaus in collaboration with specialists from the Climate and Radiation Department. Due to the two scheduled inspection inspectors' excessive workloads, additional inspectors from other county bureaus also handle complaints. On a case-by-case basis, the head of the county bureau chooses complaints inspectors. There can be a maximum of 16 inspectors involved in radiation safety supervision. The two inspectors involved in planned inspections spend half of their workload on radiation safety supervision.

The Climate and Radiation Department, in collaboration with the Environmental Resource Management Supervision Development Department, coordinates the supervision activities, trainings, and quality management of supervisions on radiation safety. From the beginning of 2021, the Climate and Radiation Department participates in the planned inspections of the Harju County Bureau and Tartu County Bureau of Supervision Department to enhance the quality of radiation safety supervisions and the inspectors' knowledge on radiation safety. Inspectors are guided and trained on radiation practices and safety measures by specialists from the Climate and Radiation Department during inspections. Additionally, inspectors' competences are developed through in-house trainings organised by the Environmental Education and Communication Department in collaboration with the Climate and Radiation Department. These trainings are conducted 3-5 times per year. Inspectors can also take part in IAEA training courses and workshops. However, in order to make the best use of the Environmental Board's human resources and to carry out inspections, it is necessary to ensure that some inspectors specialize entirely in the field of radiation safety.

As the Environmental Board executes supervision in all areas of environmental protection, there are no separate financial resources planned for radiation safety. The Supervision Department does not have special technical equipment to carry out radiation surveillance. If necessary, technical support is gained from the Climate and Radiation Department.

Article 9. Responsibility of the licence holder

Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant license and shall take the appropriate steps to ensure that each such license holder meets its responsibility.

Since the 8th review cycle of the Convention on Nuclear Safety, the responsibilities of holders of a radiation practice licence described in the Radiation Act have remained unchanged.

Estonia has no nuclear installations according to the definition of the Convention. The following text describes the responsibilities of holder of radiation practice licence in general. The few special requirements for nuclear installations, which exist in the Radiation Act, are also given.

On the 6th of July 2018 an amendment of the Radiation Act section 24^1 about liability of holders of radiation practice licences entered into force. It states that holders of radiation practice licences shall be liable for the performance of the obligations provided for in the Radiation Act and the terms and conditions of the licence for the purposes of ensuring radiation safety and protection of employees in any exposure situations relating to any source of radiation in the possession of the holder of the licence or any radiation practice of the holder of the licence. Chapter 3 of the Radiation Act sets forth the obligations of the holder of a radiation practice licence. According to Section 32 of the Radiation Act, the holder of a radiation practice licence is obligated 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 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 medical examination 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) recover radiation sources after the use thereof is terminated pursuant to the recovery 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 emergency exposure situations;
15) immediately inform the Environmental Board and the Emergency Centre by calling the emergency number 112 of any loss, theft or unauthorised use of radiation sources and of any incidents or accidents which took place during radiation practices and resulted in workers or members of the public receiving an equivalent or effective dose in excess of the dose limits established pursuant to the Regulation No 97 of the Government of the Republic "Effective Dose and Equivalent Dose Limits for the Lens of the Eyes, Skin and Extremities for Exposed Workers and Members of the Public". The holder of the licence has to submit to the Environmental Board, after the incident, an analysis of the causes thereof and implementation of the remedial measures;
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;
18) not to offer proprietary and other benefits to workers for failure to comply with any radiation safety requirements.

In addition, in case of high risk radiation practices, a holder of a radiation practice license is obliged to:
1) prepare a response plan to emergency 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.

A holder of a radiation practice licence must ensure that the holder has sufficient funds to cover the expenses of recovering radioactive substances, radiation sources containing radioactive substances and radioactive waste.

Section 38 of the Radiation Act lays down the obligations of the holder of a radiation practice licence in case of a high-activity radiation source. In addition to the provisions of Section 32 of the Radiation Act, in case of radiation practice related to high-activity radiation source the holder of a radiation practice licence must:
1) ensure that written information is included with the radiation source which proves that the radiation source is identified by a unique number and includes photos of the source, container, transport packaging of the source and, if necessary, devices and equipment;
2) ensure that proper tests have been performed with the frequency determined by the issuer of the licence in order to check and maintain the integrity of the radiation source;
3) return every disused source 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;
4) enter into a contract with manufacturer upon purchase of a radiation source according to which the manufacturer undertakes to take back the radiation source at the latest 15 years after the importation of the source if the activity of the source exceeds 10 MBq ten years after the importation thereof into the county.

Section 40 of the Radiation Act determines the obligations of the holder of a radiation practice licence when operating nuclear facilities. In addition to the provisions of Section 32 of the Radiation Act in case of radiation practice related to nuclear facilities the holder of a radiation practice licence must:

1) ensure implementation of nuclear safety measures and compliance with relevant requirements;
2) ensure that the workers and subcontractors of the nuclear facility comply with the nuclear safety culture and nuclear safety quality management system implemented at the nuclear facility on the basis of their official duties;
3) assess nuclear safety at the nuclear facility at least with the same frequency as provided for in the requirements of the radiation practice licence.

To enhance radiation safety, the Radiation Act authorizes a possibility to establish additional requirements to a radiation practice licence. According to Section 98 of the Radiation Act the regulatory body has the right to demand financial collateral (hereinafter *collateral*) from the applicant to ensure that the funds necessary for safe disposal of the radioactive source or waste are immediately available:

1) The issuer of radiation practice licences may require that applicants for radiation practice licences have collaterals to recover radioactive substances, equipment containing thereof and radioactive waste.
2) 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 recovery of radioactive substances, equipment containing thereof or radioactive waste from the radiation safety point of view and the estimated cost of recovery shall be taken into account upon making the decision.
3) The collateral must be only intended for recovery of radioactive substances, equipment containing thereof and radioactive waste and it must be immediately realizable, if appropriate.
4) The amount of collateral shall be the estimated cost of recovery of radioactive substances, equipment containing thereof 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.
5) 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 former activities, financial status or reputation of the issuer of the guarantee.
6) Collateral must be valid up to the end of the recovery of radioactive substances, equipment device containing thereof or radioactive waste.

The holders of the radiation practice licence are subject to inspections by the Environmental Board and their practices may be suspended for a period until the requested corrective measures are implemented.

The verification of safety is carried out in the form of safety reviews and safety assessments as well as in the implementation of inspection programs carried out by the Environmental Board. Ultimately, any violation of the requirements of the Radiation Act and/or its provisions determined by a radiation practice licence is punishable by fines. As a precondition for granting a radiation practice licence, the Radiation Act requires that the applicant shall present a valid proof on the safe management of any radioactive waste, which may be generated. The Radiation

Act provides that the responsible party shall manage the practice so that it meets all radiation safety requirements prescribed in the Act and it shall take all measures needed to render radioactive waste arising from its operation harmless. The Radiation Act also provides for the responsibility of decontamination of the environment, if the radioactive material is released in such an extent that the resulting health or environmental hazard requires action. According to the Act, in utilization of natural resources containing radioactive materials, the responsible party shall ensure that radioactive waste do not pose any health or environmental hazard during the operations, including the final stages.

