Republic of Lithuania

Lithuanian National Report Under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Fifth Lithuanian National Report

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Contributors to the Lithuanian National Report

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Lithuanian National Report under the Joint Convention

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LIST OF ABBREVIATIONS

CPMA – Central Project Management Agency
DP – Decommissioning Project;
DSS – Disused Sealed Sources;
DMSD- Decommissioning Management System & Database
DW- Drainage Water;
EIA- Environmental Impact Assessment;
EDW - Emergency Drainage Waters;
EPO - Emergency preparedness organisation;
HLW- High Level Waste;
HM – Heavy Metal
IAEA- International Atomic Energy Agency;
INPP –Ignalina Nuclear Power Plant;
FRD - Fire and Rescue Department;
LLW – Low Level Waste
LILW- Low and Intermediated Level Waste;
LILW-LL - Low and Intermediated Level Waste Long-Lived;
LILW-SL – Low and Intermediated Level Waste Short-Lived;
NPP- Nuclear Power Plant;
NDF – National Decommissioning Fund
PSAR – Preliminary Safety Analysis Report;
RPC- Radiation Protection Centre;
RATA- State Enterprise Radioactive Waste Management Agency;
RWMF - Radioactive Waste Management Facility;
RWMSF- Radioactive Waste Management and Storage Facility;
SAR – Safety Analysis Report;
SFA – Spent Nuclear Fuel Assembly;
SFB – Spent Nuclear Fuel Bundle;
SF- Spent Nuclear Fuel;
SFP – Spent Nuclear Fuel Pools;
SNFSF- Spent Nuclear Fuel Storage Facility;
SPH - Storage Pools Hall;
SRW- Solid Radioactive Waste;
QMS – Quality Management System
VATESI – State Nuclear Power Safety Inspectorate;
VLLW –Very Low Level Waste;

SECTION A. INTRODUCTION

Aim of the report

Lithuania has signed this Convention on 30 September 1997 and ratified it on 18 December 2003. This Convention entered in force in Lithuania on 14 June 2004.

This is the fifth report of Lithuania for this Convention. The aim of the report is to give the information on the fulfillment of obligations of this Convention to other Contracting Parties. This report will be discussed in the Sixth Review Meeting to be held in Vienna on 21 May – 1 June 2018.

This report was prepared according the Guidelines Regarding the Form and Structure of National Reports. It takes into account challenges and plans to improve safety indicated in Reporter's Report for Lithuania prepared during the Fifth Review Meeting.

Summary of major changes in the area of spent fuel and radioactive waste management in Lithuania since the presentation of last report are presented in Section L.

Sources of radioactive waste

1. Nuclear power plants

There is only one nuclear power plant in Lithuania - Ignalina nuclear power plant (INPP) . It is situated in the North-East of Lithuania near the borders of Latvia and Belarus, on the bank of the largest Lithuanian water-body, Drūkšiai Lake. The INPP has two units of RBMK-1500 reactors. RBMK-1500 is the last and the most advanced version of RBMK-type reactor design series (actually only two units were constructed).

The INPP reactors were commissioned in December 1983 and August 1987 respectively. The original design lifetime was until 2010-2015. After the accident in Chernobyl, the safety systems were re-evaluated and it was decided to decrease the maximum thermal power of the units from 4800 to 4200 MW. That limited the maximum electric power to about 1250 MW per unit. Now both units are under decommissioning.

Unit 1 of INPP was shut down on 31 December 2004 and the second unit of INPP was shut down at the end of 2009 according to the obligations of Treaty of Accession of Lithuania to European Union.

2. Isotope applications

The number of radioactive sources in Lithuania is continually decreasing - in implementing new technologies many of enterprises discontinue to use their sources (they are being replaced by other equipment). When the radioactive sources are declared as disused, and if they are not returned to supplier then they are sent to the INPP radioactive waste interim storage facility.
According to the Law on the Management of Radioactive Waste, State Enterprise Radioactive Waste Management Agency (RATA) is responsible for taking radioactive sources from small

waste producers, when sources are declared as disused and considered as radioactive waste, but not returned to supplier. From the moment of transfer of disused sealed source from small waste producer to RATA, RATA is taking responsibility to manage radioactive waste. Then RATA transfers sources to INPP for storage. INPP is responsible for the radioactive waste management from the moment of receiving them.

Specific items regarding radioactive waste management in Lithuania

It should be noted that according to the Law on Nuclear Energy the spent fuel in Lithuania is radioactive waste.

All radioactive waste management facilities in Lithuania are considered nuclear facilities. The operators have to have a license in order to operate these nuclear facilities. All these facilities are situated in the territory of INPP, only one exception is Maišiagala storage facility, which is about 30 km northwest from the capital of Lithuania Vilnius. All facilities in Lithuania are licensed.

The operator of radioactive waste management facilities is fully responsible for the safety of these facilities. INPP is responsible for the safe management of radioactive waste produced during operation or accepted for storage or processing, and produced during decommissioning until this waste is transferred for disposal. RATA is responsible for management and disposal of all radioactive waste transferred. RATA is the operator of the assigned storage facilities and repositories.
The legislative and regulatory system in Lithuania is non-prescriptive. The regulators are responsible for supervising all steps of radioactive waste management.

SECTION B. POLICIES AND PRACTICES

Article 32: Reporting, paragraph 1

1. *In accordance with the provisions of Article 30, each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address the measures taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address the established strategy for Radioactive Waste Management.*

In 2014 Law of the Republic of Lithuania for Radioactive Waste Management was amended introducing content of National waste management programme according Council Directive 2011/70/EURATOM of 19 July 2011 Establishing a Community Framework for the Responsible and Safe Management of Spent Fuel and Radioactive Waste. This programme was named Development Programme of Radioactive Waste Management (Programme). It was prepare based on the Strategy on Radioactive Waste Management (which was approved by the Government of Lithuania on September 3, 2008), including requirements coming from Directive 2011/70 EURATOM. Development Programme of Radioactive Waste Management was approved by the Government of Lithuania on December 23, 2015 and it replaced previously mentioned Strategy on Radioactive Waste Management.

The content of the Programme is:

1. The overall objectives of radioactive waste management;
2. The main milestones to achieve objectives of radioactive waste management and clear timeframes for the achievement of those milestones;
3. An inventory of all radioactive waste and estimates for future quantities (including those from decommissioning of nuclear facility), clearly indicating the location and amount of the radioactive waste in accordance with established classification of the radioactive waste;
4. The concepts or plans and technical solutions for all radioactive waste management phases (from generation to disposal);
5. The concepts or plans for the post-closure period of a disposal facility's lifetime, including the period during which institutional control is exercised and the long term means to be employed to preserve information of that facility;
6. The research, development and demonstration activities that are needed in order to implement solutions for the management of SF and radioactive waste;
7. The responsibility for the implementation of this Programme and the key performance indicators to monitor progress towards implementation;
8. An assessment of the costs for implementation of this Programme and the underlying basis and hypotheses for that assessment, which must include a profile over time;
9. The financing means and sources of this Programme;
10. The means and measures for public information;

11. If any, the agreement or agreements concluded with another country on management of radioactive waste, including the agreements on disposal facilities.

Development Programme of Radioactive Waste Management is the part of the national legal system and is adopted for a 7 year period. The Programme must be revised every 7 years. The Programmes might be sooner reviewed if necessary.
Radioactive waste management development program was prepared in response to the nuclear energy development plans, national and international environmental, nuclear and radiation safety requirements and sets of spent nuclear fuel and radioactive waste management goals, objectives, and values of evaluation criteria as well as tentative schedule of implementation of objectives and tasks.

The strategic ultimate goal of the program is safe management of all radioactive waste and spent nuclear fuel available in Lithuania, protection of people and the environment from harmful effects of ionizing radiation and avoiding to impose undue burdens on future generations. The implementation of the safety principles follows the rule that the radioactive waste, including spent nuclear fuel must be isolated for a long period of time from humans and the living environment, ensuring the safety by passive means. Storage of spent nuclear fuel and radioactive waste, including long-term storage, is an interim solution and cannot be an alternative to the disposal.
The first objective of the program is to reduce generation of radioactive waste. Lithuanian legislation requires to reduce the volume of radioactive waste to a minimum as practically and reasonably possible. Minimization of waste generation should be achieved via waste clearance (through reuse of materials, devices and equipment that have been contaminated with radionuclides or disposal as non-radioactive waste). In due course of implementation of decommissioning infrastructure INPP was installed metal waste decontamination facility to increase the efficiency of decontamination. In addition, it has been foreseen to develop and introduce technologies reducing the amount of radioactive waste or activity.

The second objective of the program is to achieve a high level of nuclear and radiation safety and environmental protection of spent nuclear fuel and radioactive waste.
Very low level of short-lived radioactive waste, accumulated in INPP storage facilities will be retrieved, and sorted in accordance with the requirements. After initial treatment the waste will be disposed of in a very low level waste repository, which will be constructed not far from the NPP. Lithuanian legislation allows to dispose of both treated and untreated waste, if it meets the repository waste acceptance criteria.
Decision shall be taken on management of waste from dumpsite of INPP industrial waste as it may contain very low level of short-lived radioactive waste.
Short-lived low- and intermediate-level radioactive waste meeting low and intermediate level waste acceptance criteria for the repository will be emplaced into reinforced concrete vaults of the near- surface repository to be constructed. This repository will be in operation from 2021 to 2038. Active institutional control will last for 100 years after the closure of the repository. After that, passive control will continue at least 200 years.
Solidified (bituminised or cemented) liquid radioactive waste is classified as short-lived low- and intermediate-level radioactive waste.
Long-lived low- and intermediate-level radioactive waste and spent sealed radiation sources will be separated from the short-lived wastes and loaded into appropriate containers. The containers with long-lived radioactive waste will be stored in a long-lived waste storage facility. Graphite from the dismantled reactors will be moved to the storage facility in 2022 - 2038. The waste will be stored up to 2066 and will be disposed of in a geological repository.
For storage of the spent nuclear fuel Lithuania has selected the dry storage option. In 2017 construction of a new dry storage was completed and up to 2022 the fuel will be transferred to the storage facility. The design lifetime of the existing storage facility is up to 2050, and that of the

new facility is until 2067. After the storage period the spent nuclear fuel should be disposed of in a geological repository.
Since the operation period of the existing spent nuclear fuel storage ends earlier than the planned commissioning of the geological repository a possibility of extending the storage period of the dry storage for spent nuclear fuel will be analyzed. This analysis program will be developed untill 2025.
Radioactive waste stored in Maišiagala radioactive waste storage facility will be retrieved, the territory rehabilitated and transferred for the uncontrolled use.
Radioactive waste management infrastructure to manage institutional radioactive waste and orphan sources of ionizing radiation will be strengthened.
Data on waste packages containing very low-level, low and intermediate level waste are stored in a computerized INPP decommissioning management system: it will be maintained until the end of passive institutional control period. In order to increase the reliability of data storage is necessary to regularly upgrade the data storage hardware and software.
The third objective of the program is to ensure sustainable management of spent nuclear fuel and long-lived radioactive waste in the long-term safety. Lithuanian laws prohibit the processing of spent nuclear fuel in Lithuania. Spent nuclear fuel can be recycled abroad, and the resulting secondary waste returned to Lithuania. However, this solution is not economical and the resulting secondary long-lived high-level radioactive waste has to be managed the same way as the spent nuclear fuel. As the storage of spent nuclear fuel and radioactive waste is only a temporary solution, the spent nuclear fuel and long-lived radioactive waste eventually has to be disposed in a geological repository. The geological repository will be needed before the end of the spent nuclear fuel and long-lived radioactive waste storage period (2050 - 2067). Usually the installation programs for geological repositories (research and development, site selection, construction) last for approximately 30 years. Therefore, a repository development project including timetable for implementing the project, preliminary research, and repository design, construction and operation will be developed.
The second task is to select the location for the geological repository. It will be a combination of successive stages ("step by step"). Selection of suitable geological formations and investigation of the repository environment will be included in the site selection program. The main repository site selection stage are: site selection process planning (2016-2017), detailed research to choose a few regions of interest (2019-2022), detailed characterization (2022-2030) and site approval phase (2030-2033). The final stage will include an environmental impact assessment and a comparative analysis of the alternative sites. The specific location will be selected according to technical, social and economic conditions. Repository site should be selected by the year 2033.
Concept of the geological repository will be based on appropriate studies and safety analysis. Repository concept will be developed gradually and in coordination with the site selection process and making sure that the safety requirements are met. Upon completion of each site selection stage the concept will be updated and the repository installation price adjustment carried out. Lithuanian geological repository concept will be developed in 2031.
When the selection of the repository site and its concept are completed the design of the facility and later, the construction will be initiated. Deep repository auxiliary access facilities construction will start in 2039, following a technical design expertise and safety justification. The construction and commissioning of the repository will be completed in 2066.
The fourth objective of the program is to ensure transparency of spent nuclear fuel and radioactive waste management.
It is foreseen to disseminate knowledge in the field of radioactive waste safety and to inform the public about management and disposal of spent nuclear fuel and radioactive waste. Dissemination of information about radioactive waste generation, their type, management practices and safety will be carried out to improve public confidence level. Efforts will be made to inform the public and to involve it in the initial decision-making already in project planning and early implementation stages.

(i) spent fuel management policy; and

(iii) radioactive waste management policy;

National Policy

National radioactive waste management policy mainly is described in Law of Radioactive Waste Management. This Law regulates public relations arising during the management of radioactive waste, and shall establish the legal grounds for the management of radioactive waste. Radioactive waste management principals are indicated in the Article 3 of Law on Radioactive Waste Management, as a part of national radioactive waste management policy, and state that management of radioactive waste must ensure that:

1) at all stages of the radioactive waste management, individuals, the society and the environment within Lithuania as well as beyond its borders, are adequately protected against radiological, biological, chemical and other hazards that may be associated with radioactive waste by applying the appropriate methods;
2) efforts are made to prevent future generations from any reasonably predictable impact greater than those permitted for the current generation and to avoid any undue burden for future generations;
3) the generation of radioactive waste is kept to the lowest practical minimum in terms of volume and activity, achieving this through measures during design, operation and decommissioning, including reprocessing and further use of nuclear fuel cycle materials.
4) interdependencies among the different steps in the radioactive waste management are taken into account;
5) the safety of radioactive waste management facilities is guaranteed during their operating lifetime and thereafter, applying passive safety measures;
6) radioactive waste management safety measures shall be implemented applying graded approach;
7) radioactive waste generated in the territory of Republic of Lithuania shall be disposed of in disposal facilities in the territory of Republic of Lithuania or transported for disposal to other country, except cases indicated in Article 24 (cases related to management of spent sealed sources).

Following articles describe other elements of National Policy:

The Article 9 of Law on Radioactive Waste Management states: The radioactive waste generator shall pay all the expenses incurred during the management of radioactive waste from the moment of its generation to its emplacement at a disposal facility, including the expenses related to the post-closure surveillance of disposal facilities.

The Article 24 part 2 of Law on Radioactive Waste Management states: Sealed sources of ionising radiation may be imported into the Republic of Lithuania if after their use it is intended to return them to the supplier of the sealed sources of ionising radiation. The Recipient of a sealed source of ionising radiation shall enter into a contract with the radioactive waste manager on the management of the sealed source of ionising radiation in case the sealed source of ionising radiation cannot be returned to its supplier. The Recipient of a sealed source of ionising radiation shall obtain suretyship insurance in the amount specified in the contract with the radioactive waste manager for the services, except in the cases stipulated in the legal act establishing the procedure for import to, export from, shipment in transit or transportation within the Republic of Lithuania

of radioactive materials, radioactive waste and spent nuclear fuel and for issuance of permits (authorisations), such legal act being approved by the Head of the State Nuclear Power Safety Inspectorate jointly with the Minister of Health, where the contract is made in relation to the sealed source of ionising radiation which will be used and stored until it no longer requires control.

The Article 25 of Law on Radioactive Waste Management states:
1. It shall be prohibited to import to the territory of the Republic of Lithuania radioactive waste and/or spent nuclear fuel, except for the cases where:
1) radioactive waste or spent nuclear fuel are shipped in transit via the territory of the Republic of Lithuania;
2) radioactive waste exported for treatment is being re-entered;
3) radioactive waste recovered from the exported materials is being re-entered;
4) radioactive waste produced after reprocessing of the exported spent nuclear fuel is being re-entered;
5) spent nuclear fuel exported for reprocessing is being re-entered, if the export was prohibited or the spent nuclear fuel has not been reprocessed.

The Article 25 part 5 of Law on Radioactive Waste Management states**:** Radioactive waste and/or spent nuclear fuel may be exported only to such countries that have the administrative and technical capabilities to receive it, as well as adequate regulatory and supervision institutions, also other structures required for radioactive waste and/or spent nuclear fuel management in accordance with the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

The Article 25 part 6 of Law on Radioactive Waste Management states: It shall be prohibited to export radioactive waste from the territory of the Republic of Lithuania with an intent of emplacement at disposal sites lying south of 60 degrees latitude South.

The Article 5 part 5 of Law on Nuclear Energy states: It shall be prohibited to produce radioactive materials for a nuclear weapon or for fuel of nuclear power plants, also to reprocess already used elements of such fuel in the territory of the Republic of Lithuania.

According to Article 4 of Law on Nuclear Energy nuclear and radiation safety in the Republic of Lithuania shall be guaranteed by the State.
According to Article 30 Law on Nuclear Energy the licence holder shall be responsible for the adequate and safe operation of the installation in accordance with the requirements stipulated in the laws and other legal acts, also in the articles of association, internal instructions and procedures of the licence holder and in the terms of the issued licence. The licence holder shall be responsible for safety of its activities and the nuclear installation.

According to Article 16 of Law on Nuclear Safety full liability for the nuclear safety of a nuclear installation and for nuclear safety in carrying out other activities with nuclear and/or nuclear fuel cycle materials shall solely fall on persons that are engaged in such activities and hold relevant licences and/or permits.

According to Article 8 of Law on Radiation Protection:

Licensing of Practices, Issuance of Temporary Permits and Permits to Ship Radioactive Materials and Radioactive Waste Generated in the Course of Non-Nuclear Fuel Cycle:

1. It shall be prohibited …handle (carry out pre-treatment of radioactive waste (collect, sort, decontaminate), carry out treatment of radioactive waste, store) and ship radioactive waste … without the licence or temporary permit issued in the manner established by the licensing rules approved by the Government.
13. Natural persons, legal entities, other organization, affiliates of legal entities and other organizations acting in violation of the requirements established under paragraph 1 of this Article shall be liable according to the laws of the Republic of Lithuania.

(ii) spent fuel management practices;

Storage of spent nuclear fuel (SF) at INPP is performed by means of two methods. "Wet" storage in SF storage pools near the reactor and "dry" storage in the detached storage facility at NPP territory. Wet storage was provided in the initial design of NPP. NPP's design was developed in the 70ies of the last century in the former Soviet Union. It was intended to store fuel unloaded from the reactor for several years and then to transfer it for processing. In the beginning of the 90ies, when it became finally obvious that the matter of SF processing is not considered any more, a decision was made to build up a dry type interim storage for spent nuclear fuel at INPP and store it for 50 years.

(iv) radioactive waste management practices;

Solid radioactive waste generated at INPP is segregated into three groups according to the surface dose rate to standards that were applied in the former USSR and applicable at INPP. The new classification was approved in 2001 however, a transition period and the new waste management facilities required for the implementation of the new system. For new designed, constructed and operated facilities new waste system is used. Old classification system will not be used when new waste treatment facilities will be constructed and operated and the waste from old storage facilities will be retrieved and reclassified. Both waste classification systems are described in item (v).

Brief description of waste according to its content

- Group I waste.

Waste with insignificant contamination, generated as a result of Units' operation on nominal power, equipment repair works, and refurbishment of rooms.
Content (roughly): paper, cotton waste, pieces of cable, filters and parts of repaired equipment, construction waste, rubber and thermal insulation.

- Group II waste.

Waste generated as a result of repair works, small volumes of operational waste generated in the central hall and in the SF cooling pools hall.
Content (roughly): depreciated equipment, parts of equipment, pipelines, and elements of structures from non-serviced rooms.

- Group III waste.

The main constituents are the parts retrieved from the reactor core. Content (roughly): elements of fuel assemblies, fuel channels, CPS channels, sensors, etc.

The solid waste at INPP is placed into reinforced concrete compartments in storage buildings No. 155, 155/1, 157, 157/1 located on the INPP site. Currently, storage buildings 157 and 157/1 are under operation. There is no reprocessing of solid waste before it is dumped. Part of the Group I

combustible/compactable waste is compacted with a 70 ton press. Since 2013, very low-level radioactive waste is stored in a Very Low-Level Radioactive Waste Storage Facility (buffer storage). Solid waste retrieval from buildings 155 and 155/1 and sorting facility was licenced to start industrial operation in 2017. Preparation for industrial operation of Solid Waste Management and Storage Facilities (B3/4) and licensing of Solid Waste Retrieval Facilities (B2-2) are in progress.

Liquid radioactive waste at INPP is collected in special tanks, from where it is transferred into evaporating facilities. The concentrate is processed and conditioned in the bitumen solidification facility, i.e. mixed with bitumen. The bitumen compound then is pumped into a special storage (building 158). The building is also located at the INPP site.
Spent ion-exchange resins filter aid (perlite) and part of evaporator concentrate with solid particle sediments stored in special tanks, from where it is transferred into cementation facility. The final cement solidified waste product is a compound of liquid radioactive waste and the dry components cement and bentonite. The compound is poured into metallic 200 l drums. The filled drums are placed into reinforced concrete storage containers, each containing 8 drums. VATESI license No.1/2006 for operation of the cementation facility and temporary cementation waste storage has been received in 2006.
Since 1964 all radioactive waste from the research, medical and industrial institutions was sent to disposal facility at Maišiagala, facility was closed down in 1989. Since closure of this facility in 1989, all collected institutional waste is stored in the INPP storage facilities. Maišiagala facility was originally designed as a disposal facility, however, recent safety assessment showed that the facility meets only short- term safety requirements. Due to it, the closed facility has been licensed as a storage facility and a license for post closure surveillance of the closed Maišiagala storage facility was issued by VATESI.

(v) criteria used to define and categorize radioactive waste.

Radioactive waste in Lithuania is defined as spent nuclear fuel and substances contaminated with or containing radionuclides at concentrations or activities greater than the approved clearance levels and for which no further use is foreseen.
Radioactive waste in the Republic of Lithuania is classified according to the disposal principle and radiological characteristics. According to the Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Facilities BSR-3.1.2-2010 the following waste categories are distinguished:

Very Low Level Waste (VLLW). Radioactive waste with radiological characteristic values exceeding clearance levels, however, lower than the characteristics for low level waste. VLLW will be disposed in licensed landfills.
Low and Intermediate Level Waste (LILW). Radioactive waste with radiological characteristics between those of very low level waste and high level waste. These may be long-lived waste (LILW-LL) or short-lived waste (LILW-SL).
High Level Waste (HLW). Radioactive waste, which shall be placed in deep geological repository for its significant capacity of emitting of heat generated during radioactive decay or for the contained amount of long-lived radionuclides.
Unconditional clearance levels are established by Nuclear Safety Requirements BSR-1.9.2-2011 "Derivation and Use of Clearance Levels of Radionuclides for Materials and Waste Generated during Activities in the Area of Nuclear Energy" (2011).
Solid radioactive waste is classified into six classes.

Table B-1: Solid waste radiological classification

Waste classes	Definition	Abbreviation	Surface dose rate mSv/h	Conditioning	Disposal method*
*Short lived low and intermediate level waste***					
A	Very low level waste	VLLW	≤0.5	Not required	Very low level waste repository
B	Low level waste	LLW-SL	0.5-2	Required	Near surface repository
C	Intermediate level waste	ILW-SL	>2	Required	Near surface repository
*Long lived low and intermediate level waste****					
D	Low level waste	LLW-LL	≤10	Required	Near surface repository (cavities at intermediate depth)
E	Intermediate level waste	LW-LL	>10	Required	Deep geological repository
Spent sealed sources					
F	Disused sealed sources	DSS		Required	Near surface or deep geological repository*****

* Disposal method is defined considering waste acceptance criteria of a disposal facility

** Containing beta and/or gamma emitting radionuclides with half-lives less than 30 years, including Cs^{137}, and/or long lived alpha emitting radionuclides with measured and/or calculated, by using approved methods, activity concentration less than 4000 Bq/g in individual waste packages on condition that an overall average activity concentration of long lived alpha emitting radionuclides is less than 400 Bq/g per waste package

*** Containing long lived alpha emitting radionuclides with measured and/or calculated, by using approved methods, activity concentration more than 4000 Bq/g in individual waste packages on condition that an overall average activity concentration of long lived alpha emitting radionuclides exceeds 400 Bq/g per waste package.

**** Depending on acceptance criteria applied to sealed sources

Liquid radioactive waste shall be classified and segregated according to:

(a) The specific activity - in low level ($\leq 4 \cdot 10^5$ Bq/l) and intermediate level ($> 4 \cdot 10^5$ Bq/l) waste;
(b) The chemical nature - in aqueous and organic waste;
(c) The phase state - in homogeneous and heterogeneous waste.

It shall be noted, that the radioactive waste classification system introduced in 2001 is applied for new radioactive waste treatment facilities. Currently, at INPP classification of radioactive waste comply with the old regulations of the Soviet Union (SP AS-88). A transition period is required for the implementation of the new system at INPP. The new classification compliant with Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Facilities BSR-3.1.2-2010 shall be fully adopted after the modernization of radioactive waste management system at INPP and will be operational at the new waste management facility.
Hence, currently solid radioactive waste is classified according to Table B-2. In practice only surface dose rate is applied.

Table B-2: "Old" Radioactive waste classification

Waste group	γ-dose rate at 0.1m distance from the surface (mSv/h)	Total activity Bq/kg	Total activity Bq/kg	Surface contamination (particle/cm^{2}min)	Surface contamination (particle/cm^{2}min)
		β- emitter	α- emitter	β- emitter	α- emitter
I low	$1x10^{-3}$÷0.3	$7.4x10^4$-$3.7x10^6$	$7.4x10^3$-$3.7x10^5$	$5.0x10^2$-$1.0x10^4$	5.0-$1.0x10^3$
II medium	0.3 ÷ 10	$3.7x10^6$-$3.7x10^9$	$3.7x10^5$-$3.7x10^8$	$1x10^4$- $1.0x10^7$	$1x10^3$- $1.0x10^6$
III high	over 10	over $3.7x10^9$	over $3.7x10^8$	over $1.0x10^7$	over $1.0x10^6$

According to fire hazard (for group I - II waste):

- combustible
- non-combustible

According to possibility to reduce volume by compaction:

- compactable
- non-compactable

Liquid radioactive waste is classified into three groups according to specific activities:

- Low level - $\leq 3.7\times10^5$ Bq/l
- Intermediate level - $3.7\times10^5 – 3.7\times10^{10}$ Bq/l
- High level - $> 3.7\times10^{10}$ Bq/l.

SECTION C. SCOPE OF APPLICATION

Article 3: Scope of application

1. This Convention shall apply to the safety of spent fuel management for spent fuel resulting from the operation of civilian nuclear reactors. Spent fuel held at reprocessing facilities as a part of a reprocessing activity is not covered in the scope of this Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.

There are no reprocessing facilities of spent nuclear fuel in Lithuania. According to the Law on Nuclear Energy, such kind of activity is forbidden. SF from INPP is stored for several decades at the storage facility.

2. *This Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this Convention shall not apply to waste that contains only naturally occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or it is declared as radioactive waste for the purposes of this Convention by the Contracting Party.*

The Lithuanian Hygiene Standard HN 73:2001 (last amended 2014) regulates the following requirements for radiation protection in such areas of the practices with natural and artificial sources (where natural sources are or have been used due to their radioactive or other properties):
- Production, processing, use, storage, transport, import, export of radioactive material and general requirements of radiation protection in management of the radioactive waste;
- Practices with materials containing natural radionuclides when exemption criteria are not applied.

3. This convention shall not apply to the safety management of spent fuel or radioactive waste within military or defense programmes, unless declared as spent fuel or radioactive waste for the purposes of this Convention by the Contracting Party. However, this Convention shall apply to the safety of management of spent fuel and radioactive waste from military or defense programmes if and when such materials are transferred permanently to and managed within exclusively civilian programmes.

According to the Law on Nuclear Energy, Article 5, It shall be prohibited to produce radioactive materials for a nuclear weapon or for fuel of nuclear power plants, also to reprocess already used elements of such fuel in the territory of the Republic of Lithuania.
There is no SF or radioactive waste from military or defense programmes in the Republic of Lithuania.

SECTION D. INVENTORIES AND LISTS

Article 32: Reporting, paragraph 2

2. This report shall also include:

(i) a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features;

At present time (2017.05) at INPP SF is stored in water of spent nuclear fuel pools (SFP) of both units and in the reactor of Unit 2 (wet storage of SF), in casks within intermediate dry storage facility (dry storage of SF), and in casks within interim SF storage facility.

Wet storage for spent fuel

Each Unit of INPP is equipped by (SFP) to store SF after it is unloaded from reactor for time period no less than 5 year.

Spent nuclear fuel assembly (SFA) after unloading from reactor are stored in SFP for time period no less than 1 year then SFA can be cutted to two SF bundles (SFB) in "hot cells" and putted in to the 32M baskets (102 SFB (or 51 SFA) in 1 basket) for storage up to the time moment (no less than 5 year from the extraction from reactor or from the final shut down of reactor) when can be extracted from SFP putted in to the container and transported to the intermediate dry storage facility for storage.
For both Units of INPP the complex of storage pools for the SF storage and its handling system comprises of 12 rooms:

- two rooms (Rooms 236/1, 236/2), intended to store SF assemblies after unloading from the reactor;
- five rooms (Rooms 336, 337/1, 337/2, 339/1, 339/2), intended to store SF bundles (SFB) in 32M baskets;
- Room 234, intended to accumulate SF assemblies prepared to be fragmentized (to two SFB), to cut suspension brackets from the SFA, transport SFA to the "hot cell" and 32M baskets with SFB from the "hot cell" to the storage pools. Also Room 234 can be used for storage of SFA or 32M baskets when one of the SFP rooms is under repair;
- two rooms (Rooms 338/1, 338/2), intended to perform operations to load the 32M baskets with the SFB into the transport casks. Also these rooms can be used for storage the 32M baskets when one the SFP rooms is under repair;
- Room 235 (transport corridor), intended to transport SFA and 32M baskets between the pools;
- Room 157 (transport corridor), intended to transport SFA and reactor assemblies from the reactor hall to the SFP hall.

The equipment of the SF storage and handling system is installed in the reactor building.

The SF assembly extracted from the reactor and SF bundles in 32M baskets are stored in the SFP rooms, SFA are stored in SFP for at least a 1 year, after which it may be cutted in "hot cell". The cutting bay is located in the reactor building between the SFP and reactor halls. The cutting bay includes a "hot cell", control room and maintenance area and is designed to:

- Cutting SF assemblies into halves (two SF bundles (SFB));

- Putting SFB into a 32M basket;
- Cutting long parts of SFA into smaller pieces (central rod, bearing tube) putting them in to the special container and removing from “hot cell”.

Total storage time of SFA (and SFB in basket after cutting of this SFA) in SFP, should be at least 5 years. When all SFB in 32M basket are stored for a time period longer than 5 years in SFP such basket can be removed from SFP. The 102 placed baskets (32M) with SFB are loaded into the transport casks and transferred to interim facility where should be stored (up to 50 years). Interim storage of SF at INPP is foreseen at 2 dry storage facilities near to the INPP controlled area.

“Dry” storage for spent fuel.

At present time at INPP it is foreseen 2 different dry storage facilities for interim storage of casks with spent nuclear fuel bundles.

- First Spent Nuclear Fuel Storage Facility (SNFSF - 1) – secured area with walls without roof.
- New Interim Spent Nuclear Fuel Storage Facility (SNFSF - 2) (B1 project) – building with roof in the secured area for casks storage.

The SNFSF - 1 is located at the INPP site within a distance of 1 km of the INPP units and 400 meters of the Drūkšiai Lake.

In SNFSF - 1 the spent nuclear fuel is stored in the multipurpose transport and storage casks CASTOR RBMK and CONSTOR RBMK.The storage is designed for 20 CASTOR RBMK casks and 78 CONSTOR RBMK casks. For the period from 2008-04-01 to 2009-02-25 the storage capacity was increased for up to 22 additional CONSTOR RBMK casks. At present (status date 2014-03-30) there are 20 CASTOR RBMK casks and 98 CONSTOR RBMK casks placed in the storage facility.

SNFSF - 2 facility (new nuclear facility licensed and put into industrial operation in 2017) is located within a distance of 1 km of the INPP units and about 1.5 km from SNFSF - 1. The territory of SNFSF – 2 is 5.93 ha. Total capacity is 202 CONSTOR®RBMK-1500/M2 casks. SNFSF - 2 is of enough capacity to house all the fuel which are presently stored at INPP Unit 1 and 2

(ii) an inventory of spent fuel that is subject to this Convention and that is kept in storage or that has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;

As of 2017-05-31, the SNFSF – 1 contained 20 CASTOR RBMK casks and 98 CONSTOR RBMK casks, with a total of 12032 SF bundles (6016 SF assemblies) of RBMK type, with uranium enriched to no more than 2%.

Presently (2017-05-31) 12 casks containing 1062 SF assemblies are stored in SNFSF - 2.

At present time the inventory of SF was: 6629 fuel assemblies in SFP of Unit 1, 4890 fuel assemblies in the SFP and 1134 fuel assemblies in reactor of Unit 2. The amount of heavy metal (HM) in one assembly is 110-112 kg. Total amount of heavy metal (mass of SF pellets in SFA and SFB) about 742448 kg in Unit 1 and about 674688 kg in Unit 2.

iii) a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features;

The facilities listed below are located on the site of INPP. These facilities are used for operational waste of INPP and for the waste from small producers in Lithuania. The volume of the waste from small producers is only about 1-2 m^3 per year, so more than 99% of radioactive waste in Lithuania is produced at INPP.

