The present document is developed for submission to the neighbouring countries concerned in respect to fulfilment of the obligations under the Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment.

## 1. Description of the Project Characteristics

The planned economic activity for which this Environmental Impact Assessment (EIA) is carried out - dismantling and decontamination of the equipment of Units A-2 and V-2 (Project 2210, Phase 1) is one of the decommissioning projects carried out in accordance with the Final INPP Decommissioning Plan.

### 1.1. General Information

Ignalina Nuclear Power Plant is located in the north-eastern part of Lithuania on the shore of Lake Drūkšiai, approximately 140 km from Vilnius – the capital city of Lithuania, near the state borders with Latvia and Belarus at the distance of approximately 8 and 4 km respectively, and approximately 260 km from the state border with Poland (Figure 1). The distance to the borders of other states is even greater.


***Figure 1. Location of Ignalina Nuclear Power Plant***

INPP consists of two power units with RBMK-1500 type reactors (electrical power – 1500 MW). The first power unit was operated from the year 1983 until 31 December 2004, and the second power unit – from the year 1987 until 31 December 2009.

In accordance with the National Energy Strategy adopted by the Seimas of the Republic of Lithuania, the State Enterprise Ignalina Nuclear Power Plant (INPP) completely ceased the production of electricity starting from 31 December 2009 due to the fulfilling of the obligations of the Republic of Lithuania, provided for in the Treaty of Accession to the European Union. The main INPP activity from 1 January 2010 is decommissioning. The legal basis for the INPP decommissioning is the Law on the Ignalina Nuclear Power Plant Decommissioning, No. XII-914.

INPP decommissioning activity is financed from the budget of the Republic of Lithuania and the European Union (EU).

The ultimate goal of INPP decommissioning process is to achieve the condition where the territory of the nuclear power plant will no longer be under the control of state supervisory authorities and could be used for other purposes.

In 2001-2004 Ignalina Nuclear Power Plant prepared, and in 2005 the Ministry of Economy has approved the Final Decommissioning Plan for Ignalina NPP, ArchPD-2241-75525. The Final Decommissioning Plan was revised in 2014 and approved by Order No 1-230 of the Minister of Energy of the Republic of Lithuania of 25 August 2014.

According to the Final INPP Decommissioning Plan, INPP decommissioning process is divided into several decommissioning projects. Each project is a separate specific process, covering a defined field of actions, which determines the scope of works, intended organization of works, safety analysis and environmental impact assessment.

Ignalina NPP decommissioning is implemented following the Ignalina NPP Final Decommissioning Plan, agreed with competent authorities and approved by the Minister of Energy, as well as according to the Decommissioning Megaproject Schedule, establishing the sequence of projects and works performance, including distribution of required resources. It is a planning tool, enabling to control projects, detect deviations from the set project indicators and to perform appropriate analysis of deviations in order to make corrective decisions in respect to projects that should be implemented by the INPP while implementing the Final Decommissioning Plan.

The main normative document governing the activity of the Ignalina NPP in planning and implementation of the decommissioning process is the Nuclear Safety Requirements BSR-1.5.1-2019 “Decommissioning of Nuclear Facilities” developed by the State Nuclear Power Safety Inspectorate (VATESI) of the Republic of Lithuania.

**Stages of Ignalina NPP decommissioning**

*The initial stage.* Nuclear power plant is suspended permanently. It is cleaned and decontaminated using available equipment. Spent nuclear fuel and accumulated radioactive waste is transferred to interim storage or entombment. Low-radioactivity units can be removed.

*Dismantling.* This phase should start after the first stage immediately. Radioactive equipment and inner layer of radioactive buildings are removed during the dismantling. This is the most difficult phase from the technical point of view.

*Demolition of buildings.* During this stage buildings are to be demolished or left for further use. They are to be demolished in the same way as other industrial facilities except that thorough checks are to be conducted for the trace amounts of radioactivity in the debris.

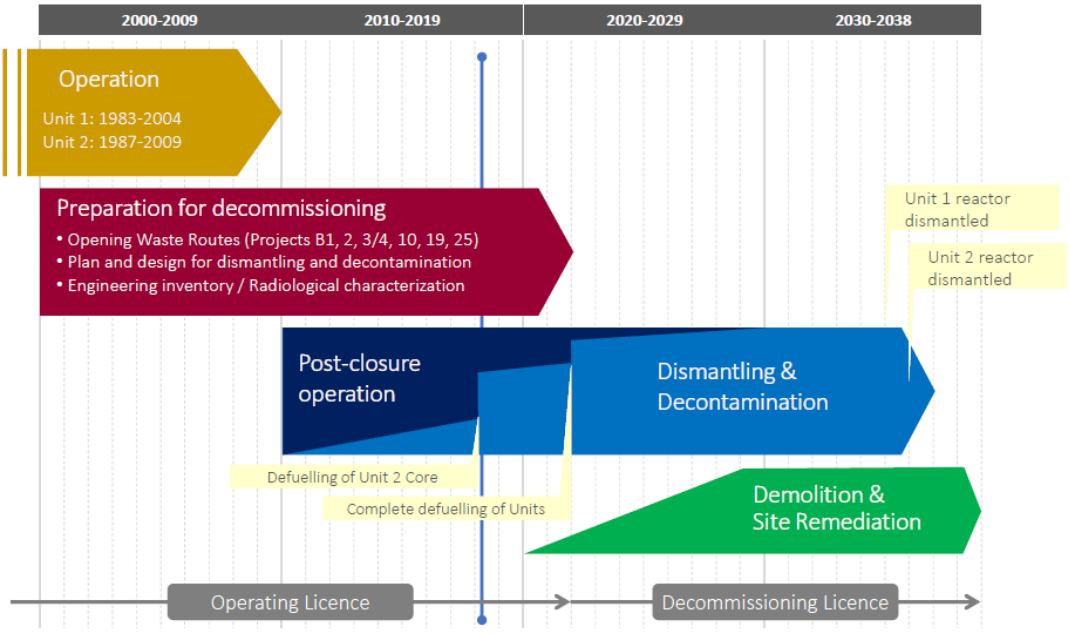



***Figure 2. Ignalina NPP Decommissioning Plan***

All the Ignalina NPP decommissioning activity is incorporated into one large project – the INPP Decommissioning Megaproject. This Megaproject consists of individual projects related to the specific field of activity:

- Spent nuclear fuel management;
- Waste management;
- Dismantling and decontamination (D&D) of equipment;
- Modification of existing facilities of infrastructure and the construction of the new ones;
- Demolition of buildings and structures.

The entire Ignalina NPP decommissioning process is phased over more than 30 years, starting with the preparatory planning in 2001 and ending with the demolition of respective on-site structures by the end of 2038.The general stages of the INPP decommissioning process are summarized in the fig.3