Section 74 of the Radiation Act states the conditions of refusal in addition to the general cases provided for in Section 52 of the General Part of the Environmental Code Act. The Environmental Board shall refuse to issue a radiation practice licence, if:

1) the planned practice is not the 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.

Section 77 of the Radiation Act states the conditions of revocation of radiation practice licences in addition to the general cases provided for in Section 62 of the General Part of the Environmental Code Act. The Environmental Board shall revoke a radiation practice licence, if:

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 Board and its representatives from controlling the practice of the holder of the licence.

The legislative, regulatory and administrative measures in the Estonian regulatory system are adequate for the situation in Estonia and in compliance with the obligations of the Convention as discussed in this Report.

Article 10. Priority to safety

Each Contracting Party shall take the appropriate steps to ensure that all organizations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety.

Since the 8th review cycle of the Convention on Nuclear Safety, the radiation safety requirements for holders of radiation practice licences have remained unchanged.

Principal obligations of holders of radiation practice licence include being responsible for radiation safety and guaranteeing the physical protection of the radiation sources in the holder's possession, also developing and implementing a radiation safety quality system. Section 70 of the Radiation Act prescribes that an application for a practice licence shall include a description of the radiation safety quality system, the performance of which is assessed by the Environmental Board in the licensing process. Section 35 of the Radiation Act provide that the quality system of radiation safety shall include the following:

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.

A radiation safety quality management system of a nuclear facility covers in addition:

1) description of systematic activities conducted for the purpose of ensuring nuclear safety;
2) analysis of duties and requirements for competence required to operate nuclear facilities;
3) description of the control system for compliance with nuclear safety requirements;
4) plans for training and instructing the workers.

According to the Radiation Act, in the licensing procedure in addition to the description of the radiation safety quality system, the applicant shall present to the Environmental Board a radiation safety assessment, which gives an overview of the aspects of radiation practices, which are related to the protection 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.

An inspection of the licensed radiation practices includes an examination of the practical application of the quality system of radiation safety.

In order to assure the quality of radioactivity analyses performed by the Environmental Board, the most important analysis procedures (gamma spectrometry, personal dosimetry, indoor radon measurements) have been accredited according to ISO standard 17025 "General requirements for the competence of testing and calibration laboratories". Quality assurance is

described in detail the Quality Manual for the Testing Laboratory of Climate and Radiation Department of the Environmental Board.

Article 15. Radiation protection

Each contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonably achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.

Since the 8th review cycle of the Convention on Nuclear Safety, regulations have been amended, and technical services have been enhanced. The changes were related to the following topics:

1) *In 2021, the Minister of the Environment enforced Regulation No 40 "Conditions for exemption and clearance of radioactive substances used or generated in radiation practices, and requirements for applications for exemption and clearance". This regulation transposes the requirements for exemption and clearance based on the Council Directive 2013/59/EURATOM, and replace the previous regulations on same subject based on requirements of Council Directive 96/29/Euratom. Furthermore, the new regulation specifies the review process for applications for exemption and clearance of radioactive substances, as well as the amount and content of the data required by the application.*
2) *The services available to people authorized to manage radioactive sources have been enhanced. Since the beginning of 2022, a new national register for exposed workers that meets the requirements and capabilities of modern information technology has been introduced. In this regard, Regulation No 41 of the Minister of the Environment "Establishment of the National Dose Register of Exposed Workers and its Statute" was amended and implemented in 2021.*

Fundamental principles of radiation safety that shall be adhered to by all licensees including possible operators of nuclear installations in the future are provided in Chapter 1 Division 3 of the Radiation Act:

1) Planned radiation practices have to be justified by proving that they are the best based on their economic, social or other benefits in relation to the potential health detriment they may cause. The justification of radiation practices shall be reviewed whenever new and important evidence about the efficacy or consequences of existing types of radiation practices is acquired.
2) Any exposure shall be kept as low as reasonably achievable, taking into account the economic and social factors.
3) The sum of exposure doses shall not exceed the limits established on the basis of the Radiation Act. This requirement does not apply to medical exposures and emergency occupational exposes.

Regulation No 97 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" (hereinafter *Regulation No 97 of the Government*) sets the following dose limits:

1) the annual limit for effective doses of exposed workers incurred from radiation practices is 20 mSv;
2) the annual limit for effective doses of apprentices or students at the age of 18 or older who use radiation sources during their studies is 20 mSv;
3) the annual limit for effective doses of apprentices or students between the ages 16–18 who use radiation sources during their studies is 6 mSv;

4) the annual limit for effective doses of members of the public incurred from radiation practices is 1 mSv.

The annual limit for equivalent doses incurred from radiation practices for exposed worker and apprentices or students at the age of 18 or older who use radiation sources during their studies is:
1) 20 mSv for the lens of the eye or 100 mSv during any consecutive five years under the condition that annual doses do not exceed 50 mSv;
2) an average of 500 mSv for 1 cm^2 of the skin, not taking into account the actual surface area of the skin that has been exposed;
3) 500 mSv for extremities.

The annual limit for equivalent doses of apprentices or students between the ages 16–18 who use radiation sources during their studies is:
1) 15 mSv for the lens of the eye,
2) an average of 150 mSv for 1 cm^2 of the skin, not taking into account the actual surface area of the skin that has been exposed;
3) 150 mSv for extremities.

The annual limit for equivalent doses incurred from radiation practices of members of the public is 15 mSv for the lens of the eye and an average of 50 mSv for 1 cm^2 of the skin, not taking into account the actual surface area of the skin that has been exposed.

The Regulation No 97 of the Government also establishes the requirements for the protection of exposed workers during pregnancy and breastfeeding:
1) as soon as an exposed worker informs the holder of radiation practice licence of her pregnancy, the holder of radiation practice licence shall immediately implement measures to keep the equivalent doses of the fetus as low as possible which shall not exceed 1 mSv during the reminder of the pregnancy;
2) as soon as an exposed worker informs the holder of radiation practice licence that she is breastfeeding a child, the exposed worker must not be assigned to any work where radioactive contamination of her body or intake of radionuclides is possible.

Section 32 of the Radiation Act lays down the basic principles of managing radioactive waste and emissions. The holder of a radiation practice licence ensures the safe management of radioactive waste and emissions generated in the course of radiation practice and ensures that:
1) 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;
2) covers all expenses incurred in radioactive waste management;
3) ensures that the activity and quantities of generated radioactive waste and emissions are as low as possible.