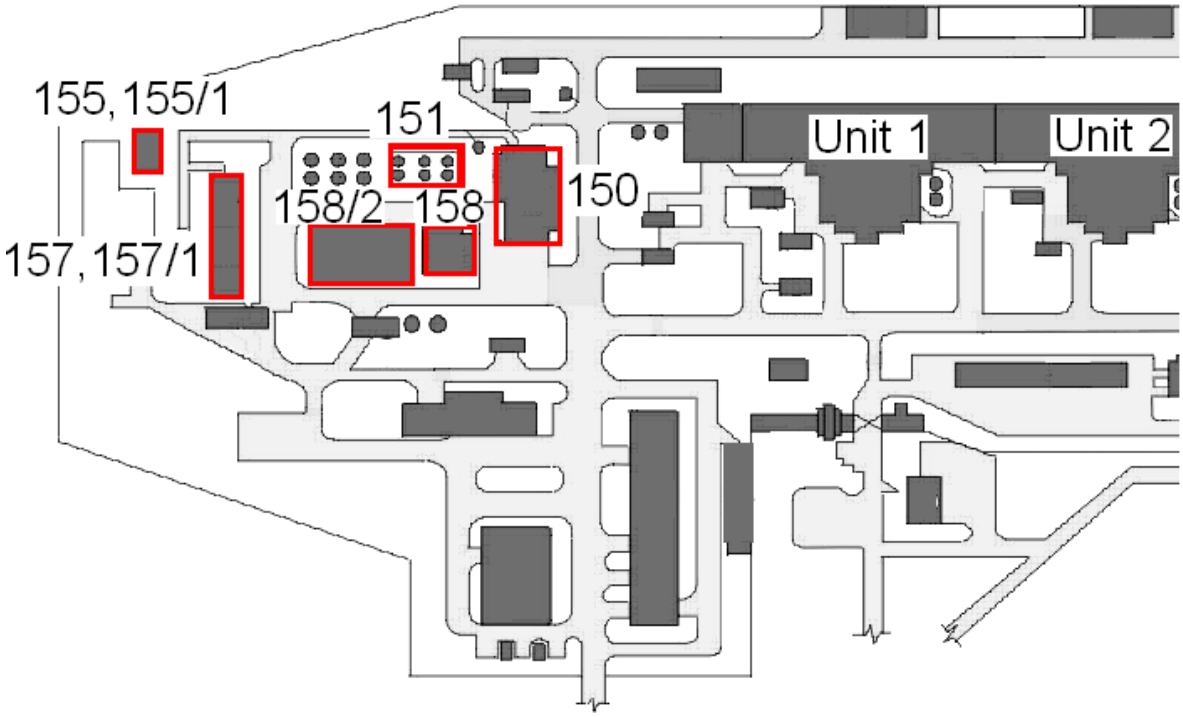

Figure D-1. Layout of radioactive waste facilities at INPP

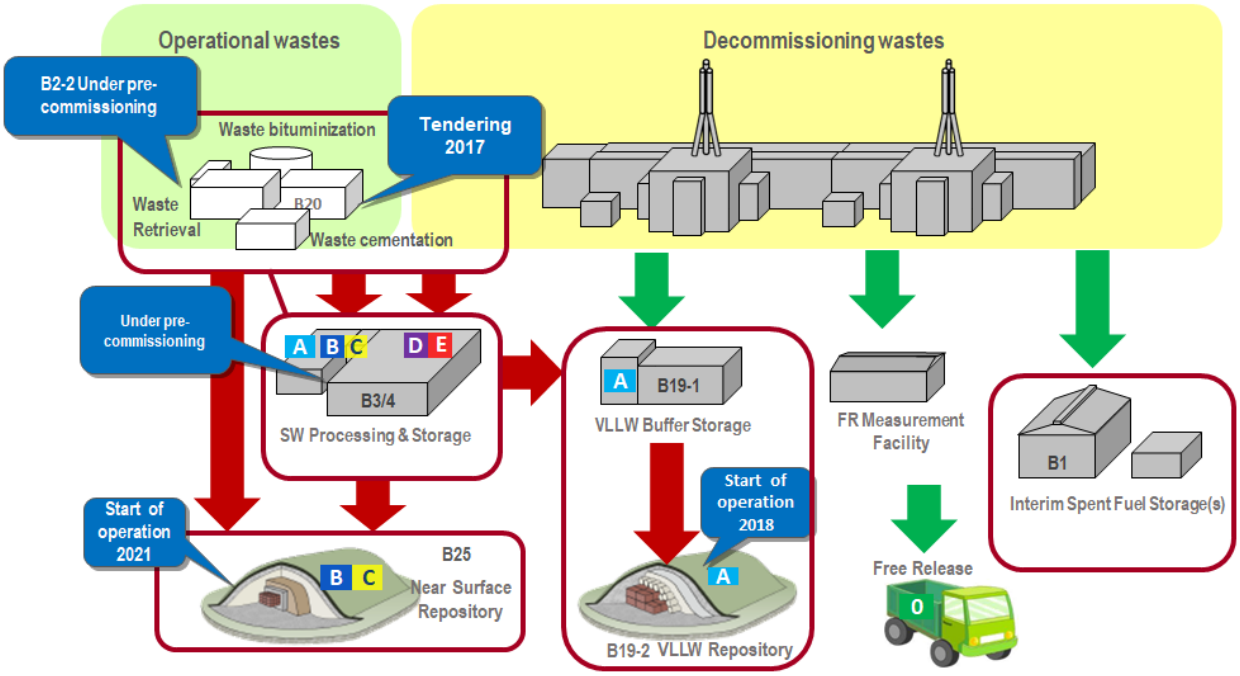

Figure D-2. Waste routes scheme at INPP

Brief technical specification of the solid waste storage and management facilities at INPP

Storage facility Building 157

Building 157 is a reinforced concrete ground structure. The bottom part is a reinforced concrete slab; external walls are pre-cast concrete panels. Standard reinforced concrete building blocks were used to reach the required thickness of the walls. The structure is separated into 15 compartments with pre-cast concrete partitions. The ceiling is made of cast-in-place concrete. Group I and II waste (according old classification of the radioactive waste) (class A, B, C and D according new classification) is loaded into the compartments through 4x5.5 m square apertures. These compartments (with wastes of Group I and II) already closed and in building 157 loading of wastes of Group III is performed only. Group III waste (according old classification of the radioactive waste) or class E (according new classification) is loaded through 1200 mm round apertures (6 per each compartment) covered by reinforced concrete plugs. Asphalt concrete hydraulic insulation is used to conserve the compartments' covering. Compartments with combustible solid radioactive waste are equipped with fire alarm and automatic carbon dioxide fire extinguishing system. At the moment the automatic fire extinguishing system is switched to manual carbon dioxide supply mode.

Storage facility Building 157/1

Building 157/1 is a reinforced concrete ground structure, consisting of three separate blocks. The distance between the blocks is 1 meter. The bottom part is a reinforced concrete slab; external walls are made of cast-in-place concrete in retained framework. The structure is separated with pre-cast concrete partitions into 29 compartments. The covering is made of cast-in-place concrete and has 6x4.5 m apertures. Asphalt concrete hydraulic insulation is used to conserve the compartments' covering. The covering over compartment No. 8 is made of cast-in-place concrete covered with metal liner and has one 1000x830 mm aperture used to load containers with filters.

Compartments with combustible solid radioactive waste are equipped with fire alarm and carbon dioxide fire extinguishing system switched to manual carbon dioxide supply mode.

Storage facility Building 155

Building 155 is a composite reinforced concrete ground structure. The bottom part is a reinforced concrete slab; external walls are reinforced concrete panels. Additional concrete protection is introduced inside. Metal panels are used as covering. Asphalt concrete hydraulic insulation is used to conserve the structure's covering. As for today, the building is completely filled with waste and conserved.

Storage facility Building 155/1

Building 155/1 is a composite reinforced concrete ground structure. The bottom part is a reinforced concrete slab; external walls are reinforced concrete panels. Cast-in-place concrete in retained framework is used inside to introduce additional biological shielding of the walls. Two pre-cast concrete partitions are used to separate the building into three compartments. Two compartments are 12x21 m each; the third one is 6x21 m. The covering is made of metal panels of 3x10.5 m that can be removed to load waste into the compartments. Asphalt-concrete hydraulic insulation is used to conserve the structure's covering. Inside and outside the building there is a fire extinguishing system. There is a pit provided to collect atmospheric precipitation inside the building. As for today, the building is completely filled with waste and conserved.

Storage facility Building 151 (Liquid waste)

The water purification and liquid waste treatment systems of INPP generate liquid radioactive waste. Waste is collected and stored in three 1,500 m³ metal lined concrete tanks which are located above ground level and covered with soil. The waste is stored in three storage tanks denoted as TW18 B01, TW18 B02 and TW11 B03 in building 151. The waste accumulated in storage tanks TW18 B01 and TW11 B03 consists of ion exchange bead resins and filter aid (perlite) mixture in water with very low salt content. The waste accumulated in storage tank TW18 B02 consists of evaporator concentrate with solid particle sediments and filter aid (perlite).

Bituminisation facility Building 150

The purpose of this facility is to condition the operational liquid waste from INPP.

The first bituminisation unit BU-1 was commissioned in 1986 and the second, BU-2 in 1993. The design capacity of the bituminisation unit is 0.5 m^3/h of evaporator concentrate.

The units mix radioactive salts into pure bitumen. A thin film of evaporates with specific activity of 3.7×10^5 Bq/l - 3.7×10^7 Bq/l and pure bitumen is mixed into bitumen compound with specific activity of 3.7×10^5 Bq/l -3.7×10^6 Bq/l.

The process of the collection of the liquid radioactive waste and the subsequent bituminisation at INPP is presented in Figure D-3. The contaminated water from different sources is accumulated in storage tanks. After evaporation in units EU-1, 2, the residual, evaporated concentrate, is accumulated. The bituminisation is carried out with two bituminisation units and the bitumen compound is transferred by heated pipeline to the storage canyons (cells) of building 158.

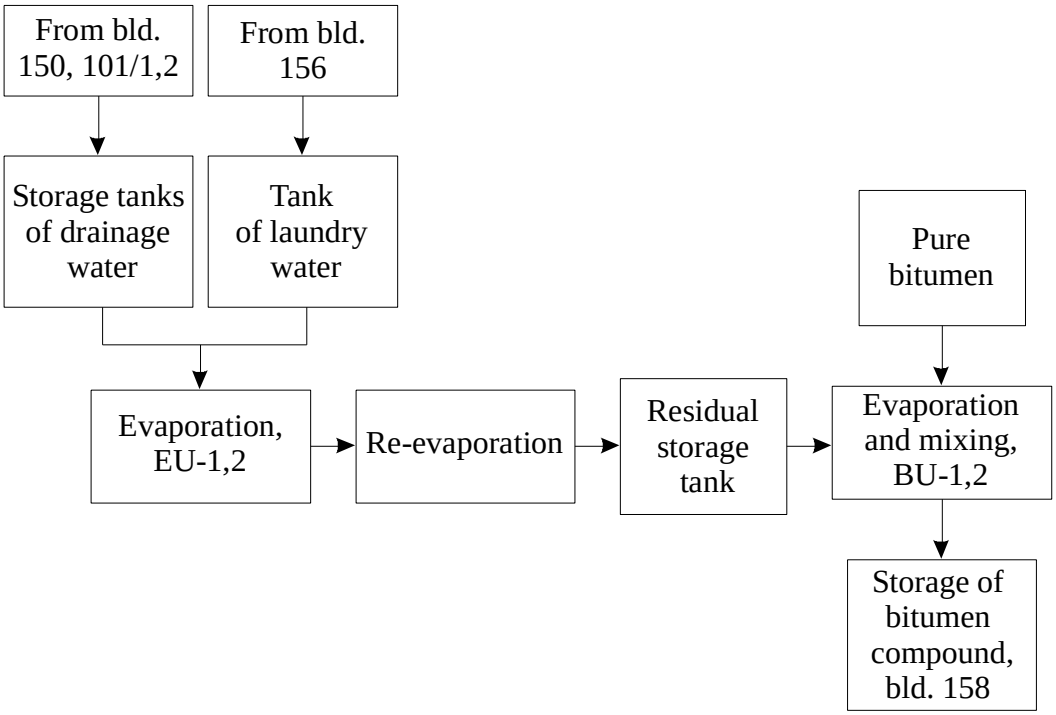

Figure D-3. The process of the collection of the liquid radioactive waste and the following bituminisation at INPP

Storage facility Building 158 (Bituminised waste)

The bituminised waste storage facility, building 158, is located in the Northwest side of the INPP site, 200 m. to the West of unit 1. The facility is a two-storey building with supporting walls and radiological shielding by concrete blocks. The foundation is made of monolithic reinforced concrete slabs. The first floor contains 11 canyons (cells) with a volume of 2500 m^3, each and an effective volume of 2000 m^3. One canyon has a volume of 1000 m^3 and an effective volume of 800 m^3. The second floor contains a servicing hall, pipe-shaped communication channels with pipelines and instrumentation rooms. A gallery with three communication channels for bitumen compound pipelines joins the storage building with the liquid waste treatment facility (building 150).

The potential conversion of the existing bituminized waste storage facility into a final repository is under investigation. INPP should complete their studies by 2020.

Cementation facility Building 150

The new liquid waste cementation facility started operation in March 2006. The ion-exchange resins from INPP water purification and liquid waste treatment systems together with filter aid (perlite) as one waste mixture type and solid particle sediments from evaporator concentrate also with filter aid (perlite) as another waste mixture type are solidified in cement which is poured into drums and put in storage containers (waste packages) in order to reduce any further risk associated with the liquid waste storage in tanks and to assure safe storage and management of solidified waste.

The cementation facility is designed to process approximately 450 m^3 of liquid radioactive waste per year. A total amount of 6000 m^3 liquid radioactive waste is envisaged to be processed. In addition to the accumulated liquid radioactive waste already in storage, the liquid waste which will be generated during future operation of INPP and potentially also during future decommissioning of INPP shall be processed.

The cement-waste mixture is captured into 200 l drums. The filled drums are capped and then loaded into a concrete storage container. Each storage container has a storage capacity of 8 drums. The storage containers are designed for shielding and protecting the loaded drums against mechanical loadings. For transport from the cementation facility to the building 158/2 the loaded storage container (FRAMATOME) is placed into a transport container (overpack).

Storage Building 158/2 (Cemented waste)

The cemented waste is stored in building 158/2. This facility started operation in 2005. The building 158/2 is three-bay shop reinforced concrete structure. The design basis for the storage building is to provide storage capacity for waste packages produced from a total quantity of 6000 m³ of liquid processed radioactive waste for duration of 60 years. The capacity is 6300 storage containers. The volume of the container is about 5.8m^3.
The cementation facility and building 158/2 are designed in such a way that in normal operation only a very small amount will be added to the discharge of radioactive substances from the overall INPP site, so that the radiation exposure due to these facilities will be negligible.

Building 159B for free release of operation wastes

The building 159B is free release measurement facility for operational wastes. After verification of acceptance criteria for free release wastes, they can be used without applying the requirements for radiation safety. It is mean that can be reused or disposed as conventional wastes.

Free release waste management unit (project B10)

The free release measurement facility (project B10) was put in operation from 2010. Main purpose of complex B10 is to ensure measurement of wastes packages or big size wastes of relatively non-radioactive wastes (non-radioactive wastes after dismantling up to verification on B10 at INPP so called “relatively non-radioactive wastes”) and after measurements and confirmation of criteria for non-radioactive wastes - wastes of class "0" or free release wastes (may be disposed as conventional wastes or reused without applying the requirements for radiation safety). In case if during verification of contamination level of wastes packages or big size wastes on B10 the contamination level of wastes is higher than acceptance criteria for free release they are returned to wastes producers for decontamination or reclassification.

Landfill disposal facility for VLLW (project B19)

The objective of Project B19 is to build the Landfill Facility for short-lived very low level waste.

The Landfill Facility will consist of the following facilities:

- Buffer storage of VLLW (project B19-1). It is a temporary building with area of 0.2 hectares, equipped by radionuclides activity measurement (characterization) system, as well as transportation and temporary storage of waste systems. The buffer storage capacity is 4000 m^3. The construction of VLLW buffer storage was finished in 2012. INPP received permission to begin industrial operation of the buffer storage in 2013;
- Three Disposal Modules (Project B19-2) with capacity of 20000 m^3 each. Presently the phase of contracting is expected to face its completion.

LLW and ILW disposal facility (project B25)

Project B25 will be implemented by two stages, signing two separate contracts:

- Stage 1 - detailed engineering-geological researches and approval of the report on the suitability of Sabatiškės site for the construction of repository; development of the Technical Design of the repository, Preliminary Safety Analysis Report and Environmental Monitoring Programme (B25-1);
- Stage 2 - development of the Detailed Design and construction and licensing of the repository (B25-2);

The task of Project B25-1 includes design, construction, equipment and commissioning of the Near Surface Repository for Low and Intermediate Level Short-Lived Radioactive Waste. The concept of the disposal structure was developed on the basis of the analysis of the best designs and international experience in the area of operation of near surface repositories and approved by the regulating authorities of the Republic of Lithuania.
It is envisaged to construct the cellular reinforced concrete repository which will consist of several groups of sections designed for final disposal of 100 000 m^3 of treated radioactive waste packed into concrete containers and immobilized in the cement matrix. In accordance with the preliminary assessment the repository, its protection areas and auxiliary buildings will occupy the area equal to approximately 40 hectares.
As of May 2017 Technical Design and PSAR are completed and the documentation for Stage 2 tendering is under preparation.

Solid waste management and storage facility (project B2/3/4)

The objective of B2/3/4 Project is to build a new INPP Solid Waste Management and Storage Facility.
The Project includes two independent components to be implemented simultaneously:

- B2 (New Solid Waste Retrieval Facilities Design and Construction);
- B3/4 (New Solid Waste Management and Storage Facilities Design and Construction).

The solid waste retrieval facility (B2) mainly comprises Retrieval Units RU1, RU2 and RU3, the Landfill Separation Facility and the Control Building. RU1 is constructed as aside structure to the buildings 155 and 155/1 and is used to retrieve, pre-sort and pack waste. Landfill Separation Facility is built against the RU1 building. The landfill separation facility is designed for treatment and characterization of VLLW. RU2 is used to retrieve, pre-sort and pack waste from buildings 157 and 157/1. RU2 is a mobile unit located on top of the building. RU3 is used to remove waste from compartments 1 and 4 of building 157. Similar to RU2, the RU3 is a mobile unit located on top of the building.
Solid radioactive waste treatment facility (B3) includes facilities intended to receipt of retrieved solid radioactive waste, sorting, fragmentation, compaction of combustible low level SRW, combustion of combustible medium and low level waste, super-compaction of medium and low level waste, compacting in containers, cementation, decontamination of transport containers, measurement and accounting, transport system, interim storage for the SRW bales, management of INPP decommissioning waste.
The Solid Waste Storage Facility (B4) comprises two stores, which are directly connected to the SWTF: one store for short-lived waste (4 modules foreseen, storage capacity of one module of 2500 m^3) and the other for long-lived waste (2000 m^3).

In June 2017 VATESI licensed INPP to start the industrial operation of solid waste retrieval facility from buildings 155 and 155/1.

Preparation for operation of Solid Waste Retrieval Facilities (B2-2) and Solid Waste Management and Storage Facilities (B3/4) are in progress.

Industrial operation of the entire facility is expected on 2018.

Maišiagala storage facility

Maišiagala radioactive waste storage site is located near the village of Maišiagala, about 30 km North-West of Vilnius. The storage was designed for institutional waste disposal and it is a typical former Soviet Union Radon type facility that has been constructed in the early 1960s in all republics of Soviet Union. In Lithuania it was built in 1964 and closed in 1989. From 1973 till 2002 maintenance of the facility was under the responsibility of the Institute of Physics. In 2002 this responsibility was transferred to RATA. An institutional control of the storage includes physical protection, environmental monitoring and public information activities.

Waste is stored in a reinforced concrete vault with internal dimensions 14.75x4.75x3 m (volume 200 m3). The vault was only partially filled with waste during operation (about 60% of the volume). The waste was inter-layered with concrete. Sealed sources are stored in stainless steel containers. At the time of closure the residual volume was filled with concrete and sand. In 2004-2006 Maišiagala storage was essentially upgraded by installing new radiological and physical protection barriers. The post closure surveillance license was obtained in 2006. The terms of the license were revised and new license was issued in 2016.

Institutional waste generated up to 1989 is stored in Maišiagala storage facility. The waste consists of static electricity neutralizers and neutron generators, an assortment of chemical compounds, gamma radiation sources with their shielding, different isotopic instrumentation with beta sources, blocks of gamma re-lays, radium salts, radioactive light emitters and fire sensors, radioactive sources, high-activity gamma sources with their biological shielding. The radionuclides important for long term safety assessment are H-3, C-14, Cl-36, Co-60, Sr-90, Cs-137, Eu-152, Ra-226 and Pu-239.

Implementation of Decommissioning project of Maišiagala radioactive waste storage facility started in December 2016. It is planned, that the project will consist of two parts:

1. Licensing, designing and other preparational tasks have to be accomplished until 2019.
2. Decommissioning should be completed until 2023.

Decommissioning of Maišiagala radioactive waste storage site is part of The Programme and is supported by EU funds.

(iv) an inventory of radioactive waste that is subject to this Convention that:

(a) is being held in storage at radioactive waste management and nuclear fuel cycle facilities;

Basic information about waste volumes, activities and specific radionuclides in the storage buildings listed above provided in the Annex 1 the Section L. Information on amount of SF and activities related to it is presented in Section D article 32 (ii).

(b) has been disposed of; or

At present time at INPP radioactive wastes are not disposed because there are no licensed operating disposal facilities, only some part of RAW are prepared for disposal in interim storage.

(c) has resulted from past practices.

Maišiagala facility and waste stored therein are the result of past practices. The historical waste from research, industry and medical institutions are accumulated in Maišiagala storage facility. Total volume is about 200 m3. Main radionuclides of the Maišiagala storage facility that are important for safety are provided in Table D-1.

Table D-1: Main radionuclides stored in the Maišiagala storage facility

Radionuclide	**Half- life, years**	**Activity, Bq, for 2014**
H-3	12,33	5,87E+13
C-14	5730	1,77E+11
Cl-36	301000	1,20E+09
Na-22	2,6	1,41E+05
Fe-55	2,73	2,62E+05
Co-60	5,27	2,41E+11
Ni-63	100,1	3,46E+10
Kr-85	10,76	4,17E+08
Sr-90	28,84	3,46E+11
Sb-125	2,76	9,29E+05
Ba-133	10,51	7,48E+05
Cs-137	30,1	3,07E+13
Pm-147	2,62	1,15E+07
Eu-152	13,54	1,42E+10
Tl-204	3,78	5,92E+10
Bi-207	31,55	3,81E+05
R-226	1600	1,11E+11
U-238	4,47E+09	4,31E+07
Pu-239	24100	9,14E+11
Total activity		**9,14E+13**

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

Unit 1 of INPP was shut down on 31 December 2004, and now this unit is being prepared for decommissioning. The second unit of INPP was shut down at the end of 2009.

The Final Decommissioning Plan

In 2005 the Final Decommissioning Plan (FDP) of INPP was approved by the Ministry of Economy.

FDP includes the whole period of INPP decommissioning (Units, auxiliary equipment and interim storage facilities for SF and waste). Based on the proposed strategy, decommissioning activities and projects are planned. FDP describes principles, methods, and technologies, as well as a general schedule, necessary for ensuring a radiological safe, ecological responsible and efficient decommissioning process.

The updated version of FDP was prepared by INPP in 2013 and approved by VATESI and Ministry of Energy after the process of reviewing and adjusting in 2014.

Decommissioning Project (DP) for INPP Unit 1 Final Shutdown and Defueling Phase

The Decommissioning Project for the INPP Unit 1 Final Shutdown and Defueling Phase (U1DP0), including a Safety Analysis Report (SAR) and an Environment Impact Assessment (EIA), was prepared in August 2004. This project, SAR and EIA, were accepted by State competent authorities.
In 2006 VATESI approved the U1DP0 for the INPP Unit 1 Final Shutdown and Defueling Phase and its SAR. VATESI also arranged for a nuclear safety review of the project and submitted the conclusion of the review to the Ministry of Environment, which arranged the State Complex Expertise of the project.

This U1DP0 does not cover dismantling work, since this will be performed within the framework of other dismantling and decontamination projects.

Decommissioning Project (DP) for INPP Unit 2 Final Shutdown and Defueling Phase

Since INPP Units 1 and 2 systems have the same structure and functionality, Unit 1 U1DP0 was accepted as the basis for development of the Decommissioning Project for the INPP Unit 2 Final Shutdown and Defueling Phase (U2DP0), taking into account performed modifications at Unit 2 and recommendations of regulating authorities.

The U2DP0 is a constituent part of the document package required for obtaining permission for Unit 2 reactor final shutdown and provides guidelines for performance of Unit 2 decommissioning works for defueling phase.

The U2DP0, including a Safety Analysis Report (SAR) and an Environment Impact Assessment (EIA), was issued by INPP in December 2009. The EIA was approved by Ministry of Environment in August 2010, The U2DP0 and SAR were approved by VATESI in September 2010. The positive conclusion of the State Complex Expertise of the project arranged by Ministry of Environment was received in October 2010.

U2DP0 does not cover dismantling work, since this will be performed within the framework of other dismantling and decontamination projects.

Equipment Dismantling & Decontamination Designs Development

After shutdown most of the INPP Units 1 and 2 systems and equipment, which do not relate to the provision of fuel cooling, defueling, transfer and safe storage at the Units, can be dismantled. Only these systems that have process connections with systems, that provide safe treatment of the fuel, remain in operation. Also systems that provide normal conditions of systems that remain in

operation and maintenance of the building (heating and ventilation, lighting, fire-prevention, drainage, etc.) will stay in operation. Engineering and licensing documentation necessary for permitting INPP personnel to perform the dismantling of the equipment taken out of operation from different buildings of INPP will be prepared.

The package of Decontamination and Dismantling projects includes:

- B9-0 “INPP Building 117/1 Equipment Decontamination and Dismantling Project Development”;
- B9-0(2) “INPP Building 117/2 Equipment Decontamination and Dismantling Project Development”;
- B9-1 “INPP Unit 1 Turbine Hall (Building G1) Equipment Decontamination and Dismantling Project Development”;
- B9-1(2) “INPP Unit 2 Turbine Hall (Building G2) Equipment Decontamination and Dismantling Project Development”;
- B9-2 “INPP Building V1 Equipment Dismantling & Decontamination Design Development”;
- B9-2(2) “INPP Building V2 Equipment Dismantling & Decontamination Design Development”;
- B9-3(1) “INPP Building A1 Equipment Dismantling & Decontamination Design Development”;
- B9-3(2) “INPP Building A2 Equipment Dismantling & Decontamination Design Development”;
- UP01 “Dismantling of Unit 1 and Unit 2 reactor facilities”.
- B9-5 “INPP Boiler House Equipment Dismantling & Decontamination Design Development”;
- B9-6(1) “Unit B1 Equipment Dismantling & Decontamination Design Development”;
- B9-6(2) “Unit B2 Equipment Dismantling & Decontamination Design Development”;
- B9-7 “Unit D0 Equipment Dismantling & Decontamination Design Development”;
- B9-7(1) “Unit D1 Equipment Dismantling & Decontamination Design Development”;
- B9-7(2) “Unit D2 Equipment Dismantling & Decontamination Design Development”;
- B9-8(1) “Unit 1 Ventilation Duct Dismantling”;
- B9-8(2) “Unit 2 Ventilation Duct Dismantling”;
- B9-11 Demolition of INPP buildings.

The objective of above Projects is the development of engineering and licensing documentation (including Design, Environment Impact Assessment, and Safety Justification) that will allow INPP personnel dismantling of INPP Units 1 and 2 equipment that are not necessary from the viewpoint of nuclear safety and operation.

The status of B9-0 project

All the intended works of the project have been completed. Contractor has provided all the documents according to the contract and harmonized them with INPP and other institutions. The licensing stage has been completed and the permission to dismantle and decontaminate the systems and equipment of the building 117/1 has been received.

The D&D activities on equipment dismantling in Building 117/1 have been completed in 2012.

The status of B9-0 (2) project

All the intended works of the project have been completed. Contractor has provided all the documents according to the contract and harmonized them with INPP and other institutions. The licensing stage has been completed and the permission to dismantle and decontaminate the systems and equipment of the building 117/2 has been received.

The D&D activities on equipment dismantling in Building 117/2 have been completed in 2015.

The status of B9-1 project

The project was commenced on 22 October 2007. To date, all the scheduled project work have been performed.

Implementation of dismantling and decontamination

Dismantling and decontamination works of Unit 1 G1 equipment were continued in 2014-2016:

- the dismantling works of Unit 1 G1 conditionally non-radioactive equipment are run;
- the initial processing of dismantled waste.

According to the baseline the dismantling works will be completed in 2019-06-27.

The status of B9-1 (2) project

The project on dismantling and decontamination of INPP Unit 2 Turbine Hall (Building G2) equipment is being implemented by the INPP personnel.

The project was commenced on 14 September 2011. By the end of 2014, the design and licensing documentation was 100% developed and approved.

According to the baseline the D&D works on project are 38,2 % completed (2017-01-01).

The status of B9-2 project

Dismantling and decontamination of the equipment and components located at Unit V1 are carried out in two phases:

- phase D1 (2011-2014) - dismantling and decontamination of the equipment and systems not required after completion of Unit 1 reactor defueling and performance of the MCC in-line decontamination;
- phase D2 (2023-2028) - dismantling and decontamination of other equipment at the stage of the INPP buildings preparation for demolition.

In total, 1179 tons of the equipment (pipelines, valves, compressors, filters, heat exchangers, electric equipment, etc.) will be dismantled at Unit V1.

The equipment dismantling works in the scope of phase D1 is finished. All planned works (dismantling of 640 tons of equipment and waste treatment) have been finished earlier than planned.

The status of B9-2 (2) project

The project which is not started yet, is foreseen to be implemented by the INPP personnel.

The status of B9-3 (1) project

The project aiming at dismantling and decontamination of the equipment located in INPP Unit 1 reactor building (building A1) is being implemented by the INPP personnel.

Preparation of design documentation started in 2013.

Environmental impact assessment report development and approval was completed in 2016.

Completion of the design documentation development and reception of permit from the regulatory institutions of the Republic of Lithuania for the INPP Unit A1 equipment dismantling and decontamination is planned in 2018.

The status of B9-3 (2) project

The project is foreseen to be run by the INPP own personnel. The preparation of design documentation started on 2017-01-02 is closely related to B9-3(1) as successor since both the projects commonly share a significant part of technical documentation to be adapted.

The status of UP01 project

The project started in 2010.

In the course of implementation the project was split into two: D&D task for zones R1 and R2 (under the project 2101) was separated from D&D task for zone R3 (under the project 2103). At the same the scope of the project 2103 was expanded due to task of temporary storage of irradiated graphite (which is to be retrieved out of the reactor core from INPP both Units).

As of 2017-01-01 80.1 % of design zones R1 and R2 D&D technical design was complete, while technical specification for procurement of designing services for zone R3 D&D was under development.

The status of B9-5 project

INPP Boiler House equipment D&D works were commenced on 2010-07-01. Equipment dismantling was carried out 2013-02-14, waste removed from the building - 2013-07-10.

The waste volume produced in the process of equipment dismantling was 1544 tons.

The status of B9-6 (1) project

The project is not started yet but it is foreseen implementation by the INPP personnel.

The status of B9-6 (2) project

The project is not started yet but it is foreseen implementation by the INPP personnel.

The status of B9-7 project

The project was completed in 2015.

The status of B9-7 (1) project

Project B9-7 (1) - is the development of engineering documentation and licensing documents, which will provide the possibility for INPP personnel to perform Unit D-1 isolated equipment dismantling, cutting, decontamination and transportation outside Bld. 101/1, as well as to keep in operation Building 101/1 infrastructure systems required for Unit D-1 maintenance at the following decommissioning phases.

The project is being implemented by the INPP personnel.

The project implementation started in 2013. The project designing and licensing phase is 100 % complete.

As of 2017-06-14 01-01 – the project was implemented at 40 %.

The end of project implementation is foreseen at 2019-02-06.

The status of B9-7 (2) project

The project is scheduled to start officially from May 2019.

The status of B9-8 (1) project

The project on dismantling and decontamination of INPP Unit 1 ventilation stack is not started yet but it is foreseen implementation by the INPP personnel.

The status of B9-8 (2) project

The project on dismantling and decontamination of INPP Unit 2 ventilation stack is not started yet but it is foreseen implementation by the INPP personnel.

The status of B9-11 project

The project is scheduled to start in 2031.

Tools and Equipment for Dismantling & Decontamination of System/Equipment Components

Tools and equipment for dismantling of system/equipment components shall ensure safe dismantling of INPP equipment and preparation for further treatment/storage.

Tools/equipment for decontamination of system/equipment components shall ensure acceptable level of contamination for further treatment and disposal, to reduce the impact on personnel and to assure that the release of radioactive contaminants to the environment will be maintained within authorized limits during dismantling activities.

For the most projects, presented above, specific equipment (systems, units etc.) are procured according to the needs for implementation of these projects. The list of necessary equipment usually are presented for each project.

SECTION E. LEGISLATIVE AND REGULATORY SYSTEM

*Article **18: Implementing measures***

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

Lithuania has taken all necessary legislative, regulatory and administrative measures implementing the obligations under this Convention. The legislature of Lithuania ensures safe management of radioactive waste and spent nuclear fuel. At the same time this legal basis is constantly in development, considering the present situation and changes in the country's nuclear energy field. The existing legislative situation in Lithuania is described below.

Article 19: Legislative and regulatory framework

1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of SF and radioactive waste management.

Lithuania has established appropriate legislative and regulatory framework in order to govern safety of SF and radioactive waste management.
All the legal acts concerning SF and radioactive waste management are prepared according best in-country and international practice including IAEA recommendations. It covers all areas of SF and radioactive waste predisposal management and disposal of very low level waste and disposal of low and intermediate level waste.

2. This legislative and regulatory framework shall provide for:
(i) the establishment of applicable national safety requirements and regulations for radiation safety;

The list of main legal acts regulating the management of spent nuclear fuel and radioactive waste in Lithuania is presented below:

Laws:

1. Law on the Management of Radioactive Waste (1999, last amended 2014);
2. Law on Nuclear Energy (1996, last amended 2014);
3. Law on Nuclear Safety (2011, last amended 2016)
4. Law on Radiation Protection (1999, last amended 2016);
5. Law on Environmental Impact Assessment (1996, last amended 2016);
6. Law on the Ratification of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (2003);

Government Resolutions:

7. Government Resolution No. 1427 On Approval of the Development Programme for Radioactive Waste Management (2015);
8. Government Resolution No. 722 On Approval of Rules of Procedure for Issuing Licenses and Permits in the Area of Nuclear Energy (2012);

9. Government Resolution No.653 On Approval of Regulations of Licensing the Practices Involving Sources of Ionizing Radiation (1999, last amended 2016);
10. Government Resolution No. 280 On Approval of Rules on the Handling of Orphan Ionizing Radiation Sources, Substances of Orphan Nuclear Fuel Cycle, Orphan Nuclear and Fissile Substances and Objects Contaminated with Radionuclides (2005, last amended 2013);
11. Government Resolution No. 651 On the Establishment of the State Register of Radiation Sources and Exposure to Workers and Approval of Its Statute (1999, amended 2011);
12. Governmental Resolution No. 461 On Approval of the Regulation on Providing of Data Concerning Activities Related with the Disposal of Radioactive Waste to the Commission of the European Communities (2007, amended 2012);
13. Government Resolution No. 1165 On Approval of the Rules for Issuing of Permits for Construction, Reconstruction, Major Repair or Demolition of Nuclear Facility (2002, last amended 2015);
14. Government Resolution No. 1879 On Approval of the Procedure for Agreement of Project for Construction or Reconstruction of Nuclear Facility (2002, last amended 2016).