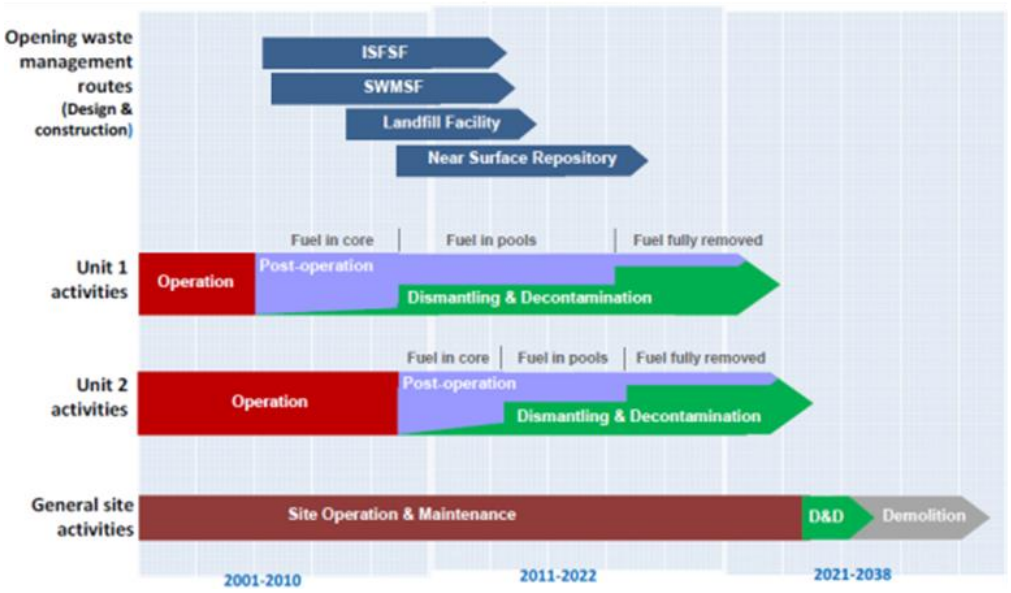



***Fig.3 Schematic of the INPP Decommissioning Process***

The decommissioning milestones to be reached at the set dates in compliance with the INPP Decommissioning Megaproject Schedule and the Final Decommissioning Plan are indicated hereafter bellow.

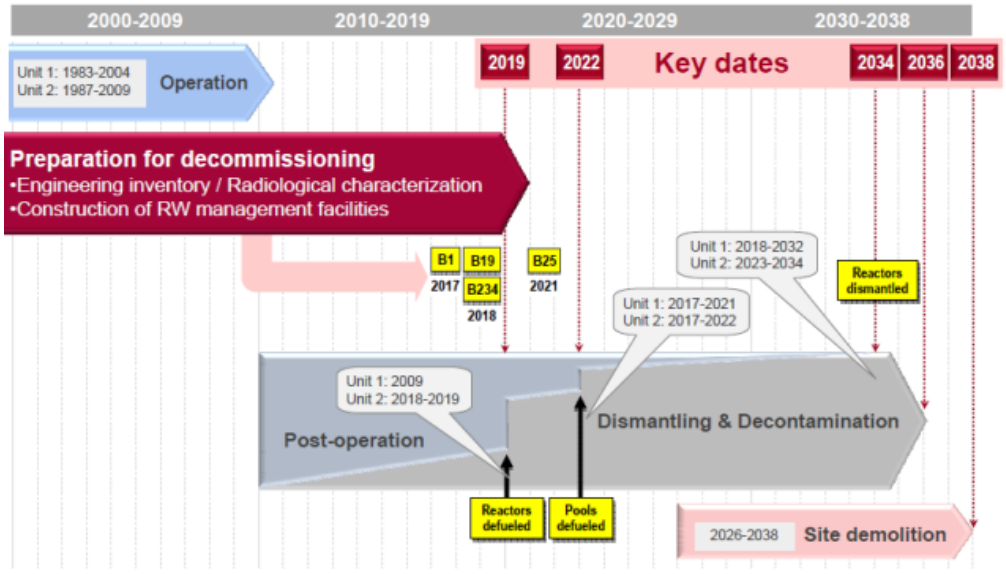



***Fig. 4 INPP Decommissioning Programme***

A finally shutdown NPP Unit is considered to be in operation as long as all nuclear fuel is completely removed from it. Pursuant to the provisions of paragraph 3 of Article 29 of the Law on Nuclear Safety the NPP Units operation licences are valid as long as all nuclear fuel is not completely removed from the Units. All requirements pertaining to the power unit in operation are applicable during this period. Therefore, currently Unit 1 and Unit 2 are maintained in the post-operation state, based on VATESI operation licence conditions and in accordance with the safe operation conditions and limits set in the Technical Specifications for operation of the Units.

Defueling of Unit 1 reactor started in 2006 and was completed in December 2009. Defueling of Unit 2 reactor started in 2010 and was completed in February 2018. The defueling phase is subdivided into two stages:

- **Stage 1** (reactor is cooldown; fuel is being unloaded from the core; transferred for storage to the spent fuel storage pools; ends after complete fuel removal for the reactor core);
- **Stage 2** (complete fuel removal to the Spent Fuel Storage Facility from the Unit, including damaged fuel, i.e. complete Unit defueling).

Both defueling phases are associated with isolation, preparation for dismantling and subsequent dismantling of systems and equipment that are not needed any more to ensure safety and safe operation of the remaining in operation safety systems and equipment. The INPP systems and equipment dismantling sequence under the INPP immediate dismantling strategy follows “building after building” approach.

According to the Final INPP Decommissioning Plan, the INPP decommissioning process is divided into several decommissioning projects. Each of the projects is a separate specific process, covering a specific scope of activities, determining the amount of work, providing for the organization of work performance, safety analysis and environmental impact assessment.

A number of systems and equipment dismantling and decontamination projects have already been implemented or are still under the process of implementation.

The extent of dismantling, the current state of dismantling of the INPP equipment and basic used techniques of dismantling and decontamination are presented in the figure 5.

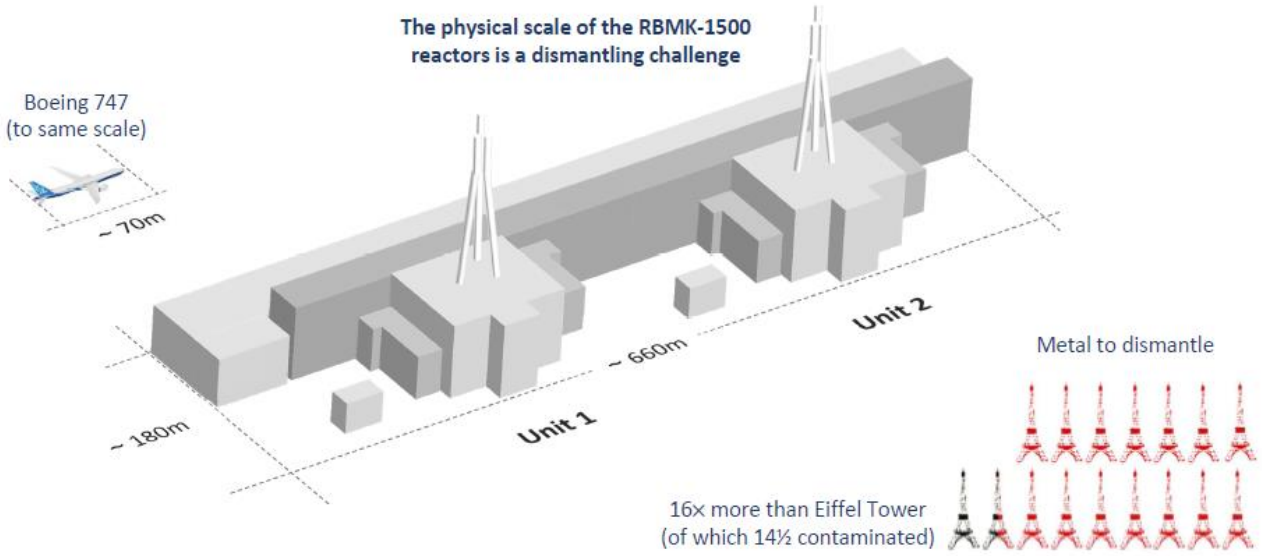



***Figure 5. Scale of Dismantling***

During the period of 2016–2019 the following D&D activities were completed or are under implementation:

- Unit 1 Turbine Hall (Building G1) project is completed: equipment dismantling was completed in July 2016, pre-treatment of waste of all planned works was completed in the end of June 2019;
- Unit 2 Turbine Hall (Building G2) equipment is in progress: 84% of all to be dismantled equipment have been dismantled. The final date of dismantling completion is set to be the beginning of January 2021;
- Unit 1 Bld. D1 (Control, Electrics & Deaerators) project is completed: equipment dismantling as well as pre-treatment of dismantled waste were completed by the end of June 2019;
- Unit 2 Bld. D2 (Control, Electrics & Deaerators) equipment dismantling started in August 2018 with the final date of the project completion to be the end of 2022. 23% of all to be dismantled equipment have been dismantled;
- Preparation for D&D in Bld. A1 (Main Circulation Circuit piping, main circulation pumps, drum separators and other related equipment located in the Reactor buildings): the Environmental Impact Assessment Report was agreed with the EIA process entities in mid 2016 and the positive decision regarding permissibility of the planned economic activity was obtained on 11th July 2016; the Safety Analysis Report and Technological Design are under review by VATESI;
- Preparation of equipment dismantling from Unit 1 reactor working areas R1 and R2: the Environmental Impact Assessment Report was agreed in June 2016; the Safety Analysis Report and Technological Design were developed by the end of 2018 and submitted to VATESI for review;
- Within the scope of the project "Unit 1 and 2 Reactor Facilities Dismantling in Zone R3 and Reactor Waste Storage Facility Development" INPP plans to procure engineering services for optioneering of dismantling and decontamination of Unit 1 and Unit 2 reactor Zone R3 equipment and development of the reactor waste storage facility. For this purpose by the end of 2018 the Project FICHE has been developed for further agreement with the EC. As part of R3 tender preparation the information, ideas, exchange of experiences with regard to Reactor Dismantling and Waste Routes Optioneering, Concept Design and Environmental Assessment Report Development were collected in the form of organising of a set of the consultative meetings/workshops "Experience of Reactors Dismantling" held in November 2018.

During the period of 2016–2018 there was no intent for new projects related to nuclear energy that shall be subject to the procedures of transboundary environmental impact assessment in Lithuania. However, in accordance with Espoo Convention Article 7 Lithuania has prepared and provided to Belarus and Latvia the Post-project analysis programme for the new nuclear facilities of State Enterprise Ignalina Nuclear Power Plant in 2018.

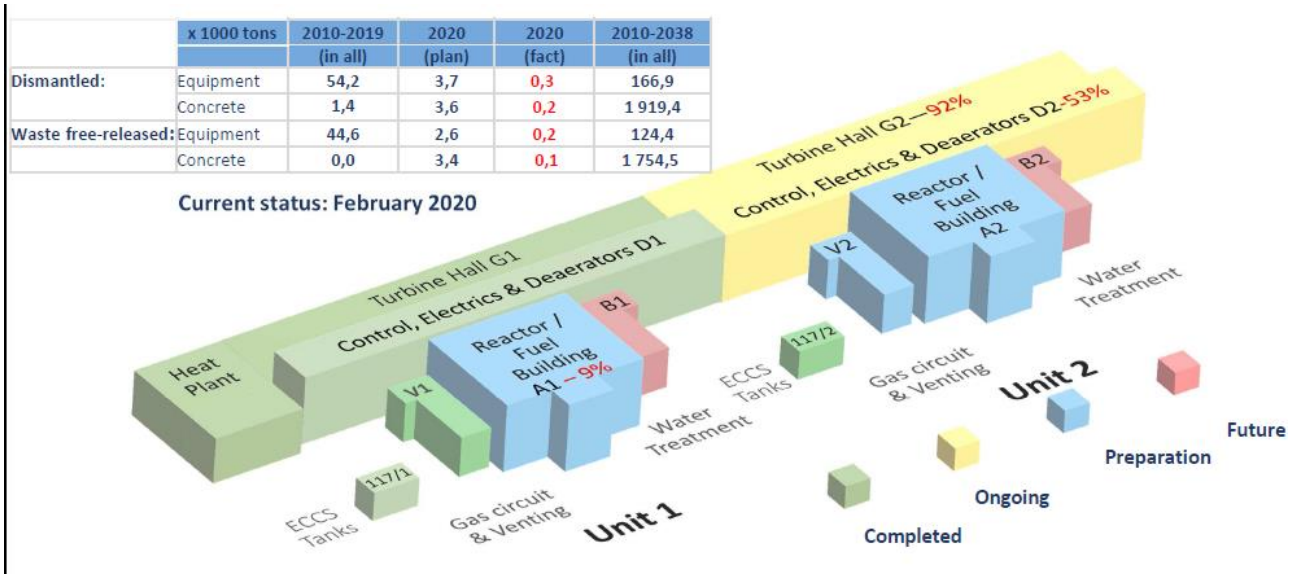



***Figure 6. Overview of current status of INPP decommissioning***

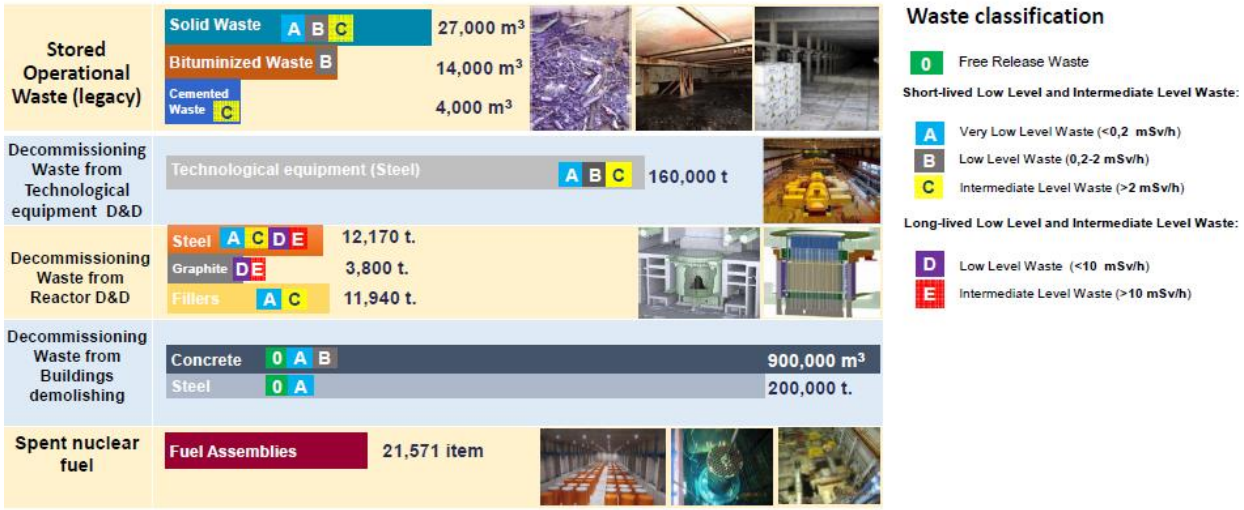



***Figure 7. Ignalina NPP Waste Inventory***

The planned economic activity for which this Environmental Impact Assessment (EIA) is carried out - *dismantling and decontamination of the equipment of Units A-2 and V-2 (Project 2210, Phase 1)* is one of the decommissioning projects carried out in accordance with the Final INPP Decommissioning Plan.

According to the Law of the Republic of Lithuania on Environmental Impact Assessment of Proposed Economic Activities planned economic activities - dismantling and decontamination of the equipment of Units A-2 and V-2 (Project 2210) - are classified as activities requiring an EIA procedure. The procedure for carrying out the EIA is established in the Law of the Republic of Lithuania on Environmental Impact Assessment of Proposed Economic Activities.

The content and structure of EIA Report for the Project on A-2 and V-2 Units Equipment Dismantling and Decontamination (Project 2210, Phase 1) comply with the requirements of the Law of the Republic of Lithuania on the Environmental Impact Assessment of Proposed Economic Activities, the Environmental Impact Assessment Report of the Proposed Economic Activities and the Regulations on Environmental Impact Assessment of the Proposed Economic Activity, approved by the Order of the Minister of Environment of the Republic of Lithuania No. D1-885 of October 31, 2017.

