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FINAL REPORT

Safeguards in Estonia

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ABBREVIATIONS AND DEFINITIONS

Abbreviation	Meaning
AP	Additional Protocol
CSA	Comprehensive safeguards agreement
EB	Environmental Board
EC	European Commission
EU	European Union
IAEA	International Atomic Energy Agency
INFCIRC	Information Circulars
LOF	Undeclared facility or location outside facilities
NEPIO	Nuclear Energy Programme Implementing Organization
NWFZ	Nuclear-weapon-free zone
NNWS	Non-nuclear weapon state
NPT	Non-Proliferation of Nuclear Weapons
MBA	Material Balance Area
R&D	Research and Development
SMR	Small modular reactor
SSAC	State system of accounting for and control of nuclear material
YVL Guide	Regulatory Guides on nuclear safety in Finland

TERMS

Term	Description
Additional protocol (AP)	A protocol additional to a safeguards agreement (or agreements) concluded between the IAEA and a State, or group of States, following the provisions of the Model Additional Protocol.
Agency	Means the International Atomic Energy Agency (IAEA).
Community	Means the States of the European Atomic Energy Community (Euratom).
Competent authority	A competent authority is any person or organization that has the legally delegated or invested authority, capacity, or power to perform a designated function. Similarly, once an authority is delegated to perform a certain act, only the competent authority is entitled to take accounts therefrom and no one else.
Complementary Access	Access provided by the State and carried out by IAEA inspectors in accordance with the provisions of an additional protocol (AP).

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Comprehensive safeguards agreement (CSA).	An agreement concluded pursuant to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and/or a nuclear-weapon-free zone (NWFZ) treaty under which a State undertakes to accept, and the IAEA has the right and obligation to apply, safeguards on all source material or special fissionable material in all peaceful nuclear activities within the State's territory, under its jurisdiction or carried out under its control anywhere, for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices.
Dual-use item	Dual-use item refer to a product, technology, service, or other commodity that can, in addition to its civilian use or application, be used to develop or manufacture weapons of mass destruction or missile systems that can be used to guide them to their targets.
Facility	Means "(a) a reactor, a critical facility, a conversion plant, a fabrication plant, a reprocessing plant, an isotope separation plant or a separate storage installation; or (b) any location where nuclear material in amounts greater than one effective kilogram is customarily used
Location outside facility (LOF)	Means any installation which is not a facility, where nuclear material is customarily used in amounts of one effective kilogram or less
Material Balance Area (MBA)	MBA is an area in or outside of a facility such that: — the quantity of nuclear material in each transfer into or out of each MBA can be determined; and — the physical inventory of nuclear material in each MBA can be determined, when necessary, in accordance with specified procedures in order that the material balance for IAEA safeguards purposes can be established.
MBA Owner	Means owner of the site/material balance area where nuclear material is located.
Nuclear material	Nuclear material shall refer to special fissionable materials and source materials, such as uranium, thorium, and plutonium, suited for obtaining nuclear energy.
Operator	Any person or organization applying for authorization or authorized and/or responsible for safety when undertaking activities or in relation to any nuclear facilities or sources of ionizing radiation. Operator includes, inter alia, private individuals, governmental bodies, consignors or carriers, licensees, hospitals, self-employed persons.
Radioactive waste	Means material, in whatever physical form, remaining from practices or interventions and for which no further use is foreseen (i) that contains or is contaminated with radioactive substances and has an activity or activity concentration higher than the level set for clearance from regulatory requirements, and (ii) exposure to which is not excluded under applicable regulations.
Regulatory body	Means anybody or bodies designated by the laws of the State as having the legal authority to conduct the regulatory process under law, including issuing authorizations.

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Safeguards agreement	An agreement for the application of safeguards concluded between the IAEA and a State or a group of States, in some cases together with a regional authority responsible for safeguards implementation, such as the European Atomic Energy Community (Euratom).
Safeguards by design	The integration of safeguards considerations into the design process of a new or modified nuclear facility or location outside facilities (LOF) at any point in the life cycle — from initial planning through design, construction, operation, waste management and decommissioning.
Security Arrangements	Measures to prevent and protect against unlawful actions. Security arrangements includes physical protection and information/cyber security.
Site representative	Means any person, undertaking or entity designated by the Member State as being responsible for the declarations referred to in Article 3(2) of Euratom/302/2005
Spent Nuclear Fuel	Means nuclear fuel that has been irradiated in and permanently removed from a reactor core
Strategic Goods	Means military goods, defence-related products, the goods used to commit human rights violations and dual-use items.
Nuclear Safeguards or safeguards	Nuclear safeguards are measures to verify that states do not use nuclear materials to develop weapons and that they respect their obligations under international non-proliferation treaties.

1 INTRODUCTION

Estonia is considering nuclear energy to be part of their energy solutions in the future and therefore are conducting studies to form an understanding what are the requirements of European Commission Regulation (Euratom) and International Atomic Energy Agency (IAEA) concerning the nuclear power programme and what are the development needs in Estonia to meet the requirements. These analyses are needed to make decision whether Estonia should commit to the nuclear energy.

This report sums up conclusions from tasks of ordered project “Safeguards support for knowledgeable decision to launch a nuclear power programme”. The report provides an assessment of current situation regarding the safeguards measures and recommendations for the development of the legal & regulatory framework and necessary measures related to safeguards. The project tasks were agreed in the kick-off meeting.

The aim of the project is to support the Nuclear Energy Working Group in its analyses and conclusions in the development of nuclear power programme.

2 CURRENT SITUATION

Existing legal framework concerning nuclear energy in general, is described briefly in reports “Preparation of human resources development strategy for the nuclear energy working group and mapping of the regulatory framework” and *“Mapping the legal framework to start the nuclear program and updating the draft nuclear law and preparing the explanatory letter”* prepared by wider study.

This chapter gives brief overview of existing legal and regulatory framework concerning nuclear materials subject to safeguards, regulatory body and measures relevant for implementing state system of accounting and control of nuclear material.

2.1 Legal and regulatory framework

From the safeguards point of view, legal framework consists of the Radiation Act¹, Strategic Goods Act² and international treaties and agreements. Estonia is already party of a Treaty on The Non-Proliferation of Nuclear Weapons and as a member of the European Union is party of Euratom treaty. Agreement of 5 April 1973 between Belgium, Denmark, the Federal Republic of Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, the European Atomic Energy Community and the Agency in implementation of Article III (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/193) and Protocol Additional to the Agreement between the Republic of Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Republic of Finland, the Federal Republic of Germany, the Hellenic Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the

¹ <https://www.riigiteataja.ee/en/eli/501072023002/consolide>

² <https://www.riigiteataja.ee/en/eli/512022020002/consolide>

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Netherlands, the Portuguese Republic, the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/193/Add.8; hereinafter referred to as “Additional Protocol” or “AP”) has been in force since 1st of December 2005.

In addition to treaties and agreements, Estonia has binding requirements from EU legislation, for example European Commission regulation on the application of Euratom safeguards (Commission Regulation (Euratom) No 302/2005 of 8 February 2005 on the application of Euratom safeguards – Council/Commission statement; hereinafter referred to as “302/2005/Euratom”).

The Additional Protocol covering the EU 27 Member States gives the IAEA more powers. Countries should provide the IAEA with an expanded declaration of activities in the nuclear field and secondly the IAEA obtains the right to make short notice visits to locations related to the nuclear fuel cycle (complementary access). EURATOM and the States concerned are jointly responsible for providing information to the IAEA under the AP to the comprehensive safeguards agreements (CSA) concluded with the non-nuclear weapon states (NNWS) of the European Union (INFCIRC/193/Add.8). In accordance with that AP’s Appendix III, States are permitted to delegate some of their obligations under the CSA to EURATOM through a side letter to the agreement (“side-letter States”). These include, for example, the obligations to provide declarations concerning: nuclear fuel cycle-related research and development (R&D) not involving nuclear material; uranium mines and concentration plants and thorium concentration plants; imports of specified equipment and non-nuclear material; and general plans for the development of the nuclear fuel cycle.

EURATOM reports to the IAEA nuclear material-related information under the Additional Protocol for all Member States. In addition, the European Commission prepares reports to respond to the extended information requirements of the AP for the side-letter. While the side-letter States retain the responsibility for the accuracy of data provided, the European Commission has accepted to collect the data and submit the reports for them to the IAEA. The European Commission reports to the IAEA nuclear material related information under the AP on its own behalf for all Member States.

The Radiation Act focuses on radiation protection and safety issues. It covers principles of concerning application and making decisions about licence of radiation practices as well as transport permit of radioactive waste and spent nuclear fuel. There are also definitions and provisions regarding the nuclear materials and safeguards related matters, but doesn’t address safeguards comprehensively. Radiation Act defines some of the key terms related to safeguards and the authority which has the supervisory role and authority issue licenses for radiation practices and transport permits of radioactive waste and spent nuclear fuel. The standard formats of documents for importation, export or transit of radioactive waste and spent nuclear fuel are set out in the Commission Decision 2008/312/Euratom of 5 March 2008 establishing the standard document for the supervision and control of shipments of radioactive waste and spent nuclear fuel referred to in Council Directive 2006/117/Euratom.

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These requirements in Radiation Act are supplemented by regulation³ issued by the Minister of the Environment in 2016. As of 1 July 2023, the amendment of the Government of the Republic Act entered into force, reorganising the work of some ministries. The former Ministry of the Environment is called the Ministry of Climate, whose area of government includes, inter alia, the development of radiation and nuclear safety policies.

Applications regarding transport of radioactive waste and spent nuclear fuel, and licenses for radiation practices are handled by Environmental Board. Requirements for application of radiation practice licence in Radiation Act are supplemented by regulation⁴ issued by the Minister of the Environment in 2016. Regulation defines in more detail the requirements related to information which shall be provided as part of license application.

Transfers of dual-use items subject to safeguards is controlled by Strategic Goods Act (dual-use items), which defines principles and requirements (for example authorisation of transfers, prohibitions, and licensees) concerning transfers of dual-use items. Regulatory body related to transfers of strategic goods, including dual-use items, is the Ministry of Foreign Affairs.

Based on information provided, currently there is not much binding regulations to the licensee, in addition to requirements set in the Radiation Act and in Strategic Goods Act. It seems that existing national regulatory framework in Estonia doesn't set detailed requirements related to safeguards for the holders of the radiation practice license (licensee). There are no requirements related to for example how licensees should implement and manage its safeguards programme and activities. The Radiation Act sets high-level requirements for the licensees concerning accounting for and control of nuclear material in their possession. Licensees are obligated to keep records of nuclear materials in their possession and inform the Environmental Board about any changes to that. Information and records are gathered from the licensees using information system used as a state system of accounting for and control of nuclear materials.

To ensure that provisions in international treaties and agreement related to records and reports are met, mandatory information which is required for the application and keeping necessary records is defined in the information system.

The existing legislation needs further development to adequately cover safeguards as part of nuclear power programme. From the safeguards point of view, existing legislation and regulatory framework is missing general principles (ensure compliance with obligations laid down in international treaties, agreements, and regulations) and objectives (non-proliferation) of safeguards which should be considered as basis for implementing nuclear power programme and for the application of safeguards.

³ Ministry of Environment regulation: 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.

⁴ Ministry of Environment regulation: 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.

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2.2 Regulatory body and Competent authority

Environmental Board is currently responsible for safeguarding issues and is implementing regulatory control of existing legal framework as stated in the Radiation Act. Environmental Board is in area of government of the Ministry of Climate which is a regulatory body in safeguards matters and responsible for policies and legislation related to radiation protection and safety.

Environmental Board consists of different departments which has their own areas of responsibilities. Radiation Protection Bureau of Climate and Radiation Department is responsible for authorisation of radiation practice licenses and is acting as the safeguards regulator in Estonia. Supervision Department is responsible for inspections. However, supervision department is not currently making inspections related to safeguards. Climate and Radiation Safety department conducts pre-authorisation inspections to verify data on the license application.

Radiation Protection Bureau is responsible for state system of accounting for, and control of nuclear material as well as issuing radiation practice licence and transport permit for radioactive waste as well as spent nuclear fuel. Environmental Board has responsibilities related to safeguards but legislation doesn't give them a mandate to be competent authority which can control safeguards matters.

Environment Board doesn't have a mandate to issue binding legislation or guidance. Ministry of Climate is responsible for developing radiation policies and drafting legislation.

Environmental Board responsibilities according to the Radiation Act includes supervision of implementation of measures and activities specified in the Act, issuing licensees, accounting for and control of nuclear material as well as reporting to the IAEA and European Commission. Environmental Board is involved in planning of the safeguards related inspections and participate in IAEA inspections as well as in cooperation with IAEA and European Commission. Environmental Board acts as a contact point for IAEA and Euratom.

Strategic Goods Commission, within the Ministry of Foreign Affairs, is responsible for matters involving strategic goods, including dual-use items. Strategic Goods Commission handles license applications related to strategic goods and gives authorisations for the transfers of dual-use items when required by the Strategic Goods Act or EU regulation.

The Strategic Goods Commission uses the electronic processing environment Stratlink, and applications, statements, reports, and other documents must be submitted to the Commission through the electronic system. During the project it was discussed also with the Strategic Goods Commission. Currently there are 6 members in the commission and their alternate members. Based on the discussion they have evaluated to need more nuclear power related

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resources in the future if Estonia becomes a nuclear power country. The tasks and current resources of the commission are discussed already in the report⁵.

2.3 State system of accounting for and control of nuclear material

Current state system of accounting for, and control of nuclear material is considered to be sufficient for current needs as there are only small amounts of nuclear materials in Estonia. There are no nuclear power plants or facilities operating with nuclear fuel cycle in Estonia, neither any activities related to nuclear fuel cycle. Most of the declared nuclear materials (depleted uranium as radiation-shielding material, plutonium in smoke-detectors) in Estonia is stored at the central interim storage facility of radioactive waste. In addition, there is the former nuclear submarine training centre together with two reactor compartments at the same site, but spent fuel was removed from the reactors and taken back to Russia already in 1995. As a result, Estonia's current nuclear material accounting system is limited to non-nuclear activities. Minor nuclear material holders in Estonia are members of a Catch-All-MBA (CAM), for the purposes of international nuclear safeguards, and is under the responsibility of Environmental Board.

Licensing of storage or use of nuclear material involved in radiation practices, including of nuclear material are done by using web-based information system where license applications and management of the licences are done. This web-based information system includes also nuclear material registry. Radiation Act requires licensees to keep records of the nuclear material which they are in possession of, and also inform the Environmental Board about changes in quantity of nuclear materials. Necessary information from the licensees is collected through the information system. Requirement for the environmental decisions information system in the General Part of the Environmental Code Act⁶ is supplemented by regulation of the Minister of the Environment⁷.

3 COMPLIANCE WITH THE REQUIREMENTS

3.1 Analysis methodology

As part of task 2 Study of compliance, binding requirements from international treaties (e.g., Treaty on The Non-Proliferation of Nuclear Weapons, NPT), IAEA as well as European Commission requirements were studied and current situation in Estonia was compared to the requirements. In the following subchapters compliance against the requirements relevant to the nuclear safeguards is presented. Recommendations concerning the development of nuclear safeguards related practices are describe in chapter 4.

International treaties, regulations and agreements which are considered in this analysis are:

⁵ Tuumaenergia Töörühmale Inimressursside Arendamise Strateegia Koostamine Ja Regulaatiivse Raamistiku Kaardistamine (VIITENUMBER 251568), 2023

⁶ <https://www.riigiteataja.ee/en/eli/529052023002/consolide>

⁷ Ministry of Environment regulation: The environmental decisions information system and its statutes.