General requirements:

15. Nuclear Safety Requirements BSR-3.1.2-2010, Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Facilities (2010).
16. Nuclear Safety Requirements BSR-3.1.1-2016, The General Requirements for Dry Type Storage for Spent Nuclear Fuel (2016);
17. Nuclear Safety Requirements BSR-3.2.2-2016, Radioactive Waste Repositories (2016);
18. Nuclear Safety Requirements BSR-3.2.1-2015 Radioactive Waste Acceptance Criteria for Near Surface Disposal Facilities (2015);
19. Nuclear Safety Requirements BSR-1.4.1-2016, Management System (2016);
20. The Requirements on the Operational Experience Feedback in the field of Nuclear Energy (2009);
21. Nuclear Safety Requirements BSR-1.8.2-2015 Categories of Modifications of Nuclear Installations and Procedure of Performing the Modifications (2015);
22. Nuclear Safety Requirements BSR-2.1.2-2010 Basic Safety Requirements for Nuclear Power Plants with RBMK-1500 Reactors (2010);
23. Nuclear Safety Requirements BSR-1.8.1-2010 Requirements for Notifying about Unusual Events at Nuclear Power Plants (2010);
24. Nuclear Safety Requirements BSR-1.5.1-2015 Requirements for the Decommissioning of Nuclear Facilities (2015);
25. Nuclear Safety Requirements BSR-1.1.3-2016 „VATESI Inspections“ (2016);
26. Nuclear Safety Requirements BSR-1.1.4-2011 “Rules of Procedure for Applying the Enforcement Measures Set by VATESI“ (2011, amended in 2012);
27. Order of the Minister of Health and the Head of the State Nuclear Power Safety Inspectorate No. V-1271/22.3-139 On the Rules of Radioactive Substances, Radioactive Waste and Spent Nuclear Fuel Import, Export, Transportation in Transit and inside the Republic of Lithuania (2008, amended 2016);
28. Order of the Minister of Health No. V-712 On Regulations of Decommissioning of the Objects in which Practices Involving Sources of Ionizing Radiation Were Executed (2003, amended 2011);
29. Order of the Minister of Health No. V-362 On Approval of the Rules of Risk Categories of Sealed Sources of Ionizing Radiation (2016);
30. Order of the Minister of Environment No. D1-546 “On Approval of Regulation of Environmental Monitoring of Economic Entities” (2009, last amended 2013);

Radiation protection requirements:

31. Nuclear Safety Requirements BSR-1.9.3-2011 “Radiation Protection at Nuclear Facilities” (2011);
32. Lithuanian Hygiene Standard HN 73:2001 "Basic Standards of Radiation Protection" (2001, last amended 2014);
33. Lithuanian Hygiene Standard HN 85:2003 "Natural Exposure. Standards of Radiation Protection" (2011);
34. Lithuanian Hygiene Standard HN 99:2011 “Protective Actions of Public in Case of Radiological or Nuclear Accident” (2011, amended 2016);
35. Lithuanian Hygiene Standard HN 89:2001 "Management of Radioactive Waste" (2001) (for institutional waste);
36. Order of the Minister of Health No. V-1020 On Approval of the Rules of the Control of Orphan Sources and Sealed Sources of High Activity (2005, amended 2012);
37. Nuclear Safety Requirements BSR-1.9.2-2011 “Derivation and Use of Clearance Levels of Radionuclides for Materials and Waste Generated during Activities in the Area of Nuclear Energy” (2011);
38. Nuclear Safety Requirements BSR-1.9.1-2011 „Limits of Radioactive Discharges into Environment from Nuclear Facilities and Requirements for a Plan for Radioactive Discharges into Environment” (2011);

The amendments of the Law on Nuclear Energy and the Law on Nuclear Safety of 2014 transpose the requirements of the Council Directive 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of SF and radioactive waste. The content of the radioactive waste management development programme is specified in the Article 8^1 of the Law on Radioactive Waste Management. Taking in to account this change, the Strategy for Management of Radioactive (2008) was repealed and new Radioactive Waste Management Development Programme was adopted on 23 December 2015 by the Government of the Republic of Lithuania Resolution No 1427. The strategic ultimate goal of the programme is safe management of all radioactive waste and spent nuclear fuel available in Lithuania, protection of people and the environment from harmful effects of ionizing radiation and avoiding to impose undue burdens on future generations. The programme covers all radioactive waste management steps, including the preparatory steps to the final disposal site for spent nuclear fuel. Four main measures are identified in the programme: 1) reduction of the generation of radioactive waste, 2) ensure of high-level nuclear and radiation safety and environmental protection in the management of SNF and radioactive waste, 3) ensure of long-term safety of SF and long-lived radioactive waste and 4) ensure of transparency of spent nuclear fuel and radioactive waste management and public awareness.
The implementation of the Radioactive Waste Management Development Programme is coordinated by the Ministry of Energy. At the beginning of each year, the Ministry of Energy informs the Government of the Republic of Lithuania about the implementation and progress of the Radioactive Waste Management Development Programme in the previous year.
The main provision of this Programme is provided in Section B, Article 32 of this report.

The basic provisions for the management of spent nuclear fuel and radioactive waste are given in the Law on the Management of Radioactive Waste. This Law defines principles of radioactive waste management, competence of the authorities, duties and responsibilities of the waste generator, duties and responsibilities of radioactive waste manager and provisions for licensing.
The basic radiation protection and safety requirements, corresponding to IAEA recommendations and requirements of the legal acts of the European Union, also allocation of responsibilities of the

bodies involved in the different steps of SF and of radioactive waste management are established in the Law on Nuclear Energy, the Law on Radiation Protection.
The Regulation on Providing of Data Concerning Activities Related with the Disposal of Radioactive Waste to the Commission of the European Communities (in compliance with the Article 37 of the Euratom Treaty) determines clarified procedure on data preparation and coordination with the competent authorities. The responsibility to submit the data about planned activity to the European Commission was delegated to VATESI. Environmental Protection Agency under the Ministry of Environment is obliged to submit the annual data on the radioactive liquid and atmospheric discharges to the Commission.

(ii) a system of licensing of SF and radioactive waste management activities;

The Law on Nuclear Energy and the Law on Nuclear Safety together with the regulations made under other laws establish the licensing system for activities related to nuclear materials or nuclear cycle materials (their transportation, acquisition, etc.), as well as for nuclear facilities of the following life-stages: site evaluation, design, construction, commissioning, operation, and decommissioning. The supervision of the closed radioactive waste repository, acquisition, keeping, use and transportation of nuclear or nuclear fuel cycle materials is also executed according to the laws mentioned above. This regulation should encompass the following areas:

- nuclear safety, radiation safety and physical security of nuclear facilities, nuclear and nuclear fuel cycle materials;
- fire protection of safety related structures, systems and components;
- emergency preparedness in nuclear facilities and during transportation of nuclear and/or nuclear fuel cycle materials;
- radioactive waste management safety;
- the release of radionuclides into the environment;
- management systems of legal entities engaged in a licensed activity and other activities involving nuclear and nuclear fuel cycle materials or carried out in nuclear facility as well as assessment of the nuclear facility construction site.

According to the Law of Nuclear Energy, the concept of nuclear facility includes:

- nuclear power plant,
- unit of nuclear power plant,
- non-power nuclear reactor,
- storage facility for nuclear materials,
- storage facility for radioactive waste,
- radioactive waste processing facility,
- radioactive waste disposal facility.

VATESI is a competent authority for the licensing of activities involving nuclear materials or nuclear cycle materials or carried out in nuclear facilities within the legally defined life-stages.
During the stage of site evaluation, VATESI shall review and assess the site evaluation report. The positive conclusions in respect of the site evaluation report shall be presented by the following institutions: the Ministry of Health, the Civil Aviation Administration, the Lithuanian Geological Survey, the Lithuanian Hydro Meteorological Service and the Fire Prevention and Rescue Department, in order to approve it. Before the design activities start, technical specification for design has to be approved by VATESI. Design of a nuclear facility has to be performed and assessed according to the requirements established by the competent institutions, including VATESI, Ministry of Environment, Ministry of Health, Ministry of Interior and other institutions involved according to the Law on Construction, the Law on Nuclear Energy and the regulations made under the Laws.

According to the Law on Nuclear Safety, the following types of licences and permits are established in order to be issued by VATESI:

- licence for construction of a nuclear facility (or facilities);
- licence for operation of a nuclear facility (or facilities);
- licence for construction and operation of a nuclear facility (or facilities);
- licence for decommissioning of a nuclear facility (or facilities);
- licence for supervision of a closed radioactive waste repository (or repositories);
- licence for transportation of nuclear fuel cycle materials, nuclear materials and other fissile materials with exception of the small amount as described in the Law;
- licence for acquisition, keeping and use of nuclear materials and other fissile materials with exception of the small amount as prescribed in the Law;
- permit for first carry-in of nuclear fuel to site of nuclear power plant, unit or nonpower nuclear reactor;
- permit for the first carry-in and testing of the nuclear facility using nuclear and/or nuclear fuel cycle materials;
- permit for first start-up of unit of nuclear power plant or non-power nuclear reactor;
- permit for industrial operation of the nuclear facility;
- permit for start-up of the nuclear reactor after its short-term shutdown;
- permit for shipment of radioactive waste generated in nuclear fuel cycle;
- permit for shipment of spent nuclear fuel.

Following the provisions of the Law on Radiation Protection VATESI issues licences and permits for the nuclear energy area activities involving the sources of ionising radiation, which mainly are a licence or a temporary permit to carry out activities under ionising radiation at a nuclear facility and a licence or a temporary permit to store, maintain and use sources of ionising radiation at a nuclear facility.

A licence for the construction of a nuclear facility may be granted only if the Parliament of Lithuania (in case of NPP) or the Government of Lithuania (in case of other facilities) has adopted a legal act on the facility.

Every licence may have licence conditions attached. Conditions attached to the licence ensure necessary control and enforcement of the purposes of the laws. Licence conditions should be oversighted during the construction, commissioning, operation and decommissioning stages of the facility.

As stipulated in the Law on Nuclear Safety, licences and permits shall be issued to legal entities or persons having sufficient technological, financial, management system, human, emergency preparedness, physical security capacities, capacities of safe storage, transportation, accounting for and control of nuclear materials meeting the provisions of IAEA and EURATOM for safeguard, allowing proper fulfilment of the conditions of the licensed activity and ensuring nuclear safety.

Lists of information and documents that applicant is required to provide for the issue of an appropriate licence or permit are established by the Resolution of the Government of Lithuania.

Radiation Protection Centre (RPC) under Ministry of Health is responsible for issuing licences for transportation of radioactive waste and to manage institutional waste excluding disposal (to collect, sort radioactive waste, to undertake its pre-treatment, treatment, and conditioning, to store, recover and decontaminate it) for small producers (waste producer with the exception of the operator of a nuclear plant). On purpose to carrying out the single transport of radioactive waste of small producers, in addition to the licence, the single permit is needed, that is issued by the RPC. An environmental impact assessment of proposed activity, coordinated by Environmental Protection Agency, must be performed to acquire license or permit for construction or decommissioning of nuclear facility designed for radioactive waste treatment, disposal, storage or re-use.

According the Article 24, para. 1, 2 and 3 of the Law on the Management of Radioactive Waste, sealed sources might be imported into Lithuania, only if after their useful life it is planned to return them back to supplier. Also the recipient shall agree with RATA for the management of radioactive sources for cases, if due to unforeseen circumstances there are no possibilities to return them back to supplier, and to insure the source for value of RATA services. In licensing practice (for small users) agreement with RATA and insurance of the source for value of RATA services is required before licence to use the source in practice will be granted.

RPC does not take part in the licensing of SF and radioactive waste management activities at the nuclear plants and centralized radioactive waste management facilities, however takes part in evaluation of the environment impact assessment of the activities of nuclear facilities in regard of radiological impact to the public health.

iii) a system of prohibition of the operation of a SF or radioactive waste management facility without a licence;

According to the Law on Nuclear Energy, the Law on the Management of Radioactive Waste and the Law on Radiation Protection without a licence it is prohibited to carry out any activity related to the radioactive waste management and SF in Lithuania. Otherwise the measures of enforcement described in the subchapter v) of Section E will be implemented.

iv) a system of appropriate institutional control, regulatory inspection and documentation and reporting;

Institutional control of nuclear facilities is ensured by the licence given to the operator. In the licence conditions there are defined all aspects which operator shall comply with. Licence conditions ensure that the oversight of operator of facility by the regulatory body will last while the licence is valid and even if the validity of licence was suspended, the responsibility remain with the operator.

According to article 28 of the Law on Nuclear Safety VATESI shall supervise the performance of licensed or permitted activities, and shall evaluate safety of nuclear facilities as well as safety of operations with nuclear and/or nuclear fuel cycle materials by conducting inspections.
VATESI regulatory inspections are conducted at all stages of the lifetime of a nuclear facility: during the evaluation of a construction site (site) for a nuclear facility, its design, construction, commissioning, operation or decommissioning stages, as well as in oversight of the closed radioactive waste repository, procuring, storing or transporting nuclear and / or nuclear fuel cycle materials and / or dual use nuclear commodities. VATESI inspects applicants for obtaining licences and permits, license and permit holders, suppliers of goods or contractors performing works and other companies performing operations related to nuclear or nuclear fuel cycle materials. While performing inspection activities, it is critically important to adequately assess the current situation in the nuclear power sector, to identify priority areas in terms of ionizing radiation hazard so that the safety related issues would be given proper attention. Every year VATESI develops a plan of inspections in accordance with the established criteria and with regard to the available human and financial resources. In addition to planned inspections unplanned inspections which may be announced or unannounced are performed as well.
VATESI areas of inspections are following: nuclear safety, radiation protection, physical security, control over dual use nuclear commodities and accounting of and control over nuclear materials. VATESI conducts inspection according Nuclear Safety requirements BSR-1.1.3-2016 „VATESI Inspections“ and VATESI quality management document “The Procedure for Inspections”.

Pursuant to provisions of the Law on the Management of Radioactive Waste and the Law on Radiation Protection, the RPC is in charge of state supervision and control for management of radioactive waste generated by small producers (institutional radioactive waste). As regards the inspection order and frequency, they are outlined in the Regulation for Radiation Protection State Supervision (2009, last amended 2016). Detailed inspection procedures (including inspection questionnaires and forms of inspection protocols) are established and approved by the Director of the RPC.

v) the enforcement of applicable regulations and of the terms of the licences;

In performing the state regulatory and supervision functions of nuclear safety, pursuant to Article 11 Paragraph 2 of the Law on Nuclear Safety, VATESI applies enforcement measures in the manner set out by the Law on Nuclear Safety and other legal acts, requires relevant persons to implement corrective measures and (or) to eliminate the violations, and supervises the implementation of such requirements.
Enforcement measures are being applied in accordance with legal principal of graded approach. All enforcement measures which are used by VATESI are arranged progressively considering the character of violation.
VATESI is empowered to impose following administrative enforcement measures according to the Law of Nuclear Safety and other laws:

- to provide mandatory requirements to all licence or permit holders, committing them to eliminate the detected violations, to suspend the works within the time-limits set by the Head of VATESI and/or to shut-down the nuclear reactor, to decrease its capacity, to discontinue operation of other equipment or activities according to Law on Nuclear Safety;
- to impose administrative fines on natural persons according to Code of Administrative Offences of the Republic of Lithuania;
- to impose fines on legal entities according to the Law on Nuclear Safety (otherwise known as economic sanctions).

Pursuant to the Article 6 of the Law on Nuclear Safety mandatory requirements are imposed on the legal entity in any of below listed cases:

- After the issuance of a licence or a permit it emerges that the information provided in the application and in other submitted documents was false, and within the time-limit prescribed by the Head of VATESI correct information is not provided;
- The licence or permit holder breaches the requirements of the legal acts;
- The licence or permit holder does not longer meet the requirements which it had met at the moment of issuance of the licence or permit, and fails to eliminate the detected violations within the time-limit prescribed in the notice of Head of VATESI as stated in the Law on Nuclear Safety;
- In case of failure to meet the requirements arising out of the international obligations for non-proliferation of nuclear weapons as assumed by the Republic of Lithuania;
- The licence or permit holder fails to meet, or meets improperly, the established terms and conditions of operation;
- On other occasions established by the Law on Nuclear Energy or other laws.

The Head of VATESI issues mandatory requirements as soon as the nuclear safety violations are detected in the activities of the licence or permit holder, taking into account the requirements for nuclear safety set by the Law on Nuclear Safety and other legal acts, as well as adhering to the nuclear safety requirements, the nuclear safety rules, the standards and the terms and conditions of the licence or permit. The type of mandatory requirements and their extent, on a case-by-case basis, have to be established upon evaluation of eventual threats, their impact on, scope of, and risk to residents, their property and the environment. The mandatory instructions have to be given on the basis of proportionality, justice, rationality and fairness.

VATESI is also empowered to take the following actions related to the issued licences and permits:

- warn the legal entity about suspending of the license, permit;
- suspend the license, permit;
- revoke the license, permit.

According to the Law on Radiation Protection and the Law on the Management of Radioactive Waste, licences to small producers for the activities related to radioactive waste management (to collect, sort radioactive waste, to undertake its treatment, to store, reprocess, transport and decontaminate it) are issued, the radiation protection state supervision and control is carried out, and in case if requirements are violated, administrative penalties (according the Code of Administrative Violations) are applied by the RPC.

(vi) a clear allocation of responsibilities of the bodies involved in the different steps of SF and of radioactive waste management;

VATESI is a competent authority for the licensing of activities involving nuclear materials or nuclear cycle materials or carried out in nuclear facilities.

RPC issues licences to small producers (radioactive waste generators) for the activities related to radioactive waste management.

Article 3 of the Law on Nuclear Safety stipulates: The full responsibility for ensuring nuclear safety shall fall on the persons in charge of the nuclear installation or the activities posing a risk of exposure to ionising radiation.
Article 30 of the Law on Nuclear Energy stipulates: The licence holder shall be responsible for the adequate and safe operation of the installation in accordance with the requirements stipulated in the laws and other legal acts, also in the articles of association, internal work rules of the licence holder and in the terms of the issued licence. The licence holder shall be responsible for safety of its activities and the nuclear installation.

Small producers (generators) are responsible for all steps radioactive waste management according to the Law on the Management of Radioactive Waste:
Article 9 of the Law on the Management of Radioactive Waste stipulates:

1. It shall be the duty of a radioactive waste generator (small producers included) to manage, in accordance with the requirements established by legal acts, radioactive waste until transferring it to a radioactive waste manager (which is licensed by VATESI).
2. The radioactive waste generator shall pay all the expenses incurred during the management of radioactive waste from the moment of its generation to its emplacement at a disposal facility, including the expenses related to the post-closure surveillance of disposal facilities.
3. The radioactive waste generator shall not be exempt from the duties and responsibilities to manage radioactive waste safely even in the event of a temporary suspension or cancellation of the licence.

3. When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.

Radioactive waste in Lithuania is spent nuclear fuel and substances contaminated with or containing radionuclides at concentrations or activities greater than clearance levels and for which

no further use is foreseen. This definition complies with the definition of radioactive waste and with objectives of this Convention.

Article 20: Regulatory body

1. Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.

In accordance with national legislation, the Joint Convention, other international conventions and treaties, the Republic of Lithuania undertakes appropriate measures to ensure the safety of nuclear installations and waste management activities through the establishment of legal framework and infrastructure necessary to maintain the effective regulatory system.

VATESI

VATESI is state regulatory and supervisory authority in Lithuania for activities involving nuclear materials and other activities in the area of nuclear energy involving sources of ionizing radiation. VATESI sets safety requirements and regulations, supervises compliance with them, applies enforcement measures in case of incompliance with safety requirements and regulations, issues licenses, permits and temporary permits, assess safety of nuclear facilities.
The mission of VATESI is to exercise the state regulation of, and supervise over the nuclear installations and the activities related to nuclear and nuclear fuel cycle materials, in order to protect the society and the environment against the harmful impact of exposure to ionising radiation.
The main tasks of VATESI are regulation supervision of nuclear safety, radiation safety of nuclear energy activities involving sources of ionizing radiation, physical security of nuclear installations, nuclear materials and/or nuclear fuel cycle materials and accountancy and control of nuclear materials as well as supervision of requirements arising from international nuclear weapon non-proliferation obligations of Republic of Lithuania.

According to the Law on Nuclear Energy VATESI performs the following functions:

- exercises functions of the state regulation and supervision of nuclear safety, physical security of nuclear installations, nuclear materials and the nuclear fuel cycle materials, accounting for and control of the nuclear materials, also of radiation safety in operating nuclear installations;
- monitors the compliance with the requirements set forth by the legal acts for activities in the area of nuclear energy subject to licences or permits and monitors exercising of the rights and obligations of licence holders and/or permit holders;
- drafts and approves the requirements and rules for nuclear safety, radiation safety in the area of nuclear energy, accounting for and control of the nuclear materials, physical security of nuclear materials and the nuclear fuel cycle materials mandatory to all the state and municipal authorities, also to all the persons engaged in such activities;
- supervises the compliance with requirements of the legal acts regulating nuclear safety, radiation safety in the area of nuclear energy, physical security of nuclear installations, nuclear materials and nuclear fuel cycle materials, accounting for and control of the nuclear materials;

- analyses and assesses the documents submitted by applicants for obtaining a licence or a permit, also the documents submitted by licence holders or permit holders or other persons, adopt relevant decisions regarding such documents, review and evaluate the nuclear safety;
- supervises and inspects applicants, licence and permit holders or the persons rendering services, supplying goods or performing works for them or other persons engaged in activities pertaining to nuclear materials and nuclear fuel cycle materials;
- in the cases specified in the laws and other legal acts issue, suspends licences and permits, revokes suspension of licences and permits, or cancels licences and permits, establishes or changes their terms, supervises compliance with such terms;
- subject to coordination with the Ministry of Health establishes norms for release of radionuclides from nuclear installations and monitors compliance with the norms for release of radionuclides;
- drafts and approves the modification categories of a nuclear installation and a description of the procedure for carrying out modifications;
- cooperates with foreign institutions exercising state regulation and supervision in the sector of nuclear energy, within its competence participate in activities of international organisations and institutions, committees and groups of the European Union;
- within its competence and in accordance of legal acts prepares and/or submits to the
- Government the draft laws and legal acts of the Republic of Lithuania on the issues of nuclear safety, physical security of nuclear installations, nuclear materials and nuclear fuel cycle materials, accounting for and control of nuclear materials, also of radiation safety in carrying out nuclear energy related activities involving sources of ionising radiation;
- prepares and submits to the Government or its authorised institution proposals regarding the national policy and strategy in the sector of nuclear energy and implementation thereof;
- prepares and submits to the Government or its authorised institutions proposals regarding improvements of the system ensuring nuclear safety, radiation safety in the area of nuclear energy, physical security of nuclear installations, nuclear materials and nuclear fuel cycle materials, accounting for and control of nuclear materials;
- in the event of a nuclear and/or radiological accident provides the interested state and municipal authorities with the time-critical information about the radiation situation in the nuclear installation, estimated threats of the nuclear and/or radiological accident and other related information.

Openness and transparency of regulatory activities including actions taken to improve transparency and communication with the public

VATESI and the licence holders must inform both the state and municipal institutions and the general public as well as other persons whose business activities are directly related to the licensed activities of a relevant licence holder about the conditions of nuclear safety, in the manner required under the Law on Provision of Information to the Public of the Republic of Lithuania and other legal acts. The organizations operating nuclear installations also must inform general public about the measures that are foreseen in the emergency preparedness plans which may have an impact on regular living conditions. VATESI has to deliver public announcements on the results of supervision the implementation of nuclear safety requirements. While implementing its supervision functions VATESI provides confirmed written and/or public consultations to the legal entities that submitted written requests and/or questions or provides public consultations on its own initiative.
The main means of ensuring the transparency of the decisions:

- draft legal documents are public in order to inform and get a response (suggestions, remarks, comments) from interested parties;
- consultations and meetings are organized on different issues with interested parties;

- regular public announcements on the information about the condition of nuclear safety in the Republic of Lithuania are announced;

Information on nuclear safety is prepared and disseminated using these methods:

- reports on conventions and other legal acts of Lithuania, EU, international institutions;
- VATESI annual reports (Nuclear Power Safety in Lithuania) and annual reports to The President and the Government in terms of its activities and finances;
- VATESI website, press releases and other publications;
- possibility for students from universities to visit VATESI.

Independence of regulatory body

National legislation provides clear division between the responsibilities and functions of VATESI and those organizations or bodies engaged in development/promotion of the nuclear energy or use of nuclear energy, including production of electricity.
Paragraph 3 of Article 23 of the Law on Nuclear Energy states, that VATESI has a power to take decisions independently in carrying out its statutory functions. To address nuclear safety issues, functions are clearly divided between the operating and regulatory institutions. VATESI acts as independent governmental institution subordinated directly to the Cabinet of Government and the President, hence its place in the governmental structure helps to assure an effective separation of the regulatory body from the institutions responsible for promotion of nuclear energy. Pursuant to Paragraph 10 of the Article 23 of the Law on Nuclear Energy, the Head and Deputy Heads of VATESI in their official capacity shall act independently from the persons engaged in activities in the field of the nuclear energy sector, also from other agencies, institutions or organisations engaged in expansion of the nuclear energy or use of nuclear energy, including generation of electricity. Independent activities imply a prohibition to be a member of a body of a legal entity, to accept other remunerated or public positions, to provide services or consultations, except the ones provided acting in the official capacity at VATESI, or to be engaged in other activities due to which a certain person, other agency, institution or organisation acting in the nuclear energy sector would or might gain unjustified competitive advantage over the persons engaged in relevant activities. A breach of this requirement shall be qualified as a serious misconduct.

Radiation Protection Centre

The Radiation Protection Centre (RPC) coordinates actions of state and municipal institutions in the manner established by the Government or, upon direction from the Government, by the Minister of Health, in the area of radiation protection, exercises the state regulation and supervision of both radiation protection in respect of exposure of members of the public and the environment and the practices involving sources of ionising radiation, except of practices in the area of nuclear energy.

RPC is under Ministry of Health. Ministry of Health is responsible for approving regulatory enactments and general rules on the radiation protection. Following this the competence of RPC is:

- exercises state radiation protection supervision and control of the radioactive waste management at small producers;
- issues licences to obtain, keep, use and transport radioactive materials, to manage with radioactive waste by small producers;
- issues permits to transport radioactive materials and radioactive waste;
- is responsible for dose assessment to public (in the vicinity of radioactive waste management and storage facilities as well) on the results of environmental monitoring, including foodstuffs, drinking water, gamma dose equivalent etc. For this purpose data

from other state institutions involved in the environmental monitoring network are delivered to RPC, the data from the INPP environmental monitoring as well.

Ministry of Environment

Ministry of Environment:

- coordinates the process of environmental impact assessment in the transboundary context of proposed economic activities;;

following the procedure prescribed by legislation and other legal acts, takes part in the issue of licences in radioactive waste management activities;
State Territorial Planning and Construction Inspectorate under the Ministry of Environment:

- takes part in state supervision and control of design and construction of nuclear facilities.

- Environmental Protection Agency under the Ministry of Environment:organizes, coordinates and performs state environmental monitoring, and controls environmental monitoring of economic entities;
- coordinates the process of environmental impact assessment and methodically manages it; makes decisions whether the proposed economic activities are allowed in the selected site from the point of view of environment protection;
- participates in the procedure of agreement of technical project for construction or reconstruction of nuclear facility and construction completion;
- exchanges monitoring information with other countries.

Regarding the application of clearance procedure in Lithuania, the operator shall measure waste or materials, intended for free release, ensuring that clearance levels are not exceeded. VATESI review and endorse the applied methodology for clearance levels and is responsible for ensuring that clearance levels in cleared waste or material will not be exceeded. Environmental Protection Agency had signed the contract with VATESI in August 2012. According to this contract responsibilities of Environmental Protection Agency are to support VATESI by performing of necessary measurements of waste, materials and discharges in-situ and in laboratory.

There are more ministries or institutions that are involved in regulating some specific questions in radioactive waste management according to their competence but these institutions are not regulatory bodies as defined in this Convention. These institutions are Ministry of Energy, Ministry of Social Security and Labour, Ministry of Transport and Communications, Ministry of National Defence, Ministry of the Interior, the State Security Department and Governmental Emergencies Commission. The competence of these institutions is defined in the Law on Nuclear Energy.

2. Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate steps to ensure the effective independence of the regulatory functions from other functions where organizations are involved in both SF or radioactive waste management and in their regulation.

In Lithuania operators and regulators are fully independent. Neither of regulators performs any activity related to the radioactive waste management. Their functions are limited to regulating and oversight of safety of the waste management.
Details on independence of regulatory body are given above in Article 20 subsection 1.

SECTION F. OTHER GENERAL SAFETY PROVISIONS

Article 21: Responsibility of the licence holder

1. Each Contracting Party shall ensure that prime responsibility for the safety of SF or radioactive waste management rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.

Article 3 of the Law on Nuclear Safety stipulates: The full responsibility for ensuring nuclear safety shall fall on the persons in charge of the nuclear installation or the activities posing a risk of exposure to ionising radiation.
Article 16 of the Law on Nuclear Safety: Full responsibility for the nuclear safety of a nuclear installation and for nuclear safety in carrying out other activities with nuclear and/or nuclear fuel cycle materials shall solely fall on persons that are engaged in such activities and hold relevant licences and/or permits.
Article 30 of the Law on Nuclear Energy stipulates: The licence holder shall be responsible for the adequate and safe operation of the installation in accordance with the requirements stipulated in the laws and other legal acts, also in the articles of association, internal work rules of the licence holder and in the terms of the issued licence. The licence holder shall be responsible for safety of its activities and the nuclear installation.
In the licence issued for the operator there is always emphasized that the licence holder is fully responsible for the safety in the nuclear facility and even if the licence is suspended the responsibility rests with the operator. The licence holder shall provide safety reports of operation of nuclear facilities to regulatory bodies, so regulator always know if the licensee meets its responsibility. For evaluating if the licence holder undertakes proper measures in ensuring safety of the management of spent nuclear fuel and radioactive waste, and how safety measures are implemented, the inspections are carried out. Any changes in practice are coordinated with regulatory authorities and are allowed only after there was assured, that safety requirements will be not violated.
Small producers (generators) are responsible for all steps radioactive waste management according to the Law on the Management of Radioactive Waste:
Article 9 of the Law on the Management of Radioactive Waste stipulates:

1. It shall be the duty of a radioactive waste generator (small producers included) to manage, in accordance with the requirements established by legal acts, radioactive waste until transferring it to a radioactive waste manager (which is licensed by VATESI).
2. The radioactive waste generator shall pay all the expenses incurred during the management of radioactive waste from the moment of its generation to its emplacement at a disposal facility, including the expenses related to the post-closure surveillance of disposal facilities.

3. The radioactive waste generator shall not be exempt from the duties and responsibilities to manage radioactive waste safely even in the event of a temporary suspension or cancellation of the licence.

The duties and responsibilities of small producers in management of radioactive waste are set in Regulations of Licensing the Practices Involving Sources of Ionizing Radiation. Before issuing the licence, it is persuaded, that licence holder has all administrative, technical capabilities to carry out the practices with sources of ionizing radiation in safe manner and (or) safely manage the radioactive waste.

2. If there is no such licence holder or other responsible party, the responsibility rests with the Contracting Party which has jurisdiction over the SF or over the radioactive waste.

Article 4 of Law on Nuclear Energy stipulates: Nuclear and radiation safety in the Republic of Lithuania shall be guaranteed by the State.

If there are non-licensed facilities from former practices then there is an institution that performs surveillance of this facility until this facility will be transferred to the operator. Then operator performs assessment of the facility and applies for the licence. For example Maišiagala storage was managed in such a manner. At first it belonged to several institutions then it was transferred to RATA. RATA performed a safety assessment of the facility and received a license for post-closure surveillance of this facility.

If the licensee does not meet the requirements or do not follow the licence conditions, the licence is suspended, but the responsibility rests with the operator.

Article 22: Human and financial resources

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

The process of selection and training of personnel at INPP is performed in accordance with the second and third level of INPP management system procedures that guarantee sufficient skills of personnel involved in all fields of activity at INPP, including SF and radioactive waste handling. Management system procedures such as "Human resources management procedure" MS-2-014-1, "Nuclear fuel handling procedure" MS-2-012-1 and "Waste management procedure" MS-2-013-1, which regulate requirements for personnel involved in SF and radioactive waste management activities, are developed in accordance with IAEA documents TRS No. 380, NS-G-2.8, NS-R-5, TS-6-1.2, NS-G-2.5, GS-G-3.1.

Initial and continuous training of personnel is performed on the basis of a Systematic Approach to Training, providing the highest level of personnel training.

All activities regarding on personnel recruitment, initial, continuous and re-qualification training, personnel certification and career development are performed in order to provide INPP with sufficient number of skilled personnel for safe and in time decommissioning of the plant.

Human resources at RATA are managed according RATA's Quality Management System, certified according ISO standards 9001:2015. The management system guarantees qualification and competences of personnel involved in all fields of RATA activity. The system foresees short

term and long term staff quantity planning, verification of staff competence, description of responsibilities, recruitment and selection of employees, assignment to a position and training.

(ii) adequate financial resources are available to support the safety of facilities for SF and radioactive waste management during their operating lifetime and for decommissioning;

According to the Law on Radioactive Waste Management, the operator of a radioactive waste management facility must take the appropriate steps to ensure that sufficient qualified staff and adequate financial resources are available during the decommissioning.

1. There are several financing sources for the management of radioactive waste and SF in Lithuania: State Enterprise INPP Decommissioning Fund (hereinafter referred to as the National Decommissioning Fund or NDF), state budget, Ignalina International Decommissioning Support Fund, Ignalina Programme. New radioactive waste management facilities, which are or will be built as part of the INPP decommissioning process, such as solid radioactive waste management and storage facility, interim spent nuclear fuel storage facility, landfill and near surface disposal facilities and others, are being financed from the Ignalina International Decommissioning Support Fund, Ignalina Programme and co-financed from the NDF or state budget. These financing sources are identified in Article 4 of the Law on the Decommissioning of Ignalina Nuclear Power Plant.

The NDF is accumulated in the special Treasury Account and contains funds that have been transferred by INPP as part of their revenue earned from electricity sales. Since Unit 2 of INPP was shut-down on 31 December 2009, payments to the Fund ceased. Starting from 2014, all the INPP revenue earned from sales of redundant assets is transferred to the NDF.

The Ignalina Programme is financed from the European Union budget. The Ignalina Programme was created under Protocol 4 of the Act of Accession of Lithuania into the European Union in order to provide assistance for the decommissioning of INPP (including radioactive waste management) and consequential measures in the energy sector. The European Commission by its implementing decisions allocates annual Union contributions under the Ignalina Programme through two channels – the Ignalina International Decommissioning Support Fund and the National Agency in Lithuania (Central Project Management Agency or CPMA). The Ignalina International Decommissioning Support Fund contains contributions of the donors, where the main contributor is the European Commission. The European Bank for Reconstruction and Development is the administrator of the fund, while the governing body is the Donors Assembly. With endorsement of the Government of Lithuania, the CPMA has been designated by the European Commission to act on its behalf as the National Agency of the Ignalina Programme. The CPMA is an agency under the Ministry of Finance of Lithuania. The funding for Ignalina Programme is based on annual commitments. Therefore a radioactive waste management project which lasts more than 1 year will be financed from funding commitments accumulated in several years. Projects that have received the favourable opinion of the Nuclear Decommissioning Assistance Programme Committee and approval of the European Commission are contracted through the CPMA in accordance with the Lithuanian Public Procurement Law. The Republic of Lithuania takes responsibility and provides full financial guarantees to the European Commission in respect to activities of the CPMA.

The Council of the European Union adopted Council Regulation on Union support for the nuclear decommissioning assistance programme in Lithuania on 13 December 2013. The financial envelope for the implementation of the Ignalina programme for the period 2014–2020 was set at EUR 450.8 million. Lithuania contributes approximately 14 percent of the funds required for INPP decommissioning.