Within the scope of the Project 2210, Phase 1 the equipment located within the structural boundaries of Building 101/2, Units A-2 and V-2, with the exception of the equipment of Unit A-2 consisting of the reactor RBMK-1500 assemblies and the storage pools hall (SPH) which will be dismantled within the scope of the individual projects, will be dismantled. Since all the works within the scope of the proposed economic activity will be carried out only within the premises of Building 101/2, thus no land-use requirements are applicable specifically for this project, as the land during the proposed economic activity will be used according to the predefined purpose. The territory of INPP and its premises are divided into the controlled and observation areas. The impact of radiation on the personnel is possible only in the controlled area, access to which is organized through the sanitary inspection facilities and is limited by administrative means or physical barriers. The radiation hazard factors in the observation area do not exceed the levels defined for the category of persons “Population”, that is practically do not exist.

Units A-2 and V-2 are located within the controlled area of the INPP industrial site.

The Sanitary Protection Zone (SPZ) in the radius of 3 km is defined around the INPP site. There are no permanent residents within the SPZ, as well as the economic activity is limited. The nearest settlement is located at the distance of approximately 3.5 kilometers to the south-west of the site. The boundaries of the INPP SPZ and facilities which are located nearby are shown in Figure 8. The proposed economic activity would not require revision or clarification of SPZ boundaries defined by INPP.

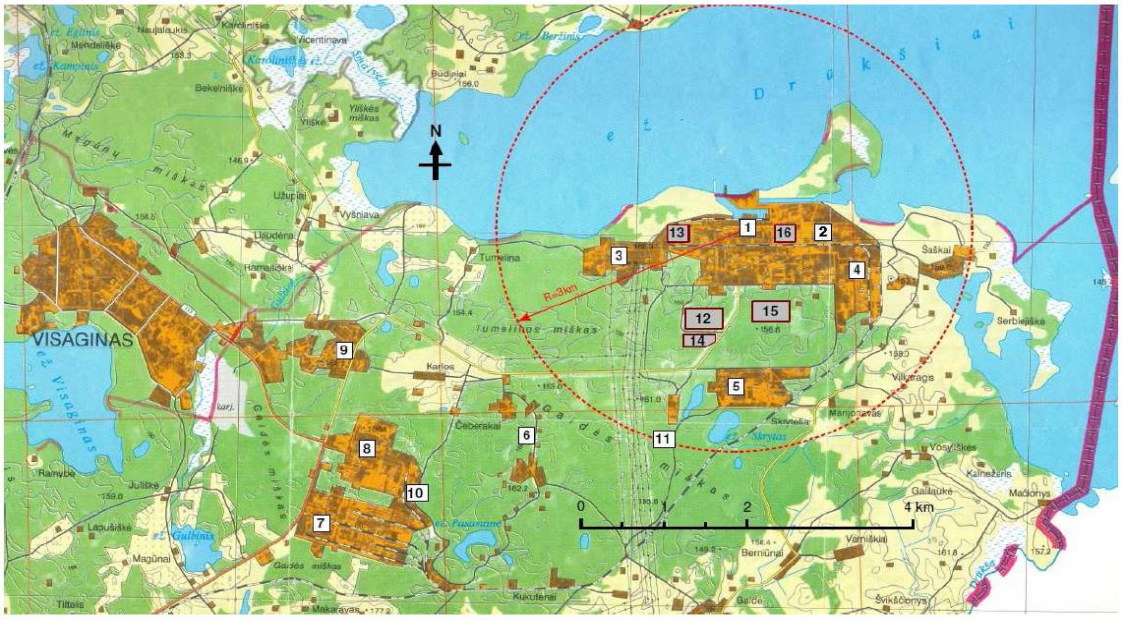



***Figure 8. SPZ of Ignalina NPP and the objects located nearby***

*1 - INPP Power Units, 2 - Existing Dry type Interim Spent Nuclear Fuel Storage Facility – DISFSF, 3 - Open Switchgear, 4 - Equipment Depot, 5 – Water Treatment Facilities of Visaginas, Transport Department, 6 – Water Intake Facilities for Visaginas, 7 - Construction Base, 8 - Construction Industrial Base, 9 - Former Military Base, 10 - Heat Boiler Station for Visaginas, 11 – Dumping of Household Waste of Visaginas, 12 – New Interim Spent Fuel Storage Facility – ISFSF (B1), and SWTSF (B3/4), 13 – Site of Solid Radioactive Waste Retrieval facility – SWRF (B2), 14 – Site of Landfill Facility for Short-lived Very Low-Level Waste, 15 – Site of Near Surface Repository for Low and Intermediate Level Short-lived Radioactive Waste, 16 – Site of Landfill Buffer Storage and Site of Free Release Measurement Facility. There are shown also the existing SPZ with the radius of 3 km.*

Units A-2 and V-2 together with Units B-2, G-2, D-2 are the constituent parts of Building 101/2 – the main building of INPP Unit 2. Ignalina NPP Units A-2 and V-2 arrangement scheme is presented in Figure 9.

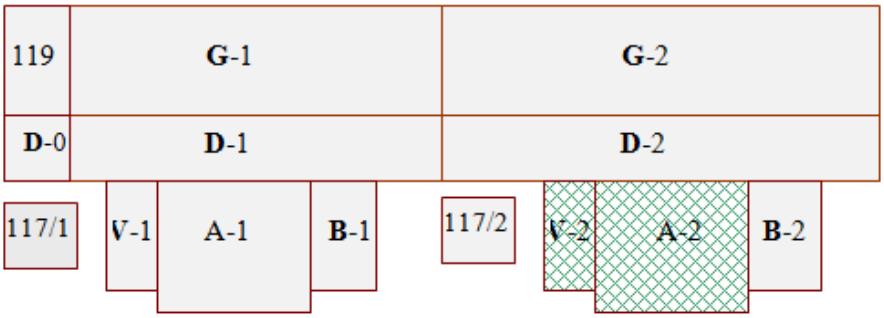



***Figure 9. Ignalina NPP Units A-2 and V-2 arrangement scheme***

*Bld. A – Reactor, Main Circulation Circuit and the reactor auxiliary systems: ECCS, ALS, CPS*
*Bld. V – Reactor gas circuit and special ventilation system*
*Bld. B – MCC purification system and low salted water purification facilities*
*Bld. 117 – Emergency core cooling system water storage tanks*
*Bld. D – Main Control Room, electrical equipment and deaerators*
*Bld. G – Turbine generators with auxiliary systems*
*Bld. 119 - Boiler House Equipment*

In addition to the main buildings and structures shown in Figure 8, the construction of new management facilities in the INPP territory for radioactive waste generated during INPP operation and stored in interim storage facilities in the INPP territory, as well as treatment facilities for waste generated during INPP decommissioning and decontamination projects is planned. The location of these facilities in the INPP territory is shown in Fig. 10. All new waste interim-storage or disposal facilities to be created on, adjacent to, Ignalina NPP site (radius » 1.5m km), that:

- Simplifies permissions
- Reduces new infrastructure
- Reduces transport
- Facilitates physical protection