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- Treaty on The Non-Proliferation of Nuclear Weapons (NPT, INFCIRC/140)
- Agreement between Belgium, Denmark, the Federal Republic of Germany, Ireland, Italy, Luxembourg, the Netherlands, the European Atomic Energy Community and the Agency with the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/193)
- Protocol Additional to the Agreement between the Republic of Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Republic of Finland, the Federal Republic of Germany, the Hellenic Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Portuguese Republic, the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/193/Add.8)
- Treaty establishing the European Atomic Energy Community (Euratom Treaty)
- Commission Regulation (Euratom) No 302/2005 on the application of Euratom safeguards
- Regulation (EU) 2021/821 setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items
- Council Directive 2006/117/Euratom on the supervision and control of shipments of radioactive waste and spent fuel
- Nuclear Energy Series No. NG-G-3.1 (Rev. 1), Milestones In The Development Of A National Infrastructure For Nuclear Power, 2015

NPT forms the basis for international safeguards and Euratom treaty for the safeguards in the European Union. NPT in the EU is applied based on the measures described in the INFCIRC/193 and its additional protocol INFCIRC/193/Add.8 Commission Regulation No 302/2005, issued based on Euratom treaty, sets detailed provisions concerning the use of nuclear materials. Regulation No 2021/821 and Directive 2006/117 describes provisions regarding transfers of dual-use items, and radioactive waste and spent nuclear fuel, accordingly.

European Commission regulations are binding on members of the EU, hence also Estonia, these are included to the analysis. For the purpose of gathering the list of relevant treaties and EU legislation, legislation in Finland as well as regulation and guides concerning nuclear safeguards were studied. The above-mentioned treaties, agreements, and EU legislation list are also referred to in Finnish legislation and regulations.

Gap-analysis was the methodology used to perform the compliance analysis. In the gap-analysis, implementation of current safeguards measures and practices were compared to what is required in the selected international treaties, regulations and agreements. Analyses of implementation was based on existing legislation and regulatory guidance provided as background information as well as additional information and discussions with the client about existing practices related to safeguards.

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During the analysis, relevant requirements from the above listed documentation were identified and then compliance of the existing legislation and practices were assessed. Analysis was conducted based on legislation and other information provided by the client and didn't include verification of implementation of measures required by the binding legislation or regulations or analysis and/or verification of licensees' implementation of required measures.

3.2 Analysis results

3.2.1 International Treaties

3.2.1.1 Treaty On The Non-Proliferation Of Nuclear Weapons (NPT)

Table 1 gives brief summary of compliance with requirements set in Treaty on The Non-Proliferation of Nuclear Weapons. Articles selected to the analysis are related to implementation of nuclear safeguards. Articles which were left out are related to treaty (e.g., amendments to the treaty and right to withdraw from treaty) or concern nuclear-weapon states.

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Table 1. Compliance with NPT

Source document	Source	Requirement	Analysis
INFCIRC/140	Article 2	Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.	The Strategic Goods Act defines conditions when transfer of strategic goods and services, including dual-use items and weapons of mass destruction, are prohibited.
INFCIRC/140	Article 3	Each Non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfilment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices.	Estonia is party of an NPT and Euratom treaty and already has CSA and Additional Protocol in force.
INFCIRC/140	Article 3	Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material specially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article.	The Radiation Act defines conditions when transport permit of radioactive waste and spent nuclear fuel shall be refused. Strategic Goods Act sets conditions for refusal for dual-use items
INFCIRC/140	Article 3	The safeguards required by this Article shall be implemented in a manner designed to comply with Article IV of this Treaty, and to avoid hampering the economic or technological development of the Parties or international co-operation in the field of peaceful nuclear activities,	Article IV address right for peaceful use of nuclear energy and participation to co-operation to the development of nuclear energy for peaceful purposes. Estonia is currently studying possibility to start a

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		including the international exchange of nuclear material and equipment for the processing, use or production of nuclear material for peaceful purposes in accordance with the provisions of this Article and the principle of safeguarding set forth in the Preamble of the Treaty.	nuclear power program and hence using it's right for the use of nuclear energy. While creating development plan, Estonia is co-operating with other states to identify development needs and best practices that should be adopted in its nuclear power program.
INFCIRC/140	Article 3	Non-nuclear-weapon States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this Article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency.	Estonia is party of an NPT and Euratom treaty and already has CSA and Additional Protocol in force.

3.2.2 European Commission

Table 2 gives brief summary of compliance with requirements set in Euratom Treaty and safeguards related regulations set by European Commission. Articles which are selected to the analysis are requirements which require measures to be implemented by the member state.

Table 2. Compliance with Euratom treaty & European Commission regulations

Source document	Source	Subject/Requirement	Analysis
Euratom Treaty	Article 78	Anyone setting up or operating an installation for the production, separation or other use of source materials or special fissile materials or for the processing of irradiated nuclear fuels shall declare to the Commission the basic technical characteristics of the installations, to the extent that knowledge of these characteristics is necessary for the attainment of the objectives set out in Article 77.	Not considered in existing national legislation (Radiation Act or in Strategic Goods Act). Covered by Euratom/302/2005 (art. 3) which is binding regulation to Estonia and shall also be complied with by the licensees/ license applicants. Regulations also sets time limit for submitting declaration.

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Euratom Treaty	Article 79	<p>The Commission shall require that operating records be kept and produced in order to permit accounting for ores, source materials and special fissile materials used or produced.</p> <p>The same requirement shall apply in the case of the transport of source materials and special fissile materials.</p>	<p>Existing legislation (Radiation Act) in Estonia requires operators/licensees to keep records of nuclear material in their possession. Covered also by Euratom/302/2005 (art. 8).</p> <p>Recommendations regarding accounting system given in chapters 4.3.</p>
Euratom Treaty	Article 81	Access of inspectors of the Commission.	Radiation Act requires that international inspectors shall be given access to all the objects in the scope of regulation of these international agreements and to relevant data, and they have the right to take samples.
Commission Regulation (Euratom) No 302/2005	Chapter 2, Article 3	Any person or undertaking setting up or operating an installation for the production, separation, reprocessing, storage or other use of source material or special fissile material shall declare to the Commission the basic technical characteristics of the installation, using the relevant questionnaire.	<p>Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety also by the licensees/ license applicants. Currently there is no additional requirements in existing national legislation.</p> <p>Currently, common practice is that all the MBA owners communicates directly with EC.</p>
Commission Regulation (Euratom) No 302/2005	Chapter 22, Article 3	Each Member State being a party to Additional Protocol 1999/188/Euratom, shall designate a site representative for each site on its territory who shall provide to the Commission a declaration containing a general description of the site.	Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety. Existing national legal framework (Radiation Act) or regulations doesn't designate site representative.

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			Recommendation given in chapter 4.2.
Commission Regulation (Euratom) No 302/2005	Chapter 2, Article 4	Time-limits for providing declaration/ information to the Commission.	Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety also by the licensees/ license applicants. As existing national regulation and guidance doesn't give time limits for declarations, licensees and license applicant shall be aware of No 302/2005 requirements and implementation guidance.
Commission Regulation (Euratom) No 302/2005	Chapter 2, Article 5	Programme of safeguards activities: To enable the Commission to plan its safeguards activities, the persons or undertakings referred to in the first subparagraph of Article 3(1) shall communicate to the Commission	Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety also by the licensees/ license applicants. As existing national regulation and guidance doesn't give more detailed requirements or guidance concerning safeguards programme, licensees and license applicant shall be aware of No 302/2005 requirements and implementation guidance.
Commission Regulation (Euratom) No 302/2005	Chapter 2, Articles 6 & 17	Particular safeguard provisions Acting on the basis of the basic technical characteristics submitted pursuant to Article 3(1) and Article 4, the Commission shall adopt particular safeguard provisions relating to the matters set out in paragraph 2 of this Article. The particular safeguard provisions shall be drawn up by means of a Commission decision addressed to the person or undertaking concerned, taking account of operational and technical constraints and in close consultation with the person or undertaking concerned and the relevant Member State.	Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety. Particular safeguard provisions are set by the Commission, if necessary, based on basic technical characteristics. Shall be taken into consideration by the nuclear power plant operator if particular safeguards provisions adopted to the operator by the Commission.

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		Nuclear materials subject to particular safeguard obligations entered into by the Community in an agreement concluded with a third country or an international organisation shall, unless otherwise stipulated by such an agreement, be identified separately for each obligation in notifications specified in article 17 of 302/2005.	
Commission Regulation (Euratom) No 302/2005	Chapter 3, Articles 7, 26-28 & 30	Accounting system: The persons or undertakings referred to in the first subparagraph of Article 3(1) shall maintain a system of accountancy and control for nuclear materials. This system shall include accounting and operating records and, in particular, information on the quantities, category, form and composition of these materials as provided for in Article 18, their actual location and the particular safeguards obligation as provided for in Article 17, together with details of the recipient or shipper when nuclear materials are transferred.	<p>Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety.</p> <p>Considered also in existing national legal and regulatory framework (Radiation Act).</p> <p>The Radiation Act requires to keep records of nuclear materials, report to the EB, to use standard data formats and informing about changes. Information system used for accounting and control of nuclear materials implemented so that 302/2005 requirement considered.</p> <p>Estonia's current nuclear material accounting system is limited to non-nuclear activities. According to the Minister of the Environment's Regulation, the applicant must provide data characterising nuclear material that is solely used for non-nuclear practises, which shall be submitted on the basis of the list of data set out in clause 4 of Annex 2 of this Regulation.</p>

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			Recommendations given in chapters 4.3.
Commission Regulation (Euratom) No 302/2005	Chapter 3, Article 8	<p>For each material balance area, the operating records shall include, where appropriate:</p> <p>(3)</p> <p>(a) the operating data used to determine changes in the quantities and composition of nuclear material;</p> <p>(b) a list of inventory items and their location;</p> <p>(c) the data, including derived estimates of random and systematic errors, obtained from the calibration of tanks and instruments as well as from sampling and analysis;</p> <p>(d) the data resulting from quality control measures applied to the nuclear material accountancy system, including derived estimates of random and systematic errors;</p> <p>(e) a description of the sequence of actions taken to prepare for, and take, a physical inventory, and to ensure that the inventory is correct and complete;</p> <p>(f) a description of the actions taken in order to ascertain the cause and magnitude of any accidental or unmeasured loss that might have occurred;</p> <p>(g) the isotopic composition of plutonium, including its decay isotopes, and reference dates, if recorded at the installation for operational needs.</p> <p>When available, the data referred to in point (g) shall be communicated to the Commission on request.</p>	<p>Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety also by the licensees/ license applicants. As existing national regulation and guidance doesn't give more detailed requirements or guidance concerning operating records, licensees and license applicant shall be aware of No 302/2005 requirements and implementation guidance.</p> <p>Considered in existing national legal framework. Estonia's current nuclear material accounting system is limited to non-nuclear activities.</p> <p>The Radiation Act requires to keep records of nuclear materials, report to the EB, to use standard data formats and informing about changes. Information system used for accounting and control of nuclear materials implemented so that 302/2005 requirement considered.</p>

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Commission Regulation (Euratom) No 302/2005	Chapter 3, Article 9	<p>In respect of each material balance area the accounting records shall show the following:</p> <p>(3)</p> <p>(a) all inventory changes, so that the book inventory can be determined at any time;</p> <p>(b) all measurement and counting results used to determine the physical inventory;</p> <p>(c) all corrections made to inventory changes, book inventories and physical inventories.</p>	Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety also by the licensees/ license applicants. As existing national regulation and guidance doesn't give more detailed requirements or guidance concerning accounting records, licensees and license applicant shall be aware of No 302/2005 requirements and implementation guidance.
Commission Regulation (Euratom) No 302/2005	Chapter 3, Articles 10-16, 18, 19 & 30 -32	<p>Accounting reports:</p> <p>The persons or undertakings referred to in the first subparagraph of Article 3(1) shall provide the Commission with accounting reports.</p> <p>The accounting reports shall contain the information available on the date of reporting and must be corrected at a later date if necessary.</p>	<p>Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety.</p> <p>Considered also in existing national legal framework. The Radiation Act require immediately inform the Environmental Board of changes in the quantity of nuclear materials. Regular accounting reporting to the Commission is set in regulation No 302/2005. Currently, the licensees/operators of each material balance area as well as well as Environmental Board of its material balance area provide reports to the Commission.</p>
Commission Regulation (Euratom) No 302/2005	Chapter 4, Article 20	<p>Exports and shipments</p> <p>The persons or undertakings referred to in the first subparagraph of Article 3(1) shall give advance notification to the Commission if any source materials or special fissile materials:</p> <p>(3)</p>	Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety. Permits for export and shipments of nuclear material considered also in existing national legal

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		<p>(a) are exported to a third country;</p> <p>(b) are shipped from a non-nuclear-weapon Member State to a nuclear-weapon Member State;</p> <p>(c) are shipped from a nuclear-weapon Member State to a non-nuclear-weapon Member State</p>	<p>framework (Radiation Act, Strategic Goods Act).</p> <p>The radiation act defines that EB is responsible for handling applications, issuing transport permits for radioactive waste and spent nuclear fuel and contacting competent authority of destination country.</p> <p>Transfers, including exports of dual-use items are controlled by Strategic Goods Act. Strategic Goods Commission gives authorisations for transfers of dual-use items.</p>
Commission Regulation (Euratom) No 302/2005	Chapter 4, Articles 21	<p>Imports and receipts</p> <p>The persons or undertakings referred to in the first subparagraph of Article 3(1) shall give advance notification to the Commission if any source materials or special fissile materials:(3)</p> <p>a) are imported from a third country;</p> <p>(b) are received in a non-nuclear-weapon Member State from a nuclear-weapon Member State;</p> <p>(c) are received in a nuclear-weapon Member State from a non-nuclear-weapon Member State.</p>	<p>Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety also by the licensees/ license applicants. Licensees and license applicant shall be aware of No 302/2005 requirements and implementation guidance.</p> <p>Transfers, including imports of dual-use items are controlled by Strategic Goods Act. Strategic Goods Commission gives authorisations for transfers of dual-use items.</p> <p>Importation of radioactive waste and spent nuclear fuel is controlled in national legislation by Radiation Act.</p>

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Regulation (EU) 2021/821	Articles 3-6, 8, 10 & 11	<p>An authorisation shall be required for the</p> <ul style="list-style-type: none"> • export of dual-use items listed in Annex I of 2021/821 • export of dual-use items not listed in Annex I of 2021/821 in cases specified in article 4 of 2021/821 • or the export of cyber-surveillance items not listed in Annex I in cases specified in article 5 of 2021/821 • for the provision of brokering services of dual-use items listed in Annex I in cases specified in article 6 of 2021/821 • for the provision of technical assistance related to dual-use items listed in Annex I in cases specified in article 8 of 2021/821 • for the export of dual-use items not listed in Annex I of 2021/821 if another Member State imposes an authorisation requirement for the export of those items on the basis of a national control list of items adopted by that Member State • for intra-Union transfers of dual-use items listed in Annex IV of 2021/821. Dual-use items listed in Part 2 of Annex IV of 2021/821 shall not be covered by a general authorisation. 	<p>Authorisation for the purposes specified in 2021/821 of dual-use items is considered in Strategic Goods Act.</p> <p>Competent authority which is responsible for issuing licenses/ authorisations necessary for the import, export, transit or transfer of dual-use items is designated, information relevant for the license/ authorisation is specified in the Strategic Goods Act.</p>
Regulation (EU) 2021/821	Article 7	The transit of non-Union dual-use items listed in Annex I of 2021/821 may be prohibited at any time by the competent authority of the Member State where the items are situated if the items are or may be intended, in their entirety or in part, for any of the uses referred to in Article 4(1).	Conditions when transfers of strategic goods are prohibited or when special authorization from Strategic Goods Commission is required, is specified in Strategic Goods Act. The Strategic Goods Act takes into account the uses referred to in Article 4 of 2021/821.
Regulation (EU) 2021/821	Article 9	A Member State may prohibit or impose an authorisation requirement on the export of dual-use items not listed in Annex I for reasons of public security, including the prevention of acts of terrorism, or for human rights considerations	Conditions when transfers of strategic goods are prohibited or when special authorization from Strategic Goods Commission is required, is specified in Strategic Goods Act.
Regulation (EU) 2021/821	Article 13	Authorisations for the provision of brokering services and technical assistance under this Regulation shall be granted by the competent authority of the Member State	According to Strategic Goods Act, Strategic Goods Commission is the competent authority which grants licences/ authorisations.