In addition, Section 39 of the Radiation Act establishes the main obligations for holders of radiation practice licences related to radioactive waste according to which a holder of a radiation practice licence is required to:
1) ensure safety of the radioactive waste 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 final disposal facility for radioactive waste within five years from the generation thereof at the latest.

Based on Subsections 8 (3), 62 (3) and 68 (5) of the Radiation Act, the minister in charge of the area establishes through regulation the clearance conditions and clearance levels for radioactive substances and items contaminated with radioactive substances as a result of radiation practices and the requirements for their clearance, recycling, and reuse, as well as the exemption conditions and exemption levels of radionuclides at or below which no radiation practice licence is required. In 2021, the Minister of Environment enforced the new Regulation No 40 "Conditions for exemption and clearance of radioactive substances used or generated in radiation practices, and requirements for applications for exemption and clearance". This regulation transposes the requirements for exemption and clearance based on the Council Directive 2013/59/EURATOM, and replace the previous regulations on same subject based on requirements of Council Directive 96/29/Euratom. Furthermore, the new regulation specifies the review process for applications for exemption and clearance of radioactive substances, as well as the amount and content of the data required by the application. Regarding clearance of radioactive substances, the Regulation No 40 of the Minister of the Environment establishes the following:

1) the clearance conditions and levels of radioactive substances, including radioactive waste and discharges, radioactively contaminated objects and buildings, and the procedure for requesting clearance;
2) the clearance conditions for the recycling and reuse of buildings, metal waste and radioactively contaminated metal objects;
3) the conditions and procedure for releasing land areas associated with radiation activity from the requirements of the Radiation Act.

The conditions for the clearance of radioactive substances from the requirements of the Radiation Act, as well as the procedure for requesting clearance, are described in Article 7 of this Report.

Concerning the release of land areas associated with radiation activity, the activities required for clearance on the basis of a radiation practice licence must be justified, and the effective dose to the general public caused by the area released from regulatory control must be less than 0.03 mSv per year. The licensee must apply for the release of land areas associated with radiation activities from the Environmental Board. On application, the Environmental Board determines whether or not the release of land area is an optimal course of action. Among other application documents, the licensee must submit a radiation safety assessment prepared by a qualified radiation expert or another person qualified in the field of radiation safety.

Subsection 70 (1) of the Radiation Act requires that the applicant of the radiation practice licence shall submit the data on radioactive waste or emissions generated during radiation practices, the management thereof and waste packaging compliance criteria and radioactive waste storage premises (if applicable) upon application. This includes data on mode of generation of waste and emissions; characterization of waste and emissions; methods of management of waste and emissions; modes of release of emissions into the environment; compliance criteria of radioactive waste packaging; procedures of registration, records and inventory of waste; physical protection measures of waste; procedures for the delivery of radioactive waste to intermediate storage or final disposal facility of radioactive waste. The content of the requirements are specified in Section 9 of the Regulation No 60 of the Minister

of the Environment. Subsection 75 (1) of the Radiation Act states that the maximum quantities of radioactive emissions, and modes of release thereof into the environment shall be described in the radiation practice licence (if applicable).

Subsection of 70 (1) the Radiation Act requires that the applicant of the radiation practice licence submits a radiation monitoring programme and information on the equipment used for monitoring with its application. Further details are specified by Section 15 of the Regulation No 60 of the Minister of the Environment: description of monitoring plan and monitoring methods; place for conducting workplace monitoring on a control and monitoring area, adjacent areas and time of monitoring; rules for registering and storing monitoring data; description of individual dosimetry, with the type and frequency of dosimetry; specification of radiation monitoring equipment and units of measure, type of equipment and data characterizing the equipment; the details about the monitoring programme, monitoring methods and the characteristics of the used radiation monitoring equipment; which areas shall be monitored, the frequency of monitoring, what data shall be submitted and how the monitoring data shall be stored.

In case of radiation practices with significant environmental impact, as defined in Section 6 of the Environmental Impact Assessment and Environmental Management System Act, the following additional data will be submitted: type of environmental sample; data on the monitoring location, including coordinates, location plan of environmental sampling; method of analysis, including measurable components and frequency of monitoring.

Subsection 75 (1) of the Radiation Act states that the requirements on radiation monitoring shall be described in the radiation practice licence. The frequency of submitting monitoring data to the Environmental Board is also established in the licence.

Safety of radiation practices is continuously supervised by the Environmental Board according to the annual work plan.

The Environmental Board is responsible for maintaining the registries related to radiation safety (state register of the doses of exposed workers; register of the radiation sources and nuclear material, register of the radioactive waste). The register of the radiation sources and nuclear material is discussed in Article 7 in this Report. The basic obligation of holder of the radiation practice licence is to ensure monitoring of the doses of radiation workers and submission of their data to the dose register. Monitoring of personal doses must be performed only by approved dosimetry laboratories. Pursuant to the Radiation Act, the Environmental Board maintains a national dose register for exposed workers and issues dose cards for foreign workers. The dose register is in use since 1999. The national dose register of exposed workers is established and managed accordance with the Regulation No 41 of the Minister of the Environment “Establishment of the National Dose Register of Exposed Workers and its Statute” (hereinafter *Regulation No 41 of the Minister of the Environment*). Due to the obsolescence of the national dose register's electronic platform, a new national register was developed and launched in early 2022. In this regard, Regulation No 41 of the Minister of the Environment was amended and entered into force in 2021. The register is stored digitally in the form of an information technology database, and the data is processed both automatically and manually. The Environmental Board continues to be the controller of the national dose register. The following persons have the right to log in to the dose register in accordance with subsection 102 (5) of the Radiation Act:
1) the exposed worker himself or herself with regard to the data concerning him or her;

2) the holder of a radiation practice licence with regard to the information concerning the exposed workers of such holder.

One of the sub-programmes of the national environmental monitoring programme is radiation monitoring, which is the responsibility of the Environmental Board. The Environmental Board composes, maintains and implements the radiation monitoring programme. The Radiation Act, the Environmental Monitoring Act, and their regulations detail the requirements for conducting radiation monitoring. Air samples, surface water, drinking water, milk, food, and soil are collected and analysed on an annual basis as part of radiation monitoring, and the dose rate of gamma radiation in the air is continuously monitored. As a signatory to the Convention for the Protection of the Marine Environment of the Baltic Sea, Estonia also collects and analyses samples of the marine environment, including sediments, seawater, and biota. The results of the monitoring are made publicly available on the Environmental Board's website. The Environmental Board operates 15 ambient gamma dose rate monitoring stations, 3 air filter stations, a stationaryanalysis laboratory, a mobile metering laboratory, and collaborates with other authorities for sample collection. The Environmental Board participates in international collaboration and exchanges radiation monitoring data.