***Figure 10. Ignalina NPP New Waste Facilities***

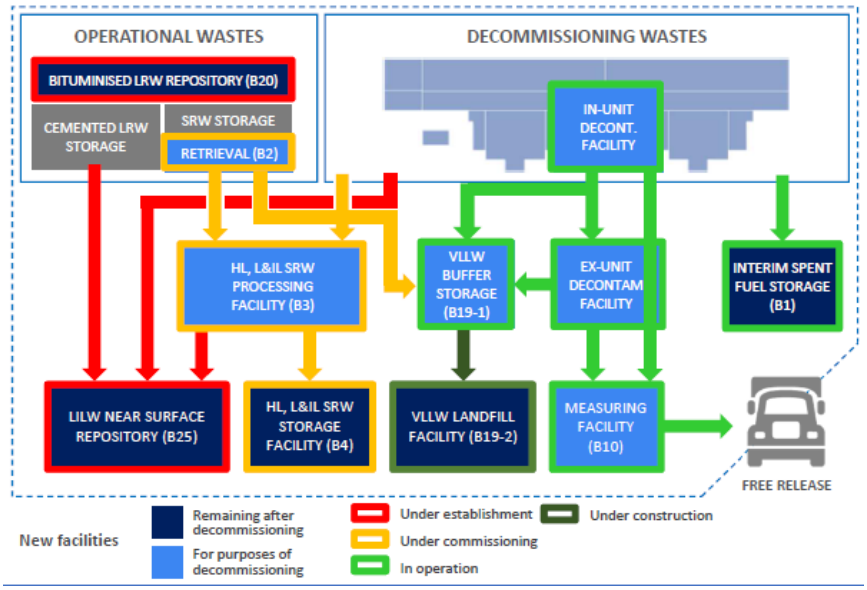



***Figure 11. Ignalina NPP opening waste routes***

Below one can find brief information on the purpose of each facility and the work status.

- ***Interim Spent Nuclear Fuel Storage Facility ISNFSF (Project B1)***

Interim Spent Nuclear Fuel Storage Facility is designed for interim storage of fuel from INPP RBMK-1500 type Units 1 and 2. Spent nuclear fuel will be stored in metal and concrete casks CONSTOR RBMK-1500/M2. Cask storage term – 50 years. The territory of new ISNFSF will take 5.93 ha. Total capacity of the Facility – 17 000 fuel assemblies (about 190 casks). Contractor under the Project – NUKEM-GNS Consortium, Germany. Transboundary impact assessment was performed in 2007.

Operation of LPBKS ISNFSF started on 4 May 2017. By the May 2019 104 casks loaded with spent fuel assemblies were transported to the ISFSF for temporary storage out of the total number of 190 casks to be interim stored at the ISFSF. It is scheduled to complete loading of casks at the ISFSF by the mid of 2022.

***Fig. 12. ISNFSF exterior and interior***

- ***Solid Radioactive Waste Retrieval Facility SWRF (Project B2) and Solid Radioactive Waste Treatment and Storage Facility SWTSF (Project B3,4).***

The Facilities are intended for the retrieval, subsequent treatment and storage of radioactive waste generated during INPP operation, as well as for the treatment and storage of solid radioactive waste stored at the INPP site in interim storage facilities after INPP decommissioning. Transboundary impact assessment was performed in2006-2008.

The license to operate SWRF was obtained on 8 June 2017, and the license to operate the SWTSF was obtained on 12 October 2017. Permits for industrial operation of these facilities are expected to be obtained by the IIIrd quarter 2020.


***Fig. 13. General view of SWRF and SWTSF under construction***

- ***Landfill Facility for Short-Lived Very Low Level Waste (Project B19):***

Buffer Storage (B19-1) – a roofed structure, area – 0.2 ha, capacity - 4000 $m^3$, located in INPP territory and designed for temporary storage of waste, with installed radiological measurement systems and equipment for transportation and storage of containers with waste. Transboundary impact assessment was performed in 2008-2009.

The Facility has been operated since May 2013.

***Fig. 14. Buffer Storage building***

Repository for Short-Lived Very Low Level Waste (B19-2) – occupies the area of approximately 4.4 ha, consists of three modules, capacity - 20 000 $m^3$ packaged waste – is constructed next to B1,3,4 Facilities.

Waste disposal modules are surface structures where waste containers will be densely installed in five floors on a concrete slab. From above, the containers will be covered with several layers of artificial and natural materials. The filling of the modules will be performed when the containers in the buffer storage are filled in stages. Between stages, the modules will be covered with insulating materials and separated by a protective wall. This type of module is operated by the Swedish Oskarshamn NPP, Forsmark and Ringhals. A radiation monitoring system will be installed in the territory of the repository.

Expected commencement of the commercial operation is the IIIrd quarter 2020.

***Fig. 15. Conceptual view of waste loading in the designed Repository for Short-Lived Very Low Level Waste and picture of operating Sweedish Oskarshamn NPP Repository***

- ***Near Surface Repository for Low and Intermediate Short-Lived Waste (Project B-25).***

The multi-compartment reinforced concrete repository is intended for the final disposal of 100,000 $m^3$ of spent, packaged in concrete containers and cemented radioactive waste. According to the preliminary assessment, the repository, its protected zones and auxiliary structures will cover an area of 40 ha.

Disposal of radioactive waste will be carried out until the moment when INPP is completely dismantled and all radioactive waste management is completed. After all the radioactive waste has been deposited in the repository, it will be closed, and there will be erosion-resistant multilayer protective engineering barriers on the surface. Once the entire repository has been filled and finally closed, it will be actively monitored by the operating organization for the first 100 years.

Over the next 200 years (during passive monitoring), land use in the repository territory will be restricted. Similar repositories already exist in Spain (El Cabril Repository) and France (Center L'Aube). Transboundary impact assessment was performed in 2005- 2007.

Expected commissioning of the Repository - in 2023.

***Fig. 16. Conceptual view of the Near Surface Repository, waste loading diagram***

- ***Free Release measurement Facility (B10).***

Free Release Measurement Facility, which determines the level of radionuclide contamination of materials generated during the dismantling and decontamination of INPP facilities, was put into operation in August 2010. If the contamination does not exceed the free release levels, the radiation control of the materials shall be terminated and they shall be treated as ordinary non-radioactive waste.

***Fig. 17. Pictures of operated Free Release measurement Facility*** **1.2. Short Description of the Project**

All works within the scope of the proposed economic activity will be carried out only within the premises of Building 101/2. Work performance places are equipped with the existing special ventilation systems or mobile filtering units containing highly efficient aerosol filters with the cleaning efficiency not lower than 99.9%. This allows to almost completely prevent the release of nuclide-contaminated aerosols into the environmental air.

The main stages and technological operations of the proposed economic activity are the following:

- preparatory works, including the establishment of buffer zones, areas of initial treatment of waste (fragmentation, decontamination, packaging) and organization of transportation ways of waste and dismantling and decontamination equipment;
- dismantling of equipment;
- transportation of waste of the dismantled equipment to for their initial treatment to the areas of fragmentation, decontamination and packaging in accordance with the applicable at the INPP requirements;
- initial treatment of dismantled waste;
- radiation measurements of waste and waste packages;
- transfer of waste and/or waste packages to the interim storage, disposal or release it from the further radiation control depending on the different classes waste acceptance criteria for each storage facility and the requirements of the normative documents of the Republic of Lithuania;
- final works, including dismantling of equipment installed during the preparatory works, restoration of building infrastructure systems, decontamination of premises and other works necessary to be conducted for compliance of the building to the requirements set in the design documents for the final state of the dismantled object .

The main objectives of the proposed activity under the Project 2210, Phase 1" are the following:

- D&D of Units A-2 and V-2 equipment;
- handling of all types of waste generated during performance of the proposed economic activity by applying such methods that are safe for personnel and the environment;
- assurance of integrity and normal functioning of the systems remaining in operation;

assurance of maintaining of the radiological status of the equipment, components and building structures not to be dismantled at the levels not higher than prior to the start of D&D work.