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Regulation (EU) 2021/821	Article 15	In deciding whether or not to grant an authorisation or to prohibit a transit under this Regulation, the Member States shall take into account all relevant considerations specified in article 15 of 2021/821.	Conditions when transfers of strategic goods are prohibited or when special authorization from Strategic Goods Commission is required, is specified in Strategic Goods Act. The Strategic Goods Act takes into account Article 15 of 2021/821.
Regulation (EU) 2021/821	Article 16	The competent authority acting in accordance with this Regulation, may refuse to grant an export authorisation and may annul, suspend, modify or revoke an export authorisation which it has already granted.	The Strategic Goods Act defines condition when authority may refuse to issue a licence or when licence may be revoked, suspended or annulled.
Council Directive 2006/117	Article 6	A holder who plans to carry out an intra-Community shipment of radioactive waste or spent fuel or to arrange for such a shipment to be carried out shall submit a duly completed application for authorisation to the competent authorities of the Member State of origin.	The Radiation Act takes into consideration transport permits for radioactive waste and spent nuclear fuel and includes reference to Council Directive 2006/117/Euratom regarding necessary documentation.
Council Directive 2006/117	Article 7	The competent authorities of the Member State of origin shall send the duly completed application referred to in Article 6 for consent to the competent authorities of the Member State of destination and of the Member States of transit, if any.	According to the Radiation Act, Environmental Board shall send documentation to the competent authority of destination country and of transit.

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3.2.3 Comprehensive Safeguards Agreement and Additional Protocol

Table 3 gives brief summary of compliance with requirements set in safeguards agreement⁸ and Additional Protocol⁹ between Estonia and the IAEA. Paragraphs which require implementation from the IAEA are not considered in the table. Articles selected includes requirement for implementation of certain safeguards measure by the state. Articles which are left out are requirements that for example concerns the IAEA.

The Community is the States of the European Atomic Energy Community (Euratom).

The Agreement is the Agreement between Belgium, Denmark, the Federal Republic of Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, the European Atomic Energy Community and the Agency in implementation of Article III (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/193).

The Agency is the International Atomic Energy Agency (IAEA).

Table 3. Compliance with CSA and AP

Source document	Source	Subject/Requirement	Analysis
INFCIRC/193	Part 1 Article 3	The community and the Agency shall co-operate to facilitate the implementation of the safeguards provided for in this Agreement.	The Radiation Act requires that inspectors shall be allowed access, inspections with the state authority conducted by the IAEA, MBA

⁸ INFCIRC/193, Agreement between Belgium, Denmark, The Federal Republic of Germany, Ireland, Italy, Luxembourg, The Netherlands, The European Atomic Energy Community and the Agency in connection with the Treaty on the Non-Proliferation of Nuclear Weapons

⁹ Protocol Additional to the Agreement between the Republic of Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Republic of Finland, the Federal Republic of Germany, the Hellenic Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Portuguese Republic, the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons

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			owners provides nuclear material reports to the community.
INFCIRC/193	Part 1 Article 5	The safeguards provided for in this Agreement shall be implemented in a manner designed: (3) (a) to avoid hampering the economic and technological development in the Community or international co-operation in the field of peaceful nuclear activities, including international exchange of nuclear material; (b) to avoid undue interference in peaceful nuclear activities in the Community, and in particular in the operation of facilities; and (c) to be consistent with prudent management practices required for the economic and safe conduct of nuclear activities	These are high level principles which needs to be taken into account when safeguards measures when planning and implementing safeguards as part of nuclear power programme. Existing legal framework doesn't define high level principles or objectives for nuclear legislation or safeguards. Recommendations in chapter 4.1.
INFCIRC/193	Part 1 Article 7	In implementing safeguards under this Agreement, full account shall be taken of technological development in the field of safeguards, and every effort shall be made to ensure optimum cost-effectiveness and the application of the principle of safeguarding effectively the flow of nuclear materials subject to safeguards under this Agreement by use of instruments and other techniques at certain strategic points to the extent that present or future technology permits.	Means listed as an example for the cost-effective implementation are used in Estonia. For example, accounting in web-based information system which is used for nuclear material accountancy is based on material balance areas, there are measures (e.g., license/permit measures, notifications & reports) to evaluate and oversight flow of nuclear materials.
INFCIRC/193	Part 1 Article 8 (a)	In order to ensure the effective implementation of safeguards under this Agreement, the Community shall, in accordance with the provisions set out in this Agreement, provide the Agency with information concerning nuclear material subject to safeguards under this Agreement and the features of facilities relevant to safeguarding such material.	Regular reports are provided to European Commission and to the IAEA, and from the European Commission to IAEA. Standard data formats and software intended for reporting is used.

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INFCIRC/ 193	Part 1 Article 8 (b ii)	Information pertaining to facilities shall be the minimum necessary for safeguarding nuclear material subject to safeguards under this Agreement.	Commission Regulation (Euratom) No 302/2005 is a binding legislative act which sets requirements for reporting and MBA owners reports to the European Commission accordingly. In the system used as state system for accounting and control and to manage licenses, only necessary information for those purposes is collected.
INFCIRC/ 193	Part 1 Article 9 (b)	The Community and the States concerned shall take the necessary steps to ensure that Agency inspectors can effectively discharge their functions under this Agreement.	The Radiation Act requires that international inspectors shall be allowed access to facilities. In comparison to legislation and regulation to Finland, existing legislation in Estonia doesn't for example designate responsibilities which regulatory body is responsible for approving international inspectors. Recommendation given in 4.1.1.3.
INFCIRC/ 193	Part 1 Article 11	Safeguards under this agreement shall terminate on nuclear material upon determination by the Community and the Agency that the material has been consumed, or has been diluted in such a way that it is no longer usable for any nuclear activity relevant from the point of view of safeguards, or has become practicably irrecoverable.	Covered by Commission Regulation (Euratom) No 302/2005 and may be implemented through inventory change reporting.
INFCIRC/ 193	Part 1 Article 12	The Community shall give the Agency notification of transfers of nuclear material subject to safeguards under this Agreement out of States, in accordance with the provisions of this Agreement.	Notifications covered by Euratom/302/2005 (see also analysis of Euratom/302/2005 article 21).

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INFCIRC/ 193	Part 1 Article 13	Where nuclear material subject to safeguards under this Agreement is to be used in non-nuclear activities, such as the production of alloys or ceramics, the Community shall agree with the Agency, before the material is so used, on the circumstances under which the safeguards on such material may be terminated.	Radiation Act gives Environmental Board possibility to prohibit manufacture and importation of such products.
INFCIRC/ 193	Part 2 Article 28	The objective of the safeguards procedures set forth in this Agreement is the timely detection of diversion of significant quantities of nuclear material from peaceful activities to the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown, and deterrence of such diversion by the risk or early detection.	<p>National system, managed by Environmental Board, is in place.</p> <p>Radiation practice licence is required for all activities involving ionizing radiation set in Radiation Act. An application for a radiation practice licence together with the annexes thereto shall be submitted to the Environmental Board through the web-based information system. Climate and Radiation Department of the Environmental Board reviews the data and documents submitted by the applicant and, if needed, checks their conformance to the actual situation conducts. Licensees has obligations to notify about changes to the Environmental Board.</p>
INFCIRC/ 193	Part 2 Article 29	For the purpose of achieving the objective set forth in article 28, material accountancy shall be used as a safeguards measure of fundamental importance, which containment and surveillance as important complementary measures.	<p>Covered by Commission Regulation (Euratom) No 302/2005. National system, managed by Environmental Board, is in place.</p> <p>Estonia's current nuclear material accounting system is limited to non-nuclear activities. According to the Minister of the Environment's Regulation, the applicant must</p>

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			provide data characterising nuclear material that is solely used for non-nuclear practises, which shall be submitted on the basis of the list of data set out in clause 4 of Annex 2 of this Regulation.
INFCIRC/193	Part 2 Article 32	<p>Community's system of accounting for and control of nuclear material under this Agreement shall be based on a structure of material balance areas. The community, in applying its safeguards, will make use of and, to the extent necessary, make provisions for, as appropriate and specified in the Subsidiary arrangements such measures as:</p> <p>(3)</p> <p>(a) a measurement system for the determination of the quantities of nuclear material received, produced, shipped, lost or otherwise removed from inventory, and the quantities on inventory;</p> <p>(b) the evaluation of precision and accuracy of measurements and the estimation of measurement uncertainty;</p> <p>(c) procedures for identifying, reviewing and evaluating differences in shipper/receiver measurements;</p> <p>(d) procedures for taking a physical inventory;</p> <p>(e) procedures for the evaluation of accumulations of unmeasured inventory and unmeasured losses;</p> <p>(f) a system of records and reports showing, for each material balance area, the inventory of nuclear material and the changes in that inventory including receipts into and transfers out of the material balance area;</p> <p>(g) provisions to ensure that the accounting procedures and arrangements are being operated correctly; and</p>	See analysis above (article 29) and analysis of Euratom/302/2005 requirements related to accounting.

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		(h) procedures for the provision of reports to the Agency in accordance with Articles 58-68.	
INFCIRC/ 193	Part 2 Para 34 (a)	When any material containing uranium or thorium which has not reached the stage of the nuclear fuel cycle described in paragraph (c) is directly or indirectly exported to a non-nuclear-weapon State, Community shall inform the Agency of its quantity, composition and destination, unless the material is exported for specifically non-nuclear purposes;	<p>Existing legislation^{10&11} and regulation¹² consider issuance of transport permits for exporting nuclear material out of Estonia. Export and import of nuclear materials is also covered by EU legislations (Commission Regulation 302/2005) which are binding to Estonia.</p> <p>Existing legislation and regulation consider issuance of transport permits for exporting nuclear material out of Estonia.</p> <p>There are measures in place to apply and issue a permit regarding import and export of nuclear material. The legislation defines responsibilities for issuing permits and contacting competent authority of destination in case of export of nuclear material.</p> <p>These measures should help Estonia to identify when nuclear material is imported</p>

¹⁰ Radiation Act

¹¹ Strategic Goods Act

¹² Minister Of the Environment Regulation, 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

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			<p>or exported and hence fulfil obligations set in Article 34 to inform the IAEA.</p> <p>See also analysis of Euratom/302/2005 Article 20.</p>
INFCIRC/193	Part 2 Para 34 (b)	When any material containing uranium or thorium which has not reached the stage of the nuclear fuel cycle described in paragraph (c) is imported, Community shall inform the Agency of its quantity and composition, unless the material is imported for specifically non-nuclear purposes;	<p>Existing legislation and regulation consider issuance of transport permits for exporting nuclear material out of Estonia.</p> <p>Export and import of nuclear materials is also covered by EU legislations (Commission Regulation 302/2005) which are binding to Estonia.</p> <p>Transfers, including imports of dual-use items are controlled by Strategic Goods Act. Strategic Goods Commission gives authorisations for transfers of dual-use items.</p> <p>Importation of radioactive waste and spent nuclear fuel is controlled in national legislation by Radiation Act.</p> <p>See also Part 2 Para 34 (a).</p>
INFCIRC/193	Part 2 Para 34 (c)	When any nuclear material of a composition and purity suitable for fuel fabrication or for isotopic enrichment leaves the plant or the process stage in which it has been produced, or when such nuclear material, or any other nuclear material produced at a later stage in the nuclear fuel cycle, is imported into Community, the nuclear material shall become subject to the other safeguards procedures specified in this Agreement.	<p>Existing legislation and regulation consider issuance of transport permits for exporting nuclear material out of Estonia.</p> <p>Export and import of nuclear materials is also covered by EU legislations (Commission</p>

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			Regulation 302/2005) which are binding to Estonia. See also analysis of Part II, paragraph 34 (a) & (b).
INFCIRC/193	Part 2 Article 35	(3) (a) Safeguards shall terminate on nuclear material subject to safeguards under this Agreement, under the conditions set forth in Article 11. Where the conditions of that Article are not met, but Community considers that the recovery of safeguarded nuclear material from residues is not for the time being practicable or desirable, Community and the Agency shall consult on the appropriate safeguards measures to be applied. (b) Safeguards shall terminate on nuclear material subject to safeguards under this Agreement, under the conditions set forth in Article 13, provided that Community and the Agency agree that such nuclear material is practicably irrecoverable.	Covered by Commission Regulation (Euratom) No 302/2005 and may be implemented through inventory change reporting.
INFCIRC/193	Part 2 Article 39	Community shall make Subsidiary Arrangements with the Agency which shall specify in detail, to the extent necessary to permit the Agency to fulfil its responsibilities under this Agreement in an effective and efficient manner, how the procedures laid down in this Agreement are to be applied.	Subsidiary arrangements ¹³ is in force.

¹³ Subsidiary arrangements to the agreement between the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of article III, (1) and (4) of the treaty on the non-proliferation of nuclear weapons (INFCIRC/193) and to the protocol additional thereto (infirc/193/add.8)

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INFCIRC/ 193	Part 2 Articles 42-44	Pursuant to Article 8, design information in respect of existing facilities shall be provided to the Agency during the discussion of the Subsidiary Arrangements. The time limits for the provision of design information in respect of the new facilities shall be specified in the Subsidiary Arrangements and such information shall be provided as early as possible before nuclear material is introduced into a new facility.	This is covered by obligations in Euratom/302/2005.
INFCIRC/ 193	Part 2 Article 51	Community shall arrange that records are kept in respect of each material balance area. The records to be kept shall be described in the Subsidiary Arrangements.	<p>Web-based information system is used for nuclear material accountancy, and it is based on material balance areas, there are measures (e.g., license/permit measures, notifications & reports) to evaluate and oversight flow of nuclear materials.</p> <p>Records are kept for nuclear material which is under radiation practice license.</p>
INFCIRC/ 193	Part 2 Article 52	Community shall make arrangements to facilitate the examination of records by Agency inspectors, particularly if the records are not kept in English, French, Russian or Spanish.	<p>Web-based information system is used for nuclear material accountancy, and it is based on material balance areas, there are measures (e.g., license/permit measures, notifications & reports) to evaluate and oversight flow of nuclear materials. The information in Web-based information system is kept in Estonian language. For nuclear material accounting, the codes outlined in Annex III of Commission Regulation 302/2005 are used.</p> <p>The European Commission's ENMAS light software is used to generate nuclear material accounting reports for submission to the Commission.</p>

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INFCIRC/ 193	Part 2 Article 53	Records shall be retained for at least five years	According to the Ministry of Climate regulation: The environmental decisions information system and its statutes, data shall be stored permanently in the web-based information system. According to Environmental Board's internal rules "Document classification scheme" by the order of DG of the Board, 15. mai 2023 nr 1-1/23/65, nuclear safety related documents are retained permanently.
INFCIRC/ 193	Part 2 Article 54	Records shall consist, as appropriate, of: (3) (a) accounting records of all nuclear material subject to safeguards under this Agreement; and (b) operating records for facilities containing such nuclear material.	Strategic Goods Act and Radiation Act requires operators to keep records, e.g., transfers and exports, of nuclear materials and Radiation Act also requires to inform of any changes. Covered also by Euratom/302/2005 which is binding regulation also to licensees/ license applicants. Operating records of the licensee and accountancy requirements (what information needed) are considered in information system used by handling licenses and accounting records. See also analysis concerning Chapter 3 Article 7 and 8 requirements.