Lithuania believes that the EU will remain committed to the agreement under Protocol No 4 of the Accession Treaty and seamlessly continue cooperation and the provision of financial assistance, which is vital for Lithuania in confronting with this decommissioning project. Negotiation actions

regarding adequate EU financial support for INPP decommissioning after 2020 have already been started.
2. Institutional waste producers pay for their waste collection, transportation, treatment, and storage and disposal services according to contracts with RATA. The fees for these services were approved by the Order of the Minister of Energy No. 1-303 On the State Enterprise Radioactive Waste Management Agency Fees for the Management of Radioactive Waste. Mandatory revisions of the fees are carried out once in two years and agreed by RATA and INPP. RATA collects fees from the institutional waste producers into a separate dedicated account. The management of historical institutional waste and orphan sources is funded from the state budget or municipal budget.
3. Activities related to the development of the deep geological disposal currently are funded from two sources:

- NDF: activities related to deep geological repository planning;
- State budget: during 2017-2019 period planned budget for project activities is 141'000 Euro per year.

Currently, Lithuania is developing a financing mechanism for the final disposal (deep geological disposal) of spent nuclear fuel and high level radioactive waste.
4. Decommissioning project of Maišiagala storage facility will be financed from EU Structural Funds through programme No C (2014) 6397 (final processing and disposal not covered). Retrieved waste will be transported to INPP for processing and storage. Costs of the final processing and disposal of radioactive waste from Maišiagala storage in INPP are calculated according to the order of the Minister of Energy No. 1-303 On the State Enterprise Radioactive Waste Management Agency Fees for the Management of Radioactive Waste.

Article 23: Quality assurance

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

National Requirements

According to the Law on Nuclear Safety the one of the main areas of nuclear safety regulation is the management systems of the persons engaged in the licensed activities and in other operations related to nuclear and/or nuclear fuel cycles materials, as well as in the evaluation of construction site of a nuclear installation. The highest priority in the management system of such persons shall be the assurance of nuclear safety. Organizations operating nuclear installations and other holders of licences and/or permits must ensure high level of safety culture and competence of the organization and its workers, on a regular basis analyses the state of nuclear safety and improve it, consider human factors (human capabilities and their limits) at all stages of life of a nuclear installation and maintain an effective integrated management system with reasonable priority on nuclear safety.
BSR-1.4.1-2016 "Management Systems Requirements", based onto the IAEA safety standard GS-R-3, is approved. The regulations specify regulatory requirements for development, implementation and maintenance of an effective management system for the organizations operating nuclear facilities and require covering all activities related to the use of safety important systems and components by management system's documentation and periodically assess effectiveness of the management system. To this end an operating organization must establish an independent department to oversee application of management system requirements and coordinate its improvement. The licensee and its safety-important contractors shall comply with all national legal requirements and regulations, including those in the area of nuclear safety.

According to the BSR-1.4.1-2016 licensee by developing management system shall consider application of the IAEA recommendations published in the IAEA guides on management systems. The BSR-1.4.1-2016 establishes requirements for implementation and continuous improvement of the integrated management system based upon GS-R-3 process approach including requirements as follows:

- periodically assess, monitor and continuously develop safety culture;
- to establish and constantly update management system documentation, and manage changes to the documents and identify the changed content within the documents;
- to approve safety as the top priority and the related commitment of management of a licence holder;
- to take into account requirements of interested parties during establishment and development of the management system, in decision-making process and in activities of a licence holder;
- to identify clearly responsibilities and roles of all employees for safety, implementation of the system requirements and adherence to safety and other legal requirements;
- to plan and ensure necessary human, financial and other resources necessary to ensure safety and implement goals and commitments of a licence holder;
- to identify, implement and improve processes with strict and systematic consideration of safety and other requirements when establishing processes and their interactions so the applicable legal requirements and standards are implemented in a safe and proper way;
- to ensure proper cooperation of management levels and different divisions for safe and effective performance;
- to apply reliable control mechanisms over activities performed by safety important contractors and still to retain the ultimate responsibility of a licence holder for safety;
- carefully prepare, plan, implement, monitor, adjust organizational changes and assess them after implementation to preclude deterioration of safety;
- to apply sufficient measurements, monitoring, control and checking activities and needed methods to ensure high level of safety, identification and following-up of needed improvements and effectiveness of the management system;
- to apply management self-assessment through all levels of management and to use the results to improve safety, safety culture and activities;
- to apply independent assessments and audits as an additional mechanism to proactively resolve safety issues and retro-actively identify needed corrections and opportunities to improve processes, the management system and (or) their documents;
- periodically perform comprehensive management reviews of the management system and to plan continuous improvement and resources to implement improvement activities.

VATESI requirements for decommissioning (BSR-1.5.1-2015) include the requirement for licensee to establish and to implement management system covering all activities having an impact on safe decommissioning, and prepare quality assurance programme outlining in it quality management measures, the allocation of responsibilities and resources, implementation procedures of actions of specific projects and storage of documents relating to the design, operation, final shutdown and decommissioning of the facility.

VATESI requirements for handling of radioactive waste in nuclear facilities before disposal (BSR-3.1.2-2010) include requirement for licensee to establish and implement quality management system applicable throughout the lifetime of a facility and for the entire duration of operation activities in normal, transient and emergency situations.

Licensee's quality assurance programme for radioactive waste handling before disposal shall be developed and implemented to ensure compliance with requirements and technical conditions necessary for activities to be carried out in a safe manner; compliance with requirements for storage and disposal; quality, integrity and tightness of stored radioactive waste packages

throughout the entire storage period; quality of required documentation, records and identification of radioactive waste packages.

Radiation Protection Centre is responsible to monitor how small waste producers establish and implement quality assurance measures according to HN 73:2001 "Basic Standards of Radiation Protection". Safety culture, which encourages licensees and workers to improve radiation protection that guarantee implementation of requirements on protection and assessment of quality control and efficiency of protection measures, shall be implemented in practices.
Small producers of radioactive waste in the quality assurance programme shall:

- designate and appoint person (service) responsible for establishment and implementation of the quality assurance programme;
- foresee the order of registration and accountancy of implemented procedures;
- describe the method (certain procedures), the order of how the workers familiarize with them;
- indicate quality control procedures, which shall be carried, and their periodicity.

Status of Implementation of the national requirements

Ignalina Nuclear Power Plant (INPP)

According to BSR-1.4.1-2016 and taking into account organizational changes related to decommissioning process, INPP has started the transition from quality assurance system to integrated and process-based management system. As part of the transition period, level 1 documents (management system manual, policies, strategies) and level 2 documents (management procedures) are being reviewed.
The INPP management system integrates all organizational components (including its structure, resources, processes and safety culture) so as to establish the goals and objectives of the organization and enable the organization to achieve all of these goals and objectives.
The application of the IMS requirements is graded so as to deploy appropriate resources, on the basis of the consideration of the significance and complexity of each product or process, the hazards and the magnitude of the potential impact associated with the safety, health, environmental, security, quality and economic elements of each product or process and the possible consequences if a product fails or a process is carried out incorrectly.
Management procedures “Reactor core control and nuclear fuel handling” (with references include 39 references to instructions, certificates and methods’ descriptions) and “Waste management” (with references to 38 instructions and a regalement) have been implemented at INPP to control the processes of nuclear fuel and radioactive waste handling. The management procedures contain information necessary for administration to manage these works at INPP:

- Objective and field of application of the management procedure;
- Responsibility and authorities of the administration for the activity defined by the management procedure;
- Information on how the work is performed including processes of planning and scheduling;
- Administrative and technical data necessary for the work performance;
- Information on how the plant divisions co-operate when performing work;
- Information on the documents and records necessary for the work performance, information on the records, which have to be kept after the work will be completed;
- References to the detail working procedures.

Radioactive Waste Management Agency (RATA)

In 2016 RATA has updated its QMS to meet the requirements of the new version of the Quality Standard (ISO 9001:2015) and also the new version of the regulator’s requirements for QMS

(Nuclear Safety requirements 1.4.1-2016 “Management System”). In December 2016 the QMS was audited by a certification authority and received an appropriate compliance certificate.

Licensing process and control of small radioactive waste producers warrants that appropriate quality assurance programmes concerning the safety of SF and radioactive waste management are established and implemented. The quality management system of RPC conforming to EN ISO 9001 standard was implemented in 2009 and covers all activities of RPC in Management of State Register of Sources of Ionising Radiation and Occupational Exposure, Authorization of Activities with the Sources of Ionizing Radiation, State Radiation Protection Supervision and Control, Emergency Preparedness and Response, Public, Occupational and Environmental Exposure Monitoring and Expertise, Radiation Protection Education and Training. The external and internal auditors’ reports confirmed that the Quality Management System of RPC successfully operates and is a daily working tool the staff performs everyday tasks according to the system procedures and work instructions.

Article 24: Operational radiation protection

1. Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a SF or radioactive waste management facility:
i) the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account;
ii) no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection; and

The basic radiation protection requirements, corresponding to IAEA recommendations and requirements of the legal acts of the European Union, are established in the Law on Radiation Protection, Law on Nuclear Energy, Law on the Management of Radioactive Waste. All activities with radiation sources are carried out in accordance with the basic principles of radiation protection: justification, optimization and limitation.

The basic standards and safety requirements for occupational and public exposure in practices with sources of ionizing radiation and also in management of radioactive waste are established in Lithuanian Hygiene Standard HN 73:2001 “Basic Standards of Radiation Protection”.
The limits for occupational and public exposure, established in HN 73:2001, are given in the table F-1 below:

Table F-1: Limits for occupational and public exposure

Application	Dose limits	
	Occupational	Public
Effective dose	maximum annual 50 mSv, 100 mSv in a consecutive 5 year period	1 mSv annual, in special circumstances - 5 mSv, provided that the average dose over 5 consecutive years does not exceed 1 mSv per year
Equivalent dose for:		
the lens of eye	20 mSv	15 mSv
the skin, hands, forearms and feet and ankles, the skin	500 mSv	50 mSv

The specific requirements for radiation protection of workers working at the nuclear facilities are established in Nuclear Safety Requirements BSR-1.9.3-2016 “Radiation protection at Nuclear Facilities”.

Dose constraint for members of the public due to normal operation and decommissioning of nuclear facility (including radioactive waste storage and disposal facilities, spent nuclear fuel storage facilities) of 0.2 mSv/year is set in the Lithuanian Hygiene Standard HN 73:2001 and BSR-1.9.1-2011 “Limits of Radioactive Discharges into Environment from Nuclear Facilities and Requirements for a Plan for Radioactive Discharges into Environment”.

In period of 2014-2016 during operating of SF or radioactive waste management facilities no individual in Lithuania was exposed to radiation doses which exceeded above presented dose limits.

According to Lithuanian legislation the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account (ALARA). Specific requirements for implementation of optimization principle in nuclear area are established in BSR-1.9.3-2016 “Radiation protection at Nuclear Facilities”, which defines the content of ALARA programme and the process for optimization. The implementation of the ALARA programme at the INPP (where the main radioactive waste management and storage facilities are settled) was started in 1996.
The ALARA Programme at the INPP has the following basic directions:

- Proper organization of the activities.
- Personnel learning and training.
- Improvement of working conditions.
- Perfection of engineering process.
- Quality maintenance.
- Safety culture.
- Human element impact.

The ALARA approach is applied at the INPP in all operation stages related to radiation protection. Application of new principles of activity organization, performance of scaled works on equipment upgrading, enabled substantially reducing the doses of INPP personnel and outside workers.
In table F-2 below the data of occupational doses of INPP workers, involved in radioactive waste management (excluding spent nuclear fuel management), are presented.

Table F-2: Data of occupational doses of INPP personnel, involved in radioactive waste management (excluding spent nuclear fuel management)

The year		Collective dose, man. mSv	Average individual dose, mSv	Maximum individual dose, mSv
2014	Liquid radioactive waste	2.34	0.04	0.72
	Solid radioactive waste	16.43	0.13	2.55
	Total	18.77	0.17	3.27
2015	Liquid radioactive waste	21.95	0.40	2.12
	Solid radioactive waste	9.23	0.07	1.45
	Total	31.18	0.47	3.57
2016	Liquid radioactive waste	11.63	0.23	4.92
	Solid radioactive waste	5.60	0.04	2.52

	Total	17.23	0.27	7.44

In table F-3 the data of occupational doses (gamma and neutron) of INPP personnel and outside employees, involved in SF management, are presented.

Table F-3: Data of occupational doses (gamma and neutron) of INPP and outside employees, involved in SF management

The year	Collective dose, man. mSv	Average individual dose, mSv	Maximum individual dose, mSv
2014	481.09	1.89	11.66
2015	427.03	1.73	9.37
2016	400.59	1.69	11.77

Data provided in tables F-2, F-3 shows that occupational exposure of the workers involved in radioactive waste and SF management remained in approximately the same relatively low level during 2014-2016 period. Slight changes of the doses were mainly due to changing amount of works. The annual individual exposure doses of the workers did not exceed established dose limits.

iii)*measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment.*

BSR-1.9.1-2011 "Limits of Radioactive Discharges into Environment from Nuclear Facilities and Requirements for a Plan for Radioactive Discharges into Environment" establishes the limits of the discharges of the radionuclides from nuclear facilities to atmosphere and water, including methodology for calculating of activities of radionuclides discharged to environment, requirements for the preparation and submission of the Plan of Discharge of Radionuclides and requirements for the control of the discharges.
BSR-1.9.2-2011 "Derivation and Use of Clearance Levels of Radionuclides for Materials and Waste Generated during Activities in the Area of Nuclear Energy" establishes criteria when materials, equipment, installations, buildings and waste, contaminated with radionuclides or containing radionuclides may be used or disposed of without any application of requirements of radiation protection. Requirements of this document are applied only to nuclear facilities, for which activity licence is required.

2. Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:
i) to keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account; and
ii) so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.

In order to protect the general public and the environment from the negative impact of ionising radiation, the activity of radionuclides released into the environment from the nuclear facility shall be limited in such a way that the annual effective dose to the critical group member resulting from the nuclear facility shall not exceed the dose constraint 0.2 mSv. This annual effective dose constrain for the general public is applied for design, operation (during the normal operation and potential operational occurrences) and decommissioning of the nuclear facility. BSR-1.9.1-2011 "Limits of Radioactive Discharges into Environment from Nuclear Facilities and Requirements for a Plan for Radioactive Discharges into Environment" establishes the limits of the discharges

of the radionuclides from nuclear facilities to atmosphere and water, including methodology for calculating of activities of radionuclides discharged to environment, requirements for the preparation and submission of the Plan of Discharge of Radionuclides and requirements for the control of the discharges. The Requirements are applied to nuclear facilities when designing, constructing and operating them as well as to nuclear facilities during decommissioning.
According to the Nuclear Safety Requirements BSR-1.9.1-2011 total annual limit values of radionuclide releases to the water and releases to the air should not exceed 0.2 mSv to the public.
Radioactive substances (in liquid or gaseous forms) can be released into the environment by the facilities only when a Plan for Radioactive Discharges into Environment is coordinated with VATESI. The Plan for Radioactive Discharges into Environment from the INPP was renewed and coordinated with VATESI in June 2015. Radiological monitoring, including the monitoring of radioactive discharges and environment monitoring (in sanitary protection area (3 km) and monitoring area (30 km)), is carried out by INPP. Requirements for radiological environmental monitoring are laid down in the Order of the Minister of Environment "On approval of regulation of environmental monitoring of economic entities". The operator of nuclear facility has to work out the monitoring programme and implement it. The monitoring programme shall cover all important routes of radionuclide dispersion and population exposure to enable the proper evaluation of annual airborne and water discharges, likewise their short term and consequently doses for critical group members, changes. Some data regarding atmospheric discharges from INPP and doses for critical group of members of the public, caused by these discharges in 2014-2016 is given in the table F-6.
The Plan for Radioactive Discharges into Environment shall be revised and updated in the following cases: there are found new discharged radionuclides; or their pathways of discharge; or points of discharge. Discharges limits and data on airborne and liquid discharges into environment from INPP are provided in tables F-4 - F-6.

Table F-4: Discharge limits from INPP

		Discharge limits, Bq/year
From 2013 to 2015	Airborne	$1{,}66 \cdot 10^{16}$ (including: inert radioactive gases – $5{,}93 \cdot 10^{15}$; radioactive aerosols – $1{,}65 \cdot 10^{13}$; Iodine-131 – $2{,}5 \cdot 10^{10}$)
	Liquid	$8{,}86 \cdot 10^{14}$
From June 2015	Airborne	$1{,}47 \cdot 10^{16}$ (including: inert radioactive gases – $2{,}22 \cdot 10^{14}$; long-lived radionuclides – $9{,}47 \cdot 10^{11}$; Tritium H-3 – $1{,}44 \cdot 10^{16}$; Carbon C-14 – $4{,}55 \cdot 10^{13}$)
	Liquid	$1{,}7 \cdot 10^{14}$

Table F-5: Discharges of radionuclides from INPP to the Drūkšiai lake during 2014-2016

Year	**Discharges, Bq**
2014	$5{,}56 \cdot 10^{9}$
2015	$8{,}19 \cdot 10^{9}$
2016	$6{,}14 \cdot 10^{10}$

No exceeding of limits in discharges was fixed.
Annual dose for critical group of the public during the decommissioning of INPP did not exceed the dose constraint (0,2 mSv):

- *in 2014 – $9{,}24 \cdot 10^{-6}$ mSv and $4{,}12 \cdot 10^{-6}$ mSv due to the airborne and liquid discharges respectively, in total $1{,}34 \cdot 10^{-5}$ mSv per year;*
- *in 2015 – $2{,}33 \cdot 10^{-5}$ mSv and $5{,}16 \cdot 10^{-5}$ mSv due to the airborne and liquid discharges respectively, in total $7{,}49 \cdot 10^{-5}$ mSv per year;*
- *in 2016 – $8{,}50 \cdot 10^{-6}$ mSv and $8{,}89 \cdot 10^{-5}$ mSv due to the airborne and liquid discharges respectively, in total $9{,}74 \cdot 10^{-5}$ mSv per year;*

Table F-6: Data on atmospheric discharges from Ignalina NPP

Years			Radioactive aerosols, GBq				Annual dose for the critical group
			Activity	% of DL			μSv
2014			0,025	0,0026			0,0092
2015			0,050	0,0029			0,0233
2016			0,057	0,0033			0,0085

*DL – Discharge Limit

Regarding the information about the decommissioning activities at the INPP the risk of nuclear or radiological emergencies and possible anticipated effects after the final shutdown of two Units became lower. Moreover, the spent nuclear fuel is unloaded from reactor core of Unit 1 and the decommissioning activities at INPP are being performed with very-low and low contaminated equipment. This is confirmed by very low releases to environment (0,036 % of the discharge limit in 2016) that results very low doses received by the public due to actual discharges of radionuclides to the environment from INPP in 2016 – 0,0974 μSv or 0,049 % of the dose constraint to the critical group of public. So the total impact of radioactive contamination on the population is insignificant and it will not exceed the exemption level – 10 μSv defined by the international standards on radiation protection. Even in the event of an accident during decommissioning activities at INPP is not liable to result in a radioactive contamination, significant from the point of view of health, of the water, soil or air of Lithuania as well as neighbouring countries.

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

Operator of nuclear facility must have the Plan for Radioactive Discharges into the Environment.

If during the monitoring of contamination is identified that the activity limits of radionuclides, released into the environment, are exceeded or the radionuclides, which are not included into the Plan for Radioactive Discharges into Environment, are detected in the emissions, then the organization, which is carrying out the activities, should:

- analyse the causes and the consequences of exceeding the limits of radionuclide activity specified in the Plan or the release of radionuclides not listed in the Plan;
- take measures to eliminate such a situation and to prevent such incidents in the future.

Operator must inform VATESI, Ministry of Health and Environmental Protection Agency about the reasons of exceeding the limits of radionuclide activity specified in the Plan or the release of radionuclides not listed in the Plan, elimination of these radionuclides and about ongoing or envisaged to implement preventive actions.

VATESI, after receiving the information, fixes a time within which the operator should eliminate the reasons which predetermined exceeding the limits of radionuclide activity specified in the Plan or the release of radionuclides not listed in the Plan and informs about this operator, Environmental Protection Agency and Ministry of Health.

If operator within the prescribed period does not eliminate the violation, VATESI has the right to apply measures of influence set out in the Law on Nuclear Safety and in the other laws.

Article 25: Emergency preparedness

1. Each Contracting Party shall ensure that before and during operation of a SF or radioactive waste management facility there are appropriate on-site and, if necessary, off-site emergency plans. Such emergency plans should be tested at an appropriate frequency.

Lithuania has established a comprehensive, transparent and effective legislative framework that defines infrastructure and functional requirements for emergency preparedness and response and allocates responsibilities for the management of radiological and nuclear emergencies. The main laws that set and describe the general criteria for ensuring on-site and off-site emergency preparedness and response in case of nuclear or (and) radiological emergencies are following:

The Civil Protection Law (accepted on 1998, last amended 2015) establishes the legal and organisational framework for the organisation and functioning of the civil protection system, the competence of state and municipal institutions and agencies, the rights and duties of other agencies, economic entities and residents in the sphere of civil protection.

The Law on Nuclear Energy (accepted on 1996, last amended 2017) sets the general obligations and assigns responsibilities for licence holders and state institutions for preparedness and response to nuclear or (and) radiological emergencies at nuclear facilities. This law sets the order of preparation and approval of the national off-site plan for protection of population in case of a nuclear accident.

The Law on Nuclear Safety (accepted on 2011, last amended 2017) sets responsibilities for license holders to ensure the preparedness for possible nuclear and radiological accidents, their prevention in nuclear installations and in shipping nuclear and/or nuclear fuel cycle materials. This law sets the obligation for license holders to prepare an on-site emergency preparedness plan.

The Law on Radiation Protection (accepted on 1999, last amended 2016) establishes the legal basis for radiation protection in allowing to protect people and the environment from the harmful effects of ionizing radiation and defines the state management system of radiation protection.

The Law on the Management of Radioactive Waste (accepted on 1999, last amended 2014) regulates the relations of legal and natural persons in management of radioactive waste, it also establishes the legal grounds for management of radioactive waste. According to this law, the operator of a radioactive waste management facility is responsible for ensuring that before the operation and during the operation of the radioactive waste management facility an emergency preparedness plan is developed and is tested at least once a year by the operator of the facility. Before the decommissioning of a radioactive waste management facility the emergency preparedness plan must be updated, taking into account the conditions of the decommissioning.

The arrangements for ensuring the on-site and off-site preparedness and response to nuclear or (and) radiological emergencies are:

The State Plan of Public Protection in Case of Nuclear Accident (hereinafter referred to as – Plan) has been approved by the Resolution No 99 of the Government of the Republic of Lithuania on 18th January 2012 (now under revision). The Plan identifies at state level the measures of civil protection to be taken, while organizing and implementing protective actions, which seek to protect and (or) minimize the risk of deterministic and stochastic effects of ionizing radiation, to protect the property of residents as well as environment from radioactive contamination due to nuclear accident in nuclear power facility (irrespective of whether it is in the Republic of Lithuania or beyond its boundaries) and (or) radiation accident (in nuclear power facility of threat category I and III), when transboundary release of radioactive materials is likely beyond the boundaries of sanitary protection zone under the threat of State level emergency or in case of State level emergency. The Plan sets arrangements for co-ordination of actions taken over by ministries, other State Administration institutions, municipal authorities, describes the early notification of neighbouring countries, EC, IAEA, etc. The Plan is prepared in accordance with IAEA requirements GS-R-2 and IAEA Safety Guide GS-G-2.1 "Arrangements for Preparedness for a Nuclear or Radiological Emergency" and now is under revision against updated national legal framework and IAEA requirements.

Hygiene Standard HN 99:2011 "Protective Actions of Public in Case of Radiological or Nuclear Emergency" adopted by the Order of the Minister of Health on December 7, 2011 (hereinafter – Hygiene Standard HN 99:2011), implements IAEA General Safety Guide No. GSG-2 "Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency". Hygiene Standard HN 99:2011 establishes Reference level of residual effective dose (100 mSv), Generic criteria for acute doses to avoid or to minimize severe deterministic effects; generic criteria for protective actions to reduce the risk of stochastic effects; operation intervention levels (OIL) for environmental measurements, skin contamination, food, milk, drinking water; procedures on administration of stable iodine, clean-up procedures and dosimetric control of contaminated population, etc. This Hygiene Standard is a basis for application of public protective actions. Implementing the IAEA requirements GSR Part 7 into the national legislation, in 2016 Lithuanian Hygiene Standard HN 99:2011 has been revised. In the amendment of the Hygiene Standard HN 99:2011, approved by the order of the Minister of Health No. V-1044, 29 August, 2016, emergency planning distances (the extended planning distance (EPD) and the ingestion and commodities planning distance (ICPD) have been approved. This amendment also gives examples of application of optimized protective actions in case of nuclear or radiological emergency which occurs in the territory of Lithuania or in another State.

Accordingly to the changes in the Hygiene Standard HN 99:2011, that were implemented considering the requirements of the new GSR Part 7, in 2016 the revision of The State Plan of Public Protection in Case of Nuclear Accident was initiated. The Minister of Interior in 2016, August 23 by the Order No. 1V-581 established the institutional working group of specialists for the revision of the Plan. The revised Plan will contain protective strategies of public in case of nuclear accident which occurs in the territory of Lithuania or in another State, additionally emergency planning distances will be defined, emergency preparedness requirements in the emergency planning distances will be provided.

Following the provisions of the Convention on Early Notification of Nuclear Accident (1986) and implementing the Council Decision 87/600/EURATOM and 89/600/EURATOM and Council Directive 89/618/Euratom On informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency, the Government Resolution

No. 559 ,,On Approval of Order of Public Information In Case of Radiological or Nuclear Accident" was approved in 2002.

Having regard the provisions of the IAEA Safety Series No. 115, No. 120, the Council directives 96/29/Euratom, 97/43/Euratom, the Hygiene Standard HN 73:2001 ,,Basic Standards of Radiation Protection" sets forth the intervention and action levels, dose levels at which intervention are needed to be undertaken under any circumstances. Also there is established the obligatory preparedness of licence holders to apply the intervention levels, requirements for establishment of emergency preparedness plans are set forth etc.

The Rules on the Handling of Orphan Ionizing Radiation Sources, Substances of Orphan Nuclear Fuel Cycle, Orphan Nuclear and Fissile Substances and Objects Contaminated with Radionuclides is approved by the Resolution No 280 of the Government of the Republic of Lithuania on 16th March 2005 determines the actions of the state and local authorities, managers of radioactive waste after the discovery, identification and suspension of ionizing radiation sources, orphan substances of nuclear fuel cycle, orphan nuclear and fissile substances and objects contaminated with radionuclides, products or materials of consumption containing natural radionuclides, and the identification of the ionizing radiation sources in the body of the person or on its surface, emitting ionizing radiation in excess of 0.2 μSv/h (20 μR/h), or upon the receipt of notification on this matter.

Emergency preparedness and response requirements for the operators of nuclear facilities, issued on 24 October, 2008 by order Head of VATESI, set the main requirements for the nuclear facilities emergency preparedness. The Requirements oblige the operator of nuclear facility to assure prevention of accidents and incidents and, in the event of an accident, to perform the emergency preparedness tasks without delay. This document requires the operator of nuclear facility to develop the Emergency Preparedness Plan complying with these Requirements. This document is based on IAEA requirements GS-R-2; GS-R-2.1 and Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency (TECDOC-953 update), and now is under revision against updated national legal acts and IAEA requirements (GSR Part 7).

The Regulations on Dosimetric Control in Case of Nuclear or Radiological Accident set forth the order of dosimetric control of accident liquidators, vehicles, equipment, goods and other objects in the hotspot of radiological or nuclear accident. The dosimetric control methods are legalized in the Regulations, by means of which it is strived to avoid an unjustified high exposure of accident liquidators, to establish, how long they are allowed to work in the territory of high exposure etc. The regulations takes into account provisions of the IAEA TECDOC-1162 "Generic procedures for assessment and response during a radiological emergency".

The applicant for a licence to conduct practices with sources of ionizing radiation or manage the radioactive waste, among other documents, submits the plan for accident prevention and elimination of its consequences. The actions and measures that will be taken in case of radiation accident are foreseen in the plan. In conducting the nuclear safety and radiation protection state supervision and control of practices, the emergency preparedness plans and their renewal are controlled. It is also controlled, how the emergency preparedness plans are tested in practice (organizing and conducting exercises in this field).
According "Regulations of Licensing the Practices Involving Sources of Ionizing Radiation" modification, the legal persons (small radioactive waste producer) willing to get a licence for to produce, operate, store, maintain, repair, recycle sources and manage (collect, sort, treat, keep, recycle, store and decontaminate) radioactive waste, requisition for licence shall supplement among other documents with the following: the emergency preparedness plan, the plan of

management of radioactive waste. Those plans shall be reviewed every 3 year or after significant changes in operation procedures.

In conducting the nuclear safety and radiation protection state supervision and control of practices, the emergency preparedness plans and their renewal are controlled. It is also controlled, how the emergency preparedness plans are tested in practice (organizing and conducting exercises in this field).
Every year health care hospitals are checked for its preparedness to take and render medical aid for injured people during radiological and nuclear accidents. Also workshops and training courses are organized for the specialists of public and personal health care. The training is provided on how in case of an accident to provide help to injured persons.

The INPP on-site emergency preparedness plan was revised in 2014 and approved on 11th June 2014. The process of on-site plan revision was done having in mind the ongoing decommissioning process at INPP and the construction of new waste storage, treatment and spent nuclear storage facilities. Emergency preparedness in all aspects of INPP activity, including SF and radioactive waste handling systems, is performed in accordance with this plan. This plan is the main management directive for implementation of all organizational, technical, medical and other protective measures, in order to protect the public, plant personnel and environment from the consequences of accidents or incidents. The objective of the plan is to provide an order of emergency planning arrangements at INPP to achieve the appropriate level of preparedness of the plant personnel, public administration institutions and actions in case of an accident at INPP.
A preparation of new version of INPP on-site emergency preparedness plan is undergoing and is going to be approved in 2017.

An Emergency Preparedness Plan for Maišiagala storage facility (the description of the storage facility provided in Article 12) was developed and approved in 2005. The plan foresees actions of RATA personnel in case of emergency. The Emergency Preparedness Plan foresees two stages of events: local emergency and radiological accident.
The on-site plans of nuclear facilities shall be reviewed every 3 years or after significant changes in operation procedures. The last update of the plan was done in 2017.

2. Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of a radiological emergency at a SF or radioactive waste management facility in the vicinity of its territory.

The Regulation of Training of Civil Protection (hereinafter referred to as – Regulation) has been approved by the Resolution No 718 of the Government of the Republic of Lithuania on 7th June 2010 establishes purposes and goals of the training of civil protection. Also the Regulation determines organization, planning of the training of civil protection, its frequency and duration and etc. There are established the programmes of civil protection training for people, who are working in state, municipal and other institutions.

The Regulation for Organization of Civil Protection Exercise (hereinafter referred to as – Regulation) has been approved by the Resolution No 1295 of the Government of the Republic of Lithuania on 8th September 2010, establishes types, levels also purposes and goals of the exercises of civil protection. The Regulation also determines organization, planning and assessment of it. The Regulation is applicable for state, municipal and other institutions, objects and etc, whose leaders must to prepare the plan of emergency management and to establish the operation centre of emergency.

Following above mentioned Resolution procedures all licence holders are required to conduct drills and exercises as it is foreseen in their procedures.

Once per three years General Director of INPP, as the Emergency Preparedness Organization Head, is trained under a special programme in the Civil Protection Training Centre of the Fire and Rescue Department (hereinafter – FRD) under the Ministry of the Interior.

General Director of INPP conducts:

- Annual training for the managers of the specific group in accordance with 6-hours training programme;
- Tabletop drills for the heads of Emergency preparedness organisation (hereinafter – EPO) Services at least once per two years;
- Full scale exercises once per three years.

Once per three years Decommissioning Department Director, as the NPP decommissioning manager, is trained under a training programme in the FRD Civil Protection Training Centre under the Ministry of the Interior as General Director does.

Decommissioning Department Director conducts annual training for the managers of the specific group in accordance with 6-hours training programme.

Once per three years the Audit, Safety and Quality Management Division, Fire Surveillance and Civil Protection Group Manager is trained under a respective programme in the FRD Civil Protection Training Centre under the Ministry of the Interior.

The Audit, Safety and Quality Management Division, Fire Surveillance and Civil Protection Group Manager conducts annual training in accordance with 6-hours training programme for the specific group of the managers not involved in EPO Services.

Managers of INPP structural units, as heads of EPO Services, conduct training for heads of subordinate service teams and groups.

All the EPO personnel shall be trained to respond in the event of an emergency.

Training of personnel includes:

- initial training in accordance with the requirements for the position assigned;
- improvement of practical skills during exercises and drills.

EPO personnel are trained by the heads of corresponding teams, groups and services.

After completion of theoretical training the personnel of EPO Services (a part of the personnel) participate in functional exercises for improvement of practical skills to carry out the specified tasks.

Once per three years the personnel of EPO Services (a specific part of the personnel) participate in full scale exercises for checking emergency preparedness level of personnel and its ability to work in complicated conditions while carrying out the specified tasks.

After the full-scale exercises the manager of the exercises together with EPO Headquarters Manager (or his deputy) shall write a report. The report shall be approved by INPP General Director, and registered and stored in the Audit, Safety and Quality Management Division in the manner established at INPP.

Based on the reports made by the supervisors after the exercises, the EPO Headquarters Deputy Manager makes a list of detected non-conformances to be included in the emergency preparedness corrective actions plan.

Theoretical trainings in groups, practical drills and high-level trainings involving full EPO team capacities from top managers to workers are being organized regularly. Here among gaining the knowledge and practical experience the recommendations to improve the EPO effectiveness are elaborated on the basis of the obtained findings.

During recent 5 years, there were organized many national, regional and international workshops, drills and exercises in the field of preparation of emergency response plans, conducting of training and exercises, dosimetric control and decontamination, international co-operation and communication between countries in case of the accident etc.

Responding to the IAEA Emergency Preparedness Review (EPREV) mission's, conducted in Lithuania on October 1–11th 2012, recommendation RPC on October 8th 2015 has organized table top exercises „Cooperation of institutions in dose projection and formulating recommendations on protective actions of the public in case of nuclear emergency". In the exercises participated professionals from INPP, VATESI, EPA, RSC. The evaluators of the exercises were highly experienced professionals from Fire and Rescue Department under the Ministry of Interior, VATESI and RSC. To observe the exercises were invited professionals from Lithuanian Hydrometeorological Service under the Ministry of Environment, National Food and Veterinary Risk Assessment Institute, Visaginas Municipality.

In 2014–2016 RPC has organized five (Taurage, Utena, Vilnius district, Kaunas and Visaginas) municipal level exercises with various radiological accident scenarios. RPC pays attention to the radiation safety training of the first responders (fire prevention and rescue, medical, police personnel) liquidating radiological or nuclear accidents. Every year the training involves over 300 emergency workers.

The main regulatory authorities, such as VATESI, RPC, have established its own emergency staff training and exercising programs.

Article 26: Decommissioning

Each Contracting Party shall take the appropriate steps to ensure the safety of decommissioning of a nuclear facility. Such steps shall ensure that:
(i) qualified staff and adequate financial resources are available;

The Law on Nuclear Energy of the Republic of Lithuania, 2011, define, that:

- the operator of the nuclear facility shall ensure accumulation of the resources in the fund for decommissioning for safe decommissioning of the nuclear installation and management of radioactive waste;
- the operator of a nuclear facility must have necessary material, organisational, human and financial resources for the performing its functions;
- the principal objective of the decommissioning fund shall be accumulation of resources required for safe decommissioning of a nuclear installation and safe management of radioactive waste, including spent nuclear fuel.