Response to COVID-19 Situation

For the issuance of various types of environmental permits as well as radiation practise licences, the Environmental Board has an online system, the Information System for Environmental Decisions. Due to the electronic submission and formalisation of all the information necessary for the application for authorization of radiation practises, there have been no delays in the licencing procedures. Inspectors have access to the Information System for Environmental Decisions. During the pandemic, high-risk radiation practices were inspected as usual (once a year). To accommodate the situation, the inspectors performed the majority of the inspection electronically (via documents) prior to the on-site visit. On-site inspections of medium-risk or low-risk radiation practises (particularly in medical facilities) were postponed in some cases.

Article 16. Emergency preparedness

1. Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency. For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.
2. Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.
3. Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.

Since the 8th review cycle of the Convention on Nuclear Safety, the legislative and regulative framework has been updated, and technical services have been improved concerning emergency preparedness and response to nuclear and radiological emergency. The following changes have been made:

1) *The Emergency Act was amended in July 2021 in order to improve the cooperation of governmental authorities. Pursuant regulations were consolidated and adopted at governmental level.*
2) *An updated risk assessment of a nuclear or radiological emergency was adopted by the Environmental Board in January 2021, and the updated National Nuclear and Radiological Emergency Response Plan was adopted in February 2022.*
3) *Technical capabilities to respond to radiological and nuclear emergencies improved due to acquisition of a new mobile detection system and modernization of laboratory equipment.*

In Estonia, the Emergency Act serves as the national legal framework for emergency preparedness, including nuclear and radiological emergencies. The Emergency Act establishes the legal framework for crisis management, which includes planning for and responding to emergencies, as well as ensuring the continuity of essential services. The Emergency Act also governs the declaration, resolution, and termination of an emergency situation, as well as the involvement of the Defence Forces and the Defence League in resolving an emergency that has resulted in the declaration of an emergency situation, as well as state supervision and liability. The Government of the Republic has passed a number of regulations outlining key provisions of the Act.

The Emergency Act establishes the following:
1) According to Chapter 2, the Government of the Republic is in charge of developing and implementing the national crisis management policy. It also specifies crisis management arrangements at the regional and local government levels.
2) Chapter 3 prescribes that risk assessments of potential emergencies must be prepared in order to prevent, prepare for and resolve emergencies. The authority in charge must annually assess,

in collaboration with the authorities involved in the risk assessment's preparation, whether the risk assessment is up to date and, if necessary, improve the risk assessment. Chapter 3 also discusses the requirements for emergency response plans, crisis management exercises, and risk communication to raise public awareness and preparedness for emergencies. The detailed procedures and requirements are outlined in Regulation No 78 of the Government "List of events that could lead to an emergency and concerning which a response plan is prepared and risk communication is organized; requirements, procedures and authorities in charge of preparing response plan and organizing risk communication." (hereinafter *Regulation No 78 of the Government*).
3) The provisions of Chapter 4 govern the declaration and termination of emergency situations. Subsection 1 of the Chapter establishes procedures for changing the conditions and ending an emergency situation. Subdivision 2 defines the people in charge of an emergency situation, as well as their responsibilities and rights. Subdivision 3 addresses emergency-related measures such as the obligation to work, expropriation of movable property, duty to grant use of items, procedure for expropriation or taking things into duty, entry into property, prohibition of stay and other restrictions on freedom of movement, restrictions on holding public meetings and public events and responsibilities of the Police in ensuring these measures. Subdivision 4 describes how the Defence Forces and Defence League are used to respond to emergencies, rescue people and provide security.
4) Chapter 5 provides a list of vital services and authorities in charge of ensuring their continuity and operation.
5) Chapter 6 outlines the conditions for compensating people for damages incurred during emergency situations.
6) The provisions of supervisory control over compliance with the Emergency Act and legal acts issued thereunder are presented in Chapter 7, along with the liabilities in cases of requirement and obligation violations.

The Radiation Act provides more specific provisions of intervention needed in the case of a radiological emergency or an existing exposure situation. Safety principles are provided in Chapter 8 of the Radiation Act: the implementation of intervention shall be justified so that the reduction in detriment caused by radiation outweighs the harm and costs of the intervention and also shall be optimized in form, scale and duration. Intervention levels, action levels and reference levels for emergency occupational exposure, which constitute the basis for preparation of the national crisis management plan for responding to a radiological emergency and implementation of measures for protecting the public are provided by the Regulation No 95 of the Government “Intervention and action levels and reference level of occupational emergency exposure in radiological and nuclear emergency”, which has been issued pursuant to the Radiation Act. Operational Intervention Levels (OIL-s) are not formally adopted into regulation.

Based on the Radiation Act, participants in the intervention are the Rescue Board on the basis of and pursuant to the procedure provided for in the Rescue Act; the Police and Border Guard Board on the basis of and pursuant to the procedure provided for in the Police and Border Guard Act; the Environmental Board; the handler of radioactive waste participating in the intervention and, as appropriate, any other persons. In the case of intervention, the Environmental Board may apply special state supervision measures provided in the Law Enforcement Act (conditions for entry into premises, conditions for examination of premises) on the basis of and pursuant to the procedure provided for in this Act. General public and emergency workers are decontaminated by the Rescue Board. The handler of radioactive waste involved in intervention

is national radioactive waste management company A.L.A.R.A. Ltd, which reports to the Ministry of Economic Affairs and Communications.

According to Regulation No 78 of the Government issued pursuant to the Emergency Act, the Environmental Board directs and resolves radiological and nuclear emergencies and prepares risk assessment and emergency response plans. The current version of risk assessment was adopted in January 2021. The National Nuclear and Radiological Emergency Response Plan was also updated and adopted in February 2022. The risk assessment includes assessment of the types of radiological events that could cause an emergency and a risk matrix to assess the likelihood and severity of these events. The identified types of emergencies are a nuclear accident in a neighbouring country and a national radiological accident, for which the Environmental Board has drawn up two different emergency response plans. To ensure safety during intervention, the emergency response plan describes issues like organization of response to radiological emergency, management structure of response to emergency, duties of institutions and persons participating in response to radiological emergency, organization of notification of public, organization of international cooperation upon responding to radiological emergency, resources, etc. The Environmental Board assesses the operations and timeliness of the plan at least once every two years or after each emergency.

Pursuant to the Radiation Act, one of the main obligations of the holder of the licence is to prepare an emergency plan and the Environmental Board reviews the emergency response plans during authorisation process. In case of radiation practices with high risk, a holder of the licence is obliged to prepare a response plan to accidental exposure situations based on the assessment of potential exposures. In Section 18 of the Regulation No 60 of the Minister of the Environment the content of the emergency response plan is described as follows:

1) brief description of the radiation source;
2) description of potential emergency exposure situations and the consequences thereof;
3) name and contact details of the manager responsible for emergency response;
4) description of actions to deal with emergency;
5) information on the equipment and resources necessary for emergency response;
6) procedure for notifying the Environmental Board, the Rescue Board, workers and the public;
7) description of organisation of cooperation with other enterprises and institutions;
8) frequency of reviewing the emergency response plan.