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INFCIRC/ 193	Part 2 Article 56	<p>The accounting records shall set forth the following in respect of each material balance area:</p> <p>(3)</p> <p>(a) all inventory changes, so as to permit a determination of the book inventory at any time;</p> <p>(b) all measurement results that are used for determination of the physical inventory; and</p> <p>(c) all adjustments and corrections that have been made in respect of inventory changes, book inventories and physical inventories.</p>	<p>Records, including change history, can be found from the system.</p> <p>Estonia's current nuclear material accounting system is limited to non-nuclear activities. According to the Minister of the Environment's Regulation, the applicant must provide data characterising nuclear material that is solely used for non-nuclear practises, which shall be submitted on the basis of the list of data set out in clause 4 of Annex 2 of this Regulation.</p> <p>See also analysis concerning Chapter 3 Article 7 requirements.</p>
INFCIRC/ 193	Part 2 Article 57	<p>For all inventory changes and physical inventories, the records shall show, in respect of each batch of nuclear material: material identification, batch data and source data. The records shall account for uranium, thorium and plutonium separately in each batch of nuclear material. For each inventory change, the date of the inventory change and, when appropriate, the originating material balance area and the receiving material balance area or the recipient, shall be indicated.</p>	<p>Covered by Radiation Act and MoE regulations¹⁴.</p> <p>Estonia uses the European Commission's ENMAS Light software is used to generate inventory changes, physical inventories and material balance reports for submission to the Commission.</p>
INFCIRC/ 193	Part 2 Article 58	<p>Operating records shall set forth as appropriate in respect of each material balance area:</p>	<p>Considered in existing legal framework. Estonia's current nuclear material</p>

¹⁴ MoE Regulations: 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 & Establishment of the information system for environmental decisions and the statute for maintaining the database

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		<p>(3) (a) Those operating data which are used to establish changes in the quantities and composition of nuclear material;</p> <p>(b) The data obtained from the calibration of tanks and instruments and from sampling and analyses, the procedures to control the quality of measurements and the derived estimates of random and systematic error;</p> <p>(c) A description of the sequence of the actions taken in preparing for, and in taking, a physical inventory, in order to ensure that it is correct and complete; and</p> <p>(d) A description of the actions taken in order to ascertain the cause and magnitude of any accidental or unmeasured loss that might occur.</p>	<p>accounting system is limited to non-nuclear activities.</p> <p>The Radiation Act requires to keep records of nuclear materials, report to the EB, to use standard data formats and informing about changes. Information system used for accounting and control of nuclear materials implemented so that 302/2005 requirement considered.</p>
INFCIRC/193	Part 2 Articles 59 - 61	<p>Community shall provide the Agency with reports as detailed in Articles 60 to 65 in respect of nuclear material subject to safeguards under this Agreement.</p> <p>Reports shall be made in English, French, Russian or Spanish, except as otherwise specified in the Subsidiary Arrangements.</p> <p>Reports shall be based on the records kept in accordance with Articles 51 to 58 and shall consist, as appropriate, of accounting reports and special reports.</p>	Estonia uses the European Commission's ENMAS Light software to generate inventory changes, physical inventories, and material balance reports for submission to the Commission.
INFCIRC/193	Part 2 Article 62	Agency shall be provided by the Community with an initial report on all nuclear material subject to safeguards under this agreement.	Estonia uses the European Commission's ENMAS Light software to generate inventory changes, physical inventories, and material balance reports for submission to the Commission.

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INFCIRC/ 193	Part 2 Article 63	<p>The Community shall provide the Agency with the following accounting reports for each material balance area:</p> <p>(3) (a) Inventory change reports showing changes in the inventory of nuclear material. The reports shall be dispatched as soon as possible and in any event within 30 days after the end of the month in which the inventory changes occurred or were established; and</p> <p>(b) Material balance reports showing the material balance based on a physical inventory of nuclear material actually present in the material balance area. The reports shall be dispatched as soon as possible and in any event within 30 days after the physical inventory has been taken.</p>	Estonia uses the European Commission's ENMAS Light software to generate inventory changes, physical inventories, and material balance reports for submission to the Commission.
INFCIRC/ 193	Part 2 Article 64	<p>Inventory change reports shall specify identification and batch data for each batch of nuclear material, the date of the inventory change and, as appropriate, the originating material balance area and the receiving material balance area or the recipient. These reports shall be accompanied by concise notes:</p> <p>(3)</p> <p>(a) explaining the inventory changes, on the basis of the operating data contained in the operating records provided for under Article 57(a); and</p> <p>(b) describing, as specified in the Subsidiary Arrangements, the anticipated operational programme, particularly the taking of a physical inventory.</p>	Estonia uses the European Commission's ENMAS Light software to generate inventory changes, physical inventories, and material balance reports for submission to the Commission.
INFCIRC/ 193	Part 2 Article 65	<p>The Community shall report each inventory change, adjustment and correction, either periodically in a consolidated list or individually. Inventory changes shall be reported in terms of batches. As specified in the Subsidiary Arrangements, small changes in inventory of nuclear material, such as transfers of analytical samples, may be combined in one batch and reported</p>	Reported periodically. Considered also in existing legal framework. The Radiation Act require immediately inform the Environmental Board of changes in the quantity of nuclear materials. Regular accounting reporting to the Commission is

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		as one inventory change.	<p>set in regulation No 302/2005. Currently, the licensees/operators of each material balance area as well as Environmental Board of its material balance area provide reports to the Commission.</p> <p>Estonia uses the European Commission's ENMAS Light software to generate inventory changes, physical inventories, and material balance reports for submission to the Commission.</p>
INFCIRC/193	Part 2 Article 67	<p>Material balance reports shall include the following entries, unless otherwise agreed by the Agency and the Community:</p> <p>(3)</p> <p>(a) beginning physical inventory;</p> <p>(b) inventory changes (first increases, then decreases);</p> <p>(c) ending book inventory;</p> <p>(d) shipper/receiver differences;</p> <p>(e) adjusted ending book inventory;</p> <p>(f) ending physical inventory; and</p> <p>(g) material unaccounted for.</p> <p>A statement of the physical inventory, listing all batches separately and specifying material identification and batch data for each batch, shall be attached to each material balance report.</p>	<p>Estonia uses the European Commission's ENMAS Light software to generate inventory changes, physical inventories, and material balance reports for submission to the Commission.</p>

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INFCIRC/ 193	Part 2 Article 68	<p>The Community shall make special reports without delay: (3) (a) If any unusual incident or circumstances lead the Community to believe that there is or may have been loss of nuclear material that exceeds the limits to be specified for this purpose in the Subsidiary Arrangements; or</p> <p>(b) If the containment has unexpectedly changed from that specified in the Subsidiary Arrangements to the extent that unauthorized removal of nuclear material has become possible.</p>	Covered by Euratom 302/2005 which is binding regulation to Estonia, including licensees and license applicants.
INFCIRC/ 193	Part 2 Article 70	The Agency shall have the right to make inspections as provided for in this agreement.	Inspector's rights to conduct inspections are considered in the existing Radiation Act. Based on the Act international inspectors shall have access to all objects in the scope of regulation of international agreements.
INFCIRC/ 193	Part 2 Article 85 (b)	The Community shall inform the Director General of the IAEA within 30 days of the receipt of such a proposal whether it accepts the proposal;	<p>Based on discussions and information studied, existing legislation doesn't define anything regarding approval or rejection of designated inspectors by Estonia.</p> <p>Legislation should define regulatory body which shall approve designated inspectors.</p> <p>Recommendation given in chapter 4.1.1.3</p>

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INFCIRC/ 193	Part 2 Article 86	The States shall grant or renew as quickly as possible appropriate visas, where required, for each inspector designated pursuant to Article 85.	Visa issues covered in the Aliens Act ¹⁵ .
INFCIRC/ 193	Part 2 Article 88	When inspectors require services available in a State, including the use of equipment, in connection with the performance of inspections, the state concerned and the Community shall facilitate the procurement of such services and the use of such equipment by Agency inspectors.	When conducting inspections, the Agency brings relevant and verified monitoring equipment as well as sample taking equipment.
INFCIRC/ 193	Part 2 Article 89	The Community and the States concerned shall have the right to have Agency inspectors accompanied during their inspections by its inspectors and their representatives respectively, provided that Agency inspectors shall not thereby be delayed or otherwise impeded in the exercise of their functions.	Both the IAEA and the European Commission (Euratom safeguards) have independent inspection mandates in Estonia, and they collaborate to conduct inspections. International inspectors are accompanied on inspection by a representative from the Environmental Board's Climate and Radiation Department.
INFCIRC/ 193	Part 2 Article 91	Nuclear material subject or required to be subject to safeguards under this Agreement which is transferred internationally shall, for purposes of this Agreement, be regarded as being the responsibility of the community and state concerned: (3) (a) in the case of transfers into the States, from the time that such responsibility ceases to lie with the State from which the material is transferred, and no later than the time at which the material reaches its destination; and	Transfers between states are covered by binding EU COMMISSION regulation 302/2005 and Regulation (EU) 2021/821

¹⁵ Aliens Act, <https://www.riigiteataja.ee/en/eli/518112013013/consolide>

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		<p>(b) in the case of transfers out of States, up to the time at which the recipient State has such responsibility, and no later than the time at which the nuclear material reaches its destination.</p> <p>The point at which the transfer of responsibility will take place shall be determined in accordance with suitable arrangements to be made by the States concerned. Neither the community nor a State shall be deemed to have such responsibility for nuclear material merely by reason of the fact that the nuclear material is in transit on or over State's territory, or that it is being transported on a ship under State's flag or in its aircraft.</p>	
INFCIRC/193a8¹⁶	Article 2	<p>Each State shall provide the Agency with a declaration containing the information identified in sub-paragraphs (i), (ii), (iv), (ix) and (x) of article 2.</p> <p>The Community shall provide the Agency with a declaration containing the information identified in sub-paragraphs (v), (vi) and (vii) of article 2.</p> <p>Each State and the Community shall provide the Agency with a declaration containing the information identified in sub-paragraphs (iii) and (viii) of article 2.</p>	Necessary information regarding current activities and locations is provided to IAEA as well as to the Commission.
INFCIRC/193a8	Article 3	<p>(b) Each State or the Community, or both, as appropriate, shall provide to the Agency, by 15 May of each year, updates of the information referred to in paragraph a. above for the period covering the previous calendar year. If there has been no change to the information previously</p>	Schedule for the necessary declarations to the IAEA and the Commission is based on time limits set in the Additional Protocol.

¹⁶ Protocol Additional to the Agreement between the Republic of Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Republic of Finland, the Federal Republic of Germany, the Hellenic Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Portuguese Republic, the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons

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		<p>provided, each State or the Community, or both, as appropriate, shall so indicate.</p> <p>(c) The Community shall provide to the Agency, by 15 May of each year, the information identified in Article 2.a.(vi)(b) and (c) for the period covering the previous calendar year</p> <p>(d) Each State shall provide to the Agency on a quarterly basis the information identified in Article 2.a.(ix)(a). This information shall be provided within sixty days of the end of each quarter.</p> <p>(e) The Community and each State shall provide to the Agency the information identified in Article 2.a.(viii) 180 days before further processing is carried out and, by 15 May of each year, information on changes in location for the period covering the previous calendar year.</p> <p>(f) Each State and the Agency shall agree on the timing and frequency of the provision of the information identified in Article 2.a.(ii).</p> <p>(g) Each State shall provide to the Agency the information in Article 2.a.(ix)(b) within sixty days of the Agency's request.</p>	<p>The Environmental Board generates reports using the IAEA's PR3 software and submits annual updates for national declarations to the IAEA and the European Commission in accordance with Articles 2.a.(i), 2.a.(iii), 2.a.(iv), 2.a.(viii), 2.a.(x), and 2.b.(i). In addition, the Environmental Board submits quarterly export declarations to the IAEA and the European Commission in accordance with Article 2.a.(ix).</p>
INFCIRC/193a8	Articles 4 & 5	<p>The Agency shall have access to locations referred to in article 5.</p> <p>Each State shall provide the Agency with access to:</p> <p>a.</p> <p>(i) Any place on a site;</p> <p>(ii) Any location identified under Article 2.a.(v)-(viii);</p> <p>(iii) Any decommissioned facility or decommissioned location outside facilities where nuclear material was customarily used</p> <p>b.</p>	<p>Existing Radiation Act ensures access of international inspectors.</p>

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		Any location identified by the State concerned under Article 2.a.(i), Article 2.a.(iv), Article 2.a.(ix)(b) or Article 2.b., other than those referred to in paragraph a.(i) c. Any location specified by the Agency, other than locations referred to in paragraphs a. and b.	
INFCIRC/ 193a8	Article 9	Each State shall provide the Agency with access to locations specified by the Agency to carry out wide-area environmental sampling, provided that if a State is unable to provide such access that State shall make every reasonable effort to satisfy Agency requirements at alternative locations.	Existing Radiation Act ensures access of international inspectors.
INFCIRC/ 193a8	Article 11	3. Designation of Agency Inspectors a. (i) Unless the Community advises the Director General of the IAEA of the rejection of such an official as an inspector for the States within three months of receipt of notification of the Board's approval, the inspector so notified to the Community and the States shall be considered designated to the States.	Existing legal framework does not assign responsibility of approving designated inspectors to any regulatory body in Estonia. Recommendation given in chapter 4.1.1.3
INFCIRC/ 193a8	Article 12	Each State shall, within one month of the receipt of a request therefor, provide the designated inspector specified in the request with appropriate multiple entry/exit and/or transit visas, where required, to enable the inspector to enter and remain on the territory of the State concerned for the purpose of carrying out his/her functions. Any visas required shall be valid for at least one year and shall be renewed, as required, to cover the duration of the inspector's designation to the States.	Issuing visas to international inspectors is considered in Aliens Act. This Act regulates the bases for the entry of aliens into Estonia, their temporary stay, residence and employment in Estonia and their legal liability for violation of obligations provided for in this Act. The Citizen of the European Union Act provides for the legal bases of the temporary stay and residence in Estonia of citizens of the member states of the European Union, citizens of the member states of the European Economic Area or citizens of the Swiss Confederation and their

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			family members. The legal bases for the temporary stay, residence and employment in Estonia of the staff of diplomatic missions and consular posts of foreign states and their family members are provided by treaties and other instruments of international law.
INFCIRC/193a8	Article 13	Subsidiary Arrangements Where a State or the Community, as appropriate, or the Agency indicate that it is necessary to specify in Subsidiary Arrangements how measures laid down in this Protocol are to be applied, that State, or that State and the Community and the Agency shall agree on such Subsidiary Arrangements within ninety days of the entry into force of this Protocol or, where the indication of the need for such Subsidiary Arrangements is made after the entry into force of this Protocol, within ninety days of the date of such indication.	Subsidiary Arrangements ¹⁷ is in force.
INFCIRC/193a8	Article 14	Communications systems Each State shall permit and protect free communications by the Agency for official purposes between Agency inspectors in that State and Agency Headquarters and/or Regional Offices, including attended and unattended transmission of information generated by Agency containment and/or surveillance or measurement devices. The Agency shall have, in consultation with the State concerned, the right to make use of internationally established systems of direct communications,	Covered in subsidiary arrangements

¹⁷ Subsidiary arrangements to the agreement between the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of article III, (1) and (4) of the treaty on the non-proliferation of nuclear weapons (INFCIRC/193) and to the protocol additional thereto (infirc/193/add.8)

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		including satellite systems and other forms of telecommunication, not in use in that State. At the request of a State, or the Agency, details of the implementation of this paragraph in that State with respect to the attended or unattended transmission of information generated by Agency containment and/or surveillance or measurement devices shall be specified in the Subsidiary Arrangements.	
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3.3 IAEA Milestone requirements

Tables 4 and 5 in chapters 3.2.1 – 3.2.4 gives brief summary of compliance with requirements set by the IAEA¹⁸ for the state's nuclear power programme in different phases.