The Requirements for decommissioning of nuclear facilities bsr-1.5.1-2015 approved by the Head of VATESI, order No. 22.3-216, November 30th, 2015 (instead of P-2009-02), define that for the management and implementation of decommissioning the licensee has to establish an organizational structure with financial, human and technical resources, defining:

1) structural units and staff functions, duties and responsibilities;
2) the number of staff;

3) minimum qualifications, experience and skill requirements for workers;
4) staff training and retraining.

In order to plan and implement the decommissioning activities, Decommissioning Service was founded at INPP in 2000.
In 2010 new INPP Organizational Structure was established in order to ensure the management of INPP decommissioning in more effective manner and taking into consideration the new status of INPP after final shut down of the Unit 2 reactor. A new Decommissioning Directorate was established within this new INPP Organizational Structure based on previous INPP Technical Directorate and former Decommissioning Service and with purpose to apply the knowledge and experience of the INPP personnel maximally during implementation of the decommissioning projects.
Decommissioning Directorate includes Technological Service, Decommissioning Projects Management Service, Radiation Safety Service, Radioactive Waste Management Service and Dismantling and Decontamination Service and Repair Service with respective responsibilities regarding different areas of decommissioning activities.

In order to implement the decommissioning activities the personnel of INPP has attended the training in these areas:

- Nuclear safety;
- Radiation safety;
- Physical security;
- Fire safety;
- Personnel safety and health.

Training of personnel is performed on the basis of a Systematic Approach to Training, providing the knowledge and skills in:

- Decommissioning methods;
- Radioactive waste management;
- Application of specific equipment and safety measures.

The following types of training on decommissioning and dismantling issues are used at INPP:

- Training provided by developers of D&D designs (B9 projects);
- Training provided by suppliers of D&D equipment;
- Participation in IAEA events (training courses, workshops, conferences, etc.);
- Internal training courses (initial training, continuous training, mandatory training, training course for the work with potentially dangerous equipment);
- External training (procured services for the INPP personnel involved in design and implementation of D&D activities).

The part of INPP personnel was retrained in order to implement the decommissioning activities.
The enterprise has enough quantity of qualified instructors to ensure the high level of personnel knowledge and skills for implementation of decommissioning activities.

The owner of INPP is the Republic of Lithuania, represented by the Ministry of Energy of the Republic of Lithuania (Ministry of Energy). Whilst implementing the owner‘s rights and obligations and as an organisation concerned with a successful and safe decommissioning of INPP the Ministry of Energy has authorised RATA) to carry out supervision of INPP‘s planning of decommissioning and implementation of technical projects.
RATA’s activities focused on supervision of decommissioning planning and technical project implementation by carrying out systematic analyses and assessment thereof started in 2016. In 2016 RATA has performed an analysis of INPP Final Decommissioning Plan focusing at

development of measures to increase an effectiveness of INPP decommissioning project. List of developed proposals for measures to be implemented was provided to the Ministry of Energy.

Financing system and financial sources for decommissioning of INPP are described in Article 22 of the Report.

(ii) the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied;

The radiation protection requirements for decommissioning of nuclear facilities are set forth in Nuclear Safety Requirements BSR-1.9.3-2011 "Radiation Protection at Nuclear Facilities" (2011). Before the decommissioning of nuclear facility, the radiation protection programme shall be established. It shall be presented to the regulatory authorities with the Final Decommissioning Plan.

Radiation protection programme of the license holder must contain:

- designation of the controlled and supervised area and access control;
- organizational rules and procedures to ensure radiation protection;
- dose constraints and investigation levels for workers and outside workers;
- measures and procedures for workplace monitoring and individual monitoring of workers and outside workers;
- procedures for use and description of the personal protective equipment;
- radiation control systems (including systems for radiation monitoring of the premises, pollution and environmental);
- application of radiation protection optimization (ALARA) principle;
- procedures for radiation protection training and instruction of workers and outside workers and instruction of visitors;
- procedures for health surveillance;
- procedures for monitoring in emergency exposure situations.

During the planning and implementation stage of each decommissioning activity the licence holder also shall:

- estimate labour expenditures, collective and individual doses for workers for each decommissioning project;
- estimate the committed effective dose for the general public for each decommissioning project;
- for ALARA and waste minimization purposes apply methods for decontamination of equipment and components of the nuclear facility if it is reasonable;
- estimate the radiation in the environment at the beginning and at the end of each decommissioning project of the nuclear facility;
- estimate the amount of radioactive waste resulting during the decommissioning of the nuclear facility and estimates the exposure of workers, managing the radioactive waste;
- estimate planned amounts of radioactive materials released to the environment, control the releases and not exceed the release limits, established in Nuclear Safety Requirements BSR-1.9.1-2011 „Limits of Radioactive Discharges into Environment from Nuclear Facilities and Requirements for a Plan for Radioactive Discharges into Environment" (2011);

- in accordance with provisions, established in Nuclear Safety Requirements BSR-1.9.2-2011 "Derivation and Use of Clearance Levels of Radionuclides for Materials and Waste Generated during Activities in the Area of Nuclear Energy" (2011), ensure, that conditional and unconditional clearance levels are applied for the radioactive substances that are transported from the nuclear facility or reused.

Order of the Minister of Health No. V-712 On Regulations of Decommissioning of the Objects in which Practices Involving Sources of Ionizing Radiation Were Executed (2003, amended 2011) establishes requirements for decommissioning of non-nuclear facilities (hospitals, radiographers, research laboratories etc.). The Regulations require preparing the Final Decommissioning Plan (Annex 2 of Regulations) in advance, which also contains safety measures in case of accident.

During decommissioning the radioactive contamination of premises, equipment, territory of the facility and surface contamination of the things shall be evaluated. If there is possibility of radioactive waste contamination, the decontamination of the contaminated premises, facilities and territory is provided until clearance levels are achieved.

If in case of increased contamination it is not reasonably to perform repeated decontamination, then contaminated materials and equipment are managed as radioactive waste.
After the decommissioning process is being finished Licensee must provide the Final decommissioning report. After evaluation and approval of this report by regulatory authority (RPC) the license can be withdrawn.

(iii) the provisions of Article 25 with respect to emergency preparedness are applied; and

The Requirements for decommissioning of nuclear facilities BSR-1.5.1-2015 define, that:

- emergency preparedness during decommissioning shall be ensured by emergency preparedness plan adapting it to the changed conditions and circumstances for the decommissioning;
- an emergency preparedness plan for decommissioning according to the laws and requirements must be approved by VATESI and other state institutions, and practically tested during the exercise before the start of decommissioning;
- the training of the staff for emergency preparedness during decommissioning shall be carried out according to the procedures of legal documents.

The organisation of on-site and off-site emergency preparedness during decommissioning of INPP will remain the same as during operation lifetime and will be adopted for the decommissioning according to the changed conditions and circumstances.

The appropriate emergency preparedness arrangements, which are applied for decommissioning activities too, are described in Article 25 of the Report.

(iv) records of information important to decommissioning are kept;

The Requirements for decommissioning of nuclear facilities BSR-1.5.1-2015 define, that:

- the Licensee shall ensure that during the operation acquired knowledge and experience of staff should be communicated and accessible;
- the Licensee shall establish the data storage and management system of decommissioning. The system must contain radioactive material waste inventory data at the end of decommissioning of the nuclear facility;

- the Licensee shall ensure that all relevant information associated with the operation, decommissioning and the safety assessment is properly handled, stored and accessible at all stages of nuclear facility;
- the information about the nuclear facility's site, employee's skills, relationships with other legal entities, which carried out the decommissioning work and radioactive waste management, after the completion of decommissioning, according to the laws and requirements must be transferred to national government institutions and local authorities for long-term storage.

A specific project, which aims to provide a data archive system at INPP was launched in 2003. The purpose of the Decommissioning Management System & Database (DMSD) is therefore to establish a ready-to-use system (hardware and software) addressing the effective management of these processes, linking all the aspects of the decommissioning management process including waste management, human resources planning, project management, material costs and documentation through a single unified interface.
The implementation of DMSD at INPP has been started in 2012, and this process is still continuing.

SECTION G. SAFETY OF SPENT FUEL MANAGEMENT

Article 4: General safety requirements

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

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

(i) ensure that criticality and removal of residual heat generated during spent fuel management are adequately addressed;

All spent nuclear fuel in Lithuania is located in INPP's storage pools, or in the dry interim storage facility. In both cases the SF is handled according to the design documentation, adopted by the regulatory body and both methods are licensed (with involvement from experts from Western Europe), thereby providing a justification for safety. It is shown, that the safety criteria, particularly criticality and sufficiency of removal of residual heat, are fulfilled during normal operation and during design basis accidents.

(ii) ensure that the generation of radioactive waste associated with spent fuel management is kept to the minimum practicable, consistent with the type of fuel cycle policy adopted;

In order to minimise the amount of SF during operation of INPP measures were taken to increase the nuclear fuel burn-up, to implement the fuel assemblies with uranium - erbium and to avoid leaking fuel assemblies. Due to the decision to terminate operation of the first Unit of INPP, the project of burn-up of SF from Unit 1 in the reactor of Unit 2 was started and implemented. Now both units are shut down.

(iii) take into account interdependencies among the different steps in spent fuel management;

The technical process of the management of SF is developed to simplify operations of transportation and minimise the number thereof and also to cope with interdependencies in the different steps in SF management. After one year storage the fuel assemblies are kept in 32M baskets, which are compatible with containers for interim dry storage. The containers are suitable for storage and transportation. In the future, in case of a decision to change the technology used, it will be not be difficult to remove the casks or separate the assemblies.

(iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;

Protection of individuals, the society and the environment from the effects of ionizing radiation is a requirement of the radiation and environmental protection legislation, where the system of radiation protection, consisting of justification, optimization and dose limitation is prescribed. The applicable dose limit for members of the public of 1mSv effective dose per year and the dose limit for workers of 20mSv per year are implemented. At each licensing step a safety analysis demonstrating compliance has to be submitted and reviewed by regulatory body.

(v) take into account the biological, chemical and other hazards that may be associated with spent fuel management;

Biological, chemical and other hazards are subject to the environmental and radiation protection legislation, which aims at human health protection. Hazards other than radiation encountered by workers during handling of SF are covered by general legislation on safety in the workplace.

(vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;

In Lithuania there are several legal requirements which aim to avoid impacts on future generations. The principle is formulated that the risk to humans and the environment shall at no time in the future exceed the levels permissible in Lithuania today.

(vii) aim to avoid imposing undue burdens on future generations.

There are currently no disposal facilities for SF in operation or under construction in Lithuania, but the legal requirements explicitly formulate as one of the overall objectives of disposal, that no undue burdens are to be imposed on future generations.

Article 5: Existing facilities

Each Contracting Party shall take the appropriate steps to review the safety of any spent fuel management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility.

The aim of the Safety analysis report (SAR) is to ensure that a SF management facility will be constructed and operated safely, i.e. that it will satisfy the requirements of the laws and regulatory documents of the Republic of Lithuania. This will be achieved by approval of the concerned

authorities that the proposed storage facility and its components have been properly technically evaluated.

The following shall be analysed and presented in the SAR:

- The essential assumptions forming the basis for the proposed storage project, paying special attention to the amount and characteristics of the SF;
- The foreseen conditions under which a storage facility may be operated and the risk factors potentially affecting the storage facility;
- A documentation of the typical storage operational limits, the maximum fuel element temperature, and the ionizing radiation levels inside the storage facility and outside its boundaries.

The SAR shall be of such extent and content that it fully describes the following:

1. The storage buildings, systems and elements, which description shall:
   - identify the purpose of the whole storage, its buildings, systems, elements and outfits being used;
   - investigate and properly substantiate those project circumstances which could affect the safety.
2. The applicable operational limits shall:
   - reflect the main safety related technical aspects;
   - be agreed with VATESI and other state or state delegated authorities and/or the supervising institutions.

3. The design process of the storage facility, which description shall be detailed enough so that:
   - the design methods and factors, which have been taken into consideration, are properly presented and documented;
   - the SAR proves that the design of the storage facility has been completed, reviewed and approved by the appropriate authorities, and that the project has been divided into parts which are properly investigated and described, and that all significant factors have been properly accounted for, are evaluated and accepted;
   - it is clear that the proper technical investigations have been applied, both for the individuals in the storage facility, as well as the storage facility itself, and that the complete analyses and calculations have been successfully performed, and are reviewed and approved by the appropriate authorities.
4. The engineering aspects of the storage facility shall include the following:
   - the spent nuclear fuel shall be fully characterised by giving its physical, chemical, radiological and engineering properties, its enrichment level, history of burn-up, and the specifications for the storing of the radiation exposed fuel in the pools. It is necessary to describe the expected alterations in the fuel characteristics during the lifetime of the fuel. Before fuel may be placed into a storage facility, it is also necessary to indicate the minimum duration of fuel storage in the pools;
   - the safe operational conditions prove that sufficient number of reliable elements and systems have been designed and that those systems are of different construction, or if they are alike, that their number is sufficient so that in case of failure of one element or system, sufficient redundancy ensures appropriate functioning of storage facility,
   - it should be clear for an expert who evaluates the SAR that functioning and conformity of all elements have been ensured, and the elements will supplement each other ensuring functioning of the system as a whole;
   - it should be indicated how the principle of "defence in depth" has been achieved;
   - it should be demonstrated that the project is technically reliable and can be realised with the available technologies upon fulfilment of well-grounded acceptable improvements.
5. The storage administration aspects (procedures, controls, monitoring, etc.)

6. The storage operational parameters.
7. The anticipated storage operational conditions, including description of the supporting methods used for the determination of these conditions, recognising the following:
   - it is necessary to describe the impact of the outside conditions (site conditions, processes, events, nature and human influences) to the storage facility, evaluation of such impact and expected alterations in the course of time. It is also necessary to indicate to which extent of impact the storage facility has been designed;
   - the integrity of the storage facility elements during normal operation as well as accidents shall be determined with supporting structural analysis methods. This structural analysis shall evaluate the future structural loads and alterations of substance properties in the course of time;
   - it is necessary to evaluate the size and the nature of the impact of the storage facility (radiological impact: radiation exposure, release, doses, and if needed, the non-radiological impact as well) upon the environment and people and to compare it with the operational criteria. The circumstances and alteration subsequent to the impact shall be described and evaluated in the course of time, including the expected changes of the number of the surrounding population;
   - the completed analysis and the documented evidence shall be clear and exact, i.e. it shall be completely clear which models have been used, what parameters have been chosen, and what limiting conditions and assumptions have been applied. The reasons why exactly those methods, parameters, limiting conditions or assumptions have been chosen shall be also documented;
   - it shall be evident that the chosen models are proper, that they are related to the concerned problem, that they properly reflect the concerned processes, and that they have been integrated into a fluent and consistent systematic model;
   - the circumstances and methods used during validation, verification and sensitivity analysis shall be documented;
   - the evaluations and calculations shall be presented in such way that an expert analysing the SAR would have the possibility to draw a conclusion that they have been properly performed and completed;
   - it should be clearly demonstrated that the whole design process, including data collection, evaluation and project preparation, has been carried out in accordance with quality assurance procedures, and that a proper general quality assurance program will be prepared during project realisation and storage operation; it should be ensured that the quality assurance program applied while carrying out the analysis and preparing the SAR be clearly described and documented.

Article 6: Siting of proposed facilities

1. Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed spent fuel management facility:

(i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime;

Description of SNFSF - 2 of INPP are presented in Section D. Article 32.
According to the procedure of the site selection, all necessary steps were performed:

- Assessment of all possible factors of the impact of the chosen site on the storage safety over its life time;
- Assessment of possible impact of the storage on personnel, the public and the environment.

These aspects and evaluation of relevant site-related safety factors during SNFSF - 2 operation are considered in the EIA report of the planned economic activity.

(ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment;

Evaluation of the safety impact of a SNFSF - 2 on individuals, the society and the environment was performed within the framework of establishing the EIA report.

The EIA report includes exhaustive examination of all issues provided in the EIA program, an analysis of the alternatives, a plan for environmental monitoring, information about the problems encountered, as well as an executive summary of all information considered in the report.

Provisions of the European Parliament and the Council Directive 2003/35/EC, 26 May 2003, requiring public participation in respect of the drawing up certain plans and programmes relating to the environmental and amendments with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC, were transferred into national EIA legislation.

The EIA procedure and requirements for documentation comply with the following international conventions:

- Convention on Environment Impact Assessment in a Transboundary Context, Espoo, 25th February 1991;
- Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, 25th June 1998.

A contracted consortium developed the EIA programme previous to the preparation of the EIA Report for the SNFSF - 2. The programme defines the content of the EIA Report including an outline of the main alternatives for site selection and an indication of the reasons for their choice. The EIA Program of SNFSF -2 was approved by Letter No. (1-15)-D8-9433 of the Ministry of Enviroment dated December 7, 2005.

The final version of the SNFSF - 2 EIA Report was issued considering comments and recommendations of the experts of the state Institutions of Lithuanian, Latvia and Belarus.

(iii) to make information on the safety of such a facility available to members of the public;

According to the requirements of the Law on the Environmental Impact Assessment of Planned Economic Activity (State News. 2005 Nr. 84-3105) and the Order on Informing the Public and the Public Participation in the Process of Environment Impact Assessment (State News. 2005 Nr. 93-3472), the SNFSF - 2 EIA Report has been presented for public review.

The general public was informed about the initiated EIA via Lithuanian media (newspapers “Lietuvos rytas” 2005-06-10, “Nauja vaga” 2005-06-11, “Sugardas” 2005-06-09 and “Zarasų kraštas” 2005-06-10).
The report on the SNFSF - 2 EIA was presented to the public and for public debate and was announced in the following Lithuanian newspapers: “Lietuvos rytas” 2007-01-06, “Nauja vaga” 2007-01-06, “Sugardas” 2007-01-11 and “Zarasų kraštas” 2007-01-09.
The public debate of the report for the SNFSF - 2 EIA took place in the INPP Decommissioning Service on 2007-01-26. Before and after the public debate no proposals regarding the content of the report on SNFSF - 2 EIA were received.

(iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.

According to the requirements of the Espoo Convention (State News 1999, No. 92-2688), the Ministry of Environment of the Republic of Lithuania notified respective Institutions of the Republics Latvia and Belarus about the proposed economic activity related with the SNFSF - 2 construction and operation and presented the EIA program. Both countries decided to participate in the transboundary EIA procedure and commented on EIA program.

The EIA report was also submitted to Latvia and Belarus. Upon request of the neighboring countries, meetings with the general public of these countries regarding the EIA of the SNFSF - 2 have been organized (May 13, 2007 in Daugavpils, Latvia and April 19, 2007 in Vidzy, Belarus). During the meetings, the proposed economic activity was presented, the public participants were familiarised with the SNFSF - 2 EIA Report of the proposed economic activity and the concerns raised were answered. The comments of Institutions and the public of the Republics Belarus and Latvia to the EIA Report are presented in the Ministry of Environment letter No. (1-15)-D8-2987 from April 3, 2007.

The answers to the comments of the Republic of Belarus and the Republic of Latvia for the EIA Report are attached to the final SNFSF - 2 EIA Report.
In addition, the Government Resolution No. 1872 adopted on 6 December 2002 (based on requirements of Article 37 of the EURATOM Treaty) requires to provide the European Commission with the general data relating to any plan for the disposal of radioactive waste in whatever form to enable determination whether implementation of such plans could result in radioactive contamination of water, soil and air of another member State.
In accordance with the aforementioned requirement, INPP prepared the General Data Set for the activity related to the removal of radioactive waste to the SNFSF - 2 as required by the European Commission. During 2011 the document underwent the coordination process with the regulatory authorities at the national level and the subsequent analysis by the European Commission and on 2 March 2012 the affirmative opinion of the European Commission No. C(2012)1312 was received.

2. In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 4.

The nearest foreign countries from INPP are the Republics of Latvia and Belarus. As it was mentioned above, they were informed about plans to build and operate SNFSF - 2 and they were provided with the EIA documentation had the opportunity to comment to it.

Environmental Radiological Monitoring in the surroundings of the SNFSF -2 was started from the beginning of 2015. Following results of monitoring will give possibility to evaluate possible impact when exploitation is started.

Results of National environmental radiological monitoring are available on EPA website; moreover data of gamma dose rate from national network are available on EURDEP website in on-line mode. INPP provides gamma dose rate data on its website as well (http://www.iae.lt/en/radiation-monitoring/).

Belarus has possibility to check the level of activity concentration of radionuclides in the Drūkšiai Lake itself. Once per year joint sampling of water from Drūkšiai Lake is organised with

participation of The Republican Center for Hydrometeorology, Radiation Control and Environmental Monitoring (Belarus) and Environmental Protection Agency (Lithuania). Received results are compared. Once per 2 years, when sampling is done on Lithuania site, sampling is done directly from discharge channel.

Moreover, Ministry of Environment of the Republic of Lithuania, after the receipt of requests from Belarusian side to carry the post-project analysis for the I NPP projects for which transboundary EIA was carried out, conducted consultations with other competent Lithuanian authorities and the developer regarding the necessity and scope of the post project analysis for INPP decommission projects. Even though the monitoring data at the INPP site and the region hasn't revealed any factors that may result in significant adverse transboundary impacts, aiming to ensure full transparency and cooperation and fully address the concerns of Belarusian authorities, it was agreed to carry out the post-project analysis for the Interim SF Storage Facility (B1 Project).

The elaboration of the content of the post-project analysis and its realisation was included in the revised INPP Decommissioning Inter-institutional Action Plan approved by Governmental resolution No. 1249 dated 7th of December 2016. The Plan foresees that the content for the post-project analysis program will be determined in 2017. the proposed content of the post project analysis was submitted to Belarus on 2 May 2017 for comments.

Article 7: Design and construction of facilities

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

(i) the design and construction of a spent fuel management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;

According to the rules existing at the time of the former Soviet Union, the wet SF storage facility was designed as a part of the Unit end 70ies, beginning 80ies. Within the last ten years, a number of measures which improved safety of the SF storage to the level required by modern standards of the Lithuanian Republic were implemented. The required safety level has been upgraded to fall within the limits of the SAR of INPP Units 1 and 2 as confirmed by the SAR for "wet" storage.

The existing dry SF storage facility was designed at the end of the 90ies and it meets all safety requirements. Design of the existing dry SF storage facility also contains a SAR which confirms that the radiological influence of storage on personnel, public and environment is limited to the prescribed limits (see Article 4).

The Technical Design and the Preliminary SAR for SNFSF - 2 were prepared by the Consortium and approved by Lithuanian authorities in August 2009. In the beginning of September 2009, the License for Construction of SNFSF - 2 was issued by VATESI and on 13th of September 2009 the Permission for Construction was issued. Currently (as of May 2017) the SNFSF - 2 is put into operation after successful hot trials completion and Final SAR approval by Lithuanian authoritative bodies.

(ii) at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a spent fuel management facility are taken into account;

The decommissioning issue of the SNFSF - 2 is considered in assessing the safety of the facility. The PSAR, produced before construction of facility, describes the concept of decommissioning of the facility. Engineering and organisational measures for decommissioning of the SNFSF - 2, retrievability of fuel after long-term storage, dismantling, decontamination, disposal of equipment

and storage casks, restoration of site are described in decommissioning plan, that shall be periodically reviewed and updated.

The Updated SAR presents a conceptual plan for decommissioning of a storage facility which includes Decommissioning options, decommissioning considerations and program to review and update decommissioning plan periodically.

(iii) the technologies incorporated in the design and construction of a spent fuel management facility are supported by experience, testing or analysis.

In accordance with the Technical Specification, the technologies incorporated in the design and construction of a SNFSF - 2 are supported by experience, tests and analyses from the company GNS (Germany) that has experience in commissioning of the existing INPP SF storage technology. The new proposed technologies were tested over pre-commissioning, commissioning testing ("Cold trial" and "Hot trial" testing) before industrial operation for SNFSF - 2.

Article 8: Assessment of safety of facilities

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

(i) before construction of a spent fuel management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;

Since it was not required to perform safety analysis at the moment of design of the INPP units, the assessment of wet storage facility safety was executed within the framework of the INPP Unit 1 license. The SAR for Unit1 was developed in 1999, was reviewed by a group of international experts and was adopted by VATESI as the basic document for licensing. The SAR for Unit 2 was reviewed by a group of Lithuanian and international experts in 2004 and adopted by VATESI as the basic document for licensing also. Later SAR for single unit operation was prepared and reviewed and a licence for operation of Unit 2 was updated.
Assessment of the safety of the existing dry SF storage facility was performed during the design process and was reviewed and approved in a coordinated as required by the Lithuanian legislation. As it was mentioned above, the final version of SNFSF - 2 Environmental impact assessment report was issued considering comments of the experts of the State Institutions of Lithuania, Latvia and Belarus. On the basis of the results of SNFSF - 2 EIA Report the Ministry of Environment of Lithuania on 30th November 2007 made the decision documented as No. (1-15)-D-8-10101 concluding that construction of a SNFSF - 2 is acceptable.
The Preliminary SAR (PSAR) of the SNFSF - 2 has been prepared by the consortium in accordance with standards applicable for the Lithuanian Republic.

The SNFSF - 2 Preliminary SAR was finally approved by Lithuanian authorities in August 2009.

(ii) before the operation of a spent fuel management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph(i).

The Updated SAR (USAR) was prepared and approved by Lithuanian authorities before the SNFSF - 2 commissioning.
Before start of the industrial operation of the SNFSF - 2 the Final SAR had been prepared based on the PSAR and USAR, taking into account construction and the results of pre-commissioning,

commissioning testing ("Cold trial" and "Hot trial" testing) and comments from Lithuanian authorities. The Final SAR was finally approved by Lithuanian authoritative bodies by May 2017.

Article 9: Operation of facilities

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

(i) the license to operate a spent fuel management facility is based upon appropriate assessments as specified in Article 8 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;

The wet SF storage facilities (storage pools near the reactor) are in operation from the date INPP Power Unit 1 was commissioned in December 1983. At that time it was not required to obtain a license for operation of the SF storage facility. Permission to operate was granted by the VATESI after reviewing all the procedures required to confirm safe operation, prior to commissioning. Also, all systems were tested prior to commissioning i.e. all characteristics of the systems to prove safe functioning. All such checks and tests were performed in accordance with special procedures co-ordinated by regulatory bodies responsible for safe operation of INPP. Licenses to operate the wet storage facilities at Units 1 and 2 were granted together with the licenses for operation of these Units.
Permission for operation of the SNFSF - 1 was also granted by the VATESI, upon successful "Cold trial" and "Hot trial" tests and after review of the appropriate documents and procedures necessary for commissioning. All systems and the proper and safe functioning thereof were tested in the same way as for the wet SF storage facility. Upon successful testing the license for operation of the dry storage facility was granted in 2000.
"Cold trial" tests of the SNFSF - 2, in accordance with approved SNFSF - 2 Commissioning Programme, were conducted in Q1-Q3 2016 under construction license of SNFSF -2 which had been issued by VATESI in 2009. VATESI issued operation license for SNFSF - 2 of INPP after approved report of "Cold Trial" tests in September 2016. "Hot trial" tests were conducted in Q4 2016-Q1 2017 in accordance with abovementioned SNFSF - 2 Commissioning Programme. Permission for commercial operation of SNFSF - 2 was issued by VATESI in May 2017 after approved report of "Hot trial" tests.

(ii) operational limits and conditions derived from tests, operational experience and the assessments, as specified in Article 8, are defined and revised as necessary;

The storage limits for SF in the SNFSF - 1 were described in the conditions of the license - 20 CASTOR and 78 CONSTOR casks. For the period from 2008-04-01 to 2009-02-25 the storage capacity was increased for up to 22 additional CONSTOR RBMK casks. At present (status date 2017-05-31) there are 20 CASTOR RBMK casks and 98 CONSTOR RBMK casks placed in the storage facility

The conditions of the SF are described in the license as follows:

- enrichment of isotope of uranium U-235 shall be no more than 2%;
- burn-up shall be no more than 20 MWd/ kg of uranium;
- the criteria for compacting SF assemblies is set such that the increase of activity of Cs - 137 in the water of container shall not exceed 5×10^{-6} Ci/kg;
- the minimum time for storage in the pools 5 years.

Operation limits and conditions (OLC) for SNFSF - 1 were established in their preliminary SAR as well as specified in updated SAR. OLC for SNFSF - 1 were indicated in SNFSF – 1 Operation Technical Regulation which have been approved by VATESI in Q4 2016.

(iii) operation, maintenance, monitoring, inspection and testing of a spent fuel management facility are conducted in accordance with established procedures;

The operation, maintenance, surveillance, inspection and testing of the wet storage facilities (SF pools) are performed in accordance with the procedures, that are part of the design documentation. During the period of operation of the storage pools there were no safety related incidents.
The operation of the SNFSF – 1 started in 2000 when the license was received.
Operation, maintenance, surveillance, inspection and test of the dry storage facility are performed in accordance with approved procedures.
Operation, maintenance, monitoring, inspection and testing procedures and instructions for SNFSF - 2 were approved by VATESI before issuing operation license in September 2016. Updated operation, maintenance, monitoring, inspection and testing procedures and instructions for SNFSF - 2, in accordance with completed SNFSF - 2 Commissioning Programme, were approved by VATESI before issuing permission for commercial operation of SNFSF - 2 in May 2017.

(iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a spent fuel management facility;
All activities related to safety in SFP are supervised by Nuclear safety department of INPP which provide engineering and technical support in the field of spent nuclear fuel handling. The group provides constant engineering support to the operation of the SF handling systems and is responsible for modification of the SF handling equipment and systems and the implementation of new projects.

(v) incidents significant to safety are reported in a timely manner by the holder of the license to the regulatory body;

INPP procedures concerning reporting are developed in accordance with Requirements for Notifying about Unusual Events at Nuclear Power Plants approved by VATESI and recommendations from IAEA were taken into account.
INPP managers, the VATESI inspector on duty and the local authorities of neighboring communities are informed by the Plant Shift Supervisor about events at INPP in accordance with the requirements of the "Instruction on Unusual Events Report".
Written reports about events will be prepared and send to VATESI and co-operating organizations by the Audit, Safety and Quality Management Division in accordance with the Instruction on Unusual Events Report at INPP. Written reports on events evaluated as level 2 or higher according to the INES scale, shall be sent to IAEA according to this procedure.
Written reports to the media, the public and local authorities are prepared and sent by the INPP Communications Division in accordance with the Procedure ("Instruction on Preparation and Transformation of Informational Reports on Operation and Unusual Events at INPP to Mass Media, Local Authorities, Ministries and Departments").
In case of accidents at INPP the information is transferred by the Emergency Preparedness Centre as required by the Management Procedure MS-2-008-1, "Emergency preparedness".

(vi) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;

Analysis and recording of INPP operational experience are performed in accordance with Requirements on the Operational Experience Feedback in the field of Nuclear Energy and Management Procedure MS-2-003-1 "Using operational experience" and with related working procedures.

Events used for the analysis are selected in accordance with the criteria as established in the Procedure "Instruction on unusual events analysis".
In accordance with this Procedure the Plant Shift Supervisor provides the preliminary information necessary for the analysis, prepares the shift report on the event and subsequently sends it to the Event Analysis Commission.

Event analysis is performed according to the ASSET methodology, by officially appointed commissions. The commissions perform a root cause analysis of the events, define corrective measures and prepare the report. The Manual for the International Scale of Nuclear Events INES Users of the IAEA, is used to evaluate the event impact on safety.
Reports of the events are distributed within the plant and externally, according to distribution criteria. The report distribution criteria are based on the importance for safety.
The Documents Management Division ensures the registration, distribution of the prepared reports within the plant, filing and control of the corrective measures in accordance with Management Procedure MS-2-002-1, "Management of documents and data records".
The Audit, Safety and Quality Management Division takes care of the distribution of external reports. Reports on events distributed externally undergo an independent review by the Audit, Safety and Quality Management Division in accordance with the Procedures "Instruction on unusual events analysis" and "Instruction on performance of periodical review of events at INPP".
Event reports are filed in the computerized archive system and information system for unusual events, which enables the possibility of a quick search for required information.

The Audit, Safety and Quality Management Division keeps a list of annual events that took place during the past year and which were selected for the analysis.
The Safety Surveillance Department performs a trend analysis and evaluation of causes of these events and informs the INPP Communications Division as required by the Procedure and Instruction for the performance of periodic review of events at INPP.
Once a month the Audit, Safety and Quality Management Division issues a report on review of events, that took place during this period in accordance with the Instruction for the performance of periodic review of events at INPP. Reports are sent to the plant managers, INPP departments and services and to the On-Site Division of VATESI.
Every month, the Audit, Safety and Quality Management Division forwards the list of events that took place during the past month to VATESI. The list of events for each calendar year and the results of the analysis of all these events are included in the Annual Report on INPP safety.

Programme of own and industrial experience evaluation

Evaluation and usage of operational experience are performed according to the Procedure "Instruction on Evaluation and Use of its Own and Industrial Experience".

All information on its own, as well as the industrial experience is forwarded to the Documents Management Division, which performs registration, reproduction and distribution of the documents, as well as feedback on the use of the operational experience.
A responsible co-ordinator for the usage of its own, as well as the industrial experience is appointed

within each division.
These divisional co-ordinators issue proposals on improvement as required by the Procedures "Instruction on Evaluation and Use of its Own and Industrial Experience" and "Instruction on the Work with INPP Employees Proposals", which will be submitted for approval to the division managers, where after they are forwarded to the Documents Management Divisiont Co-ordinator. Corrective measures and change proposals for the procedures and equipment are issued in accordance with Management Procedure MS-2-016-1 "Plant Modifications". Corrective measures requiring a change in procedures are issued in accordance with Management Procedure MS-2-002-1 "Management of Documents and Data Records".
The INPP Personnel Division incorporates information on its own and the industrial experience into the personnel training process and uses it to improve the training program as required by Management Procedure MS-2-014-1 "Personnel".

(vii) decommissioning plans for a spent fuel management facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body.

The plan for a dry storage facility decommissioning was part of the facility design and was approved in co-ordination with all institutions that participated in the design during the licensing of the facility. According to the existing legislation, a Final Decommissioning Plan for a SF management facility must be prepared 5 years before start of decommissioning, and can be updated as necessary.

Article 10: Disposal of spent fuel

If, pursuant to its own legislative and regulatory framework, a Contracting Party has designated spent fuel for disposal, the disposal of such spent fuel shall be in accordance with the obligations of Chapter 3 relating to the disposal of radioactive waste.

According National waste management programme the 3rd object is to ensure safety of spent nuclear fuel and long lived radioactive waste. For this object purpose the following measures are foreseen:
a) to plan installation of geological repository;
b) to choose the site for deep geological repository;
c) to develop the concept of deep geological repository, based on investigations and safety analysis;
d) to build up geological repository and to put in it all radioactive waste and long lived radioactive waste.

Initial studies on geological disposal possibilities of the SF were performed in 2004. The main objective was to demonstrate that in principle it is possible to implement a direct disposal of SF in Lithuania in a safe way. The objective does not imply that disposal of spent nuclear fuel will take place in Lithuania. Which option shall be used for the potential disposal of Lithuanian SF is to a large extent a political decision, and this investigation will be an important input to such decision once required.