The Environmental Board evaluates the emergency response plans, trainings and exercises during the pre-authorization inspection based on the documentation provided by the applicant. By granting the radiation practice licence the Environmental Board also approves the emergency response plan. 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. According to the Radiation Act, the holder of the 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. Responsibility of licensees specified by the Radiation Act also includes preventing or reducing the release of radioactive material and exposure of workers and the public.

According to Section 111 of the Radiation Act the Environmental Board shall ensure the operation of the radiation hazard early notification system. Early warning in case of a

radiological emergency in Estonia or at a nuclear facility in the vicinity of Estonia is based on the international agreements on exchange of information. The Environmental Board of Estonia signed bilateral Memorandums of Understanding with the Radiation and Nuclear Safety Authority of Finland (STUK) in May 2019 and with the State Environmental Service of Latvia (VVD) in March 2020 for cooperation and exchange of information on radiation and nuclear safety and regulatory matters, which includes cooperation in preparedness for and response to nuclear or radiological incidents and emergencies, taking into account international emergency arrangements. Estonia is a Contracting Party to the International Convention on Early Notification of a Nuclear Accident and to the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.

As a supplement to the early warning agreements, Estonian on-line system for automatic monitoring of radioactivity is in service 24 hours a day. The system consists of 15 ambient gamma dose rate monitoring stations and 3 air filter stations (Figure 3).

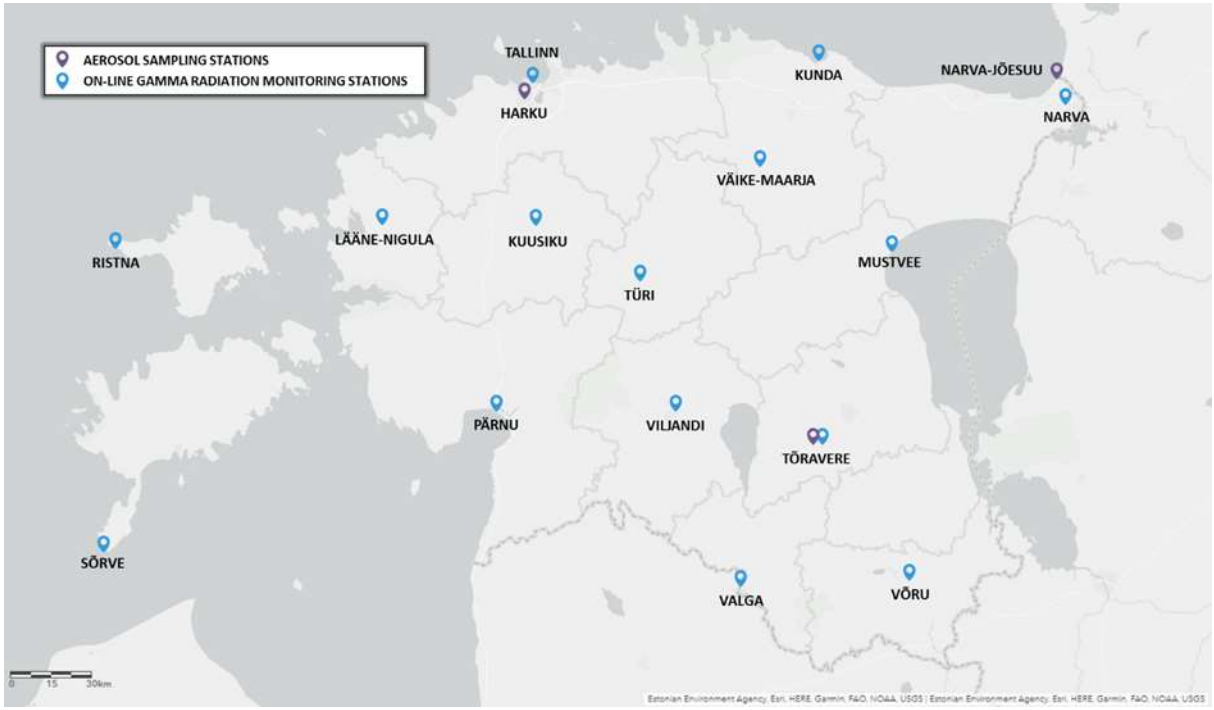

Figure 3. *On-line automatic gamma dose-rate monitoring stations and high-volume air samplers in Estonia.*

All the automatic gamma radiation monitoring stations have spectrometric capabilities also. Any increase in the gamma radiation dose rate above the threshold level initiates an alarm and a notification of the officer of the Environmental Board on a 24/7 duty. Three high-volume air samplers with aerosol filters are continuously operating in Narva-Jõesuu, Tallinn, and Tõravere (Figure 3). The weekly filters with deposited radioactivity from these stations are analysed by the laboratory of the Environmental Board to determine the radionuclide content in the out-door air. The results of the automated gamma dose-rate monitoring stations and high-volume air samplers are available to the public on the Environmental Board's official website and through the European Radiological Data Exchange Platform (EURDEP).

The Decision Support System ARGOS has been in use in Estonia since 2005. ARGOS was originally developed by the Danish Emergency Management Agency (DEMA) in association with the Prolog Development Centre Inc.. Now, an international consortium, where the

Environmental Board is a member, manages the ongoing development and maintenance of the ARGOS system.. The system is regularly updated, so that any lesson learned from exercises or from uses in emergency can be incorporated into the operational system. The data with analyses and simulations may be used for decision-making (e.g. planning emergency related environmental monitoring) and management support in nuclear emergency situations. The ARGOS system allows viewing prognostic, measured radiation, agricultural and meteorological data overlaid in a geographic information system. Results of ARGOS simulations of possible accidents in nuclear power plants of neighbouring countries, in addition to analysis of the practices of other countries, have been taken into account in decision-making on strategic aspects of preparedness.

Estonian authorities regularly participate in the international exercises, such as those coordinated by the IAEA or European Commission (ECURIE). On the regional scale, the Council of Baltic Sea States has its own agreements about the information exchange in the case of emergencies. The following exercises took place between 2019 and 2022:
1) on the 19th of September 2019, a national emergency exercise involving CBRN materials was held;
2) on the 12th of February 2020, part two of the previous exercise was conducted, which was a table-top exercise focusing on activities to be carried out by the national emergency operations centre.

Early notification of a nuclear accident occurring abroad is received in Estonia via the ECURIE system of the European Council or the IAEA USIE notification system or both. The Environmental Board is the National Warning Point and the National Competent Authority in Estonia for any situation, which might result in an actual or potential deterioration of radiation safety of the population, environment or society. In order to immediately notify, advise and/or consult the local and governmental authorities on the needed emergency response actions, an expert of the Environmental Board is on duty for 24 hours a day. The communication systems and the arrangements for transfer of early notifications are tested regularly.