3.3.1 Legal Framework

Table 4. Legal framework requirements

Source document	Chapter	Milestone	Requirement	Analysis

¹⁸ Nuclear Energy Series No. NG-G-3.1 (Rev. 1), Milestones In The Development Of A National Infrastructure For Nuclear Power, 2015

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IAEA No. NG-G-3.1 (Rev. 1)	3.5.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	<p>The legal framework for nuclear power should establish the responsibilities of all organizations necessary for a successful nuclear power programme.</p> <p>National legislation should comprehensively cover all aspects of nuclear law (i.e. nuclear safety, nuclear security, safeguards and civil liability for nuclear damage)</p>	<p>Existing legal framework (described in 2.1) comply partly with the requirements as some of the safeguards related measures and responsibilities are taken into account in existing Radiation Act and Environmental Board practices, but it doesn't comprehensively cover necessary matters of nuclear law and safeguards or designated regulatory body.</p> <p>National legislation should be developed in during the early stage of phase 2 after the commitment to nuclear energy is made.</p> <p>Recommendations related to legislation is presented in chapter 4.1.1.</p>
No. NG-G-3.1 (Rev. 1)	3.5.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	<p>The NEPIO's comprehensive Phase 1 report should include the need to put in place legislation to establish an independent nuclear regulatory body with adequate human and financial resources and a system of authorization, inspection and enforcement. The legislation should clearly delineate the responsibilities of all authorities involved in the nuclear power programme and cover all areas of nuclear law, for example radiation protection, the safety and security of nuclear facilities and radioactive material including physical protection, emergency preparedness and response, mining and milling, transport, radioactive waste and spent fuel management, decommissioning, nuclear liability and coverage, safeguards, and export and import controls.</p>	<p>In the final report of "Mapping the legal framework to start the nuclear program and updating the draft nuclear law and preparing the explanatory letter", conclusions and recommendations concerning the development of legal framework are presented. Guidance with examples about the implementation of legal framework related to safeguards is presented in chapter 4 of this report.</p>

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No. NG-G-3.1 (Rev. 1)	3.5.2	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	During Phase 2, the country should enact comprehensive national legislation covering all aspects of nuclear safety, nuclear security, safeguards and civil liability for nuclear damage. It should also put in place all legislation that may affect the nuclear power programme.	Not yet started, there are couple of reports, including this report, which gives recommendation how nuclear legislation should be developed. According to plan, development is expected to start during 2024 after government decision.
No. NG-G-3.1 (Rev. 1)	3.5.2	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	During Phase 2, the country should take the necessary steps to adhere to the international legal instruments in Box 1 ¹⁹ .	From safeguards point of view, Box 1 lists Comprehensive Safeguards Agreement and Additional Protocol to which Estonia is adhered to.
No. NG-G-3.1 (Rev. 1)	3.5.3	Milestone 3 — Ready to commission and operate the first nuclear power plant	By the beginning of Phase 3, comprehensive nuclear legislation and all other legislation that may affect the nuclear power programme should be in force, together with mechanisms to ensure compliance.	Planned to be developed during phase (2024-2025).
No. NG-G-3.1 (Rev. 1)	3.5.3	Milestone 3 — Ready to commission and operate the first nuclear power plant	During Phase 3, all actions to implement the relevant international legal instruments should be completed.	Processes and practices should be development as a part of legal and regulatory framework.

¹⁹ Nuclear Energy Series No. NG-G-3.1 (Rev. 1), Milestones In The Development Of A National Infrastructure For Nuclear Power, 2015, chapter 3.5

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No. NG-G-3.1 (Rev. 1)	3.5.3	Milestone 3 — Ready to commission and operate the first nuclear power plant	The legal framework should be maintained, reviewed and amended as necessary during the lifetime of the nuclear power programme.	Processes and practices should be development as a part of legal and regulatory framework.
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3.3.2 Regulatory Framework

Brief summary of regulatory framework is given in the table 5.

Table 5. Regulatory framework requirements

Source document	Chapter	Milestone	Requirement	Analysis
No. NG-G-3.1 (Rev. 1)	3.7.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	The NEPIO's recommendations at the end of Phase 1 should include plans to develop a regulatory framework in Phase 2 that matches the proposed nuclear power programme and takes account of the existing regulatory framework for radiation safety and nuclear security.	Not complied at the moment. Recommendations and practical examples for the development of safeguards related legal and regulatory framework is presented in chapter 4.1.2 of this report. Plans for developing nuclear legislation & regulatory framework is not in the scope of this report but recommendations are presented in other reports.

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No. NG-G-3.1 (Rev. 1)	3.7.2	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	Early in Phase 2, the country should establish a licensing system and an effectively independent regulatory body with sufficient competence to evaluate licence applications and to make safety, safeguards and security decisions.	Legislation and regulatory body are planned to be established and developed after government decision concerning implementation of nuclear power programme. Recommendations of competent authority are given in chapter 4.2
No. NG-G-3.1 (Rev. 1)	3.7.2	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	The regulatory body and the owner/operator should develop and, as needed, implement a protocol for communications about licensing and safety, security and safeguards issues between the regulatory body, the owner/operator and the suppliers. This should include arrangements for the transmittal of information, correspondence, agreement of actions and formal meetings at a range of levels of seniority.	Legislation and regulatory body are planned to be established and developed after government decision concerning implementation of nuclear power programme.
No. NG-G-3.1 (Rev. 1)	3.7.2	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	During Phase 2, the priority issues for regulatory attention are: — The import/export, transshipment, transport, storage and handling of nuclear material and other radioactive material; — The safety of nuclear material and other radioactive material in use, storage and transport; — Nuclear security, including physical protection of nuclear material and nuclear facilities; — Safeguards; — The oversight process for regulated activities that includes inspections and enforcement	Legislation and regulatory body are planned to be established and developed after government decision concerning implementation of nuclear power programme.

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No. NG-G-3.1 (Rev. 1)	3.7.3	Milestone 3 — Ready to commission and operate the first nuclear power plant	The regulatory body's plans to maintain competent staff and develop future staff should be in place.	Legislation and regulatory body are planned to be established and developed after government decision concerning implementation of nuclear power programme.
No. NG-G-3.1 (Rev. 1)	3.7.3	Milestone 3 — Ready to commission and operate the first nuclear power plant	By the end of Phase 3, the regulatory body should have developed comprehensive programmes for inspection and enforcement, and competent staff should be in place to provide regulatory oversight of the operation and maintenance of the plant by conducting inspections and enforcing regulations in accordance with these programmes.	Legislation and regulatory body are planned to be established and developed after government decision concerning implementation of nuclear power programme.

3.3.3 Safeguards

Table 6 gives brief summary of safeguard requirements.

Table 6. Safeguards requirements

Source document	Chapter	Milestone	Requirement	Analysis
IAEA No. NG-G-3.1 (Rev. 1)	3.6.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	Non-nuclear-weapon States that are party to the NPT are required to have a comprehensive safeguards agreement (CSA) and associated Subsidiary Arrangements conforming to INFCIRC/153 (Corrected) in force with the IAEA.	Estonia is a signatory to the NPT and has already has CSA and Additional Protocol in force.

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IAEA No. NG-G-3.1 (Rev. 1)	3.6.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	The country should be aware of the obligations of the Additional Protocol and, if it intends to ratify and has not already done so, a plan should be in place by the end of Phase 1 for timely ratification.	Additional Protocol is already in force.
IAEA No. NG-G-3.1 (Rev. 1)	3.6.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	Many countries that do not have any nuclear facilities have concluded small quantities protocols (SQPs), which have the effect of temporarily suspending many of the detailed provisions of the CSA. However, if the country currently has an SQP in force, by the end of Phase 1 it should have in place a plan for rescinding the protocol in a timely manner.	CSA and Additional Protocol in force.
IAEA No. NG-G-3.1 (Rev. 1)	3.6.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	In order to exercise the required State control and to facilitate cooperation with the IAEA in implementing the provisions of its CSA and Additional Protocol, the country should establish and maintain an effective State system of accounting for and control of nuclear material (SSAC)	Partially met. Estonia has SSAC in place to meet its current needs and obligations (non-nuclear activities). Because the small amount of nuclear material, current practices may not be adequate for a country with nuclear power programme. SSAC related measures shall be further developed to ensure compliance with the requirements. Recommendations for implementing SSAC as part of Nuclear power programme is presented in chapter 4.3.
IAEA No. NG-G-3.1 (Rev. 1)	3.6.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	Establishing an SSAC includes designating, as part of the country's nuclear law, the responsible regulatory body. Making the regulatory body for safety and/or security also responsible for the SSAC offers potential synergies	Partially met.. The Radiation Act defines that Environmental Board (EB) grants the licenses and permits and has the supervisory role over safeguards obligations. However, the legislation doesn't give the EB a clear

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				mandate to act as the competent authority in nuclear related matters
IAEA No. NG-G-3.1 (Rev. 1)	3.6.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	The NEPIO's comprehensive report at the end of Phase 1 should cover the country's additional efforts that will be needed with the introduction of nuclear power to ensure the required: <ul style="list-style-type: none"> — Cooperation between the country, facility operator and the IAEA in safeguards implementation; — Completeness and correctness of the country's declaration in order to ensure effective independent verification by the IAEA; — Preparations by entities likely to be involved in the programme to meet their reporting obligations to the designated regulatory body. 	Objective of this report, in addition to reports made in other studies concerning nuclear legislation and human resources, is to identify development needs and describe action necessary in later phases.
IAEA No. NG-G-3.1 (Rev. 1)	3.6.2	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	The SSAC organizational and functional responsibility should be adjusted as required for the country to fulfil its safeguards obligations.	Legislation and regulatory body are planned to be established and developed after Government's decision on the implementation of nuclear power programme.
IAEA No. NG-G-3.1 (Rev. 1)	3.6.2	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	The country should consider including in the bid invitation specifications requirements on safeguards design features that would facilitate effective safeguards implementation.	Legislation and regulatory body are planned to be established and developed after Government's decision on the implementation of nuclear power programme.

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IAEA No. NG-G-3.1 (Rev. 1)	3.6.2	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	The terms of all international and regional instruments to which the government is a party, or intends to become a party, should be examined to ensure that its national legislation is consistent with the obligations in those instruments. For example, development of the nuclear power programme may require adjustments in the country's import–export controls. Plans for the effective implementation and enforcement of such legislation should be completed during Phase 2.	Legislation and regulatory body are planned to be established and developed after Government's decision on the implementation of nuclear power programme.
IAEA No. NG-G-3.1 (Rev. 1)	3.6.3	Milestone 3 — Ready to commission and operate the first nuclear power plant	All elements of the safeguards infrastructure at the facility should be in place and ensured for the long term prior to fuel arriving at the first nuclear power plant. This includes trained and fully equipped staff, procedures for the accounting and control of nuclear materials, an accounting system that can be verified by the IAEA and established reporting mechanisms to the regulatory body.	Legislation and regulatory body are planned to be established and developed after Government's decision on the implementation of nuclear power programme.

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3.3.4 Human Resource Development

Table 7 gives brief summary of human resource requirements.

Table 7. Human resource requirements

Source document	Chapter	Milestone	Requirement	Analysis
No. NG-G-3.1 (Rev. 1)	3.10.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	During Phase 1, the NEPIO should identify the knowledge and skills needed for a nuclear power programme. Its comprehensive report at the end of Phase 1 should review human resource development options and recommend an outline of the principle features of a national human resource development plan. Even if the country will initially make extensive use of knowledge and skills from other countries, it should consider how it would develop its own long-term knowledge and skills. Important areas for consideration by the NEPIO include: — Identifying specialized recruiting and training that will be needed in, for example, nuclear safety, nuclear security, safeguards, radiation protection, management systems and emergency preparedness and response;	Strategies for the human resources development in general is addressed in report <i>“Strategy On Estonia’s Capabilities For The Development Of Human Resources In The Field Of Nuclear Energy”</i>
No. NG-G-3.1 (Rev. 1)	3.10.2.	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	During Phase 2, the regulatory body will need to develop its competence, as by the end of Phase 2, the majority of the human resources for the regulatory body will need to be in place and competent to fulfil their licensing functions.	Strategies for the human resources development in general is addressed in report <i>“Strategy On Estonia’s Capabilities For The Development Of Human Resources In The Field Of Nuclear Energy”</i>

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No. NG-G-3.1 (Rev. 1)	3.10.2.	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	All organizations should identify the knowledge and skills they will need in Phase 3 and beyond and establish workforce plans to develop them. For the regulatory body, this will need to be early in Phase 2. Depending on the country's acquisition strategy, human resource needs in Phase 2 may include: — The technical and regulatory expertise to develop and implement regulations, codes and standards for nuclear safety, site approval, plant licensing, radiation protection, safeguards , nuclear security (including physical protection systems), emergency preparedness and response, spent fuel and radioactive waste management, and decommissioning;	Strategies for the human resources development in general is addressed in report <i>"Strategy On Estonia's Capabilities For The Development Of Human Resources In The Field Of Nuclear Energy"</i> Future potential license applicant should also form strategy for the development of competences. Regulations should require licensees to ensure adequate resources and knowledge to implement safeguards measures.
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4 RECOMMENDED ACTIONS AND GUIDANCE FOR IMPLEMENTATION

This chapter provides recommended actions for the development nuclear safeguards matters and practical examples how for example legislation and regulatory framework may be implemented in Estonia. Requirements from Chapter 3 where some open issues are found out are presented at beginning of each Chapter in the tables 8-12.

Recommendations and examples are mainly developed based on relevant IAEA guidance (e.g. Handbook on Nuclear Law Implementing Legislation) as well as how nuclear safeguards is implemented in states (e.g. Finland) where nuclear power programme is in place.