Table G-1: Long – lived wastes to be disposed of in a geological repository

Waste	Estimates
SF, tons U	2394
Spent graphite, t	3843

Operational and decommissioning waste, t	5035
Spent sealed sources, (including Maišiagala inventory), m3	128

The following main conclusions were made during the studies:

1. Employing present technologies it would in principle be possible to dispose SF and other long-lived high level radioactive wastes into the repository built in the crystalline basement of Lithuania. Modelling of safety relevant radionuclide migration shows that doses to humans will not exceed the existing dose restrictions. Clays having very good confining properties are an alternative media to the crystalline basement.

2. The internationally agreed safety standards that ensure protection of human health and the environment have been applied. Despite a scientific evidence of achievable safety, the implementation of a geological disposal encounters difficulties because of lack of confidence from the politicians and the public.
It is intended to use several means to increase such confidence level:

- assessment and demonstration of performance of the geological repository and in-depth involvement of scientific community;
- systematic information of the public about technologies and safety of nuclear installations;
- use of experience from other countries.

SECTION H. SAFETY OF RADIOACTIVE WASTE MANAGEMENT

Article 11: General Safety Requirements

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

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

(i) ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed;

For managing low and intermediate level radioactive waste (LILW), sub-criticality and removal of heat do not represent a specific problem. It is prohibited by the Law on Nuclear Energy to reprocess SF as it is only high level waste (HLW) according to the waste categorization. The safety of SF management is covered by section G of the report. Nuclear Safety Requirements BSR-3.1.2-2010, Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Facilities states that radioactive waste shall be treated and conditioned in such a way that it complies with the waste acceptance criteria for disposal. The generic waste acceptance criteria for near surface disposal require that the fissile mass of the waste package shall be limited in such a way that it can be exempted from the transport requirements that apply to transport of fissile material "Regulations for the Safe Transport of Radioactive Material" from IAEA Safety Standards Series No. ST-1.

(ii) ensure that the generation of radioactive waste is kept to the minimum practicable;

One of the basic principles established by the Law on Radioactive Waste Management is that the generation of radioactive waste is kept to the practicable minimum. Nuclear Safety Requirements BSR-3.1.2-2010, Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Facilities requires reduction of waste through reduction of waste at the source of generation, authorized discharge of effluents by minimizing environmental pollution with radionuclides, reuse of equipment and materials and clearance of waste from regulatory control. Waste reduction at the source of generation shall be considered as the most efficient method and shall be implemented by the following:

- careful selection of materials, processes and equipment;
- containment and packaging of radioactive materials to retain integrity;
- decontamination of areas, premises, and equipment and prevention of the spread of contamination;
- detailed analysis of possibilities aiming at minimizing the production of secondary radioactive waste resulting from procedures being used, e.g. decontamination;
- avoidance of introduction of non-radioactive materials (e.g. packing materials) into controlled areas;
- avoidance of materials, decontamination of which is complicated (e.g. wood), in controlled areas.
- reduction of leakage from the main circulation circuit;
- keeping coolant impurity levels as low as practicable.
- used as clean coolant as possible.

(iii) take into account interdependencies among the different steps in radioactive waste management;

The waste management principle that interdependencies among the different steps in the radioactive waste management shall be taken into account is required by the Law on Radioactive Waste Management. Nuclear Safety Requirements BSR-3.1.2-2010, Regulation on the Pre-disposal Management of Radioactive Waste at the Nuclear Facilities. All the activities from the generation of the waste through to its disposal shall be seen as parts of the process, components of which shall be selected to be compatible with the each other.
Following requirements on the waste management are related to the waste management steps interdependencies principle:

- *Waste classification*. Solid waste classification scheme references to the disposal method of the particular waste class. Solid waste should be classified according to the treatment method applied at NPP in the following categories: combustible, non-combustible, compactable, non-compactable and non-treatable waste. Liquid radioactive waste shall be classified and segregated according to the chemical nature and the phase state.
- *Collection of waste.* Liquid waste shall be collected in suitable vessels according to the chemical and radiological characteristics and volume of the waste, and the handling and storage requirements. Solid waste shall be collected in proper containers according to the physical and radiological characteristics and volume of the waste, and the handling and storage requirements.
- *Waste processing.* The radioactive waste shall be treated and conditioned in a manner that will give reasonable assurance that the conditioned waste can be accepted for storage, transporting and disposal.
- *Storage.* Each storage facility should have the internal criteria for acceptance of radioactive waste packages for storage. The acceptance criteria for the storage facility shall reflect both the requirements for storage and the known or likely (interim) acceptance criteria for waste disposal.

(iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;

The protection of individuals, society and the environment against radiological hazards is ensured by the application of requirements established in the legislation (see section E). Operational radiation protection is described on Article 24.
According to the Law on Radioactive Waste Management, before the start of the construction of a radioactive waste management facility, a systematic safety assessment, and an assessment of a likely impact on individuals and the environment must be carried out in accordance with the Law on the Environmental Impact Assessment of Planned Economic Activity. The assessment must be appropriate to the hazard presented by the facility and cover its operating lifetime, for repositories including the post closure period. EIA documentation is produced in accordance with the Law on EIA of the Proposed Economic Activity of the Republic of Lithuania. During EIA potential environmental impacts are analysed and evaluated. Upon the examination of the EIA report, the conclusions of institutions participating in the EIA process and the evaluation of the motivated proposals by the public and the evaluation of comments of countries participating in transboundary EIA procedure, the competent authority (Ministry of Environment, from 2010 Environmental Protection Agency) adopts the justified decision regarding the feasibility to implement the planned activity at the chosen site.

The applicant for the construction license shall submit the SAR to the regulatory authorities. Before start of operation of a radioactive waste management facility, an updated and detailed version of the safety assessment must be prepared. According to the established requirements the SAR shall be periodically renewed.

(v) take into account the biological, chemical and other hazards that may be associated with radioactive waste management;

The radioactive waste management principle of protection against biological, chemical and other hazards that may be associated with radioactive waste management is established by the Law on Radioactive Waste Management. Radioactive waste shall be treated and conditioned in such a way that it complies with the waste acceptance criteria for disposal. Requirements established for disposal of radioactive waste requires that for environmental protection in the post-closure phase, the focus shall be on the protection of the environment from radioactive contaminants including such factors as the content of chemically or biologically toxic materials in the waste. Physical, chemical, and biological characteristics of packages must not put a repository in jeopardy. General waste acceptance criteria for near surface disposal require to consider the following waste properties in addition to properties related to radioactivity: chemical properties **(**chemical stability and confinement, chemical composition, pyrophoricity, ignitability, reactivity, corrosivity, explosiveness, chemical compatibility, gas generation, toxicity, decomposition of organic wastes), physical properties (permeability and porosity, homogeneity, voidage), mechanical properties (mechanical strength against external stresses, mechanical stability), thermal properties (fire resistance, freeze/thaw stability (take into account temperatures as low as –40^{o}C)).

(vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;
(vii) aim to avoid imposing undue burdens on future generations.

Law on Radioactive Waste Management states that management of radioactive waste must ensure that efforts are made to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation and to avoid imposing undue burdens on future generations. One of the overall objectives of waste disposal established by the Regulation on Disposal of Short Lived LILW, is to fully ensure long-term protection avoiding undue burden of unsolved issues (e.g. technical, financial, organizational or in terms of restriction of resource use) on future generations. A near surface repository shall be designed, constructed and closed to provide the safety of the waste over the long term. According to the existing requirements long term safety assessment shall be performed using the same safety criteria, which are applied at present. It shall be demonstrated that after the expiry of the post-closure surveillance the radiological consequences of events that might break the integrity of the repository and/or the capability of the repository to stem radionuclides will meet the requirements established.

Article 12: Existing Facilities and Past Practices

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

(i) the safety of any radioactive waste management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility;

(ii) the results of past practices in order to determine whether any intervention is needed for reasons of radiation protection bearing in mind that the reduction in detriment resulting from the reduction in dose should be sufficient to justify the harm and the costs, including the social costs, of the intervention.

Radioactive waste management facilities were designed as a constituent part of INPP Units at the end of 70s and at the beginning of 80s in accordance with the rules applicable at that time in the former Soviet Union. Safety of the radioactive waste management system at INPP was evaluated within the framework of licensing the INPP Unit 2 operation. The SAR of Unit 2 covered all radioactive waste management aspects, except the storage facilities for solid radioactive waste and bituminized waste, like emissions to the environment and the monitoring and management of solid, liquid and gaseous waste. In 2000 two SAR's were issued for the existing storage facilities of solid radioactive waste and bitumen compound as interim storage facilities. Objective of the reports were to justify safety of the storage facilities for 10 years. Later periodical safety review was performed.

The storage facility for institutional radioactive waste at Maišiagala was built in the 1960s following the regulations applicable at that time. In 2005, within the framework of international support, RATA prepared the SAR and the proposals for safety improvement. The radiological safety was improved by installing additional engineering barriers, consisting of double layer height density polyethylene membrane, grave and special drainage system made from concrete. RATA obtained license for Maišiagala storage facility in 2006.

During the last 10 years for the decommissioning needs of INPP few new RAW management facilities are constructed and operation already began and few of are under construction and at design stage. These facilities were licenced in accordance with national legislation.

A brief technical specification of all the facilities mentioned above is given in section D.

Currently, according to the Law on Management of Radioactive Waste, RATA is responsible for taking radioactive sources from small waste producers, when sources are declared as disused and considered as radioactive waste. From the moment of transfer of disused sealed source from small waste producer to RATA, RATA is taking responsibility to manage radioactive waste. RATA performs conditioning of institutional waste. The conditioned waste is transferred to INPP for intermediate storage. Before radioactive waste will be taken by RATA, managed and transported for long-term storage to INPP radioactive waste storage facility, radioactive waste is temporary stored in equipped temporary storage facilities (according to requirements of HN 89:2001 "Management of Radioactive Waste"). Compliance of temporary storage facilities with the requirements set out in the above mentioned document is controlled during regular inspections.
As mentioned in the National Report of Lithuania, Section F, the Hygiene Standard HN 89:2001 also establishes the requirements and possibilities for management of liquid, solid, gaseous radioactive waste and spent sealed sources.

Institutional waste, meeting the acceptance criteria for near-surface disposal, will be disposed in a near-surface repository. Other waste has to be disposed in a geological repository or a near surface repository.

Article 13: Siting of Proposed Facilities

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

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

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

The siting procedure for radioactive waste management facilities is the same as for SF management facilities. All issues are addressed in the Environmental Impact Assessment documentation. Description of the EIA procedure is given on Article 6 in section G.

Comprehensive Environmental Impact Assessments have been performed for construction of the new solid waste management and storage facilities, SF storage facility and near surface disposal facilities. Decisions regarding suitability of the sites for the proposed activities have been taken after evaluation of all relevant factors likely to affect the safety of such facilities during its operating lifetime as well as after closure. Impacts of the proposed facilities on individuals, society and the environment have been assessed and the information on the safety of such facilities has been made available to the public. Neighbouring countries Latvia and Belarus participated in the EIA process, participated in the international consultations.

Following the regulations of UNECE Convention on Environmental Impact Assessment in a Transboundary Context (Espoo), the assessment of transboundary environmental impact for construction of the Landfill Facility for Short-lived Very Low Level Waste was conducted. On 5 August 2009 Ministry of Environment made a positive decision regarding the feasibility to construct the Landfill Facility for Short-lived Very Low Level Waste on the chosen site. Main motives used as a basis when making a decision:
During INPP operation and decommissioning approximately 60000 m3 of short-lived very low level waste will be generated, due to this reason, if it is not properly managed, contamination of the environment with radioactive materials and negative impact on the health of the population due to the ionizing irradiation become possible.
Total radiological impact of the planned Landfill Facility for Short-lived Very Low Level Waste and other existing INPP and planned nuclear facilities on the environment and population will comply with the requirements established in the legal acts.
The buffer storage construction will facilitate the low level radioactive waste management and ensure the lower impact on the environment, since it will be possible to choose the most favorable

season for disposal of radioactive waste in the modules. One disposal operation will take only 1-2 months. After its completion it will be possible to introduce immediately the surface engineering barriers and ensure the long-term safety.
Transboundary EIA procedure according to Espoo Convention:
On the 30th July 2008 the Ministry of Environment informed the Republic of Latvia and the Republic of Belarus (Espo Convention countries) about the assessment of environmental impact of construction of the Landfill Facility for Short-lived Very Low Level Waste having provided the written information about the planned economic activity and having attached the Environmental Impact Assessment Programme in English and Russian languages for the Ministry of Environment of the Republic of Latvia and for the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus.
On the 15th September 2008 the Ministry of Environment of the Republic of Latvia announced that Latvia would participate in the process of environmental impact assessment and submitted the proposals regarding the Environmental Impact Assessment Programme where it was emphasized that during the environmental impact assessment for this project it is necessary to undertake a full-scale assessment of the impact of other INPP decommissioning and the new nuclear power plant construction projects and that it is necessary to develop the system for control and monitoring of the activity implementation.
On the 17th September 2008 the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus submitted the comments on the Environmental Impact Assessment Programme. The biggest part of comments and proposals is related to the assessment of the radiological impact on the population of the Republic of Belarus, possibility of the radionuclides transfer to the waters of the Republic of Belarus, engineering aspects of the activity.
On the 20th March 2009 the Ministry of Environment submitted to the specified countries the Environmental Impact Assessment Report which had been developed with due regard for the comments received from the countries. On request of Latvia the public of the Republic of Lithuania was familiarized with the Environmental Impact Assessment Report on the 22nd April 2009 in Daugavpils. Both countries did not submit any comments on the Environmental Impact Assessment Report.
EIA procedure implemented in accordance with international requirements for the construction of Landfill Facility for Short-Lived Very Low Level Waste was finished in the 5th of August 2009. Positive decision of the Ministry of Environment regarding the feasibility to construct the Landfill Facility for Short-Lived Very Low Level Waste was issued 2009-08-05 and in accordance with the Law on Environmental Impact Assessment is valid for 5 years. In July 2014, by INPP request, the Ministry of Natural Resources and Environmental Protection had permitted to extend the validity period of INPP Landfill Facility EIA for another 5 years.

In April of 2012 RATA has applied for prolongation of positive decision regarding the feasibility to construct the Near Surface Repository for Radioactive Waste. This Decision was issued in 2008 and in accordance with the Law on Environmental Impact Assessment was valid for 5 years. Environmental Protection Agency have agreed to prolong the decision for following 5 years.

The post project analysis described in Article 6 section G chapter 2 will be also carried for all radioactive waste management projects in which Belarus participated as affected Party (Solid Waste Retrieval Facility and Solid Waste Treatment and Storage Facility (B2/3/4 Project); Near Surface Repository for Low and Intermediate Level Short-Lived Radioactive Waste (B25 Project); Landfill Facility for Short-Lived Very Low Level Waste (B19 Project)). The elaboration of the content of the post-project analysis and its realisation was included in the revised INPP Decommissioning Inter-institutional Action Plan approved by Governmental resolution No. 1249 dated 7th of December 2016. The Plan foresees that the content for the post-project analysis program will be determined in 2017. The proposed content of the post project analysis was submitted to Belarus on 2 May 2017 for comments.

Article 14: Design and Construction of Facilities

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

the design and construction of a radioactive waste management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;

The new Radioactive Waste Management Facilities, mentioned in Section K, as the radioactive waste management modernization projects, shall be designed and constructed in compliance with Article 18 of Section 6 of the Law on Radioactive Waste Management and the requirements as established in approved regulatory documents (see Article 19 in Section E). The Technical Specification for design and construction of a new INPP RAW Management Facilities bind the Contractor to propose, in his tender, that the hazardous impact of such waste conditioning and storage technologies shall not exceed the limits set for personnel, public and the environment taking into account the existing limits valid at INPP.
Impacts on individuals, the society and the environment, including those from discharges or uncontrolled releases for the Cement Solidification, Storage Facilities and Landfill and Near surface repository have been evaluated in the EIA reports and Preliminary SARs, previous to the facilities' construction.

at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a radioactive waste management facility other than a disposal facility are taken into account;

The decommissioning issue of the radioactive waste management facility (RWMF) is considered in assessing the safety of the facility. The PSAR, produced before construction of facility, describes the concept of decommissioning of the facility. Engineering and organisational measures for decommissioning of the INPP RWMF, following the expiration of its operating lifetime, included into the scope of the project for the new facility. Decommissioning of existing and new facilities shall be in accordance with the INPP Final Decommissioning Plan. The existing RWMF and the Cement Solidification Facility for INPP decommissioning activities will be covered by the decommissioning projects within INPP.
The decommissioning of the Buffer Storage of the Landfill Facility is considered in Preliminary Safety Analysis Report. The PSAR, produced and agreed by regulatory bodies before construction of the facility, describes the concept of the facility decommissioning. Due to very low activity of the waste to be stored in the Buffer Storage, it is expected that the greater part of the equipment and structures will meet to free release criteria. The remaining part could be classified as very low-level radioactive waste and they could be disposed in the Landfill disposal.

at the design stage, technical provisions for the closure of a disposal facility are prepared;

According to the Regulation on Radioactive Waste Disposal Facilities, BSR-3.2.2-2016 (till 2017-05-01 – Regulation on Disposal of Low and Intermediate Level Short Lived Radioactive Waste, P-2002-02, and Regulation on Disposal of Very Low Level Radioactive Waste, P-2003-02), and in order to obtain a construction license for the repository, the applicant shall submit a general description of the closure of the repository. Hence, for the new disposal facilities a closure shall be considered at the design stage.
The technology of the Landfill Disposal closure is elaborated in the Technical design of the facility. Also, the monitoring system to control status of the Landfill Disposal barriers during post-

operational period is foreseen. In PSAR of the Landfill disposal the duration of post-operational (institutional) control is defined as 30 years for active and 70 years for passive control.
The closure of NSR is foreseen in the Technical design of the facility.

The existing Maišiagala storage facility for institutional waste is closed according to the typical project for such facility, but in 2011 a storage facility decommissioning plan was prepared. According to that plan waste will be retrieved from this facility and sent to INPP waste management facilities.

the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.

A Cement Solidification Facility for spent resins, perlite and evaporator concentrate sediments is designed based on worldwide experience. The cement solidification technology of liquid radioactive waste is one of the most advanced, well developed and practically proven technologies for waste conditioning. The technique of immobilizing radioactive waste in cement has been used in the nuclear industry and at nuclear research centers for more than 40 years.
The technical specification for design and construction of a new INPP RAW Management Facilities binds the contractor to tender, for such waste conditioning and storage practices that have already been licensed in some Western European countries or that are based on approved experience of industrial operation of the proposed facilities.
The concept of the Landfill Facility for Short-Lived Very Low Level Waste has been analyzed and proposed by Studsvik RadWaste AB on the basis of experience of design and operation of such facilities in Sweden.
The concept of the near surface repository for the short-lived LILW is developed on the basis of experience of design of similar facilities in other countries. The NSR design that is under preparation by a consortium, is based on the experience of disposal facilities of L`Aube Centre (France) or El Cabril (Spain),. The design is based on a clay embedded concrete cell construction protected by a top cover. The NSR is located above the groundwater table. According to the RATA Lithuanian clay should be used, based on their research. The top cover comprises layers with boulders/pebbles, sandy gravel and sand above the clay material. The NSR closure method will be based on a concrete lid and covering layers to be identified during the technical design phase, progressive closure could be possible. NSR covering layers and closure methodology will need to consider the unfavourable weather and geological conditions in Lithuania.

Article 15: Assessment of Safety of Facilities

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

(i) before construction of a radioactive waste management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;

Due to the fact that a separate safety analysis was not required at the time of designing INPP units, safety analysis of the existing INPP radioactive waste management facilities was performed within the framework of licensing INPP Unit 1 and Unit 2. Before the installation of the cement solidification facility for spent resins, perlite and evaporator concentrate sediments and construction of the storage facility for conditioned waste, the EIA report and the Preliminary SAR were produced and approved by the regulatory body. Safety assessment of the new INPP RWMSF

was performed in compliance with the normative standards of the Republic of Lithuania as foreseen in tender requirements for contract of the RWMSF project. The EIA Report and SAR for this project were approved by the state institutions of the Republic of Lithuania.

The EIA Report for the INPP Landfill Facility was developed and approved by the state institutions in compliance with the normative standards of the Republic of Lithuania. Decision of the Ministry of Environment on feasibility of construction of the Landfill Facility was issued on 05 August 2009. The Preliminary Safety Analysis Reports for the INPP Landfill Facility was approved by the regulatory body on 28 September 2009 for the Buffer Storage and on 23 December 2010 for the Landfill Disposal.

The EIA Report for the INPP Near surface repository was developed in 2007 and approved by the state institutions in compliance with the normative standards of the Republic of Lithuania.
The the EIA was presented in Visaginas (Lithuania) on 7 September of 2006, in Daugavpils (Latvia) on 12 December of 2006 and in Braslav (Belarus) on 21 December of 2006.
The NSR Project (B25) consists of two separate contracts B25-1 (repository design) and B25-2 (repository construction). Finish of III stage of B25-1 is foreseen in 2020-2021.
Engineering-geological research (characterization phase) completed in July, 2010. In August 2010, the soil research works were launched which will be used as the main repository's engineered protection barriers material. In December 2010, the outdoor works and laboratory studies related to the selection and testing of the clay for the future repository's barriers were completed. Hydrogeology research report of Sabatiškės was agreed with the Geological Service in February 2011. In May-September 2011 the outdoor works and laboratory studies of three types of clay proceeded. The report on the results of this research was agreed with Lithuanian Geological Service in May 2011.

The Contractor finished additional tectonic and seismic research works of Stabatiškės in December 2011. The research report was agreed with the Geological Service in December 2011. In August 2011 the contractor submitted a report in which main options and technical solutions of project implementation were presented in consideration of safety requirements, value, hydrogeological characteristics of the site, radiological characteristics of the waste, also experience of similar repositories operating in other countries. The report was approved by INPP in May 2012. The Basic Engineering Design (BED) was approved by INPP in June 2013. As of May 2017 Technical Design and PSAR are completed and the documentation for Stage 2 tendering is under preparation.

(ii) in addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following closure shall be carried out and the results evaluated against the criteria established by the regulatory body;

The selection of sites for the Landfill Facility for short-lived VLLW and for near surface repository for short-lived LILW was carried out. The safety assessment and the EIA's for the INPP Landfill and NSR, covering both operational and post closure periods, was developed in compliance with the normative standards of the Republic of Lithuania. EIA's for Landfill and NSR approved by the regulatory bodies. Safety assessment for Landfill already approved by the regulatory bodies, for NSR will be presented to regulatory bodies for approval on May 2015.

Design and construction of repositories shall be carried out according established requirements (see Article 11).

(iii) before the operation of a radioactive waste management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).

The Final SAR issued on the basis of the Preliminary SAR, subject to regulatory approval previous to issuing the operating license, and commissioning test results. This was done for the cement solidification facility and the storage facility for solidified waste, very low level waste storage facility, spent nuclear fuel facility, solid waste retrieval from buildings 155 and 155/1 and sorting facility of the retrieved waste. Final SAR's have to be prepared for the other waste management modernization projects before start of industrial operation.

Article 16: Operation of Facilities

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

(i) the license to operate a radioactive waste management facility is based upon appropriate assessments as specified in Article 15 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;

(ii) operational limits and conditions, derived from tests, operational experience and the assessments as specified in Article 15 are defined and revised as necessary;

(iii) operation, maintenance, monitoring, inspection and testing of a radioactive waste management facility are conducted in accordance with established procedures. For a disposal facility the results thus obtained shall be used to verify and to review the validity of assumptions made and to update the assessments as specified in Article 15 for the period after closure;

(iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a radioactive waste management facility;

(v) procedures for characterization and segregation of radioactive waste are applied;

(vi) incidents significant to safety are reported in a timely manner by the holder of the license to the regulatory body;

(vii) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;

(viii) decommissioning plans for a radioactive waste management facility other than a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body;

(ix) plans for the closure of a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility and are reviewed by the regulatory body.

Issuing licences, permits and temporary permits, setting forth their validity terms and supervision of licensed activities are one of the mechanisms of the state governance system for nuclear and radiation safety and physical security. The mechanism includes a regular safety assessment and assurance that safety complies with criteria and requirements provided for in the legal acts, and that activities are suspended once they become unsafe.

Before the operation of a radioactive waste management facility, licence holder and/or an applicant for the licence shall prepare and coordinated with VATESI a commissioning programme in the manner established by laws and other legal acts.
During the operation of a radioactive waste management facility:
1) the licence holder shall define and, as necessary, revise operational limits and conditions derived from tests, operational experience and the safety assessment;
2) operation, technical maintenance, control, inspection and testing of the radioactive waste management facility must be conducted in accordance with established procedures, norms, regulations and conditions of the licence. As regards a disposal facility, the assessment results derived in such manner shall be used to verify and review validity of assumptions during the preparation of safety assessments;
3) impact on individuals and the environment must be monitored;
4) radioactive waste must be segregated (sorted) in accordance with the approved procedures and its characteristics must be established, taking into account its physical and chemical properties that might affect safety of its management;
5) programmes to collect and analyse relevant operating experience must be established and implemented and, as necessary, appropriate measures must be taken to improve the operation of a facility on the basis of the obtained results;
6) the licence holder must notify VATESI in the manner and subject to the provisions of the legal acts about any incidents significant to safety of the radioactive waste management facility;
7) physical protection of a radioactive waste management facility must be ensured in accordance with the manner established by the Government or its authorised institution.

INPP SOLID RADIOACTIVE WASTE MANAGEMENT PRACTICES

Based on its activity level solid radioactive waste (SRW) is sorted in the SRW accumulation areas within the INPP controlled area. Waste of the respective group is loaded into the dedicated transport containers (for this group of waste) and transported to the SRW storage facilities. Waste is also sorted according to physical form into combustible and non-combustible. A standard registration certificate is issued for each filled waste container. Containers loaded with Group I and II waste (according to the old classification used for operational wastes) are weighed prior to being offloaded in the storage facility. The data for the waste from each individual container are entered into the electronic database and recorded on the registration certificate. The following data are entered:

- registration certificate number,
- accumulation point,
- date of dispatch,
- waste group,
- waste characteristic (combustible, non-combustible)
- container number,
- waste volume,
- waste weight;
- SRW dose rate,
- facility, canyon number for waste to be loaded,
- SRW nuclide composition.

For volume reduction, the combustible Group I waste is transported to INPP building 150, a compaction facility. The following waste is compacted: cotton waste, paper, personal protection means, overalls, rubber articles, filters with wooden casing, wood with the dimensions not exceeding 300x30 mm. The gamma-radiation dose rate of the compacted waste shall not exceed 0,3 mSv/h. Waste is accumulated in plastic bags, and once fully loaded, the bags are tied up to prevent waste scattering.

Sorting of waste and labelling of bags are performed at the place of accumulation. The final inspection and, if needed, the additional sorting is performed before loading the compacted waste into the transport containers.
Containers with compacted waste are transported to building 150 by motor vehicles. Compacted waste briquettes (volume of each ~ 1m^3, weight: 500 – 700 kg) are wrapped into film, registered and transported to facility 157/1 by motor vehicles (offloaded by crane and loaded into dedicated compartments).
All waste is separately loaded into the storage facility according to its activity. The combustible waste is loaded separately from non-combustible waste.
All waste is loaded into bulk compartments (except compacted).
Following the offloading of the SRW containers, the special motor vehicles and containers are checked on radiation contamination in building 159. In case, the radiation contamination level of motor vehicles and containers exceeds set limits, they will be decontaminated in building 159 by personnel from the Decontamination and Radioactive Waste Retrieval Department. Dosimetric control of the special motor vehicles and containers could be performed by the portable device at the point of their offloading at the facilities 157, 157/1, 155/1.
To monitor the presence of water being able to pump the water each compartment is equipped with a device of a 600 mm diameter pipe, perforated into the lower part. Water from compartments is pumped into the special sewage system and later treated in the INPP liquid radioactive waste treatment facility.
The combustible waste storage compartments are equipped with automatic fire detection and extinguishing systems switched to manual carbon dioxide supply mode.
The SRW is transported in compliance with procedures that are based on existing normative standards.
Since December 1988, the INPP started accepting spent sealed sources for storage. Until 20 December 2000, spent sealed sources were loaded into compartments of facilities 155/1, 157 and 157/1 together with other waste. Since October 2000, the spent sealed sources loaded into protective casks are put into dedicated containers depending on the dose rate and source type (α, β, γ) and are then stored in a dedicated compartment of building 157/1 separately from other radioactive waste.
Wastes of class “A” (by new classification) from decommissioning activities at present time are stored in buffer storage (project B19-1) of Landfill facility.

ACCOUNTING OF SOLID RADIOACTIVE WASTE

The accounting of SRW, stored in facilities 157, 157/1, 155, 155/1, is carried out individually for each facility and compartment in a special logbook and database according to the following indices:

- Activity groups,
- Waste volume m^3,
- Waste mass, kg,
- Waste type (combustible, non-combustible),
- Waste radionuclide composition.

Certificates of each waste batch (containers) are registered in the electronic database and special logbook and have the following data:

- Waste delivery date,
- Waste shipment point,
- Storage location (facility and compartment number),
- Waste volume (m^3),
- Waste mass (kg),

- Waste group,
- Waste radiation dose rate (mSv/h),
- Registration certificate number,
- Waste type (combustible, non-combustible),
- Surname of an official handing in waste,
- Surname of health physicist,
- Surname and signature of an official accepting waste for storage.

Prior to offloading the SRW into the storage facility, waste nuclide composition is measured by a gamma-spectrometer located in building 159, and waste is weighed on platform scales attached to the ceiling of facility 157/1. Data on waste radionuclide composition and weight are entered into the registration certificate and database.

Accounting of stored waste (volume, mass, total activity and activity of each nuclide) in the electronic database is performed monthly, quarterly and annually for each facility and each compartment.

The amount of compacted waste (bales) is also recorded in the electronic database, as well as on the registration certificates of compacted bales are archived.

The INPP's Decontamination Department draws up a report on the SRW being loaded into storage facilities indicating waste group, waste volume, waste mass and total activity on a quarterly basis by the 10th of the next month. Reports are submitted to the INPP's Production Engineering Division, the Radiation Protection Center and VATESI. Besides, the report on stored RAW is annually submitted to VATESI.

Upon the packages of wastes of class "A" arrival to the buffer storage facility (B19-1), identification number of packages, surface contamination and dose rate are checked. If the results do not exceed the limits established in the operation procedures, the package is accepted for activity measurement in characterization system of the Buffer Storage. During the measurement, a comparison of nuclide's activities in waste package with acceptance criteria established in the SAR is performed. In case of acceptance criteria are not exceeded the waste package is accepted for storage in the Buffer Storage and waste package passport is formed. In other case the waste package is returned for regrading. Results of activity measurements, as well as results of entrance checks and operations with the packages are registered in the B19 electronic data base. B19 database provides reports on quantity and activity of waste accepted for storage, quantity and activity of waste to be accepted for storage under condition that operational limits are not exceeded. B19 database can exchange data with INPP Decommissioning Management Database.

INPP LIQUID RADIOACTIVE WASTE MANAGEMENT PRACTICES

The liquid radioactive waste (LRW) at INPP is collected in special tanks, from where it is transferred to the evaporating facilities. The storage system for the LRW, residual distillation of evaporation units, spent ion exchange resin and filter-perlite is located in building 151/154. The LRW storage system includes the following: six tanks 1500 m^3 each, two tanks 5000 m^3 each, and ancillary equipment. The drainage water (DW) and emergency drainage water (EDW) are received from two units through common pipelines. The DW is stored in two tanks of 1500 m^3 each, the EDW are stored in two tanks of 5000 m^3 each. The sewage water of the washing facility and installation 159, due to presence of surface active material, are received through a separate pipeline, and stored in a 1500 m^3 tank and is periodically processed separately of the rest of drainage water, delivering unconditioned condensate into the DW and the EDW collection tanks. The pulp of spent ion-exchange resin and perlite is received from both units through different pipelines and is stored in two 1500 m^3 tanks under a sheet of water.

The residual distillation from evaporation units is stored in a 1500 m^3 tank, and it is periodically processed on bituminization facilities. Then, the bitumen compound is pumped into a special

storage (build. 158). The non-soluble admixtures, contained in the DW and the EDW, as well as in the sewage water of the washing facility are accumulated in the tanks to allow for time to form sediment.

The operation, maintenance, monitoring and testing are established and conducted in compliance with the standards and rules, as well as the internal operational manuals, procedures and instructions.

The safety of the facility shall be ensured and impact on personnel, the public and the environment shall be monitored during its operating lifetime. Throughout the operating lifetime is must therefore be ensured that personnel with relevant knowledge and experience is available to operate the facility.

The radioactive waste is sorted in compliance with the procedures currently existing at INPP, as described in the Radioactive Waste Management Practices above.

All data on events significant to safety are timely and in due manner reported to VATESI, the Ministry of Environment and the Radiation Protection Centre under the Ministry of Health of the Republic of Lithuania.

The information on operating experience of the radioactive waste management and the storage facilities is analyzed and applied for development of measures for upgrading operation within the overall the INPP Quality Assurance System.

Currently there are no disposal facilities in operation. As mentioned in item (iii) of Article 14, a general description of the closure of the repository is part of the submitted licensing documents for the construction license of the repository. Before the start of closure of operations, the operational licensee shall submit to VATESI, the Ministry of Environment and RPC a detailed closure plan and obtain an authorization for the execution thereof to VATESI, the Ministry of Environment and the RPC. Such detailed closure plan shall include: an updated safety assessment based on available pertinent data; the proposed procedures for decontamination, removing or sealing redundant structures, systems and equipment; details of the proposed closure method, including the materials and techniques to be used and its expected performance; a justification of the materials and techniques to be used, based on experience and analysis; types of the post-closure surveillance that should be put in place after closure has been completed and the ways of records keeping and management.

ACCOUNTING OF HAZARDOUS WASTE:

In accordance with INPP waste management procedures, the hazardous waste is accumulated, accounted and handed over to a special licensed company for further treatment. If the hazardous waste is contaminated, then radioactive waste management safety procedures cover the safety requirements for hazardous waste handling.

Article 17: Institutional Measures after Closure

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

(i) records of the location, design and inventory of that facility required by the regulatory body are preserved;

(ii) active or passive institutional controls such as monitoring or access restrictions are carried out, if required; and

(iii) if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary.

There are no closed disposal facilities in Lithuania.

SECTION I. TRANSBOUNDARY MOVEMENT

Article 27: Transboundary movement

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

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

The Law on the Management of Radioactive Waste, the Law on Radiation Protection, the Law on Nuclear Energy and the Law on Nuclear Safety establish the general provisions of export, transport within the country, transit of radioactive waste and spent nuclear fuel and the order of return of disused sealed sources. These laws prohibit transporting radioactive waste and spent nuclear fuel without the licence. The order of issuance of permits needed for transport of radioactive waste and spent nuclear fuel is established in the Rules of Radioactive Substances, Radioactive Waste and Spent Nuclear Fuel Import, Export, Transportation in Transit and Inside the Republic of Lithuania (hereinafter – Regulations). Requirements of above-mentioned laws, IAEA Regulations for the Safe Transport of Radioactive Materials, SSR-6 (2012), Council directive 92/3/Euratom, Council Regulation 1493/93/Euratom, Council Regulation 2006/117/Euratom, Commission Decision 93/552/Euratom, Commission Decision 2008/312/Euratom, Commission Recommendation 2009/527/Euratom and Council directive 2011/70/Euratom are transposed in the Regulations. After having the application from consignor for the authorization as regards the shipment, country competent authority send such application for approval to the competent authorities of the country of destination and of the country or countries of transit. If all transport conditions are met, the authorization (permit) is issued to the consignor of radioactive waste and the competent authorities of countries of destination and transit are notified by sending them the copy of the permit. The State Border Guard Service and Customs Department control that radioactive waste and SF is not transported out or transported into country without appropriate authorization (permit).