**Dismantling and Decontamination Technology**

The organization of the dismantling of Units A-2 and V-2 equipment and the selection of technologies are based on the following principles:

- Dismantling technologies and work organization must ensure the safety of employees and keep the facilities in operability of the equipment remaining in operation;
- Individual operations and the entire technological process must comply with ALARA principles;
- Use of existing technologies and standard equipment used for INPP equipment repair works for their removal from their installation sites and pipeline cutting;
- Application of technologies of already implemented D&D projects (including Units A1 and V1 equipment D&D projects) and use of INPP equipment acquired procured for these projects;
- Use of technologies with the minimal generation of the secondary waste and the emissions of harmful substances into the environment;
- Application of automated methods of dismantling of contaminated equipment, allowing remote control of the technological process;
- Localization of welding gases and aerosols during gas-flame, plasma cutting and mechanical cutting at the places of their formation, use of local suction and venting pumping and blowing from the internal cavities of dismantled equipment;

- Dismantling of equipment by large-sized blocks which dimensions depend on the lifting capacity of hoisting devices and sizes of the transport openings and the requirements of the fragmentation workshop equipment;
- Use of technologies with lower-cost equipment and the least need for consumables.

Primary treatment of decommissioning waste at Units A-2 and V-2 will be carried out in existing / newly installed primary treatment workshops in building 130/2 of Units A1, G1, A2.

Dismantling of Units A-2 and V-2 equipment within the scope of the Project 2210, Phase 1 will be implemented by application of *disassembly, mechanical and thermal cutting* methods. During the main dismantling works two types of cutting: the mechanical and thermal cutting will be used. The thermal cutting includes oxygen-acetylene and plasma cutting.

***Figure 18. Cutting methods:*** hot cutting – plasma cutting, acetylene oxygen cutting; cold cutting – band saws, electric hand saws, electric and hydraulic shears, etc.

Equipment consisting of separate elements and having detachable connections will be dismantled by means of *disassembling* using regular bench-work tools. As a rule, for such equipment there is maintenance documentation, containing the sequence of its disassembling, and which will be used during development of detail engineering design documentation for dismantling.

The following is assigned to such equipment:

- pumps;
- isolation and regulating valves, including its remote control;
- electromechanical equipment: cabinets, assemblies, electric motors, transformers;
- C&I equipment.

*Mechanical cutting* will usually be applied for small and medium diameter (up to D100) pipelines, sheet metal and rolled metal, cables, highly radioactive contaminated equipment, oil system equipment or in case of inability or inexpediency of using of thermal cutting for any reason. Equipment used for mechanical cutting is as follows: pipe cutters, cutting machines with abrasive discs, hydraulic shears, etc. For dismantling of the large-sized equipment (collectors and tanks of main circulation pumps, etc.) diamond wire cutting will be applied.

*Thermal cutting* will generally be applied for cutting large diameter pipelines (exceeding D100) and vessels, heavy metal structures, and metal structures of complex geometric shapes. Workplaces will be provided with sufficient ventilation.

The equipment of Units A-2 and V-2 which will be dismantled during the proposed economic activity is summarized in Table 1. The table below also gives the approximate weight of the equipment to be dismantled. The actual weight of the equipment can only be determined at the stage of preparation for

transportation from the proposed economic activity site. The Technological Design will provide a detailed description of the equipment and systems to be dismantled.

***Table 1***

| No | Equipment | Waste weight (t) | Comment |
|---|---|---|---|
| 1. | PC pipelines and equipment, including drum-separators | 3104.3 | |
| 2. | Accident localisation system equipment | 1138.8 | |
| 3. | MCP and auxiliary systems | 1390.2 | |
| 4. | Fresh steam pipeline equipment and PC overpressure protection system | 775.9 | |
| 5. | Emergency reactor core cooling system equipment | 472.0 | |
| 6. | Auxiliary equipment for technical water supply systems to main customers and reactor compartment | 256.4 | |
| 7. | CPS pump and heat exchanger equipment | 196.8 | |
| 8. | Equipment and pipelines of blow-down and fooling system | 106.8 | |
| 9. | Pipelines and equipment for feed water supply to DS system | 49.8 | |
| 10. | Industrial circuits of the reactor compartment | 17.6 | |
| 11. | „L“ and „D“ type pump and heat exchanger equipment | 13.7 | |
| 12. | Equipment of reactor compartment auxiliary systems | 586.2 | Combined low-mass systems located within the boundaries of Unit A-2: reactor gas circuit, hydraulic pressure test and seal cooling pump station, exhaust gas cleaning system, sampling system, etc. |
| 13. | Ventilation equipment | 358.2 | Insulated equipment for ventilation systems / components |
| 14. | Auxiliary maintenance system equipment | 12.3 | |
| 15. | Auxiliary Rm equipment | 283.0 | |
| 16. | Fuel supply, treatment and control system | 0.6 | Long articles turner |
| 17. | Protective casing | 202.4 | RM biological shielding components |
| 18. | Transport equipment | 212.3 | Cargo lifting mechanisms, grabbers |
| 19. | Power supply equipment and technological system C&I | 272.3 | 6/0.4 kV transformers, primary and secondary switchboards-0.4 kV, technological assemblies, panels, cabinets, cables, cable structures, etc. |
| 20. | Metal structures | 1213.9 | Ladders, supports, passageways, decks, barriers, trays, pallets, etc. |
| 21. | Concrete structures | 259.8 | Unit A-2, room 613 removable concrete slabs and concrete resulting from preparatory works |
| | **Total:** | **10923.3** | |

## 1.3. Required Resources and Materials

In order to ensure the efficiency and safety of the planned works, the qualified INPP personnel with experience and knowledge in operation and repair of to be dismantled equipment will be used to the maximum extent, as well as the trained personnel with the work experience in dismantling and

decontamination of equipment according to other already implemented D&D projects. The works will be carried out on a regular basis by 198 employees.

The electricity supply for the equipment dismantling and decontamination works, as well as for the remaining in operation technological systems will be required for carrying out the proposed activities. When assessing the electricity consumption of the needs of the proposed economic activity, the load of electric motors of continuously operating ventilation systems was not taken into account. It is estimated that the maximum total load of electricity consumers, ensuring the implementation of the proposed economic activity, is 220 kW. The main consumers of electricity will be filtration equipment, cranes, machine tools, power tools.

***Figure 19. Decontamination methods:*** • physical (mechanical) techniques such as blasting, jetting, wiping, brushing, etc; • ultrasonic techniques; • chemical techniques

Thermal heating will be necessary only for heating of the rooms with the permanent presence of the personnel in winter (sanitary inspection rooms). According to the proposed economic activity, it is not planned to use additional heat energy.

Compressed air will be necessary to ensure the performance of works using pneumatic tools. The maximum compressed air (0.6 MPa) consumption is planned to be about 275 $m^3$ / h. The supply of compressed air for pneumatic vessels will be included in the scope of the preparatory works.

Surface water will not be used during the proposed activities. Artesian water will be used for personnel hygiene. No changes in the amount of water used for the proposed activities are expected, as the proposed activities will be carried out by INPP personnel.

Diesel fuel will be needed for transportation and decontamination of dismantling waste at the INPP industrial site. The planned fuel demand is approximately 5.17 t.

The main material used for gas and flame cutting of to be dismantled equipment is oxygen and acetylene, supplied in high-pressure cylinders.

Quantities of tools used to ensure mechanical cutting of equipment, quantities of additional personal protective equipment, amount of polyethylene film, etc. will be determined at the stage of preparation of the detailed project documentation.

During the proposed economic activity decontamination pastes, gels and foams will be used for decontamination of the equipment, which were earlier used for the works performed under the previous D&D projects. The use of substances or preparations containing solvents is not envisaged during the proposed activities. Assessment data on the demand of some resource types are provided in Table 2.