In general, documentation where examples and guidelines for implementation can be found includes but is not limited to:

- IAEA, Handbook on Nuclear Law: Implementing Legislation
- IAEA, Services Series 15, Nuclear Material Accounting Handbook
- IAEA, Services Series 21, Guidance for States Implementing Comprehensive Safeguards Agreements and Additional Protocols
- European Commission, COMMISSION RECOMMENDATION of 15 December 2005 on guidelines for the application of Regulation (Euratom) No 302/2005 on the application of Euratom safeguards (2006/40/Euratom)
- Nuclear Energy Act of Finland²⁰
- Nuclear Energy Decree of Finland²¹
- YVL Guide D.1 Regulatory control of nuclear safeguards²²

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<https://finlex.fi/en/laki/kaannokset/haku/?search%5Btype%5D=pika&search%5Bkieli%5D%5B%5D=en&search%5Bpika%5D=nuclear+energy&submit=Search>

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<https://finlex.fi/en/laki/kaannokset/haku/?search%5Btype%5D=pika&search%5Bkieli%5D%5B%5D=en&search%5Bpika%5D=nuclear+energy&submit=Search>

²² STUK YVL guides, <https://stuk.fi/en/yvl-guides>

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4.1 Legal framework

4.1.1 Legislation

Table 8. Requirements related to legal framework recommendations

INFCIRC/ 193	Part 1 Article 5	<p>The safeguards provided for in this Agreement shall be implemented in a manner designed:</p> <p>(a) to avoid hampering the economic and technological development in the Community or international co-operation in the field of peaceful nuclear activities, including international exchange of nuclear material;</p> <p>(b) to avoid undue interference in peaceful nuclear activities in the Community, and in particular in the operation of facilities; and</p> <p>(c) to be consistent with prudent management practices required for the economic and safe conduct of nuclear activities</p>	These are high level principles which needs to be taken into account when planning and implementing safeguards measures as part of nuclear power programme. Existing legal framework doesn't define high level principles or objectives for nuclear legislation or safeguards.
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Table 9. Requirements related to recommendations for legislation

IAEA No. NG-G-3.1 (Rev. 1)	3.5.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	<p>The legal framework for nuclear power should establish the responsibilities of all organizations necessary for a successful nuclear power programme. National legislation should comprehensively cover all aspects of nuclear law (i.e. nuclear safety, nuclear security, safeguards and</p>	Existing legal framework (described in 2.1) comply partly with the requirement as some of the safeguards related measures and responsibilities are considered in existing Radiation Act and Environmental Board practices, but it doesn't comprehensively cover
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			civil liability for nuclear damage)	<p>necessary matters of nuclear law and safeguards or designated regulatory body.</p> <p>National legislation should be developed in during the early stage of phase 2 after the commitment to nuclear energy is made.</p>
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Recommendation based on identified open issues. Examples how legislation may be developed is given in chapters 4.1.1 and its sub-chapters.

Recommendation #1

Develop national nuclear safeguards legislation.

National law (legal framework) shall identify the need to establish and maintain sufficient legislation and regulatory framework for implementing measures to prevent, detect and respond to unauthorized actions involving nuclear material and hence prevent proliferation of nuclear weapons.

As stated in table 1 (Compliance with NPT) and Table 3 (Compliance with CSA and AP), the existing national legal framework (Radiation Act, Strategic Goods Act) doesn't directly address the non-proliferation of nuclear weapons, manufacture or control nuclear weapons or other nuclear explosive devices but prohibits transfer of strategic goods which includes dual-use items and weapons of mass destruction. These are covered at the moment by the EU legislation (e.g. EC 428/2009). Existing national legal framework doesn't define high-level principles or objectives for nuclear legislation or safeguards. Examples how these may be implemented are given below.

States shall implement non-proliferation obligations by enacting laws and regulations which establish requirements regarding nuclear material possession, handling, use, import and export. According to IAEA guidance²³, regarding safeguards, the national legal framework should address, but not limited to, following elements:

- The enactment of laws and regulations, including designation of regulatory body, to control and oversee the use of nuclear material and nuclear-related activities in the State, consistent with the State's obligations under its safeguards agreement;
- The assignment of responsibilities for safeguards activities and the granting of legal authority to perform them, to an independent state authority;

²³ IAEA Services Series No. 21, Guidance for states implementing comprehensive safeguards agreements and additional protocol

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- The design and implementation of an effective SSAC;
- The creation of an effective communication mechanism, including a point of contact, between the IAEA and the State; and
- The implementation of procedures and practices necessary to facilitate information gathering, timely reporting and in-field verification.

National law may set forth the regulatory and control framework regarding the peaceful use of nuclear energy, establish definitions, and authorize an entity in the government to be responsible for oversight of nuclear material and related activities.

The basic elements of a legislative framework, according to IAEA guidance²⁴, for safeguards are like those for other subjects covered in this report. They include:

- A clear statement of the objectives of the law or relevant chapter of the law (see Chapter 4.1.1.1);
- A basic undertaking of the general principle affirming the exclusively peaceful use of nuclear energy in the State (see Chapter 4.1.1.2);
- Clear definitions of key terms used in implementing the relevant safeguards agreement(s) and protocols thereto (see Chapter 4.1.1.4);
- Designation of a regulatory body to coordinate the implementation of safeguards (see Chapter 4.2);
- Provisions regarding authorization or licensing, inspection, and enforcement measures relevant to nuclear material, nuclear facilities and other items subject to the safeguards agreement(s) and protocols thereto (see Chapters 4.1.1.5 & 4.1.2);
- Establishment and maintenance of a state system of accounting for and control of nuclear material (see Chapter 4.3);
- Arrangements for supporting verification activities conducted by the IAEA (see Chapter 4.1.1.3);
- Requirements for record keeping by those authorized to produce, process or use nuclear material (see Chapter 4.5);
- Requirements for reporting of information to the regulatory body and to the IAEA (Chapters 4.3 & 4.5);
- Arrangements for the submission of amplifications or clarifications of any information requested by the IAEA (Chapter 4.3);

Recommendations regarding implementation of safeguards legislation and regulations does not specify whether these should be implemented in one comprehensive act or should these be implemented with separate acts for different subjects.

²⁴ IAEA, handbook on nuclear law: Implementing legislation, 2010

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Nuclear safeguards elements listed above may be considered in the general nuclear law or act (i.e. Nuclear Energy and Safety Act which was referred to in Final report²⁵) related to the use of nuclear energy. Below are presented how those elements may be considered in national legislation.

4.1.1.1 Objectives and scope of application

Nuclear energy legislation should include statement of the objectives of the law and definition of scope of application. Objectives should include statement concerning the peaceful use of nuclear energy and non-proliferation of nuclear weapons. Description in the scope of application of the national nuclear energy law should include activities related to safeguarding nuclear material.

Examples how these may be implemented can be found for example from Finnish legislation, Nuclear energy act²⁶ (Chapter 1, §1 and §2), as well as from IAEA guide Handbook on Nuclear Law: Implementing Legislation.

4.1.1.2 Application of Safeguards

Principles for the application of safeguards measures should be defined in legislation. Implementation example can be found from Finnish Nuclear energy decree²⁷ (Chapter 15 Regulatory control 118 § and 118 § a/b)) and from IAEA guide Handbook on Nuclear Law: Implementing Legislation (Chapter 12 SAFEGUARDS).

4.1.1.3 Inspections

Table 10. Requirements related to recommendations for inspections

INFCIRC/ 193	Part 1 Article 9 (b)	The Community and the States concerned shall take the necessary steps to ensure that Agency inspectors can effectively discharge their functions under this Agreement.	The Radiation Act requires that international inspectors shall be allowed access to facilities. In comparison to legislation and regulation to Finland, existing legislation in Estonia doesn't for example designate responsibilities which regulatory body is responsible for approving international inspectors.
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²⁵ Mapping the legal framework to start the nuclear program and updating the draft nuclear law and preparing the explanatory letter, March 2023

²⁶ Nuclear Energy Act (990/1987) https://www.finlex.fi/en/laki/kaannokset/1987/en19870990_20200964.pdf

²⁷ Nuclear Energy Decree (161/1988) https://finlex.fi/en/laki/kaannokset/1988/en19880161_20200000.pdf

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INFCIRC/ 193	Part 2 Article 85 (b)	The Community shall inform the Director General of the IAEA within 30 days of the receipt of such a proposal whether it accepts the proposal;	Based on discussions and information studied, existing legislation doesn't define anything regarding approval or rejection of designated inspectors. Legislation should define regulatory body which shall approve designated inspectors.
INFCIRC/ 193a8	Article 11	Designation of Agency Inspectors a. (i) Unless the Community advises the Director General of the IAEA of the rejection of such an official as an inspector for the States within three months of receipt of notification of the Board's approval, the inspector so notified to the Community and the States shall be considered designated to the States.	Existing legal framework does not assign responsibility of approving designated inspectors to any regulatory body in Estonia.

International treaties and agreements require that international inspectors shall be guaranteed access to sites. Legislation should ensure the access of inspectors (considered in existing Radiation Act) and also designate regulatory body which is responsible for approving international inspectors. Implementation example can be found from Finnish Nuclear energy decree (Chapter 15 Regulatory control 118 § a) and from IAEA guide Handbook on Nuclear Law: Implementing Legislation (Chapter 12 SAFEGUARDS).

4.1.1.4 Definitions

No. NG-G-3.1 (Rev. 1)	3.7.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	The NEPIO's recommendations at the end of Phase 1 should include plans to develop a regulatory framework in Phase 2 that matches the proposed nuclear power programme and takes account of the existing regulatory framework for radiation safety and nuclear security.	Not completed at the moment. Recommendations and practical examples for the development of safeguards related legal and regulatory framework is presented in chapter 4.1.2 of this report. Plans for developing nuclear legislation & regulatory framework is not in the scope of this report but recommendations are
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				presented in other reports.
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As described in the list of basic elements of legal framework in the 4.1, nuclear legal framework shall include definitions for the key terminology regarding safeguards. Examples of what definitions may be defined can be seen in Finnish Nuclear Energy act (Chapter 1, §3), Nuclear Energy decree (Chapter 1, §1) and YVL guide D.1²⁸ and in IAEA guidelines, such as Handbook on Nuclear Law: Implementing Legislation (Chapter 1.6).

4.1.1.5 Licence for import and export of nuclear materials

There were no clear deficiencies identified related to licensing issues.

Responsible regulatory body, principles, and requirements, including information included in the application, related to import and export of nuclear material applications should be defined in the nuclear legislation and/or regulation.

Defined principles should also include the information that should be given in decisions made by the regulatory body.

Examples of how import and export licenses could be implemented can be found in Nuclear Energy decree of Finland (Chapter 7a Import licenses, Chapter 7b Export licenses and licences for transfers through Finnish territory, Chapter 7c Import and export of nuclear waste and Chapter 8 Transport licenses).

4.1.2 Safeguards Regulation & Requirement's

No. NG-G-3.1 (Rev. 1)	3.7.1.	Milestone 1 — Ready to make a knowledgeable commitment to a nuclear power programme	The NEPIO's recommendations at the end of Phase 1 should include plans to develop a regulatory framework in Phase 2 that matches the proposed nuclear power programme and takes account of the existing regulatory framework for radiation	Recommendations and practical examples for the development of safeguards related legal and regulatory framework is presented in chapter 4.1.2 of this report. Plans for developing nuclear legislation & regulatory framework is not in the
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²⁸ YVL D.1 <https://stuk.fi/en/yvl-guides>

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			safety and nuclear security.	scope of this report but recommendations are presented in other reports.
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Recommendation based on identified open issues.

Recommendation #2

Develop national nuclear safeguards regulation which sets requirements for the implementation of safeguards measures to the licensees and license applicants.

It shall be defined in regulation what information is needed from the nuclear safeguards point of view for the radiation license. Regulation should require license applicant to submit necessary information in timely manner. Additional Protocol defines timeline for regular reporting and it is followed by Environmental Board as stated in the table 2 of the Chapter 3.

Regulations should be established by the competent authority to set out specific requirements for implementing the safeguards agreement and any protocols. Legally binding regulations should be established for nuclear safeguards to ensure sufficient implementation of nuclear safeguards measures to comply with the requirements from treaties and agreements.

According to IAEA guidelines²⁹ (Chapter 3.7.1), the fundamental elements of a regulatory framework include:

- Designation of an effectively independent competent regulatory body with clear authority, adequate human and financial resources and strong government support;
- Assignment of core safety, security and safeguards regulatory functions for developing regulations, review and assessment, authorization, inspection, enforcement and public information;
- Authority and resources to obtain technical support as needed;
- A clear definition of the relationship of the regulatory body to other organizations;
- Clearly defined responsibilities of licensees;

²⁹ IAEA Nuclear Energy Series (No. NG-G-3.1) Milestones in the Development of a National Infrastructure for Nuclear Power, Chapter 3.7.1

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- Authority to implement international obligations, including IAEA safeguards;
- Authority to engage in international cooperation;
- Provisions to protect proprietary, confidential and sensitive information;
- Provisions for stakeholder involvement and communication with the public.

Licensees and license applicants in a State should establish procedures to carry out functions necessary to account for and control nuclear material, for example designating a person responsible for safeguards, keeping accurate records of nuclear material inventories and transactions, taking samples for analysis, monitoring nuclear material movements in a plant, assuring the quality of measurements of nuclear material, and taking a physical inventory. Operators should also establish procedures for preparing reports for submission to the designated regulatory body, making records and supporting documentation available to inspectors, and facilitating IAEA activities at the facility.

Nuclear Safeguards regulatory framework should include description and/or requirements concerning the following topics:

- International treaties, regulation and agreements concerning safeguards in Estonia
- Authorities involved in safeguards and their tasks/roles
- General principles for implementing safeguards, e.g.
 - Licenses
 - Nuclear safeguards system and organisation
 - Basis for the planning and implementation of the use of nuclear energy
 - Security arrangements and information security
 - International transfers of nuclear materials
 - Submission of necessary information (e.g. safeguards programme)
 - Nuclear fuel cycle and/or disposal of spent nuclear fuel
- System of accounting and control
 - Requirements regarding accounting (e.g. implementation of Euratom 302/2005 article 17 requirement)
 - Requirements regarding reporting
 - Requirements regarding notifications
 - Accountancy, notifications and reports of international transfers of nuclear materials
 - Termination of safeguards
- Notifications according to Comprehensive safeguards agreement and additional protocol
- Inspections
- Regulatory body's role and regulatory oversight (e.g. licenses, inspections, reports and notifications)

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Designated regulatory body should issue regulations and requirements related to topics listed above which should be implemented by licensees. For example, in Finland, regulatory body has issued guidance and requirements in YVL guide D.1.

4.2 Competent authority for safeguards

Table 11. Requirements related to recommendations for authority

No. NG-G-3.1 (Rev. 1)	3.7.2	Milestone 2 — Ready to invite bids/negotiate a contract for the first nuclear power plant	Early in Phase 2, the country should establish a licensing system and an effectively independent regulatory body with sufficient competence to evaluate licence applications and to make safety, safeguards and security decisions.	Legislation and regulatory body are planned to be established and developed after Government's decision on the implementation of nuclear power programme.
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Recommendation based on identified open issues.

Recommendation #3

Designate competent authority for supervision of nuclear safeguards.

The requirements set by the IAEA for the state's nuclear power programme in different phases, defines that, that the country should establish during the early stages of phase 2, a licensing system and an effectively independent regulatory body with sufficient competence to evaluate licence applications and to make safety, nuclear safeguards and security decisions as noted also in the table 5 of the chapter 3.