85 authorizations (permits) for the import, export, transit or transport within the country of radioactive materials and 21 authorizations (permits) for transportation of radioactive waste (disused sealed sources) within the country were issued during 2014-2016 in Republic of Lithuania (Fig. I-1).

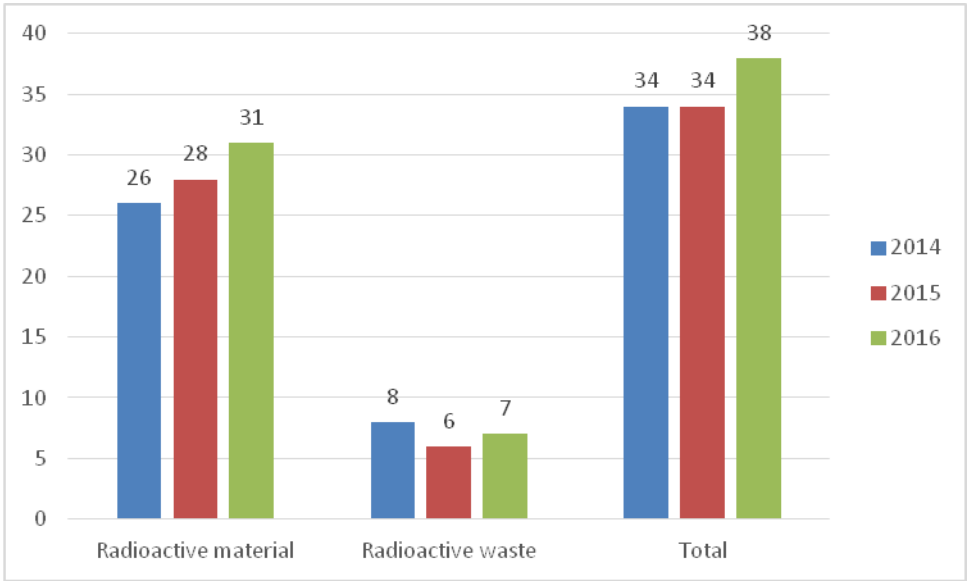

Fig. I-1. Authorizations (permits) issued for the import, export, transit or transport of radioactive materials and authorizations (permits) for transport of radioactive waste (disused sealed sources) within the country during 2014-2016

Specific attention is given to the management of disused sealed sources. With the aim at decreasing the amounts of radioactive waste in Lithuania, legal acts have established additional requirements for import of sealed sources into Lithuania. In such cases it is obligatory for licence holder to obtain a written commitment from the source provider to return the sealed source after its disuse and to contract the state enterprise Radioactive Waste Management Agency (RATA) for the management of source in a case, if due to arisen circumstances it would be impossible to return the source to the supplier, and to insure for the value equivalent to RATA services.

It is not allowed to import radioactive waste. It is possible only in case if source was produced in Lithuania and is being returned for final disposal. But at present there are no manufacturing or reprocessing practices here in Lithuania and consequently disused sealed sources are not imported.

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

Having regard the provisions of the Law on the Management of Radioactive Waste, the Law on the Nuclear Energy and the Law on Nuclear Safety, the radioactive waste shall be transported, exported or transported in transit in accordance with the provisions of the international agreements ratified by the Republic of Lithuania, other laws of the Republic of Lithuania and other legal acts regulating transportation of radioactive waste and spent nuclear fuel. It is allowed to transport, export, import and transit the radioactive waste and spent nuclear fuel only after notification of country of destination, and having received the approval of that country according to established order. These provisions are implemented by the Regulations. During the authorization process (issuing permits) for transport of radioactive waste, it is evaluated the compliance of shipment procedures with the Law on Carriage of Dangerous Goods by Car, Rail and Inland Waterway, IAEA Regulations for the Safe Transport of Radioactive Materials, SSR-6 (2012), IAEA TS-G-1.1 (2008), Council Regulation 1493/93/Euratom and other legislation, as well as:
1. during transport by road – A and B Technical Annexes of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR);
2. during transport by air – Annex 18 of the International Civil Aviation Convention of the International Civil Aviation Organization and DOC 9284-AN/905 „Technical Instructions for the Safe Transport of Dangerous Goods by Air“;

3. during transport by sea – the requirements of the International Maritime Dangerous Goods (IMDG) Code of the International Maritime Organization (IMO);
4. during transport by railway – the requirements of the Convention concerning International Carriage by Rail (COTIF) and Annex 2 „Regulations for Transport of Dangerous Goods" of the Agreement for Transport of International Goods of the Organization for Railways Cooperation (OSZhD).

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

According to provisions of the Law on the Management of Radioactive Waste, it is prohibited to import the radioactive waste and spent nuclear fuel into Lithuania, except the cases when radioactive waste is transported in transit or radioactive waste and spent nuclear fuel is returned to Lithuania as the country of origin. It is established in Lithuania the administrative and technical capacity needed to manage the SF or the radioactive waste in a manner consistent with this Convention.

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

According to provisions of the Law on the Management of Radioactive Waste, radioactive waste may be transported only to such states that have the administrative and technical capacity to receive it, as well as the regulatory and other structures, needed to manage radioactive waste in accordance with the Joint Convention on the Safety of SF Management and on the Safety of Radioactive Waste Management. It is ensured that radioactive waste and spent nuclear fuel is exported and transported in transit only after notification of the country of destination, and having received the approval of that country according to established order.

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

It is foreseen in the legal acts of the country, that consignor of radioactive waste and spent nuclear fuel shall take back the waste, if the shipment cannot be finished or if the conditions for the shipment are not fulfilled. Appropriate state authorities control that radioactive waste and spent nuclear fuel is returned to the holder in Lithuania and in cases, if the radioactive waste is shipped from the non EU Member State to the Republic of Lithuania, it is controlled that the consignee of the waste agrees with waste holder, who is in the country non EU Member State, on his responsibility to take back the waste, if it is not possible to carry out its shipment. Yet there were no such cases in the practice.

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

The provisions of the Law on the Management of Radioactive Waste foresee, that it is prohibited to export radioactive waste for disposal in sites lying south of 60 degrees latitude South.

SECTION J. DISUSED SEALED SOURCES

Article 28: Disused sealed sources

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

The basic requirements for management of disused sealed sources, as radioactive waste are established in Law on the Management of Radioactive Waste.

Detail requirements for small radioactive waste producers are set in Lithuanian Hygiene Standard HN 89:2001 "Management of Radioactive Waste" (2001) and other normative legal acts.

In Regulations of Licensing the Practices Involving Sources of Ionizing Radiation the requirement is set, that before the licence for practice with sources of ionizing radiation is issued, the plan for radioactive waste management must be provided for regulatory authority. In this plan the way and methods of radioactive waste management must be presented.

The licence holder, besides of other duties, must to return to the manufacturer or dispose disused or not suitable for the use sealed sources (also those, which after technical examination and evaluation of practices in which they are used, RPC requires to dispose) in terms, approved by RPC.

If there is no possibility to return disused sealed sources to the manufacturer, then disused sealed sources are transferred to Radioactive Waste Management Agency (RATA), which after appropriate treatment transports them to the INPP radioactive waste storage facility for storage and dispose in disposal facilities in future.

Before radioactive waste will be transported for disposal to INPP radioactive waste storage facility, radioactive waste is storied in temporary storage facilities equipped in special premises (HN 89:2001 "Management of Radioactive Waste").

Accordance of temporary storage facilities to the requirements set above is controlled during regularly inspections.

The data concerning all sources which are in use, or stored by users in Lithuania is collected and recorded in the State Register of Sources of Ionizing Radiation and Occupational Exposure. The safety of sources is supervised and controlled during regularly inspections.

The data regarding sealed sources which were in use in Lithuania in period of 2014-2016 are presented in figure J-1 below.

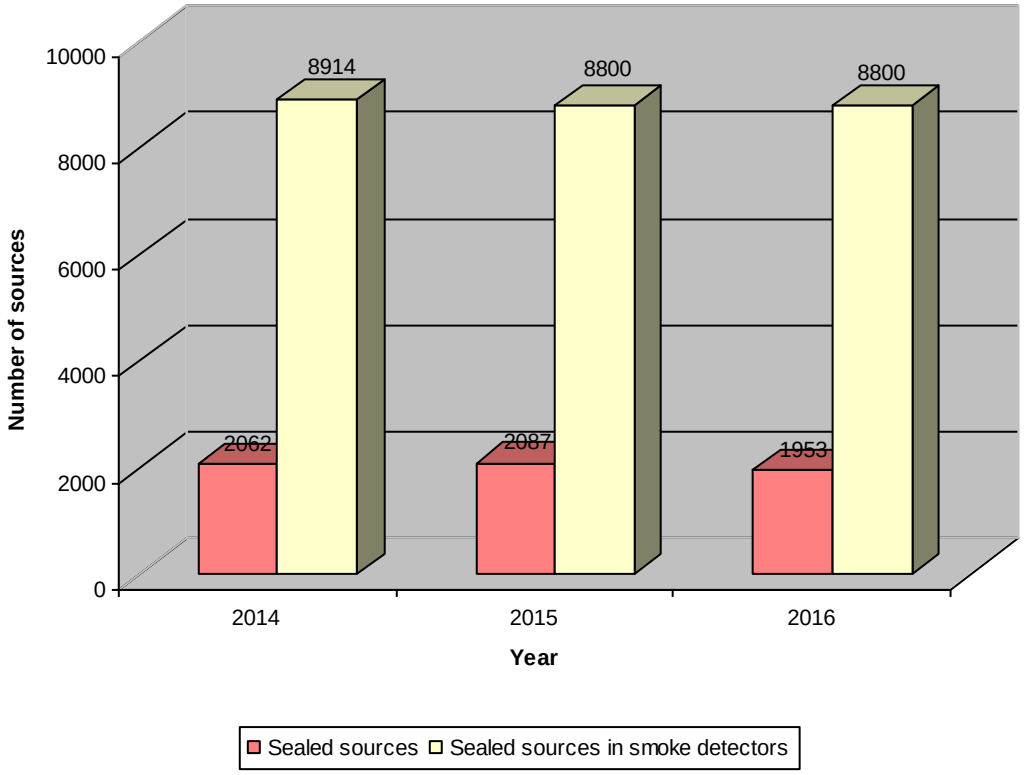

Figure J-1: Sealed radioactive sources, which were in use in Lithuania in period of 2014-2016

The actions, which shall be executed according to the received notification on found illegal, orphan source or material contaminated with radionuclides, are determined in the Government Resolution No. 280 On Approval of Rules on the Handling of Orphan Ionizing Radiation Sources, Substances of Orphan Nuclear Fuel Cycle, Orphan Nuclear and Fissile Substances and Objects Contaminated with Radionuclides (2005, last amended 2013).

As for example, 4 illegal sources were found in 2016 and 12 in the period of 2014-2016 and were managed as radioactive waste according the requirements of legal acts.

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

According to the Law on the Management of Radioactive Waste disused sealed sources may be returned into the Republic of Lithuania only in case if they are intended for the legal person who has manufactured them and who is authorized to receive and keep the disused sealed sources. However, there are no manufacturing or reprocessing practices here in Lithuania and consequently disused sealed sources are not exported and returned to Lithuania.

SECTION K. GENERAL EFFORTS TO IMPROVE SAFETY

Integrated Regulatory Review Service mission

From 18 to 29 April 2016 full scope Integrated Regulatory Review Service (IRRS) mission took place at the VATESI and Radiation Protection Centre (RSC) Headquarters in Vilnius. The IRRS mission has covered all civilian nuclear and radiation source facilities and activities regulated in Lithuania. The review compared the Lithuanian regulatory framework for safety against IAEA safety standards as the international benchmark for safety. The IRRS team carried out the review in the deferent areas including radioactive waste and SF management.

Before IRRS mission self-assessment of compliance of Lithuanian waste and SF management legal system to IAEA safety standards was performed. Number of possible improvements of legislation were identified, especially in waste disposal area. After self-assessment Lithuanian legislation was reviewed and new regulations approved, including identified improvements. As example, in comparison to the previous nuclear safety requirements related to radioactive waste repositories, new requirements cover all types of radioactive waste repositories (very low level, low and intermediate level and geological) to be constructed in Lithuania. More detailed requirements were introduced on: waste acceptance to the repositories, safety analysis, design, closure and supervision of closed radioactive waste repositories, also detailed requirements for site evaluation and commissioning of radioactive waste facilities were introduced which were not explicitly provided in previous regulation.

The IRRS team identified a number of good practices and made recommendations and suggestions that indicate where improvements are necessary or desirable to continue enhancing the effectiveness of regulatory functions in line with IAEA safety standards. Concerning waste and spent nuclear fuel management it was recommended to revise and improve legislation according results of self-assessment (already performed) and initiate amendment of the legal framework to ensure there are distinct steps for authorizing the closure of repositories (need for change of the Law on Radioactive Waste Management, change is planned). Lithuania follows these recommendations.

The report of (IRRS) mission to Republic of Lithuania is published VATESI official site: *www.vatesi.lt.*

INPP safety improvements

INPP continuous improves safety of the radioactive waste and SF handling.

The modernization of the radioactive waste handling system includes the change to a new classification, compliant with international standards, and the operation of solid radioactive waste storage and processing facilities in 2018. The content of the project for new solid radioactive waste storage and management facility, a retrieval facility (to retrieve waste from the existing storage) and the solid radioactive waste treatment facility, which scope includes facilities for:

- receipt of retrieved solid radioactive waste (SRW);
- sorting;
- fragmentation;
- compaction of combustible low level SRW;
- combustion of combustible medium and low level waste;
- super-compaction of medium and low level waste;
- compacting in containers;
- cementation;
- decontamination of transport containers;
- measurement and accounting;
- transport system;

- interim storage for the SRW bales;
- management of INPP decommissioning waste.

Radioactive waste processing facilities and modular design storage facilities are currently under construction with the storage capacity of one module of 2500 m^3 for treated short-lived waste (in to be disposed containers) and 2000 m^3 for long-lived waste (in storage containers).

The other radioactive waste management modernization projects, currently under implementation or recently implemented are:

- SNFSF - 2 is put in operation at INPP in May 2017. It will store the rest of the SF (beyond the SF already being stored at the SNFSF - 1 commissioned in February 2000).
- Additional investigations shall be performed and a decision shall be taken whether the bituminized radioactive waste storage facility could be converted into a repository or not. Depending on the decision, the bituminized radioactive waste storage facility shall be licensed as a repository or the bituminized waste shall be retrieved and enclosed into suitable containers as required for storage, transport and disposal in the near surface repository.
- Decision about irradiated graphite interim storage will be made in the near future (during the envisaged designing and licensing phase of the project 2103 to be performed by Contractor). Preliminarily, two principal options were considered at INPP: construction of new storage facility to store irradiated graphite only and storage of irradiated graphite in building 158/2.

Disposal Facilities

It is planned to construct a disposal facility for VLLW (Landfill) and a disposal facility for short lived LILW (Near Surface Repository).

The scope of the project for the Landfill Facility for short lived VLLW includes Buffer Storage (project B19-1) for waste awaiting landfill disposal (with capacity of about 4000 m^3 of packaged waste) and 3 Landfill disposal modules (project B19-2) (each module has capacity of 20000 m^3 of packaged waste or 60000m^3 total capacity of Landfill facility).

The Buffer Storage (project B19-1) has been constructed and commissioned in 2013.

Construction and commissioning of the Landfill disposal modules are planned under separate contract in 2018. Carrying out of the first waste disposal campaign is planned in 2018.

TDD and PSAR of the near surface repository (NSR) for short-lived LILW were prepared in 2015. NSR at Stabatiškė site will be a hill-type construction located above the ground water with reinforced concrete vaults and engineered low-permeable barriers. Safety of the disposed waste should be ensured by a multiple barrier system as follows: the waste matrix, waste packaging or container, concrete vault and surrounding low permeable clay as well as the natural barrier.

Volume of conditioned waste to be disposed in NSR is 100,000 m^3. However, the planned repository is a modular type facility, therefore it should be easy to adapt for other disposal volumes by reducing or increasing the number of vaults. As waste disposal in the NSR occurs over a long period of time, for practical and financial reasons the disposal vaults will be built section by section to keep up with the disposal rate. Disposal rate is 2 vaults per year.
The disposal rates should be based on quantity of conditioned operational and decommissioning waste placed in the waste packages stored in the interim storage facilities at INPP.
The NSR should meet following criteria:

- Waste emplacement: fully automatic and manual.
- Design life time of the disposal vaults, sealing and water drainage system: 300 years.
- Passive post-operational safety system.

- Active institutional control: not less 100 years.
- Passive institutional control: not less 200 years.
- Design life time of storage and other auxiliary buildings: 30 years.

The near surface repository will increase safety in the region. It will be built by using the best experience that exists in the world and accumulated during operation equivalent repositories in other countries such as Sweden, France, and Spain.

Tendering, construction and commissioning of first group of NSR disposal vaults are planned in2021-2023.

Challenges identified for Lithuania during the fifth Review Meeting

There were two challenges identified for Lithuania during the fifth Review Meeting:

- Decommissioning of INPP and implementation of waste treatment and disposal facilities.

Information on implementation status of all radioactive waste and decommissioning projects is provided in Section D. Inventories and Lists.

- Maintaining investigation program on final solution of spent nuclear fuel and other long lived radioactive waste.

In the Radioactive Waste Management Development Programme (2015), a task to ensure sustainable management and long-term safety of SF and long-lived radioactive waste is set. In the Programme, it is stated that the storage of spent nuclear fuel and radioactive waste is only a temporary solution, SF and long-lived radioactive waste must eventually be disposed in a geological repository. Taking into account this statement, four measures for the implementation of the abovementioned task are formulated:

a) planning of the installation of the deep geological repository. The geological repository will be needed before the end of the spent nuclear fuel and long-lived radioactive waste storage period (2050–2067). Therefore, in 2015–2017, a repository development project including implementation timetable, preliminary research and repository design, construction and operation will be developed.

b) selection of the location for the deep geological repository. Selection of suitable geological formations and investigation of the repository environment will be included in the site selection programme. The main repository site selection stages are: site selection process planning (2016–2017), detailed research to choose several regions of interest (2019–2022), detailed characterization (2022–2030) and site approval phase (2030–2033). The final stage will include an environmental impact assessment and a comparative analysis of the alternative sites. The specific location will be selected according to technical, social and economic conditions. Repository site should be selected by 2033.

c) development of the concept of the deep geological repository based on appropriate studies and safety analysis. The concept of the repository will be developed gradually and in coordination with the site selection process, making sure that safety requirements are met. Upon the completion of each site selection stage, the concept will be updated and the repository installation price adjustment carried out. The Lithuanian geological repository concept will be developed in 2032.

d) building and commissioning of the deep geological repository and disposal of spent nuclear fuel and long-lived radioactive waste. The construction of the repository will start in 2039, following a technical design expertise and safety justification. The construction and commissioning of the repository will be completed in 2066. Spent nuclear fuel and long-lived radioactive waste should be disposed of in the deep geological repository before the end of 2072.

For the implementation of these measures, progress assessment criteria, targets, responsible institutions and needed funds are described in the Programme.

Currently, main implementer of the Programme measures dedicated to the deep geological repository is RATA. RATA working on the preparation of The Deep Geological Repository Development Project, developing draft proposal on the possible financing mechanism for the final

disposal (deep geological disposal) of spent nuclear fuel and high level radioactive waste, preparing and implementing measures for the communication with public for the deep geological repository project. RATA activities related to the development of deep geological disposal currently are funded from two sources: National decommissioning fund and State budget."

In 2001-2013here has been done the study of possibilities to implement a geological repository In Lithuania.

SECTION L. ANNEXES

Annexe 1: Summary of major changes in the area of spent fuel and radioactive waste management in Lithuania since the presentation of the last Report

1. The amendments of the Law on Radioactive Waste Management of 2014 reflected the transposition of the requirements of the Council Directive 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of SF and radioactive waste. The amendment of the Law has triggered the preparation of the new Radioactive Waste Management Development Programme which was adopted on 23 December 2015 by the Government of the Republic of Lithuania Resolution No 1427. The new Radioactive Waste Management Development Programme defines the general objectives of radioactive waste management and the steps of their fulfilment, each including conceptions and technical solutions, description of all radioactive waste and calculation of quantities, scientific research, development activities, division of responsibilities and main progress indicators, financial resources, public communication.
2. Technical Design and PSAR of Near Surface Repository (Facility B25) were finally approved by May 2017.
3. The validity term of EIA for Landfill Disposal (Facility B19-1/B19-2) was EIA extended by Ministry of to the next 5 years (i.e., until 2019).
4. The SNFSF - 2 (Facility B1) is put into operation (after successful hot commissioning trials conduction and Final SAR approval by Lithuanian authoritative bodies) in May 2017.
5. Solid Waste Retrieval Facility (SWRF, or Facility B2) construction works had been entirely completed by the Contractor. On June 9, 2017 the B2 hot trials have started. After completion of hot trials the Final SAR will be prepared and agreed with VATESI. The SWRF is scheduled to be commissioned in 2018.
6. New solid radioactive waste (SRW) treatment and storage facility (B3/4) is erected as directed by Technical Design and SAR (approved by Lithuanian authorities in November 2008). Currently the SRW treatment and storage facility is under preparation for hot commissioning trials. It is scheduled to be put it in operation in 2018.
7. The task of irradiated graphite (i.e., graphite sleeves, rods and stack's bricks to be retrieved from the core from the core during zones R1/R2/R3 dismantling) management before its final disposal was transferred to the scope of the project 2103.
8. Additional decontamination equipment is being procured and installed at the radioactive waste initial treatment points (which are being organized in building A1 and in auxiliary building 130/2) in order to enhance INPP Unit 1 and Unit 2 D&D projects in their capacities for initial treatment of the coming out waste streams.
9. Data on quantity of all radioactive waste in existing storage facilities was updated. See section L Annexe 2.

Annex 2. Inventory of radioactive waste in Lithuania

The volume of the waste from small producers is only about 1-2 m^3 per year, so more than 99% of radioactive waste in Lithuania is produced at INPP. Inventory of the Maišiagala storage facility is presented in Section F, *iv),* c). Inventory for INPP is presented in the tables below:

Table L-1: Solid radioactive waste at INPP in volume (SF not included)

Solid radioactive waste, 2017 January 1 at INPP						
Type of waste	1 group combustible	1 group non-combustible	2 group combustible	2 group non-combustible	3 group	Total volume
Volume of the waste (m^3)	11 865	8 797	2 252	3 072	914	26 900

Inventory of solid radioactive waste in deferent storage facilities at INPP

Table L-2: Building 155: Group 1 Combustible Waste

Outer dimensions:	Width 22, length 37, height 4.45 m
Walls:	620 mm concrete + 4 mm carbon steel lining
Compartments:	1
Capacity:	2 400 m^3
Contents:	2 400 m^3 Group 1, combustible waste
Status:	Full, date of closure 6/1990
SSSs:	Yes
Remarks:	Sand (685 m^3, 960 tons)

Table L-3: Building 155/1: Group 1 Combustible Waste

Outer dimensions:	Width 22, length 31, height 4.24 m
Walls:	720 mm concrete + 4 mm carbon steel lining
Compartments:	3
Capacity:	2 400 m^3
Contents:	2 400 m^3 Group 1, combustible waste
Status:	Full, date of closures: Compartment 1: 2/1991 Compartment 2: 6/1993 Compartment 3: 1/1999
SSSs:	In compartments 1 & 2
Remarks:	286 bales in comp. 3

Table L-4: Building 157: Group 1, 2 & 3 Solid Waste (excl. comp. 1 & 4)

Outer dimensions:	width 28.6, length 32, height 9.7 m
Walls:	600 mm concrete
Compartments:	15
Capacity:	6 790 m^3
Contents:	Group 1 Combustible: 2 340 m^3 Group 1 Non-combustible: 940 m^3 Group 2 Combustible: 1 170 m^3 Group 2 Non-combustible: 960 m^3 Group 3 Non-combustible: 907 m^3
Status:	Full (excl. comp. 1 & 4), date of closures: 4/1987 – 9/1989
SSSs:	In compartments 1, 4, 5, 6, 8, 11, 13
Remarks:	Metallic waste is mixed with combustible waste in compartments 8 and 11 (see Chapter A4.5.2.1)
Compartments 1 & 4; Group 3 Waste	
Outer dimensions:	Width 16, length 12, height 10.7 m
Walls:	1 m concrete (roof 1.4 m)
Capacity:	Compartment 1: 695 m^3 Compartment 4: 685 m^3
Contents:	Compartment 1: 259 m^3 Compartment 4: 648 m^3
Status:	In operation
SSSs:	In both compartments

Table L-5: Building 157/1: Group 1 & 2 Solid Waste and SSS's

Outer dimensions:	Width 28.6, length 82, height 9.7 m
Walls:	700 mm concrete
Compartments:	Group 1 & 2 Solid Waste: 28 Spent Sealed Sources: 1
Capacity:	17 340 m^3
Contents:	Group 1 Combustible: 4557 m^3 Group 1 Non-combustible: 7713 m^3 Group 2 Combustible: 1075 m^3 Group 2 Non-combustible: 2054 m^3 Spent Sealed Sources
Status:	Full: Compartments 1 – 8, 9 – 16, 18/1, 18/2, 19/1, 20/1, date of closure 6/1992 – 8/2013 In operation: Compartments 17, 18/3, 19/2, 20/3, 21/1, 21/2 Empty: Compartments 20/2, 20/3, 21/3
SSSs:	In compartments 10 – 14, 16 & 18/3
Compartment 18/3; Spent Sealed Sources	
Outer dimensions:	Width 5.2, length 9.4, height 9.7 m
Walls:	700 mm concrete
Capacity:	380 m^3
Contents:	260 containers with SSS's (62949 pieces) 26 containers with 101 pieces Long Lived nuclides
Status:	In operation

Quantity and characteristics of waste stored in building 155
Table L-6

FACILITY STATUS	Full (6/1990)													
AVERAGE WASTE AGE	17.7 y													
WASTE CLASSIFICATION	**Radiological** Group 1		**Physical** Combustible		**Waste Form** In bulk									
WASTE VOLUME	2 400 m^3													
WASTE MASS	708 tons													
	Combustible					**Non-combustible**								
PHYSICAL COMPOSITION (In % vol.)	**Cloth**	**Wood**	**Filters**	**PVC**	**Other**	**Metal**	**Construction Materials**	**Thermal Insulation**	**Graphite**	**Cables, Casings**	**Sediments**	**Other**		
	40 – 50%	15 – 20%	15 – 20%	15 – 20%	No	No	No	No	No	No	Yes[1]	Yes[2]		
GENERAL RADIOLOGICAL PROPERTIES	**Total Activity**		**Specific Activity**			**Surface Dose Rate [3]**								
	3.11E13 Bq		4.40E10 Bq/t		1.30E10 Bq/m^3	< 0.3 mSv/h								
RADIONUCLIDE	^{60}Co [4]	^{137}Cs [4]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
COMPOSITION	1.9E12	2.6E13	6.2E10	9.6E7	1.5E11	1.3E10	2.9E12	2.5E10	1.3E8	8.6E8	5.5E8	1.6E8	3.6E8	2.91E10
RELEVANT COMMENTS	[1] Sand used to extinguish fire. Amount 685 m^3 960 tons. Loaded in two stages, 345 m^3 during first stage and 340 m^3 during second. In between the storage was filled with additional waste. Sand is not included in the physical waste composition presented above. [2] Spent Sealed Sources: 92 sources in 20 packages (shielded containers, metal boxes, plastic box, drum) [3] At the time of waste production [4] Radionuclides used as scaling factor in evaluation of other nuclides													

Table L-7 Quantity and characteristics of waste stored in building 155/1

FACILITY STATUS	**Comp. 1** Full (2/1991)		**Comp. 2** Full (6/1993)		**Comp. 3** Full (1/1999)									
AVERAGE WASTE AGE	**Comp. 1** 23 y		**Comp. 2** 21 y		**Comp. 3** 15 y									
WASTE CLASSIFICATION	**Radiological** Group 1		**Physical** Combustible		**Waste Form** In bulk, comp. 3 bales									
WASTE VOLUME **WASTE MASS**	**Comp. 1** 1050 m^3 310 tons		**Comp. 2** 1050 m^3 310 tons		**Comp. 3** 300 m^3 (286 bales, 20 m^3 in bulk) 205 tons									
PHYSICAL COMPOSITION (In % vol.)	**Combustible** **Cloth** 40 – 50 %	**Wood** 15 – 20%	**Filters** 15 – 20 %	**PVC** 15 – 20 %	**Other** No	**Metal** No	**Non-combustible** **Construction Materials** No	**Thermal Insulation** No	**Graphite** No	**Cables, Casings** No	**Sediments** No	**Other** Yes[1]		
GENERAL RADIOLOGICAL PROPERTIES	**Total Activity**		**Specific Activity**			**Surface Dose Rate [2]**								
	Comp. 1	1.02E13 Bq	3.31E10 Bq/t		9.76E9 Bq/m^3	< 0.3 mSv/h								
	Comp. 2	1.05E13 Bq	3.38E10 Bq/t		9.98E9 Bq/m^3	< 0.3 mSv/h								
	Comp. 3	1.96E10 Bq	9.56E7 Bq/t		6.53E7 Bq/m^3	< 0.3 mSv/h								
RADIONUCLIDE COMPOSITION	^{60}Co [3]	^{137}Cs [3]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 1	7.2E11	8.7E12	1.5E10	3.4E7	5.2E10	3.2E9	7.2E11	6.1E9	4.0E7	2.7E8	1.8E8	5.0E7	1.1E8	1.0E10
Comp. 2	8.2E11	8.9E12	1.4E10	3.5E7	5.3E10	2.9E9	6.6E11	5.6E9	3.9E7	2.6E8	1.8E8	4.9E7	1.1E8	1.1E10
Comp. 3	1.6E9	1.7E10	1.4E7	7.3E4	1.0E8	3.0E6	6.9E8	5.6E6	6.7E4	4.6E5	3.2E5	8.5E4	1.9E5	2.4E7
RELEVANT COMMENTS	[1] Spent Sealed Sources: Compartment 1: >100 packages Compartment 2: 4 packages [2] At the time of waste production [3] Radionuclides used as scaling factor in evaluation of other nuclides													

Table L-8 Quantity and characteristics of waste stored in building 157, compartments 9 and 11 – 15

FACILITY STATUS	**Comp. 9** Full (8/1987)	**Comp. 11** Full (8/1988)	**Comp. 12** Full (9/1988)	**Comp. 13** Full (8/1989)	**Comp. 14** Full (7/1989)	**Comp. 15** Full (2/1988)							
AVERAGE WASTE AGE	**Comp. 9** 27 y	**Comp. 11** 26 y	**Comp. 12** 26 y	**Comp. 13** 25 y	**Comp. 14** 25 y	**Comp. 15** 26 y							
WASTE CLASSIFICATION	**Radiological** Group 1	**Physical** Combustible	**Waste Form** In bulk										
	Comp. 9	**Comp.** 11	**Comp. 12**	**Comp. 13**	**Comp. 14**	**Comp. 15**							
WASTE VOLUME	390 m^3	390 m^3	390 m^3	390 m^3	390 m^3	390 m^3							
WASTE MASS	117 tons	117 tons	118 tons	117 tons	118 tons	120 tons							
	Combustible					**Non-combustible**							
PHYSICAL COMPOSITION (In % vol.)	**Cloth**	**Wood**	**Filters**	**PVC**	**Other**	**Metal**	**Construction Materials**	**Thermal Insulation**	**Graphite**	**Cables, Casings**	**Sediments**	**Other**	
	40 – 50 %	15 – 20%	15 – 20 %	15 – 20 %	No	Yes [1]	No	No	No	No	No	Yes[2]	
GENERAL RADIOLOGICAL PROPERTIES		**Total Activity**		**Specific Activity**		**Surface Dose Rate [3]**							
	Comp. 9	2.93E12 Bq		2.51E10 Bq/t	7.52E9 Bq/m^3	<0.3 mSv/h							
	Comp. 11	3.02E12 Bq		2.58E10 Bq/t	7.75E9 Bq/m^3	<0.3 mSv/h							
	Comp. 12	3.02E12 Bq		2.56E10 Bq/t	7.74E9 Bq/m^3	<0.3 mSv/h							
	Comp. 13	3.03E12 Bq		2.59E10 Bq/t	7.77E9 Bq/m^3	<0.3 mSv/h							
	Comp. 14	3.05E12 Bq		2.58E10 Bq/t	7.82E9 Bq/m^3	<0.3 mSv/h							
	Comp. 15	2.97E12 Bq		2.47E10 Bq/t	7.61E9 Bq/m^3	<0.3 mSv/h							
RADIONUCLIDE COMPOSITION	^{60}Co [4]	^{137}Cs [4]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 9	1.5E11	2.5E12	5.0E9	9.3E6	1.5E10	1.1E9	2.3E11	2.0E9	1.2E7	8.3E7	5.4E7	1.6E7	3.5E7	2.8E9
Comp. 11	1.8E11	2.6E12	4.9E9	9.7E6	1.5E10	1.0E9	2.3E11	2.0E9	1.2E7	8.3E7	5.4E7	1.6E7	3.5E7	2.9E9
Comp. 12	1.8E11	2.6E12	4.9E9	9.7E6	1.5E10	1.0E9	2.3E11	2.0E9	1.2E7	8.3E7	5.4E7	1.6E7	3.5E7	2.9E9
Comp. 13	1.9E11	2.6E12	4.8E9	9.8E6	1.5E10	1.0E9	2.3E11	2.0E9	1.2E7	8.2E7	5.3E7	1.5E7	3.4E7	3.0E9
Comp. 14	1.9E11	2.6E12	4.8E9	9.9E6	1.5E10	1.0E9	2.2E11	1.9E9	1.2E7	8.3E7	5.4E7	1.5E7	3.5E7	3.0E9
Comp. 15	1.6E11	2.5E12	5.0E9	9.4E6	1.5E10	1.1E9	2.3E11	2.0E9	1.2E7	8.3E7	5.4E7	1.6E7	3.5E7	2.8E9
RELEVANT COMMENTS	[1] Parts of decommissioned Emergency Cooling System: Compartment 11 [2] Spent Sealed Sources: At least 2 packages in compartment 13 [3] At the time of waste production [4] Radionuclides used as scaling factor in evaluation of other nuclides												

Table L-9 Quantity and characteristics of waste stored in building 157, compartments 7, 8 and 10