***Table 2***

| Demanded resources | Amount | Source |
|---|---|---|
| Electrical power, MW/h. | 4200 | INPP 0.4 kV power distribution network |
| Compressed air, $m^3$ | 550000 | INPP compressed air system (0.6 MPa) |
| Diesel fuel, t | 5,17 | External supply |
| Oxygen, $m^3$ | 16400 | External supply |
| Acetylene, $m^3$ | 2640 | External supply |

## 1.4. Assessment of Expected Waste Volumes and Emissions during the Project Implementation

During the proposed activity approximately 10923.3 tons of equipment will be dismantled. The general composition of to be dismantled waste is shown in Figure 20. The main materials are carbon steel and stainless steel.

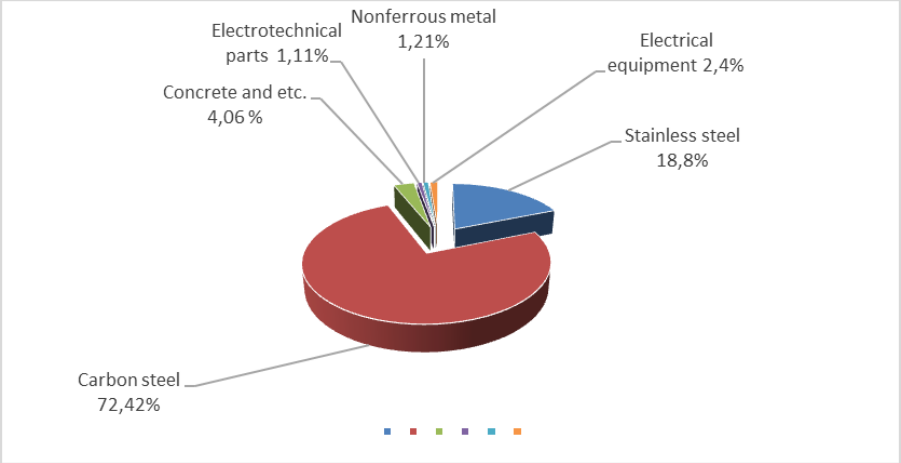



***Figure 20. General composition of the dismantling waste***

Decontamination of to be dismantled equipment will be carried out according to D&D technology used earlier during the implementation of other projects, as well as on the basis of the project developed for Unit A-1 equipment D&D. The results of engineering surveys performed within the scope the D&D project for Unit A-1 equipment will be used in selecting the specific methods of decontamination, as well as the waste decontamination experience existing at the INPP. In case of need to obtain the missing initial data for the Project 2210, Phase 1 or clarification of the existing data, additional engineering surveys can be performed in the scope of the Project 2210, Phase 1.

At the end of the proposed activity all dismantled equipment (the primary waste), as well as the secondary waste generated during the performing of work will be removed from Building 101/2 as RAW for further processing, storage and disposal to the relevant waste treatment facilities.

During the performing of the proposed activity the primary waste in the amount of 10923.3 tons will be generated. According to the RAW classification defined by the Nuclear Safety Requirements BSR-3.1.2-2017 “Pre-disposal Management of Radioactive Waste at the Nuclear Facilities, the waste of Classes 0, A, B, C will be generated. The waste management will be carried out in accordance with the provisions of the INPP documents.

The planned masses of waste of different classes before their initial treatment and after decontamination are presented in Table 3.

***Table 3***

| Class of waste | 0 | A | B | C |
|---|---|---|---|---|
| Before decontamination, t | 1559.3 | 7886.0 | 1075.0 | 403.0 |
| After decontamination, t | 9348.8 | 1509.7 | 64.6 | 0.2 |

It is planned that the major part, ~ 84% of RAW, will be decontaminated to free release condition (Class 0). The waste of Class 0, after the confirmative measurements on the free-release equipment (in B10 facility or building 159B on the INPP site), are exempted from the further control and the management is carried out in accordance with the provisions of the Law of the Republic of Lithuania on Waste Management.

Very low-level waste (Class A) amounting to ~13% of the dismantling waste mass will be placed in appropriate packages and transported to the buffer storage (B19-1 facility) (its operation started in May 2013), and further will be transferred for the final disposal to the Landfill Facility (which is under construction according to the Project B19-2, and its operation is planned to start in year 2020).

Low-level and intermediate-level waste (Classes B and C, accordingly) amounting to ~0.6% of the dismantling waste mass will be placed into appropriate containers and transported to the SWTSF (Solid Waste Treatment and Storage Facilities – Project B3/4), which consists of two facilities: SWTF (Solid Waste Treatment Facility) and SWSF (Solid Waste Storage Facility). After the appropriate treatment, characterization and packaging of waste into final disposal containers at the SWTF, the containers will be transferred for the interim storage to the SWSF, and then finally – to the Near Surface Repository (Project B25, its operation is planned to start in year 2023).

No wastewater discharge is planned during the proposed economic activity.

The analysis of potential non-radiological impacts has shown that the proposed activity can only affect the ambient air due to CO and NOx emissions during thermal cutting, dismantling and fragmentation of equipment, as well as emissions from vehicles transporting dismantling materials as radioactive waste. The maximum emissions of pollutants as a consequence of thermal and mechanical cutting (~ 0.151 kg per year) were estimated as insignificant and having no environmental impact. The main source of the ambient air pollution with nitrogen and carbon oxides in the INPP region is the SE “Visagino Energija” boiler house and the INPP steam boiler house. Due to the proposed activity, the concentration of pollutants in the ambient air, even taking into account the background pollution, will neither exceed the air pollution threshold values established by the requirements of normative documents, but will also be significantly lower than the established limit values.

The analysis of potential radiological impact showed that under the normal operating conditions the impact may be caused by the direct irradiation from dismantled equipment materials, release of airborne radioactive materials, as well as radiation due to radioactive waste containers transportation at the INPP industrial site. The possible radiological impact of the proposed economic activity on the environment components outside of SPZ is estimated as very low. Based on the completed assessment, the maximum annual effective dose to the representative (the member of the critical group of population) will be 1.08E-04 mSv which will amount to 1.08E-01% of the dose constraint for airborne discharges – 0.1 mSv. In case of the INPP, the representatives are these residents who live or undertake activity on the boundary of the SPZ and the INPP monitoring zone.

# 2. Analysis of Alternatives

One of the tasks solved within the scope of Project 2210 to be implemented following the selected INPP decommissioning strategy is to minimize the negative impact of the proposed economic activity on the personnel, population and the environment. The solution of this task is based on the analysis of the work organization and the technological solutions alternatives. The analysis of alternatives for implementation of Project 2210 is carried out in the light of existing practical experience gained during implementation of other dismantling and decommissioning projects and the worldwide best practices applied in the field of the decommissioning of nuclear facilities. The alternatives considered for the proposed activity (dismantling and decontamination of INPP Units A-2 and V-2 equipment) can be divided into the following groups:

- Work performance organisation alternatives;
- Alternatives of technological solutions related to dismantled equipment dismantling, fragmentation and decontamination operations.

## 2.1. Work Performance Organisation Alternatives

### *2.1.1. Work Sequence Options*

Equivalent dose rates at dismantling works performance sites are of different values and require redistribution of personnel doses. In implementation of Project 2203, i.e. analogous Unit A-1 equipment D&D project, two options of work performance at work performance workshops were considered:

- Subsequent work performance of works starting from “contamination freenon-contaminated” work performance workshopsbars and moving to “contaminated” work performance workshops in order to reduce the equivalent dose rate due tofrom the dismantled equipment related toas a consequence of the natural decay decomposition of nuclides;
- Simultaneous performance of works: work performance in work performance workshops where dismantling equipment with low levels contaminated to be dismantled equipment of radioactive contamination and work performance in equipment dismantling work performance workshopsbars with high levels contaminated to be dismantled equipment.of contamination.