The Competent authority should be implemented so that it accomplishes the functions described on the IAEA guidance³⁰. It shall be noted that IAEA's guidance does not consider the European Commission regulation and these functions are instructional. However, when establishing competent authority for the nuclear safeguards, Estonia shall consider the European Commission regulations. Guidance for the implementation of the functions given in chapter 4 if deficiencies were identified.

³⁰ IAEA, Guidance for states implementing comprehensive safeguards agreements and additional protocol

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1. Regulate and control all nuclear activities in Estonia for the purpose of assuring that the nuclear material is used only for peaceful purposes, and:
 - maintain awareness of and oversight over all nuclear material subject to safeguards in Estonia, imported into, and exported from Estonia,
 - account for and control nuclear material (state system for accounting and control),
 - manage information on nuclear facilities,
 - manage information on other nuclear fuel cycle-related activities, non-nuclear material, equipment, technology and trade (for States with an AP);
2. Provide correct and complete information, on time, to the IAEA and European Commission, as required, on:
 - nuclear material (forms, amounts, flows, locations, uses and transfers),
 - nuclear facilities,
 - nuclear fuel cycle-related activities and their locations, including research, mining, waste processing, equipment manufacturing, trade and nuclear development plans (for States with an AP);
3. Facilitate IAEA activities to confirm or verify the information provided, and resolve questions and inconsistencies, through institutional arrangements, and by providing access to:
 - nuclear facilities during all of their lifecycle stages,
 - any other location where nuclear material is present,
 - any place on a site (for States with an AP),
 - locations of nuclear fuel-cycle-related activities (for States with an AP),
 - other locations as requested by the IAEA pursuant to the agreements.

Implementation for establishing regulatory body and designation of responsibility concerning safeguards in nuclear legislation provided in the following chapters are based on Finland's Nuclear Energy Act³¹ (Chapter 8 Nuclear energy authorities) and Nuclear Energy Decree³² (Chapter 15 Regulatory control).

Designation of regulatory body

³¹ Nuclear energy act of Finland (990/1987)

³² Nuclear energy decree of Finland (161/1988)

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Commission Regulation (Euratom) No 302/2005	Chapter 2, Article 3	Each Member State being a party to Additional Protocol 1999/188/Euratom, shall designate a site representative for each site on its territory who shall provide to the Commission a declaration containing a general description of the site.	Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety. Existing national legal framework (Radiation Act) or regulations doesn't designate site representative.
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Recommendation based on identified open issues.

Recommendation #4

Designate site representative in order to comply with 302/2005/Euratom regulation.

Legislation shall designate regulatory body which is responsible for oversight of nuclear safeguards. Designation of regulatory body and its role and tasks can be found from Nuclear Energy Act (Chapter 8 Nuclear energy authorities) and Nuclear Energy Decree (Chapter 15 Regulatory control, e.g. §111, §118).

In Finland, there is a specific act³³, which defines the role and management of regulatory body in more detail.

Legislation should define that designated regulatory body has supervisory rights to carry out oversight required by the legal framework as well as by the international treaties concerning nuclear energy and safeguards of nuclear material binding Estonia.

4.2.1 Resources and competences

According to STUK's annual report³⁴, resources of Finnish regulatory body Radiation and Nuclear Safety Authority for safeguards includes 7 safeguards experts, 1 researcher and section head performing safeguards activities and oversight, including maintaining the national material accounting system. Practice is that experts work in pairs to ensure knowledge and adequate response time. It shall be noted that there are five operating nuclear

³³ Laki Säteilyturvakeskuksesta (Act on Radiation and Nuclear Safety authority, 1164/2022, Not available in English), <https://www.finlex.fi/fi/laki/alkup/2022/20221164>

³⁴ Implementing nuclear non-proliferation in Finland, Annual report 2022, <https://www.julkari.fi/bitstream/handle/10024/146685/stuk-b299.pdf?sequence=1&isAllowed=y>

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reactors in Finland, resources related to safeguards on authority side shall be scaled based on this. Requirements related to operator's resources are discussed in chapter 4.5.

Commission Regulation (Euratom) No 302/2005 requires that States designate a site representative for each site on its territory who shall provide to the European Commission a declaration containing a general description of the site as stated also in the chapter 3. In Finland, the state has delegated its responsibility for these declarations to STUK. STUK has been nominated as a site representative (Nuclear energy decree §118), as per European Commission Regulation No. 302/2005. STUK collects, inspects and reviews the relevant information and then submits the compiled declarations in a timely fashion to the European Commission and the IAEA

STUK defines requirements for competence of operators' person responsible for safeguards and his/her deputy in YVL guide A.4³⁵. That definition can be used as an example of what should be required also from the regulatory body personnel.

Requirements for competences in YVL guide A.4 include:

- have a higher university degree suitable for the position at the nuclear facility;
- have at least three years of work experience with at least one year in the nuclear sector;
- have technical knowledge of the nuclear energy sector;
- be sufficiently familiar with nuclear energy legislation and international contractual arrangements, in particular with regard to nuclear safeguards.

Regulatory body personnel should in addition to have sufficient knowledge of relevant EU regulation and IAEA guidance. IAEA guidance for Nuclear Material Accounting Handbook defines inspection activities which should be included to the inspection programme of the state authority. Regulatory body personnel should have sufficient competence to perform listed activities. Training for safeguards personnel could consist of e.g. IAEA training courses and workshops or via internal trainings.

4.3 State System for Accounting and Control

Table 12. Requirements related to recommendations of SSAC

IAEA No. NG-G-3.1 (Rev. 1)	3.6.1. Milestone 1 — Ready to make a knowledgeable commitment to a nuclear	In order to exercise the required State control and to facilitate cooperation with the IAEA in implementing the provisions of its CSA and Additional Protocol, the country should establish and maintain an effective State	Partly complied with. Estonia has SSAC in place for its current needs and obligations (non-nuclear activities). Because the small amount of nuclear material current practices may not be adequate for a country with nuclear power programme. SSAC
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³⁵ YVL A.4, Organisation and personnel of a nuclear facility, <https://stuk.fi/en/yvl-guides>

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	power programme	system of accounting for and control of nuclear material (SSAC)	related measures shall be further developed to ensure compliance with the requirements.
Euratom Treaty	Article 79	<p>The Commission shall require that operating records be kept and produced in order to permit accounting for ores, source materials and special fissile materials used or produced.</p> <p>The same requirement shall apply in the case of the transport of source materials and special fissile materials.</p>	Existing legislation (Radiation Act) in Estonia requires operators/licensees to keep records of nuclear material in their possession. Covered also by Euratom/302/2005 (art. 8).
Commission Regulation (Euratom) No 302/2005	Chapter 3, Articles 7, 26-28 & 30	<p>Accounting system: The persons or undertakings referred to in the first subparagraph of Article 3(1) shall maintain a system of accountancy and control for nuclear materials. This system shall include accounting and operating records and, in particular, information on the quantities, category, form and composition of these materials as provided for in Article 18, their actual location and the particular safeguards obligation as provided for in Article 17, together with details of the recipient or shipper when nuclear materials are transferred.</p>	<p>Commission Regulation (Euratom) No 302/2005 is a binding legislative act. It must be applied in its entirety.</p> <p>Considered also in existing national legal and regulatory framework (Radiation Act).</p> <p>The Radiation Act requires to keep records of nuclear materials, report to the EB, to use standard data formats and informing about changes. Information system used for accounting and control of nuclear materials implemented so that 302/2005 requirement considered.</p> <p>Estonia's current nuclear material accounting system is limited to non-nuclear activities. According to the Minister of the Environment's Regulation, the applicant must provide data characterising nuclear material that is solely used for non-nuclear practises, which shall be submitted on the basis of the list of</p>

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			data set out in clause 4 of Annex 2 of this Regulation.
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Recommendation based on identified open issues.

Recommendation #5

Ensure that State system for accounting and control of nuclear material is sufficient for nuclear power programme.

Recommendation #6

Ensure that legislation & regulation sets requirements for licensees for implementation of accounting and control of nuclear material at the facility level.

Estonia has State System of accounting for and control of nuclear material (SSAC) in place for its current needs and obligations as stated in the table 6 of chapter 3. As existing SSAC includes only non-nuclear related activities, it should be ensured that SSAC is sufficient and includes all the necessary information if commitment to nuclear power is made. SSAC related measures shall be further developed to ensure compliance with the requirements.

One of the objectives of the State System of accounting for and control of nuclear material (SSAC) should be to account for and control of nuclear material in the State and to contribute to the detection of possible losses or unauthorized use or removal of nuclear material. To achieve this the SSAC should function both at the State authority level and at the facility level. Designated regulatory body should be responsible for SSAC at the State level and regulation should set requirements for the system for accounting and control at the facility level. Recommendation with reference to implementation example related to setting requirements in regulation is presented in chapter 4.1.2.

Practical example how responsibility of SSAC is implemented legal framework in Finland can be found from Nuclear Energy decree of Finland³⁶ (Chapter 17 Notification obligation). Also, IAEA guide Handbook of Nuclear Law: Implementing Legislation provide example of implementation of legal framework concerning SSAC.

³⁶ Nuclear energy decree, Finland (161/1988)

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The competent authority should ensure the quality of facility/LOF operator information before submitting it to the IAEA via the European Commission. The competent authority must receive information from the facilities and LOFs, evaluate its correctness and completeness, and assure it is in the agreed reporting format, before submitting it on time to the IAEA via the European commission. In cases where the SSAC has established an inspectorate, the conclusions of its inspections may be included in the State's reported findings.

The IAEA has issued a guidance³⁷ on how to implement SSAC. Example of regulatory guideline and setting requirements for the operators is Finland's guideline YVL D.1 "Regulatory control of nuclear safeguards".

4.4 Safeguards related to SMRs

No open issues identified during the analyses. Information below provided as guidance what should be considered in small modular reactors from the safeguards point of view.

Basic principles of safeguards described in other parts of this document are not different related to Small Modular Reactors. However, there are challenges and issues which shall be considered comprehensively before and during the design phase as well as during construction, commissioning, and operation of the plant. For small modular nuclear power plants, the following points are at least noted as possible issues:

- Coverage of the operating area: small modular nuclear power plants may be dispersed and located in different locations. There is a need to ensure that safeguards cover all installations and associated areas.
- Diverse operational roles: The roles of plant owner, user and, for example, maintenance operator may differ from traditional models, where one actor has often managed all aspects.
- New type of systems: Small modular nuclear power plants might use new systems and technologies. Safeguards must take these specificities into account and ensure that safeguards systems are compatible and effective.
- Operation and fuel cycles: Operating and fuel cycles may differ from the current general 12–18-month cycles. This will affect, for example, time schedule and reporting of safeguards.
- Spent fuel management: New models for spent fuel management may emerge and it may be possible, for example, that the entire fuel cycle is handled by the plant supplier or that specialised waste management operators enter the market who do not operate the actual power plants.
- Transport monitoring: Small modular nuclear power plants may require regular transport to deliver nuclear materials and fuel from a centralised fuel storage if there is no one on the site. It is important to ensure that these transports are carried out

³⁷ IAEA Services Series 15, Nuclear Material Accounting Handbook, 2008

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under appropriate supervision and that the materials being transported remain secure.

- Staff awareness: There might lot of different parties taking part to operation of small modular nuclear power plants, which are not as familiar with nuclear technology. Staff must be aware of the importance of safeguards and follow strict safety instructions. Training programmes and awareness-raising can ensure that all staff understand and are able to comply with the safeguards' requirements.
- International cooperation: Small modular nuclear power plants can be part of the international nuclear energy operator. It is important to cooperate with other countries and international organisations to improve safeguards and share best practices.

Safeguards is often implemented after design phase during construction and commissioning. In connection to SMRs it is important that safeguards are considered as early as possible because changes are not anymore made during construction because of modular design of plants. Safeguards by design (IAEA's approach)³⁸ is defined as a way whereby international safeguards requirements and objectives are fully integrated into the design process of a nuclear facility, from initial planning through design, construction, operation, and decommissioning. It needs awareness by all stakeholders through whole lifecycle of the plant. It shall be noted that IAEA's approach does not consider the requirements set by the European Commission.

The safeguards authority is responsible for two key interfaces: one with the European Commission and IAEA and one with the operator or designer. The responsibilities include the management of formal discussions with the IAEA regarding safeguards activities in the State and the transmission of safeguards documentation and data to the commission and IAEA. The safeguards authority should manage and expect interaction with all stakeholders regarding safeguards considerations throughout the design and construction lifecycle.

Preparing for improvements in technology and incorporation of these technologies early in the design phase of a new facility should reduce the incidence of human error, communication failure, anomalies, and inconclusive results which reduces the State's workload to resolve such issues.

The main point what following table (Table 13) emphasizes is the exchange of information over the entire project lifetime, specifically the exchange of the relevant information at the relevant time. The detailed steps will vary from project to project, but early and continuous consideration of safeguards will allow the project to accommodate it smoothly. The information in the table 8 is referenced and elaborated from the IAEA document "International Safeguards in Nuclear Facility Design and Construction".

³⁸ IAEA Nuclear Energy Series, No. NP-T-2.8, International Safeguards in Nuclear Facility Design and Construction

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Table 13. Elaborated safeguards by design steps

Phase	Authority	European Commission/ IAEA	Operator	Designer / Plant supplier
R&D Phase	<ul style="list-style-type: none"> - Identification of operator - General information to necessary parties on new facility - First review of the tenders 	<ul style="list-style-type: none"> - Provision of a list of possible safeguards measures for the facility type 	<ul style="list-style-type: none"> - Call for tenders - Review of tenders - Tender selection 	<ul style="list-style-type: none"> - Pre-concept tenders
Conceptual design	<ul style="list-style-type: none"> - Review and approval of concept design - Preliminary design information to the necessary parties 	<ul style="list-style-type: none"> - List of potential safeguards measures 	<ul style="list-style-type: none"> - Review and approval of concept design 	<ul style="list-style-type: none"> - Concept design
Preliminary design	<ul style="list-style-type: none"> - Review, feedback and approval of safeguards design and documentation 	<ul style="list-style-type: none"> - Safeguards guidelines - Possible safeguards approaches - Feedback to authority 	<ul style="list-style-type: none"> - Review and approval of preliminary design 	<ul style="list-style-type: none"> - Preliminary design - Feedback to safeguards equipment suppliers
Final design	<ul style="list-style-type: none"> - Review, feedback and approval of safeguards design and documentation 	<ul style="list-style-type: none"> - Detailed safeguards guidelines - Design information evaluation - Feedback to the relevant safeguards authority 	<ul style="list-style-type: none"> - Review and approval of final design 	<ul style="list-style-type: none"> - Final design
Construction	<ul style="list-style-type: none"> - Control of construction - Safeguards reporting 	<ul style="list-style-type: none"> - Detailed safeguards guidelines - Design information evaluation 	<ul style="list-style-type: none"> - Safeguards equipment installation - Possible changes and feedback to equipment supplier - Safeguards reporting 	

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Commissioning	<ul style="list-style-type: none"> - Control of commissioning - Safeguards reporting 	<ul style="list-style-type: none"> - Feedback to the relevant safeguards authority 	<ul style="list-style-type: none"> - Safeguards review, testing and approval - Possible feedback to equipment supplier - Safeguards reporting 	<ul style="list-style-type: none"> - Support and possible changes to design and documentation
Operation	<ul style="list-style-type: none"> - Accompany inspections - Provide information to necessary parties - Safeguards reporting 	<ul style="list-style-type: none"> - Inspections - Design information verification 	<ul style="list-style-type: none"> - Comply with inspections - Safeguards reporting 	<ul style="list-style-type: none"> - Possible support and warranty period - Updates and modifications

4.5 Responsibilities of the licensee

Requirements which were analyzed doesn't include requirement which require state to define requirements and responsibilities of operator/licensee. Topics presented in this chapter are more based on practices how nuclear safeguards is implemented in Finland.