In order to ensure that people know how to behave in emergency situations, members of the public must be informed of the risks that may cause the crisis and the possible consequences. The responsibility to arrange risk communication for radiological emergencies was appointed to the Environmental Board by the Government in 2018.

In 2018 the Ministry of the Interior in cooperation with the State Chancellery published a document “Code of Conduct for Crisis Situations”, which gives main instructions to the public on how to prepare for and act during different crisis situations, including radiological accidents[4]. To raise public awareness, more information is published on the websites of authorities in charge of management of response to respective emergency situations. Environmental Board has published information related to a radiological emergency on its website and continues further improvement of guiding materials.

Enhancing technical capabilities to respond to and resolve emergency situations is an area of continuous importance. The main achievements in this area in 2021 and 2022 were the acquisition of a new mobile radiation detection system by the Environmental Board and modernization of the cooling systems of gamma-spectrometers at the laboratory of the Environmental Board.

[4] https://www.olevalmis.ee/en

Response to COVID-19 Situation

Exercises for national radiological emergencies had to be postponed because of COVID-19.

Chapter 3 Summary

In the above, the implementation of the obligations of the Convention, Articles 7, 8, 9, 10, 15 and 16 is evaluated. Based on the evaluation it can be concluded that the relevant Estonian regulations and practices continue to be in compliance with the obligations of the Convention. The following are the main developments since the 8th review cycle of the Convention on Nuclear Safety:

1) The Minister of the Environment approved the National Radiation Safety Development Plan for the period of 2018-2027 and its annexes (National Action Plan for Radioactive Waste Management, National Radon Action Plan) in early 2020.
2) The Estonian Government adopted a decision to establish a Working Group of Nuclear Energy to define the nation's positions towards the use of nuclear energy. The Minister of the Environment founded the Nuclear Energy Working Group on the 20th of April 2021. The working group is led by the Ministry of the Environment.
3) Since the 1st of January 2021, the new regulatory body is Estonian Environmental Board as a result of merging the Environmental Board and the Environmental Inspectorate. The new authority continues with the same tasks and responsibilities of the previous Environmental Board and the Environmental Inspectorate, including authorisation, review and assessment, inspection and enforcement of radiation practices.
4) In 2021, the Minister of the Environment enforced the new Regulation No 40 "Conditions for exemption and clearance of radioactive substances used or generated in radiation practices, and requirements for applications for exemption and clearance". This regulation transposes the requirements for exemption and clearance based on the Council Directive 2013/59/EURATOM, and replace the previous regulations on same subject based on requirements of Council Directive 96/29/Euratom.
5) Since the beginning of 2022, a new national register for exposed workers that meets the requirements and capabilities of modern information technology has been introduced.
6) The Environmental Board of Estonia has bilateral Memorandums of Understanding signed with the Radiation and Nuclear Safety Authority of Finland (STUK) in May 2019 and with the State Environmental Service of Latvia (VDD) in March 2020 for cooperation and exchange of information on radiation and nuclear safety and regulatory matters, which includes cooperation in preparedness for and response to nuclear or radiological incidents and emergencies, taking into account international standards.
7) The Emergency Act was amended in July 2021 in order to improve the cooperation of governmental authorities. An updated risk assessment of a nuclear or radiological emergency was adopted by the Environmental Board in January 2021, and the updated National Nuclear and Radiological Emergency Response Plan was adopted in February 2022.
8) Estonia hosted the IAEA pilot Advisory Mission on Radiation Protection and Safety in Medical Exposure in March 2022.

Challenges identified by the Contracting Parties in the 7th Review Meeting in 2017 and their status by 2022:

Challenge 1: Implementation of the NRSDP 2018-2027, including the relevant IRRS findings related to appropriate steps for the preparation and testing of emergency plans.

Follow Up Status of Challenge 1: The challenge has been met with the approval of the NRSDP 2018-2027 in 2020. The NRSDP 2018-2027 is currently being implemented.

The Minister of the Environment approved the National Radiation Safety Development Plan for the period of 2018-2027 (NRSDP 2018-2027) and its annexes (National Action Plan for Radioactive Waste Management, National Radon Action Plan) in early 2020. The NRSDP 2018-2027 will be implemented based on action programmes, which are composed for periods of up to four years. Action programme for 2018-2021 was approved together with the NRSDP 2018-2027. The Minister of the Environment approved the second action programme for 2022-2025 in January 2022. NRSDP 2018–2027 does not include topics related to nuclear safety. During the period of 2018-2022, Estonia has renewed risk assessments and response plans for nuclear and radiological emergencies. The Ministry of the Interior in cooperation with the State Chancellery published a document "Code of Conduct for Crisis Situations", which gives main instructions to the public on how to prepare for and act during different crisis situations, including radiological accidents.

Challenge 2: Relevant training of the staff remains a challenge.

Follow Up Status of Challenge 2: The NRSDP 2018-2027 is currently being implemented.

One of the objectives of the NRSDP for 2018-2027 is to ensure competence through development of training. The NRSDP 2018-2027 foresees to develop an online course on introduction to radiation protection. The e-learning module on introduction to radiation protection is planned to be developed by 2027. With the assistance of the IAEA technical cooperation programme, an online learning programme with various modules for various licence holders and organizations involved in radiation protection and safety will be developed. In this regard, the IAEA-supported national project EST9007 "Enhancing the Effectiveness of the Legislative, Regulatory, and Organizational Infrastructure and Technical Capabilities of Radiation Protection and Nuclear Safety" was launched in 2022 with a duration of 2022-2025.

Suggestions identified by the Contracting Parties in the 7th Review Meeting in 2017 and their status by 2022:

Suggestion 1: Ensuring that Estonia has cooperation agreements related to emergency preparedness and response with its neighbouring countries.

Follow Up Status of Suggestion 1: Closed.

The Environmental Board of Estonia signed bilateral Memorandums of Understanding (MoUs) with the Radiation and Nuclear Safety Authority of Finland (STUK) in May 2019and with the State Environmental Service of Latvia (VVD) in March 2020 for cooperation and exchange of information on radiation and nuclear safety and regulatory matters, which includes *inter alia* cooperation in preparedness for and response to nuclear or radiological incidents and emergencies, taking into account international emergency arrangements.

Challenges identified by the Contracting Parties in Draft Country Review Report for the 8th Review Meeting and their status by 2022:

Challenge 1: Ensuring that the inspectors who carry out inspections of licensees with radiation sources/generators have sufficient time and training noting that they also involved with non-radiation related activities in the Environmental Inspectorate.