FACILITY STATUS	**Comp. 7** Full (6/1989)		**Comp. 8** Full (3/1988)		**Comp. 10** Full (9/1989)									
AVERAGE WASTE AGE	**Comp. 7** 25y		**Comp. 8** 26 y		**Comp. 10** 25 y									
WASTE CLASSIFICATION	**Radiological** Group 2		**Physical** Combustible		**Waste Form** In bulk									
WASTE VOLUME	**Comp. 7** 390 m^3		**Comp. 8** 390 m^3		**Comp. 10** 390 m^3									
WASTE MASS	98 tons		100 tons		98 tons									
PHYSICAL COMPOSITION (In % vol.)	**Combustible** **Cloth** 25 %	**Wood** 40 %	**Filters** 10 – 15 %	**PVC** 15 – 20 %	**Other** No	**Non-combustible** **Metal** Yes [1]	**Construction Materials** No	**Thermal Insulation** No	**Graphite** No	**Cables, Casings** No	**Sediments** Yes	**Other** Yes[2]		
GENERAL RADIOLOGICAL PROPERTIES		**Total Activity**		**Specific Activity**			**Surface Dose Rate [3]**							
	Comp. 7	1.21E13 Bq		1.24E11 Bq/t	3.10E10 Bq/m^3		0.3 – 10 mSv/h							
	Comp. 8	1.16E13 Bq		1.16E11 Bq/t	2.98E10 Bq/m^3		0.3 – 10 mSv/h							
	Comp. 10	1.19E13 Bq		1.22E11 Bq/t	3.06E10 Bq/m^3		0.3 – 10 mSv/h							
RADIONUCLIDE COMPOSITION	^{60}Co [4]	^{137}Cs [4]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 7	1.4E12	8.9E12	3.6E10	3.4E7	5.3E10	7.6E9	1.7E12	1.4E10	4.2E7	2.8E8	1.8E8	5.3E7	1.2E8	1.0E10
Comp. 8	1.2E12	8.7E12	3.5E10	3.2E7	5.2E10	7.4E9	1.6E12	1.4E10	4.2E7	2.8E8	1.8E8	5.3E7	1.2E8	9.8E9
Comp. 10	1.3E12	8.8E12	3.5E10	3.3E7	5.2E10	7.5E9	1.6E12	1.4E10	4.2E7	2.8E8	1.8E8	5.2E7	1.2E8	1.0E10
RELEVANT COMMENTS	[1] Parts of decommissioned Emergency Cooling System in compartment 8 [2] Spent Sealed Sources: Compartment 8 one package with 2 Pu-238 sources (4.3E10 Bq) [3] At the time of waste production [4] Radionuclides used as scaling factor in evaluation of other nuclides													

Table L-10 Quantity and characteristics of waste stored in building 157 Compartments 3 and 6

FACILITY STATUS	**Comp. 3** Full 6/1987	**Comp. 6** Full 4/1987												
AVERAGE WASTE AGE	**Comp. 3** 27 y	**Comp. 6** 27 y												
WASTE CLASSIFICATION	**Radiological** Group 1	**Physical** Non-combustible	**Waste Form** In bulk											
WASTE VOLUME **WASTE MASS**	**Comp. 3** 470 m^3 260 tons	**Comp. 6** 470 m^3 259 tons												
PHYSICAL COMPOSITION (In % vol.)	**Combustible**					**Non-combustible**								
	Cloth	**Wood**	**Filters**	**PVC**	**Other**	**Metal**	**Construction Materials**	**Thermal Insulation**	**Graphite**	**Cables, Casings**	**Sediments**	**Other**		
	No	No	No	No	No	20 – 35%	27 – 35%	15 – 20%	No	30%	2%	1%[1]		
GENERAL RADIOLOGICAL PROPERTIES		**Total Activity**		**Specific Activity**			**Surface Dose Rate** [2]							
	Comp. 3	3.53E12 Bq		1.36E10 Bq/t	7.50E9 Bq/m^3		< 0.3 mSv/h							
	Comp. 6	3.44E12 Bq		1.32E10 Bq/t	7.32E9 Bq/m^3		< 0.3 mSv/h							
RADIONUCLIDE COMPOSITION	^{60}Co [2]	^{137}Cs [2]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 3	1.8E11	3.0E12	6.0E9	1.1E7	1.8E10	1.3E9	2.8E11	2.4E9	1.5E7	1.0E8	6.4E7	1.9E7	4.2E7	3.3E9
Comp. 6	1.6E11	3.0E12	6.2E9	1.1E7	1.8E10	1.3E9	2.8E11	2.5E9	1.5E7	1.0E8	6.4E7	1.9E7	4.3E7	3.2E9
RELEVANT COMMENTS	[1] Spent Sealed Sources: About 100 of packages (different types) in compartment 6 [2] At the time of waste production [3] Radionuclides used as scaling factor in evaluation of other nuclides													

Table L-11 Quantity and characteristics of waste stored in building 157 Compartments 2 and 5

FACILITY STATUS	**Comp. 2** Full (9/1987)		**Comp. 5** Full (12/1987)											
AVERAGE WASTE AGE	**Comp. 2** 27 y		**Comp. 5** 27 y											
WASTE CLASSIFICATION	**Radiological** Group 2		**Physical** Non-combustible		**Waste Form** In bulk									
WASTE VOLUME **WASTE MASS**	**Comp. 2** 480 m^3 220 tons		**Comp. 5** 480 m^3 240 tons											
PHYSICAL COMPOSITION (In % vol.)	**Combustible**					**Non-combustible**								
	Cloth	**Wood**	**Filters**	**PVC**	**Other**	**Metal**	**Construction Materials**	**Thermal Insulation**	**Graphite**	**Cables, Casings**	**Sediments**	**Other**		
	No	No	No	No	No	50 – 70%	20%	20 – 25%	Yes [2]	No	Yes	Yes[1]		
GENERAL RADIOLOGICAL PROPERTIES	**Total Activity**		**Specific Activity**			**Surface Dose Rate [3]**								
	Comp. 2	1.34E13 Bq	6.10E10 Bq/t	2.80E10 Bq/m^3		0.3 – 10 mSv/h								
	Comp. 5	1.43E13 Bq	5.94E10 Bq/t	2.97E10 Bq/m^3		0.3 – 10 mSv/h								
RADIONUCLIDE COMPOSITION	^{60}Co [4]	^{137}Cs [4]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 2	1.1E12	1.0E13	4.2E10	3.7E7	6.0E10	9.0E9	1.9E12	1.7E10	5.1E7	3.4E8	2.2E8	6.4E7	1.5E8	1.1E10
Comp. 5	1.4E12	1.1E13	4.5E10	3.9E7	6.3E10	9.5E9	2.1E12	1.8E10	5.2E7	3.5E8	2.2E8	6.5E7	1.5E8	1.2E10
RELEVANT COMMENTS	[1] Spent Sealed Sources: Compartment 5, one package (type ???) with 2 Co60 sources (2.6E9 Bq) and one package (type ???-?) with 5 Cs137 sources (9.8E8 Bq) [2] For radionuclide properties of graphite, see Chapter 8.1 [3] At the time of waste production [4] Radionuclides used as scaling factor in evaluation of other nuclides													

Table L-12 Quantity and characteristics of waste stored in building 157 Compartments 1 and 4

FACILITY STATUS	**Comp. 1**		**Comp. 4**										
	In operation		In operation										
AVERAGE WASTE AGE	**Comp. 1**		**Comp. 4**										
	14.0 y		14.0 y										
WASTE CLASSIFICATION	**Radiological**		**Physical**		**Waste Form**								
	Group 3		Non-combustible		In bulk								
	Comp. 1		**Comp. 4**		**Annual Arising (total)**								
	Zr-alloys	Other	Zr-alloys	**Other**									
WASTE VOLUME	29 m^3	223 m^3	79 m^3	539 m^3	32 m^3								
WASTE MASS	33.0 tons	259.0 tons	81.2 tons	555.8 tons	~33 tons								
	Combustible					**Non-combustible**							
PHYSICAL COMPOSITION (In % vol.)	**Cloth**	**Wood**	**Filters**	**PVC**	**Other**	**Metal**	**Construction Materials**	**Thermal Insulation**	**Graphite**	**Cables, Casings**	**Sediments**	**Other**	
	No	No	Yes [1]	Yes [2]	No	97 %	No	No	No	No	No	Yes[3]	
GENERAL RADIOLOGICAL PROPERTIES			**Total Activity**		**Specific Activity**			**Surface Dose Rate [4]**					
	Comp. 1	**Zr-alloys**	2.71E14 Bq		1.32E13 Bq/t		1.19E13 Bq/m^3	> 10 mSv/h					
		Other	3.56E15 Bq		1.37E13 Bq/t		1.6E13 Bq/m^3	> 10 mSv/h					
	Comp. 4	**Zr-alloys**	1.22E15 Bq		2.61E13 Bq/t		2.35E13Bq/m^3	> 10 mSv/h					
		Other	6.71E 16 Bq		1.21E14 Bq/t		1.24E14 Bq/m^3	> 10 mSv/h					
RADIONUCLIDE COMPOSITION [6]		^{60}Co [5]	^{3}H	^{14}C	^{55}Fe	^{59}Ni	^{63}Ni	^{94}Nb	^{93}Zr				
Comp. 1	**Zr-alloys**	2.7E14	2.0E7	2.3E11	1.6E11	5.9E9	9.7E11	3.3E12	4.2E10				
	Other	2.7E14	-	4.5E12	4.4E14	4.9E12	5.2E14	-	-				
Comp. 4	**Zr-alloys**	1.2E15	9.0E7	1.0E12	7.2E11	2.6E10	4.4E12	1.5E13	1.9E11				
	Other	1.2E15	-	2.0E13	2.0E15	2.2E13	2.4E15	-	-				
RELEVANT COMMENTS	[1] Filters from Hot Cell ventilation system												
	[2] PVC baskets used as a liner in transport casks												
	[3] Spent Sealed Sources: Compartments 1: 13 packages Compartment 4: 7 packages												
	[4] At the time of waste production												
	[5] Radionuclide used as scaling factor in evaluation of other nuclides												
	[6] Contamination by fission products and actinides not considered												
	Other: It is estimated that 10 % (weight) of the waste consists of Zr-alloy (2.5 % Nb) and it contains 50% of ^{60}Co activity												

Table L-13 Quantity and characteristics of waste stored in building 157/1 compartments 1 – 4, 6, 7 and 9

FACILITY STATUS	**Comp. 1** Full (12/1994)	**Comp. 2** Full (6/1992)	**Comp. 3** Full (3/1993)	**Comp. 4** Full (6/1992)	**Comp. 6** Full (1/1997)	**Comp. 7** Full (12/1993)	**Comp. 9** Full (3/1999)
AVERAGE WASTE AGE	**Comp. 1** 20 y	**Comp. 2** 22 y	**Comp. 3** 21 y	**Comp. 4** 22 y	**Comp. 6** 17 y	**Comp. 7** 21 y	**Comp. 9** 15 y
WASTE CLASSIFICATION	**Radiological** Group 1	**Physical** Combustible	**Waste Form** In bulk				
	Comp. 1	**Comp. 2**	**Comp. 3**	**Comp. 4**	**Comp. 6**	**Comp. 7**	**Comp. 9**
WASTE VOLUME	380 m^3	380 m^3	380 m^3	380 m^3	380 m^3	380 m^3	380 m^3
WASTE MASS	114 tons	116 tons	118 tons	117 tons	108 tons	124 tons	96 tons

	Combustible					**Non-combustible**						
PHYSICAL COMPOSITION (In % vol.)	**Cloth**	**Wood**	**Filters**	**PVC**	**Other**	**Metal**	**Construction Materials**	**Thermal Insulation**	**Graphite**	**Cables, Casings**	**Sediments**	**Other**
	40 – 50%	15 – 20%	15 – 20%	15 – 20%	No	No	No	No	No	No	No	Yes[1]

		Total Activity	**Specific Activity**		**Surface Dose Rate [2]**
GENERAL RADIOLOGICAL PROPERTIES	Comp. 1	6.37E12Bq	5.59E10 Bq/t	1.68E10 Bq/m^3	< 0.3 mSv/h
	Comp. 2	1.96E12Bq	1.69E10 Bq/t	5.15E9 Bq/m^3	< 0.3 mSv/h
	Comp. 3	2.93E12Bq	2.48E10 Bq/t	7.71E9 Bq/m^3	< 0.3 mSv/h
	Comp. 4	2.89E12Bq	2.47E10 Bq/t	7.62E9 Bq/m^3	< 0.3 mSv/h
	Comp. 6	2.06E12Bq	1.91E10 Bq/t	5.41E9 Bq/m^3	< 0.3 mSv/h
	Comp. 7	1.77E12Bq	1.43E10 Bq/t	4.66E9 Bq/m^3	< 0.3 mSv/h
	Comp. 9	5.24E9 Bq	5.45E7 Bq/t	1.38E7 Bq/m^3	< 0.3 mSv/h

RADIONUCLIDE COMPOSITION	^{60}Co [3]	^{137}Cs [3]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 1	2.8E12	1.8E12	3.5E10	7.6E6	1.1E10	7.4E9	1.7E12	1.4E10	7.7E6	5.2E7	3.5E7	9.7E6	2.2E7	2.4E9
Comp. 2	2.7E11	1.4E12	4.8E9	5.7E6	8.6E9	1.0E9	2.3E11	1.9E9	6.4E6	4.3E7	2.9E7	8.0E6	1.8E7	1.8E9
Comp. 3	3.1E11	2.4E12	4.8E9	9.4E6	1.4E10	1.0E9	2.3E11	2.0E9	1.0E7	6.9E7	4.6E7	1.3E7	2.9E7	3.0E9
Comp. 4	3.4E11	2.3E12	5.7E9	8.9E6	1.3E10	1.2E9	2.7E11	2.3E9	9.9E6	6.7E7	4.5E7	1.2E7	2.8E7	2.8E9
Comp. 6	8.3E11	7.8E11	8.7E9	3.3E6	4.7E9	1.8E9	4.2E11	3.5E9	3.1E6	2.1E7	1.5E7	3.9E6	8.9E6	1.1E9
Comp. 7	3.3E11	1.2E12	4.7E9	4.8E6	7.2E9	1.0E9	2.3E11	1.9E9	5.1E6	3.5E7	2.3E7	6.4E6	1.5E7	1.5E9
Comp. 9	8.9E8	4.0E9	7.0E6	1.7E4	2.4E7	1.5E6	3.5E8	2.8E6	1.5E4	1.0E5	7.1E4	1.9E4	4.3E4	5.7E6

RELEVANT COMMENTS	[1] Spent Sealed Sources: 4 packages in compartment 9 [2] At the time of waste production [3] Radionuclides used as scaling factor in evaluation of other nuclides

Table L-14 Quantity and characteristics of waste stored in building 157/1 compartment 5

FACILITY STATUS	**Comp. 5** Full (4/1998)													
AVERAGE WASTE AGE	**Comp. 5** 16 y													
WASTE CLASSIFICATION	**Radiological** Group 1		**Physical** Non-combustible		**Waste Form** In bulk									
	Comp. 5		**Comp. 8**		**Annual Arising**		**Comments**							
WASTE VOLUME	380 m^3		-		-		Note that also compartment 18/2 is in operation for storage of Group 2 combustible waste							
WASTE MASS	95 tons		-		-									
	Combustible					**Non-combustible**								
PHYSICAL COMPOSITION (In % vol.)	**Cloth** 25 %	**Wood** 40 %	**Filters** 10 – 15 %	**PVC** 15 – 20 %	**Other** No	**Metal** No	**Construction Material** No	**Thermal Insulation** No	**Graphite** No	**Cables, Casings** No	**Sediments** No	**Other** No		
GENERAL RADIOLOGICAL PROPERTIES	**Total Activity**		**Specific Activity**			**Surface Dose Rate [1]**								
	Comp. 5	8.25E12 Bq	8.68E10 Bq/t	2.17E10 Bq/m^3	0.3 – 10 mSv/h									
RADIONUCLIDE COMPOSITION	^{60}Co [2]	^{137}Cs [2]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 5	3.2E12	3.2E12	3.6E10	1.3E7	1.9E10	7.7E9	1.8E12	1.5E10	1.3E7	8.8E7	6.0E7	1.6E7	3.7E7	4.3E9
RELEVANT COMMENTS	[1] At the time of waste production [2] Radionuclides used as scaling factor in evaluation of other nuclides													

Table L-15 Quantity and characteristics of waste stored in building 157/1 compartments 10 – 15

FACILITY STATUS	**Comp. 10** Full (10/1995)	**Comp. 11** Full (9/1995)	**Comp. 12** Full (8/1997)	**Comp. 13** Full (4/1999)	**Comp. 14** Full (5/2002)	**Comp. 15** Full (8/2006)								
AVERAGE WASTE AGE	**Comp. 10** 19 y	**Comp. 11** 19 y	**Comp. 12** 17 y	**Comp. 13** 15 y	**Comp. 14** 12	**Comp. 15** 8								
WASTE CLASSIFICATION	**Radiological** Group 1	**Physical** Non-combustible	**Waste Form** In bulk											
	Comp. 10	**Comp. 11**	**Comp. 12**	**Comp. 13**	**Comp. 14**	**Comp. 15**	**Annual Arising**							
WASTE VOLUME	1160 m^3	1160 m^3	1160 m^3	1160 m^3	1160 m^3	1160 m^3	350 m^3							
WASTE MASS	654 tons	658 tons	804 tons	837 tons	842 tons	783 tons	~210 tons							
	Combustible					**Non-combustible**								
PHYSICAL COMPOSITION (In % vol.)	**Cloth** No	**Wood** No	**Filters** No	**PVC** No	**Other** No	**Metal** 20 – 35%	**Construction Materials** 27 – 35%	**Thermal Insulation** 15 – 20%	**Graphite** No	**Cables, Casings** 30%	**Sediments** 2%	**Other** 1%[1]		
GENERAL RADIOLOGICAL PROPERTIES		**Total Activity**	**Specific Activity**		**Surface Dose Rate [2]**									
	Comp. 10	7.99E12Bq	1.22E10 Bq/t	6.89E9 Bq/m^3	<0.3 mSv/h									
	Comp. 11	9.07E12Bq	1.38E10 Bq/t	7.82E9 Bq/m^3	<0.3 mSv/h									
	Comp. 12	3.58E10Bq	4.45E7 Bq/t	3.08E7 Bq/m^3	<0.3 mSv/h									
	Comp. 13	5.44E10 Bq	6.50E7 Bq/t	4.69E7 Bq/m^3	<0.3 mSv/h									
	Comp.14	7.45 E11 Bq	8.85E8 Bq/t	6.42 E8 Bq/m^3	<0.3 mSv/h									
	Comp.15	6.78 E12 Bq	8.66E9 Bq/t	5.84 E9 Bq/m^3	<0.3 mSv/h									
RADIONUCLIDE COMPOSITION	^{60}Co [3]	^{137}Cs [3]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 10	2.2E12	4.2E12	3.2E10	1.7E7	2.5E10	6.7E9	1.5E12	1.3E10	1.8E7	1.2E8	8.0E7	2.2E7	5.0E7	5.4E9
Comp. 11	3.0E12	4.1E12	3.9E10	1.7E7	2.4E10	8.4E9	1.9E12	1.6E10	1.7E7	1.2E8	7.9E7	2.2E7	4.9E7	5.4E9
Comp. 12	2.0E9	3.2E10	2.0E7	1.8E5	1.9E8	4.2E6	9.7E8	8.0E6	1.3E5	8.8E5	6.0E5	1.6E5	3.7E5	4.5E7
Comp. 13	8.9E9	4.2E10	6.8E7	1.8E5	2.5E8	1.4E7	3.4E9	2.7E7	1.6E5	1.1E6	7.5E5	2.0E5	4.5E5	6.1E7
Comp. 14	2.0E11	2.7E11												
Comp. 15	1.3E12	8.3E11												
RELEVANT COMMENTS	[1] Spent Sealed Sources: Compartments 10 – 14 [2] At the time of waste production [3] Radionuclides used as scaling factor in evaluation of other nuclides													

Table L-16 Quantity and characteristics of waste stored in building 157/1 compartments 8 and 21/2

FACILITY STATUS	**Comp. 8**	**Comp. 21/2**												
	full (11/2009)	In operation												
AVERAGE WASTE AGE	**Comp. 8**	**Comp. 21/2**												
	5 y	5 y												
WASTE CLASSIFICATION	**Radiological**	**Physical**	**Waste Form**											
	Group 1	Non-combustible	In bulk											
	Comp. 8	**Comp. 21/2**	**Annual Arising**											
WASTE VOLUME	380 m^3	373 m^3												
WASTE MASS	192 tons	201 tons												
	Combustible					**Non-combustible**								
PHYSICAL COMPOSITION (In % vol.)	**Cloth**	**Wood**	**Filters**	**PVC**	**Other**	**Metal**	**Construction Materials**	**Thermal Insulation**	**Graphite**	**Cables, Casings**	**Sediments**	**Other**		
	No	No	No	No	No	68%	10-12%	8-10%	No	No	No	7%		
GENERAL RADIOLOGICAL PROPERTIES		**Total Activity**	**Specific Activity**			**Surface Dose Rate [2]**								
	Comp. 8	5.7E10 Bq	2.97E8 Bq/t	1.50E8 Bq/m^3		<0.3 mSv/h								
	Comp. 21/2	8.56E10 Bq	6.07E8 Bq/t	3.54E8 Bq/m^3		<0.3 mSv/h								
RADIONUCLIDE COMPOSITION	^{60}Co [2]	^{137}Cs [2]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 8	2.4E10	1.1E10								1.2E8	8.0E7	2.2E7	5.0E7	5.4E9
Comp. 21/2	5.1E10	1.1E10								1.2E8	7.9E7	2.2E7	4.9E7	5.4E9
RELEVANT COMMENTS	[1] At the time of waste production													
	[2] Radionuclides used as scaling factor in evaluation of other nuclides													

Table L-17 Quantity and characteristics of waste stored in building 157/1, compartments 16 and 17

FACILITY STATUS	**Comp. 16** Full 8/1999	**Comp. 17** In operation											
AVERAGE WASTE AGE	**Comp. 16** 15 y	**Comp. 17** 12 y											
WASTE CLASSIFICATION	**Radiological** Group 2	**Physical** Non-combustible	**Waste Form** In bulk										
	Comp. 16	**Comp. 17**	**Annual Arising**										
WASTE VOLUME	1160 m^3	894 m^3	56 m^3										
WASTE MASS	672 tons	461 tons	~30 tons										
	Combustible					**Non-combustible**							
PHYSICAL COMPOSITION (In % vol.)	**Cloth** No	**Wood** No	**Filters** No	**PVC** No	**Other** No	**Metal** 50 – 70%	**Construction Materials** 20%	**Thermal Insulation** 20 – 25%	**Graphite** Yes [2]	**Cables, Casings** No	**Sediments** No	**Other** Yes[1]	
GENERAL RADIOLOGICAL PROPERTIES		**Total Activity**	**Specific Activity**		**Surface Dose Rate** [3]								
	Comp. 16	7.69E13 Bq	1.14E11 Bq/t	6.6E10 Bq/m^3	0.3 – 10 mSv/h								
	Comp. 17	5.3E13 Bq	1.23E11	6.5E10 Bq/m^3	0.3 – 10 mSv/h								
RADIONUCLIDE COMPOSITION	^{60}Co [4]	^{137}Cs [4]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 16	5.2E11	3.8E12											
Comp. 17	1.5E13	6.6E11											
RELEVANT COMMENTS	[1] Spent Sealed Sources: Compartment 16 [2] For radionuclide properties of graphite, see Chapter 8.1 [3] At the time of waste production [4] Radionuclides used as scaling factor in evaluation of other nuclides												

Table L-18 Quantity and characteristics of waste stored in building 157/1 Compartments 18 – 20/2

FACILITY STATUS	**Comp. 18/2** Full (3/2004)	**Comp. 19/2** In operation	**Comp. 20/2** Empty										
AVERAGE WASTE AGE	**Comp. 18/2** 12 y	**Comp. 19/2** 8 y	**Comp. 20/2** -										
WASTE CLASSIFICATION	**Radiological** Group 2	**Physical** Combustible	**Waste Form** In bulk										
	Comp. 18/2	**Comp. 19/2**	**Comp. 20/2**						**Annual Arising**	**Comments**			
WASTE VOLUME	380 m^3	315 m^3	-						75 m^3	Note that also compartment 8 is in operation			
WASTE MASS	87 tons	91 tons	-						~20 tons	for storage of Group 2 combustible waste			
	Combustible					**Non-combustible**							
PHYSICAL COMPOSITION (In % vol.)	**Cloth** 35-45 %	**Wood** 5-10 %	**Filters** 10 – 15 %	**PVC** 15 – 20 %	**Other** 15%	**Metal** No	**Construction Materials** No	**Thermal Insulation** No	**Graphite** No	**Cables, Casings** No	**Sediments** No	**Other** No	
GENERAL RADIOLOGICAL PROPERTIES	**Total Activity**		**Specific Activity**			**Surface Dose Rate [1]**							
	18/2 - 6.18E13 Bq		7.1E10 Bq/t	1.6E10 Bq/m^3		0.3 – 10 mSv/h							
	19/2 – 3.2E12 Bq		4.27E10 Bq/t	1.1110 Bq/m^3		0.3 – 10 mSv/h							
RADIONUCLIDE COMPOSITION	^{60}Co [2]	^{137}Cs [2]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 18/2	1.5E12	1.0E11												
Comp. 19/2	2.9E10	1.1E11												
RELEVANT COMMENTS	[1] At the time of waste production [2] Radionuclides used as scaling factor in evaluation of other nuclides												

Table L-19 Quantity and characteristics of waste stored in building 157/1, compartments 18 – 21/1 and 19 – 21/3

FACILITY STATUS	**Comp. 18/1** Full (9/2000)	**Comp. 19/1** Full (12/2002)	**Comp. 20/1** Full (4/2007)	**Comp. 21/1** In operation	**Comp. 19/3** Full (8/2013)	**Comp. 20/3** In operation	**Comp. 21/3** Empty
AVERAGE WASTE AGE	**Comp. 18/1** 14 y	**Comp. 19/1** 12	**Comp. 20/1** 8	**Comp. 21/1** 12.6 y	**Comp. 19/3** 7.0	**Comp. 20/3** 1 y	**Comp. 21/3** -
WASTE CLASSIFICATION	**Radiological** Group 1	**Physical** Combustible	**Waste Form** **Bulk in plastic bags, in comp. 21/1 bales [1]**				

	Comp. 18/1	**Comp. 19/1**	**Comp. 20/1**	**Comp. 21/1**	**Comp. 19/3**	**Comp. 20/3**	**Comp. 21/3**	**Annual Arising**
WASTE VOLUME	390 m^3	390 m^3	390 m^3	297 m^3	390 m^3	40 m^3	-	250 m^3
WASTE MASS	97 tons	112 tons	139 tons	153 tons	103 tons	11 tons	-	~80 tons

	Combustible					**Non-combustible**						
PHYSICAL COMPOSITION (In % vol.)	**Cloth**	**Wood**	**Filters**	**PVC**	**Other**	**Metal**	**Construction Materials**	**Thermal Insulation**	**Graphite**	**Cables, Casings**	**Sediments**	**Other**
	40 – 50%	10-15%	15 – 20%	10-15%	5-10%	No	No	No	No	No	No	No

		Total Activity	**Specific Activity**		**Surface Dose Rate [2]**
GENERAL RADIOLOGICAL PROPERTIES	Comp. 18/1	1.0E11 Bq	2.56E8 Bq/t	1.0E9 Bq/m^3	<0.3 mSv/h
	Comp. 19/3	1.28E11 Bq	1.68E9Bq/t	3.68E8 Bq/m^3	<0.3 mSv/h
	Comp. 20/1	2.10E11 Bq	1.37E9Bq/t	3.38E8 Bq/m^3	<0.3 mSv/h
	Comp. 21/1	5.80E12 Bq	3.79E10 Bq/t	1.95E10 Bq/m^3	<0.3 mSv/h

RADIONUCLIDE COMPOSITION	^{60}Co [3]	^{137}Cs [3]	^{14}C	^{244}Cm	^{90}Sr	^{59}Ni	^{63}Ni	^{94}Nb	^{129}I	^{241}Am	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu
Comp. 18/1	4.0E9	2.1E8	-	-	-	-	-	-	-	--	-	-	-	-
Comp. 19/3	4.2E10	1.9E10												
Comp. 20/1	8.0E10	9.7E11												
Comp. 21/1	1.3E10	1.3E9												

RELEVANT COMMENTS
[1] 126 pieces of bales and 30 m^3 of bulk waste (bulk waste not included in radiological inventory)
[2] At the time of waste production
[3] Radionuclides used as scaling factor in evaluation of other nuclides

Table L-20 Solid radioactive waste of class A stored in very low level waste storage facility (2017-01-01)

Containers with non-combustible waste		**Combustible waste packages**	
Quantity of containers	**Volume, m^3**	**Quantity of packages**	**Volume, m^3**
201	2954	284	229,32

Inventory of liquid or processed liquid radioactive waste in deferent storage facilities at INPP

Table L-21, Nuclide composition and activities of bitumen compounds in canyons of Building 158

Total volume of bituminized compound in Building 158 – **14417 m^3**.

Canyons		№1, UF44B01	№2, UF44B02	№12, UF59B01	№3, UF44B03	№4, UF44B04	№5, UF45B01	№6, UF45B02	№10, UF59B03	Building 158.
Filling	from	1987-08	1989-02	1990-11	1992-01	1994-07	1996-08	2001-05	2007-01	1987-08
	Up to	1989-01	1990-10	1991-12	1994-06	1996-07	2001-04	2006-12	2013-12*	2013-12*
	Nuclide	Activity, Bq								
	^{14}C	1,17E+10	1,63E+10	6,14E+09	1,59E+10	1,38E+10	1,71E+10	1,80E+10	2,00E+10	1,19E+11
	^{60}Co**	4,54E+09	8,24E+09	4,17E+09	2,40E+10	1,77E+10	3,88E+10	9,87E+10	2,83E+11	4,80E+11
	^{59}Ni	2,78E+08	3,88E+08	1,46E+08	3,79E+08	3,29E+08	4,07E+08	4,29E+08	4,76E+08	2,83E+09
	^{63}Ni	3,17E+10	4,41E+10	1,66E+10	4,31E+10	3,75E+10	4,63E+10	4,88E+10	5,41E+10	3,22E+11
	^{90}Sr	1,10E+10	1,53E+10	5,78E+09	1,50E+10	1,30E+10	1,61E+10	1,70E+10	1,88E+10	1,12E+11

Canyons	№1, UF44B01	№2, UF44B02	№12, UF59B01	№3, UF44B03	№4, UF44B04	№5, UF45B01	№6, UF45B02	№10, UF59B03	Building 158.
^{94}Nb	6,10E+09	8,49E+09	3,20E+09	8,30E+09	7,21E+09	8,92E+09	9,40E+09	1,04E+10	6,20E+10
^{99}Tc	8,85E+09	1,23E+10	4,64E+09	1,20E+10	1,05E+10	1,29E+10	1,36E+10	1,51E+10	9,00E+10
^{129}I	1,44E+07	2,01E+07	7,57E+06	1,96E+07	1,71E+07	2,11E+07	2,22E+07	2,46E+07	1,47E+08
^{134}Cs**	4,94E+07	1,44E+08	1,21E+08	2,87E+09	1,62E+09	1,06E+10	1,36E+11	2,29E+12	2,44E+12
^{137}Cs**	2,52E+13	3,51E+13	1,32E+13	3,43E+13	2,98E+13	3,69E+13	3,89E+13	4,31E+13	2,57E+14
^{234}U	7,96E+04	1,11E+05	4,18E+04	1,08E+05	9,41E+04	1,16E+05	1,23E+05	1,36E+05	8,10E+05
^{235}U	4,57E+03	6,36E+03	2,40E+03	6,22E+03	5,41E+03	6,69E+03	7,05E+03	7,81E+03	4,65E+0
^{238}U	2,33E+04	3,25E+04	1,22E+04	3,18E+04	2,76E+04	3,41E+04	3,60E+04	3,99E+04	2,37E+05
^{237}Np	3,63E+05	5,05E+05	1,90E+05	4,94E+05	4,29E+05	5,31E+05	5,60E+05	6,20E+05	3,69E+06
^{238}Pu	1,29E+07	1,79E+07	6,75E+06	1,75E+07	1,52E+07	1,88E+07	1,98E+07	2,20E+07	1,31E+08
^{239}Pu	1,12E+07	1,56E+07	5,87E+06	1,52E+07	1,32E+07	1,64E+07	1,73E+07	1,91E+07	1,14E+08
^{240}Pu	1,41E+07	1,96E+07	7,40E+06	1,92E+07	1,67E+07	2,06E+07	2,18E+07	2,41E+07	1,44E+08
^{241}Pu	1,14E+09	1,59E+09	5,99E+08	1,55E+09	1,35E+09	1,67E+09	1,76E+09	1,95E+09	1,16E+10
^{241}Am	5,80E+08	8,07E+08	3,04E+08	7,89E+08	6,86E+08	8,48E+08	8,94E+08	9,90E+08	5,90E+09
A α, Bq	6,18E+08	8,61E+08	3,24E+08	8,42E+08	7,31E+08	9,04E+08	9,53E+08	1,06E+09	6,29E+09
A β, Bq	2,53E+13	3,52E+13	1,33E+13	3,44E+13	2,99E+13	3,70E+13	3,92E+13	4,58E+13	2,60E+14

Table L-22 Reprocessed (cemented) liquid radioactive wastes (ion-exchange resins and perlite) stored in building 158/2 (2017-01-01)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Volume of reprocessed liquid radioactive wastes, m^3	22	130,39	134,7	207,35	128,93	57,85	6,4	24,7	108,32	156,2	158,41	1460
Number of drums with cemented wastes, pcs.	344	1366	1430	2197	1346	649	72	274	814	1219	1248	10980
Total activity of cemented compounds, Bq	8,26E+12		8,99E+12	14,4E+12	7,94E+12	3,46E+12	0,386E+12	1,58E+12	4,34E+12	4,05E+12	3,27E+12	41,8E+12

Table L-23 Volumes of liquid wastes in the tanks TW18B01, TW18B02, TW11B03 (2017-01-01)

	Tanks	Volume, m^3
1	TW18B01, Ion-exchange resins and perlite	450
2	TW18B02, Ion-exchange resins and perlite, Evaporated concentrates	800
3	TW11B03, Ion-exchange resins	1267

Table L-24 Nuclide composition and activities of liquid RAW in TW18B01

Nuclide	Activity, Bq
^{3}H	1,81E+09
^{14}C	8,61E+11
^{60}Co**	3,77E+12
^{59}Ni	1,60E+10
^{63}Ni	1,85E+12
^{90}Sr	3,69E+10
^{94}Nb	9,00E+09
^{99}Tc	1,55E+08
^{129}I	2,55E+06
^{134}Cs**	1,42E+11
^{137}Cs**	2,09E+13
^{234}U	4,35E+06
^{235}U	2,16E+04
^{238}U	1,09E+05
^{237}Np	2,22E+06
^{238}Pu	5,39E+07
^{239}Pu	4,85E+07
^{240}Pu	6,99E+07
^{241}Pu	1,55E+09
^{241}Am	9,86E+08
A α, Bq	1,16E+09
A β, Bq	2,76E+13

Table L-25 Nuclide composition and activities of evaporated concentrates in TW18B02

Nuclide	Activity, Bq
^{14}C	1,27E+08
^{60}Co**	1,73E+09
^{59}Ni	3,02E+06
^{63}Ni	3,44E+08
^{90}Sr	1,20E+08
^{94}Nb	6,61E+07
^{99}Tc	9,59E+07
^{129}I	1,56E+05
^{134}Cs**	7,32E+10
^{137}Cs**	2,74E+11
^{234}U	1,03E+04
^{235}U	4,96E+01
^{238}U	2,53E+02
^{237}Np	3,94E+03
^{238}Pu	1,39E+05
^{239}Pu	1,21E+05
^{240}Pu	1,53E+05
^{241}Pu	1,24E+07
^{241}Am	6,29E+06
A_{α}, Bq	6,72E+06
A_{β}, Bq	3,49E+11