Operators are required to strategize and execute the utilization of nuclear energy in a manner that meets the prescribed obligations concerning nuclear safeguards as stipulated in the law and regulations. These requirements also encompass the provisions set forth in the Euratom Treaty and its associated regulations, while ensuring the overall safety of nuclear energy usage.

Operators must carefully plan and execute the utilization of nuclear energy, taking into account the facilitation of their internal control mechanisms as well as the regulatory oversight exercised by the relevant authorities. Operators or the plant suppliers shall plan and implement any use of a nuclear facility with consideration to the control methods (e.g. non-destructive assays and remote monitoring) and control tools (cameras, seals and measuring instruments) employed by authority, the EC and the IAEA in such a way that the nuclear security arrangements and safety of the facility are not compromised. These measures should be implemented in a manner that preserves the integrity of nuclear security arrangements and safeguards the safety of the facility. It is imperative that any location where nuclear energy is utilized, be it a nuclear facility or any other site, does not contain any undisclosed premises, materials, or functions that are relevant to nuclear safeguards.

The operator shall have an accountancy and control system for nuclear use items (nuclear safeguards system) in place for the use of nuclear energy that functions as part of the national nuclear safeguards system (see chapter 4.3). The system shall provide:

- up-to-date information on all nuclear use items the operator is possessing and the operations associated with them

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- the opportunity to verify the accuracy, scope and consistency of the information
- prerequisites to produce reports and information necessary for the safeguards for the proliferation of nuclear weapons.

The precondition for the use of nuclear energy is that the operator has enough skilled personnel qualified for their duties. Regulations and requirements for license applicants and license holders shall require them to appoint a person who is responsible for the safeguards of nuclear material. Legal framework (see chapter 4.1) should also require license applicants and license holders to appoint manager who has ultimate responsibility regarding for example safety and safeguards as well as compliance with the requirements set in legislation and regulations. Examples how those could be implemented in legislation can be taken from Nuclear Energy Act of Finland (990/1987)³⁹ (Section 7i Personnel). Competence requirements for appointed personnel are defined in YVL guide A.4.

The person in charge of nuclear safeguards shall:

- have a higher university degree suitable for the position at the nuclear facility;
- have at least three years of work experience with at least one year in the nuclear sector;
- have technical knowledge of the nuclear energy sector;
- be sufficiently familiar with nuclear energy legislation and international contractual arrangements, in particular with regard to nuclear safeguards.

The licence holder shall ensure that the persons referred to above occupy the positions required for the task, have sufficient authority and a real opportunity to bear the responsibility vested in them.

In addition to appointment of responsible personnel, the regulatory body should set binding requirements for the license applicants and license holders which should concern for example, system for accounting and control of nuclear material in possession of license applicant or license holder, security arrangements related to nuclear materials and delivery of design and technical information.

The licence holder or other user of nuclear energy shall have an accounting and reporting system for nuclear material and other nuclear commodities which ensures the correctness, scope and continuity of information in order to implement the safeguards necessary for the non-proliferation of nuclear weapons.

The operator is required to develop a document and guidelines that outline the methods employed to meet their responsibilities regarding nuclear safeguards, accounting, reporting,

³⁹ Nuclear Energy Act 11.12.1987/990, <https://www.stuklex.fi/en/ls/19870990#L>

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and other obligations. These obligations are necessary for effectively managing their material balance area, as well as other related accounting aspects such as international transfers of uranium, or activities specified in the Additional Protocol to the Safeguards Agreement⁴⁰. This manual on nuclear safeguards should provide sufficient information to assess the comprehensiveness of the operator's safeguards system.

Operators have a duty to maintain accurate records and submit reports for all nuclear materials they are accountable for, following the directives established by the relevant authority, Commission Regulation No 302/2005⁴¹, and any other guidelines and recommendations issued by the EC. Furthermore, operators should be required to provide the authority with copies of all information and notifications submitted to the Commission.

Additionally, operators must maintain records and report any occurrences and actions that are relevant to safeguards. This ensures that there are no undisclosed activities, premises, or materials within the operator's designated area of responsibility. The operator's accountancy and reporting system shall be always available for inspection and so designed that the information obtained from it enables real-time:

- Tracking and reporting of plans and activities concerning nuclear use items
- Tracking of the current location of nuclear use items
- Assurance that the nuclear use items are not used for the manufacture of nuclear weapons or explosives or for any unknown purposes
- Assurance that the nuclear use items are used in compliance with the licence conditions and regulations
- Assurance of the absence of undeclared activities, premises or materials
- Assurance that the proliferation of nuclear weapons is not facilitated
- Assurance that nuclear use items are not used for any other unlawful action
- Assurance that the obligations of law of the country and the EU's international treaties in the nuclear energy sector are fulfilled.

The operator's nuclear use item accountancy records for a specific material balance area or other accountancy area shall meet the following requirements:

- Accountancy shall be kept to an accuracy of a nuclear material category or nuclear use item category.
- Occurrences shall be itemised by nuclear use item batch as well as by the applicable particular safeguards obligation and Euratom's safeguards obligation.
- The accountancy item shall be a nuclear use item batch for which the composition and quantity can be defined by a single set of specifications or measurements.
- A nuclear use item batch shall share the same chemical composition and physical form

⁴⁰ INFCIRC/193a8, Additional Protocol

⁴¹ Commission Regulation (Euratom) No 302/2005 on the application of Euratom safeguards

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- The accountancy shall be kept to an accuracy of an individual occurrence and so arranged that the information becomes more general in form when advancing from source documents to the actual accountancy records.
- It shall also be possible to track the history data back to the original source data.
- It shall be possible to explain any discrepancies between the accountancy and the actual nuclear use item inventory and identify any missing nuclear use items.

The reports which operator shall present to the authority in Finland and the European Commission are presented in the table 14 (YVL D.1).

Table 14. Necessary reports made by the operator

Report	Requirements
Advance notifications	<p>The operator shall file a notification with authority and the Commission of any significant occurrences pertaining to nuclear materials that are of nuclear safeguards relevance if they have not been declared in the programme of activities or the information declared in the programme of activities has changed.</p> <p>An advance notification (facility, occurrence and date and time) shall be submitted for information no later than 40 days prior to the planned occurrence or immediately as soon as the action is known.</p> <p>Furthermore, any changes to the plans shall be communicated as soon as possible.</p>
Inventory change report	<p>The operator shall prepare an inventory change report of the nuclear materials on a monthly basis, except in cases where the Commission has granted a derogation from the reporting obligations.</p> <p>The operator shall prepare an inventory change report (ICR) of all changes to the inventory of the nuclear materials in the material balance area. Examples include the import, receipt, export, shipment and accidental loss of a nuclear material, a change of the nuclear material category, a change of batch, as well as nuclear production and nuclear loss, which are reported in connection with the refuelling.</p> <p>The inventory change report shall contain the identification and batch data for each batch of nuclear material, the date of the inventory change, and the shipping and receiving material balance area or the consignee. The report shall also indicate the ending book inventory by nuclear material category and safeguards obligation even if no inventory changes have occurred.</p>

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Material balance report	<p>Operators shall draw up a material balance report (MBR) in connection with the physical inventory taking (PIT) of nuclear materials stating the nuclear material balance of the material balance area indicated by the physical inventory taking. The balance report shall be drawn up in compliance with the instructions given in Commission Regulation No 302/2005, and it shall state the following:</p> <ul style="list-style-type: none"> • beginning physical inventory • inventory changes as occurrence-specific sums • ending book inventory • ending physical inventory • material unaccounted for. <p>Operators shall submit the material balance report to the Commission and authority as soon as possible and at the latest within 30 days of the date on which the physical inventory was taken.</p>
Physical inventory listing	<p>Operators shall draw up a physical inventory listing (PIL) in connection with the physical inventory taking showing the details of each nuclear material batch separately for each key measurement point (KMP). The physical inventory listing shall be drawn up in compliance with the instructions given in Commission Regulation No 302/2005.</p> <p>Operators shall submit the physical inventory listing to the Commission and authority as soon as possible, at the latest within 30 days.</p>
Notifications of operations	<p>In case actual operations differ from what is stated in the advance notification, the activity shall be verified and notified to authority by means of a notification of operations. The notification of operations shall be submitted within two weeks of the activity.</p>
Annual report	<p>Operators possessing nuclear material or nuclear use items to be reported on a monthly basis shall annually prepare an annual report on nuclear safeguards actions.</p>

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Special nuclear safeguards reports	<p>The operator shall report any unusual incidents in safeguards-related activities to authority immediately and provide the available further details about the occurrence as soon as possible. A written special safeguards report shall also be drawn up of the incident and submitted to authority. In the event that the incident makes it necessary to conduct more extensive investigations, a preliminary report shall be submitted.</p> <p>Operators shall also draw up a special report of the incidents or circumstances defined in Articles 15 and 22 of Commission Regulation No 302/2005 and in the particular safeguard provisions. Examples of such incidents or circumstances include:</p> <ul style="list-style-type: none"> • tampering with the IAEA, Commission or authority control equipment without the presence of the authorities concerned or the required advance notification • actual or suspected loss of nuclear material • damage to the integrity of a fuel assembly due to an accident or a structural change at the facility as a result of which the unauthorised removal of nuclear material has become possible.
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The operator shall always be liable for the accuracy and up-to-datedness of the accountancy, reports and notifications for which the operator is responsible. To ensure this, the operator shall also carry out internal inspections in addition to the inspections and physical inventories specified in Commission Regulation No. 302/2005 and the particular safeguard provisions issued thereunder.

The operator shall carry out a physical inventory taking annually; at reactor plants, this is normally carried out in connection with the refuelling outage before the reactor lid is closed. The operator shall carry out inspections of the nuclear use item accountancy, reporting and safeguards system when necessary but at least once a year.

4.6 Safeguards practices related to fuel cycle and radioactive waste management

No open issues identified during the analyses. Information below provided as guidance what should be considered in from the safeguards point of view.

In nuclear legislation it should be defined whether radioactive waste and spent fuel is allowed to be imported or exported or should Estonia/Operators arrange final disposal of radioactive waste and spent nuclear fuel within the territories of Estonia. This high-level principle in legislation directs whether open or closed nuclear fuel cycle should be chosen and has also effect on necessary safeguard measures. Issues that should be considered from the safeguard point of view when selecting fuel cycle strategy are presented below.

Issues that should be considered in open fuel cycle approach and final disposal:

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- Legal framework should describe general provisions concerning radioactive waste management and whether nuclear waste generated in Estonia should be disposed in Estonia or would be possible to export it from Estonia
 - Provisions related to importing nuclear waste into the Estonia should be considered
- Safeguarding spent fuel in interim storage
- Physical protection of spent fuel in interim storage and final disposal repository
 - Security of nuclear material should be ensured and required through legislation and regulations
 - Shall be ensured that nuclear material is not removed from the repository
- Licensing regarding final disposal repository
 - Verification of final disposal repository design, construction and operation
 - Nuclear material continues to be subject to safeguards even after geological disposal
- Verification of material receipt and flow

Issues that should be considered in closed fuel cycle approach:

- Proliferation is the most important concern when reprocessing nuclear fuel
 - Safeguard measures should in the responsibility of reprocessing facility after receipt
- Transfers outside Estonia
 - Legislation & regulation should have measures for handling and issuing of permits and require that security of spent fuel and radioactive waste during the transport is to be ensured
 - EU Directive 2006/117/EURATOM⁴² shall be complied with when spent fuel or radioactive waste imported or export (including transport through EU Member State)
- Termination of safeguards
 - Spent fuel in storage continues to require safeguarding but operator of reprocessing facility and state where it is located should be responsible for it

⁴² Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel

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- Estonia should be able to terminate safeguarding of transferred spent fuel when it is transferred outside of Estonia and received by reprocessing facility⁴³
 - State or organization which performs the reprocessing of spent nuclear fuel may have right to return the radioactive waste which is the result of reprocessing activities to country of origin of spent nuclear fuel
 - Returned radioactive waste may need to be safeguarded by Estonia

4.7 Security aspects regarding safeguards

Nuclear law(s) and regulations should require protection of nuclear material from threats and unlawful actions (for example theft of nuclear material). It is recommended that in the legal and regulatory framework, sufficient security arrangements (physical protection and information/cyber security of nuclear material) are required to be implemented by the operator in possession of nuclear material as well as during the transport of nuclear material. Requirements should, for example to ensure the confidentiality and integrity of nuclear material and nuclear information, demand that access (physical or logical access) to nuclear material should be restricted only for personnel who has need-to-know basis for the access in order to do their tasks.

More detailed security arrangements requirements should be developed for the use of nuclear energy and those requirements should also apply operators in possession of nuclear material or nuclear information subject to safeguards.

Implementation examples of physical security and information security of nuclear materials can be seen from Finnish regulatory documents Radiation and Nuclear Safety Authority Regulation on the Security in the Use of Nuclear Energy⁴⁴ (Chapter 2 Basis of security) and YVL guide D.1⁴⁵. More detailed requirements for physical protection of nuclear facility is provided in YVL A.11⁴⁶ and for information/cyber security in YVL A.12⁴⁷.

5 SUMMARY AND CONCLUSION

As stated, Estonia is considering nuclear energy to be part of their energy solutions in the future and therefore study was made to form an understanding what are the requirements of Euratom and International Atomic Energy Agency (IAEA) concerning the nuclear power programme and what are the development needs in Estonia to meet the requirements. These analyses are needed to make decision whether Estonia should commit to the nuclear energy.

⁴³ According to Infirc/547 Article 90, Estonia's responsibility over safeguards of nuclear material shall end when recipient State assumes responsibility or no later than nuclear material reaches destination.

⁴⁴ STUK Y/3/2020, Radiation and Nuclear Safety Authority Regulation on the Security in the Use of Nuclear Energy, <https://www.stuklex.fi/en/maarays/stuk-y-3-2020>

⁴⁵ YVL D.1 Regulatory control of nuclear safeguards, <https://stuk.fi/en/yvl-guides>

⁴⁶ YVL A.11 Security of a nuclear facility, <https://www.stuklex.fi/en/ohje/YVLA-11>

⁴⁷ YVL A.12 Information security management of a nuclear facility, <https://www.stuklex.fi/en/ohje/YVLA-12>

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The report provided an assessment of current situation regarding the safeguards measures and recommendations for the development of the legal & regulatory framework and necessary measures related to safeguards. The project supports the Nuclear Energy Working Group in its analyses and conclusions in the development of nuclear power programme.

The assessment shows that Estonia has the basic principles of safeguards in place. However, it should be noted, as in the assessment section of the report, that the requirements for nuclear power are more stringent and necessary changes in the country's operation are foreseen. The IAEA and European Commission regulations and requirements provide guidance on how to proceed at the state level. However, there is a lack of regulation by the state, especially for a new nuclear operator, and this may pose challenges in the future if the correct procedures are not required from beginning. The type of SMR plant that Estonia intends to build also poses its own challenges in terms of modularity, where, for example, safeguard issues must also be taken into account from the early design stages. In addition, a nuclear authority should be established in Estonia to manage also safeguards issues. At present, responsibilities are divided between several agencies.

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