Since the 1st of January 2021, the new regulatory body is the Estonian Environmental Board as a result of merging the Environmental Board and the Environmental Inspectorate. The new authority continues with the same tasks and responsibilities of the previous Environmental Board and the Environmental Inspectorate. Radiation safety supervisions are carried out by the Supervision Department County Bureaus of Environmental Board. From the beginning of 2021, the Climate and Radiation Department participates in planned inspections of some county bureaus of the Supervision Department to enhance the quality of radiation safety supervisions and the inspectors' knowledge of radiation safety. Inspectors are guided and trained on radiation practices and safety measures by specialists from the Climate and Radiation Department during inspections. Additionally, inspectors' competence is developed through in-house trainings. These trainings are conducted 3-5 times per year. Inspectors can also take part in the IAEA training courses and workshops. However, in order to make the best use of the Environmental Board's human resources and to carry out inspections, it is necessary to ensure that some inspectors specialize entirely in the field of radiation safety.

Planned activities to improve safety:

The main activities planned to improve safety are the following:
1. Implementation of the NRSDP 2018-2027 in accordance with the action plan for 2022-2025.
2. In the second half of 2023, host an IAEA Integrated Nuclear Infrastructure Review (INIR) mission for Phase 1 of the IAEA Milestone Approach to assess the state of national infrastructure before making a decision to launch a nuclear power programme.
3. Implementation of the national project EST9007 "Enhancing the Effectiveness of the Legislative, Regulatory, and Organizational Infrastructure and Technical Capabilities of Radiation Protection and Nuclear Safety" launched under IAEA technical cooperation programme. The project will last from 2022 to 2025.

Chapter 4 Annexes

Annex A. Shut-down submarine nuclear reactors in the Paldiski site

The site of the former USSR nuclear submarine training centre is located in Paldiski, North Estonia. It is currently in the process of decommissioning. The nuclear facility in Paldiski was established in the early 1960' for training the USSR navy personnel for the operation of submarine nuclear reactor systems. Two full-sized PWR type reactors were installed in the submarine mock-ups in a large building. The reactors were close analogues of those operated on real nuclear submarines of the Echo and Delta classes. Operating nuclear propulsion systems with the complete power transmission to propeller shafts and the corresponding hydraulic brake systems have been used as the training stands. The first-generation 70 MWth reactor was commissioned in 1968. The reactor was in operation during about 20,000 h until January 1989. In 1983 the 90 MWth PWR reactor was commissioned. This reactor was in operation for about 5,300 h until December 1989. Table A1 presents main available data of the reactors.

Table A1. Characteristics of the submarine nuclear reactors in Paldiski.

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	7.5 m	9.5 m
- length	~ 50 m	~ 50 m

In 1994 the reactors were defuelled and the spent nuclear fuel was shipped to Russia. Non-radioactive components of the training stands were dismantled, hull sections housing reactor vessels with their primary circuits, auxiliary equipment and some additional waste were partly grouted, seal-welded and enclosed into concrete sarcophagi. In 1995 the ownership and control of the site were officially transferred to Estonia. Since then, the work on monitoring, dismantling, decommissioning, decontamination and dismantling of the Paldiski facilities is in progress. Site is under administration of the Estonian Radioactive Waste Management Agency A.L.A.R.A. Ltd. In 1997 A.L.A.R.A. Ltd established at the site a centralized interim storage for both D&D and institutional radioactive waste. During the period 1995-2011, a number of activities have been undertaken on the site to guarantee a safe storage of the reactor compartments until 2040. By that time, Estonia should have radioactive waste disposal facilities available, which could accommodate waste arising from decommissioning of the reactor compartments. Related to the decommissioning of reactor compartments feasibility studies have been carried out in 2014-2015. Preferable option for decommissioning is full dismantling (without cutting of reactor vessel) with cutting into small pieces and fitting waste in standard concrete containers. Arising waste volume will be around 1000 m^3 conditioned low and intermediate level waste. According to the project's results reactor vessels and internals are

classified as intermediate level waste based on Estonian legislation (heat generation less than 2 kW/m^3). As spent fuel was sent back to Russia there are no high level waste present in Estonia.

Annex B. References to national legislation

Estonian legislation on radiation and nuclear safety is listed below, as in force on the 30th of July 2022. The legislative acts are available through an electronic database "*Riigi Teataja*" – The State Gazette: www.riigiteataja.ee (the Acts are available in English).

1. Acts

1.1. Radiation Act, passed 8 June 2016 and enforced on 1 November 2016, latest amendment enforced on 1 January 2021.
1.2. General Part of the Environmental Code Act, passed on 16 February 2011 and enforced on 1 August 2014, in part 1 January 2015 and 1 August 2017, latest amendment enforced on 1 January 2021.
1.3. Administrative Procedure Act, passed on 6 June 2001 and enforced on 1 January 2002, latest amendment enforced on 15 March 2019
1.4. Environmental Supervision Act, passed on 6 June 2001 and enforced on 7 July 2001, latest amendment enforced on 1 January 2021.
1.5. Emergency Act, passed on 8 February 2017 and enforced on 1 July 2017, latest amendment enforced on 1 July 2021.
1.6. Environmental Impact Assessment and Environmental Management System Act, passed on 22 February 2005 and enforced on 3 April 2005, latest amendment enforced on 13 January 2022.
1.7. Law Enforcement Act, passed on 23 February 2011 and enforced on 1 July 2014, latest amendment enforced on 1 May 2021.
1.8. Code of Misdemeanour Procedure, passed on 22 May 2002 and enforced on 1 September 2002, latest amendment enforced on 1 March 2022
1.9. Environmental Monitoring Act, passed on 4 May 2016 and enforced on 1 January 2017, latest amendment enforced on 1 January 2022.
1.10. Penal Code, passed on 6 June 2001 and enforced on 1 September 2002, latest amendment enforced on 31 May 2021.

2. Regulations of the Government of the Republic

2.1. Regulation No 95 of 15 September 2016, latest amendment enforced on 3 August 2018: Intervention and action levels and reference levels of emergency exposure.
2.2. Regulation No. 97 of 15 September 2016, latest amendment enforced on 3 August 2018: Effective Dose and Equivalent Dose Limits for the Lens of the Eyes, Skin and Extremities for Exposed Workers and Members of the Public.
2.3. Regulation No. 112 of 22 June 2017, latest amendment enforced on 1 January 2022: 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.
2.4. Regulation No 77 of 29 July 2021: The list of events that could lead to an emergency and that are subject to a risk assessment, requirements and procedures for the preparation of the assessment and the authority leading the preparation of the assessment.
2.5. Regulation No 78 of 29 July 2021: List of events that could lead to an emergency and concerning which a response plan is prepared and risk communication is organised; requirements, procedures and authorities in charge of preparing response plan and organizing risk communication.
2.6. Regulation No 76 of 29 July 2021: The requirements set for the conducting of crisis management exercises and organisation of exercises.
2.7. Regulation No. 186 of 10 December 2009, latest amendment enforced on 1 February 2022: Statute of the Ministry of the Environment

3. Regulations of the Minister of the Environment

3.1. Regulation No. 47 of 30 September 2020, latest amendment enforced on 1 January 2021: Statute of the Environmental Board

3.2. Regulations No 60 of 24 November 2016, latest amendment enforced on 22 June 2020: The detailed requirements for applications for radiation practice licences, lists of data of applications and radiation practice licences, and lists of data characterising radiation sources used to keep lists of nuclear materials

3.3. Regulation No 57 of 24 November 2016: Requirements for radiation safety training of radiation safety specialists and exposed workers.

3.4. Regulation No 28 of 6 September 2016, latest amendment enforced on 22 March 2021: The data indicated in the dose card of an outside worker and the procedure for formalizing dose cards and the standard format of dose cards.

3.5. 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.

3.6. Regulation No 45 of 27 October 2016: The radiation safety curriculum for training of radiation experts, their professional skills requirements, the procedure for application for the certificate, application form and certificate form.

3.7. Regulation No 34 of 4 October 2016, latest amendment enforced on 30 June 2022: The classification of radioactive waste, the requirements for registration, management and delivery of radioactive waste and the acceptance criteria for radioactive waste.

3.8. Regulation No 40 of 25 August 2021: Conditions for exemption and clearance of radioactive substances used or generated in radiation practices, and requirements for applications for exemption and clearance.

3.9. Regulation No 54 of 18 November 2016: The procedure for monitoring and estimation of effective doses incurred by exposed workers and members of the public, and the coefficients for calculating radionuclide ingestion and inhalation doses

3.10. Regulation No 41 of 20 October 2016, latest amendment enforced on 21 September 2021: Establishment of the national dose register of exposed workers and its statute.

3.11. Regulation No 28 of 30 July 2018, latest amendment enforced on 12 November 2021: The reference levels for indoor radon concentrations in workrooms, the procedure for radon measurements and obligations of employers at workplaces with an increased radon risk.

3.12. Regulation No 20 of 29 June 2017, latest amendment enforced on 1 January 2021: The environmental decisions information system and its statutes.

3.13. Regulation No 27 of 6 September 2016, latest amendment enforced on 1 September 2020: The list of paid services and rates of fee of the Environmental Board.

3.14. Regulation No 33 of 3 October 2016: Specifications of the procedure for processing the documents for the import, export or transit of radioactive waste and the time limits thereof based on the countries of origin and destination.

3.15. Regulation No 46 of 4 November 2016, latest amendment enforced on 1 January 2021: Establishment of the object inspection database system and its statutes.

4. Regulations of the Minister of Health and Labour:

4.1. Regulation No 71 of 19 December 2018, latest amendment enforced on 24 January 2022: Radiation safety requirements for medical radiological procedures, clinical audit requirements for medical radiological procedures, and diagnostic reference levels and requirements for determination thereof.

Annex C. References to national reports and other documents

1. 5th Estonian National Report on Compliance with the Obligations of the Convention on Nuclear Safety as referred to in Article 5 of the Convention. 8th Review Meeting. Environmental Board. Tallinn, Estonia, July 2019.
2. International Atomic Energy Agency. Integrated Regulatory Review Service (IRRS) Mission to Estonia. IAEA-2016.
3. International Atomic Energy Agency. Integrated Regulatory Review Service (IRRS) Follow-Up Mission to Estonia. IAEA-2019.
4. International Atomic Energy Agency. Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation (ARTEMIS) Mission to Estonia. IAEA-2019.
5. Ministry of the Environment. National Radiation Safety Development Plan 2018-2027 and its Annex I. National action plan for radioactive waste management, Annex II National Radon Action Plan. Tallinn, 23 January 2020.
6. Ministry of the Economic Affairs and Communications. National Development Plan of the Energy Sector until 2030, Tallinn, 2017.
7. 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. 2015
8. The Ministry of the Interior and the Government Office of Estonia. Code of Conduct for Crisis Situations. Tallinn, 2018
9. Estonian National Energy and Climate Plan 2030 (NECP 2030). 2019
10. Analysis of Opportunities for Increasing the Estonian Climate Ambition. 2019

Annex D. Compilation of Treaties signed by Estonia

Multilateral Agreements

No.	Title	In Force	Status
1.	Agreement on the Privileges and Immunities of the IAEA	1992-02-12	acceptance: 1992-02-12
2.	Treaty on the Non-Proliferation of Nuclear Weapons	1992-01-07	Accession: 1992-01-07
3.	Comprehensive Nuclear-Test-Ban Treaty	Not yet	Signature: 1996-11-20 Ratification:1999-08-13
4.	Convention on Environmental Impact Assessment in a Transboundary Context	2001-07-24	Ratification: 2001-04-25
5.	Amendment to the Convention on Environmental Impact Assessment in a Transboundary Context	2014-08-26	Ratification: 2010-04-12
6.	Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context	2010-07-11	Ratification: 2010-04-12
7.	Amendment to the Convention on Environmental Impact Assessment in a Transboundary Context	2017-10-23	Ratification: 2010-04-12
8.	Convention on the Protection of the Marine Environment of the Baltic Sea Area	2000-01-17	Signature: 1992-04-09 Ratification: 1995-06-08
9.	Convention on the Physical Protection of Nuclear Material	1994-06-08	accession: 1994-05-09
10.	Vienna Convention on Civil Liability for Nuclear Damage	1994-08-09	accession: 1994-05-09
11.	Convention on Early Notification of a Nuclear Accident	1994-06-09	accession: 1994-05-09
12.	Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	1994-06-09	accession: 1994-05-09
13.	Convention on Nuclear Safety	2006-05-04	accession: 2006-02-03
14.	Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention	1994-08-09	accession: 1994-05-09
15.	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	2006-05-04	Signature: 2001-01-05 ratification: 2006-02-03
16.	Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the IAEA (RSA)	2001-07-17	Signature: 2001-07-17
17	Amendment to the Convention on the Physical Protection of Nuclear Material	2016-05-08	ratification: 2009-02-24

Safeguards Agreements

Reg.No	Title	In Force	Status
1240	Application of safeguards in implementation of Article III (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons (with Protocol)	2005-12-01	accession: 2005-07-28
1696	Agreement between the Government of the Republic of Estonia and the IAEA for the Application of Safeguards in connection with the Treaty of the Non-Proliferation of Nuclear Weapons	1997-11-24	Signature: 1997-11-24
1769	Prot.Add. to Agreement between the Rep. Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Rep. of Finland, the Federal Rep. of Germany, the Hellenic Rep., Ireland, the Italian Rep., the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Portuguese Rep., the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the IAEA in Implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons	2005-12-01	accession: 2005-07-28