The collective exposure dose for all works performed according to the project is approximately the same for both options. However, taking into account the work schedule for Option 1, in some years the average individual exposure dose of employees exceeds the limited annual dose of 18 mSv applied at INPP.

The second option allows for the rotation of personnel involved in the dismantling works in order to distribute the doses evenly and not to exceed the limited annual dose of 18 mSv.

This approach will be applied in Project 2210. The procedure for performance of works in individual work performance workshops will be determined on the basis of the results of the assessment of individual doses of personnel for each work performance workshop, taking into account natural decay of radionuclides.

### *2.1.2. Primary Waste Treatment Options*

Possible options for primary waste treatment were analysed:

- All primary waste treatment operations will be carried out in Unit A-2;
- All primary waste treatment operations will be carried out in primary treatment bars workshops of Units A-1, G-1 and building 130/2;

- Part of operations shall will be carried out in primary treatment bar workshops of Unit A-2, the other part – in primary treatment bar workshops of Units A-1, G-1 and building 130/2.

The analysis showed:

- The capacity of the existing and to be commissioned (within the scope of other projects) primary treatment workshops in Units A-1, G-1 and the primary treatment bars of building 130/2 is sufficient to decontaminate the total amount of waste generated during the INPP decommissioning projects carried out in parallel within at the set deadlines. There is no need to procure new shotgun wheel-blasting and shot- blasting equipment to decontaminate Unit A-2 equipment dismantling waste;
- It is not reasonable to move the equipment located in the primary treatment workshop equipment from in Unit A-1 to Unit A-2;
- In order to reduce the personnel exposure doses when packing and transporting waste from Unit A-2 to the primary treatment workshops of Units A-1, G-1 and building 130/2, it is reasonable to carry out pre-treatment with a water jet (to remove weakly fixed contamination).

Considering the mentioned above mentioned information, it was decided that both the existing and the newly organized primary waste treatment bars workshops under Project 2210 will be used for the primary treatment of waste in Units A-2 and V-2:

- Primary treatment workshop at Unit A - 2 LTC (fragmentation and primary treatment with water jet);
- Packaging workshop for relatively conditionally non-radioactive waste in the rooms 140/2, 191 of Unit A-2;
- Additional shot-blasting workshop bar for relatively conditionally non-radioactive waste in the rooms of 136/2, 137 of Unit A-2;
- Class A SRW packaging workshop in the rooms 127, 128, 130, 135, 135/1 of Unit B-2;
- Class B and C SRW packaging workshop in room 613 of Unit A-2;
- Primary waste treatment workshop in Unit A-1 LTC;
- Primary waste treatment facility in building 130/2;
- Primary waste treatment workshop in Unit G-1.

## 2.2. Alternatives of Technological Solutions

The technological design for dismantling and decontamination of Units A-2 and V-2 equipment will include a comparative analysis of technological solutions of dismantling, fragmentation and decontamination of to be dismantled equipment, taking into account the experience of similar D&D works under ongoing and already completed dismantling and decontamination projects, also on the basis of the developed technological project for D&D of Unit A1 equipment.

The selection of technological solutions is carried out in accordance with the basic principles of the organization of dismantling and decontamination works, which ensures that the negative environmental impact is avoided or minimized, labour and material costs are reduced.

### *2.2.1 Equipment Dismantling and Waste Fragmentation Options*

Waste fragmentation is understood as the segregation of dismantled equipment, pipe assembly or other element into smaller parts in a specially organized workshop using dedicated equipment. If the equipment is dismantled into parts and do not require further fragmentation, such works are included in the scope of dismantling.

Dismantling of equipment and fragmentation of waste will be carried out by dismantling, mechanical and thermal cutting (see section 2.1.2). The selection of equipment used for each method depends on the specific conditions under which the work is performed.

Each technology has its advantages and disadvantages. Mechanical (“cold”) cutting does not produce gases (CO and NOx) and welding aerosols. Considering the fact that CO and NOx are not

trapped by the treatment systems and are completely emitted into the atmosphere, “cold” cutting methods are more appropriate in this respect. On the other hand, the rate of “cold” cutting is much lower, which means that the personnel exposure is higher, and it leads to generation of metal chips which increases the amount of secondary radioactive waste.

Thermal cutting is usually a faster technology. However, during thermal cutting, some of the radionuclides are attached to the slag at the cutting site, so additional treatment of the edges is required, thus increasing the amount of secondary radioactive waste.

Therefore, when choosing equipment cutting methods, such aspects as the material, its thickness, equipment configuration, cutting surface availability, work area conditions, equipment contamination level, and others must be considered. The choice of methods and tools must be well-grounded and differentiated. Specific dismantling technologies will be identified in the design for each process system and equipment.

Both the existing equipment and tools, as well as equipment and tools procured under Project 2210 will be used for the application of the specified technologies. Qualified and trained personnel, as well as successful work experience gained in dismantling of similar equipment under other dismantling and decontamination projects, will enable to minimize the formation of secondary radioactive waste and discharge of emissions into the environment.

### *2.2.2. Equipment Decontamination Options*

In order to analyse the alternatives of decontamination technologies, the results of the engineering surveys carried out under the project 2203 (Unit A1 equipment D&D) are used in preparation of the project 2210 design documentation, and the existing experience of waste decontamination at INPP is taken into account. Additional engineering surveys may be performed under Project 2210 to obtain the missing data required for project 2210 or to specify the available data. The TD will identify groups of equipment that are technically feasible to be decontaminated, perform radiological control of the decontamination results, and performance of this work is cost-effective. The remaining waste will be disposed / stored without decontamination: waste that is contaminated by their volume (thermal insulation, porous materials, filters, etc.), equipment with a complex configuration that its decontamination and / or radiological control is complicated (low diameter pipes and fittings, electrotechnical equipment, etc.).

Both, the existing and newly procured equipment under Project 2210 will be used for decontamination. Qualified and trained personnel, tested procedures, as well as successful work experience gained from decontamination of equipment under other dismantling and decontamination projects will reduce the formation of secondary radioactive waste and emissions to the environment.

## 3. Description of the Environmental Components that may be Impacted by the Proposed Economic Activity

### 3.1. Water Components

The impact of the proposed economic activity on the surface and underground water of the INPP region and neighboring countries is not expected due to the fact that:

- the proposed economic activity will be carried out in the controlled area of the INPP industrial site;
- it is not planned to increase the consumption of underground and surface water, therefore an impact on the hydrology of the region will not occur;
- the ingress of uncontrolled water discharges to the environment during the proposed economic activity under the normal operating conditions is excluded;
- industrial water discharges will be treated as potentially radioactive discharges in order to completely eliminate the possibility of radionuclides ingress into the environment. For this purpose, the water discharges will be pumped to the INPP Liquid Radioactive Waste

Treatment Facility. Thus, the possibility of environmental pollution will be eliminated;

- sewage water will be collected by the wastewater collection system and pumped for the treatment to the Water Treatment Facilities of SE "Visagino energija". As the work will be performed by the INPP existing staff, the increase in the amount of discharges from INPP is not expected if compared with the existing situation;
- surface water from the INPP territory will be discharged into the environment (Lake Drūkšiai) through the industrial-surface water drainage channels equipped with mechanical oil retaining devices;
- the proposed activity will be performed outside the SPZ of the Water Intake Facilities and Boreholes of Visaginas town located approximately 3 km to the south-west from the INPP site. The drinking water sources of the Daugavpils district of Latvia and the Braslav district of Belarus are located at much greater distance (Figure 21);
- INPP assures continuous monitoring of ground water, monitoring of the surface and industrial water discharges into Lake Drūkšiai, monitoring of Lake Drūkšiai.

Measures on the impact reduction from the proposed economic activity are not envisaged due to absence of such impact.

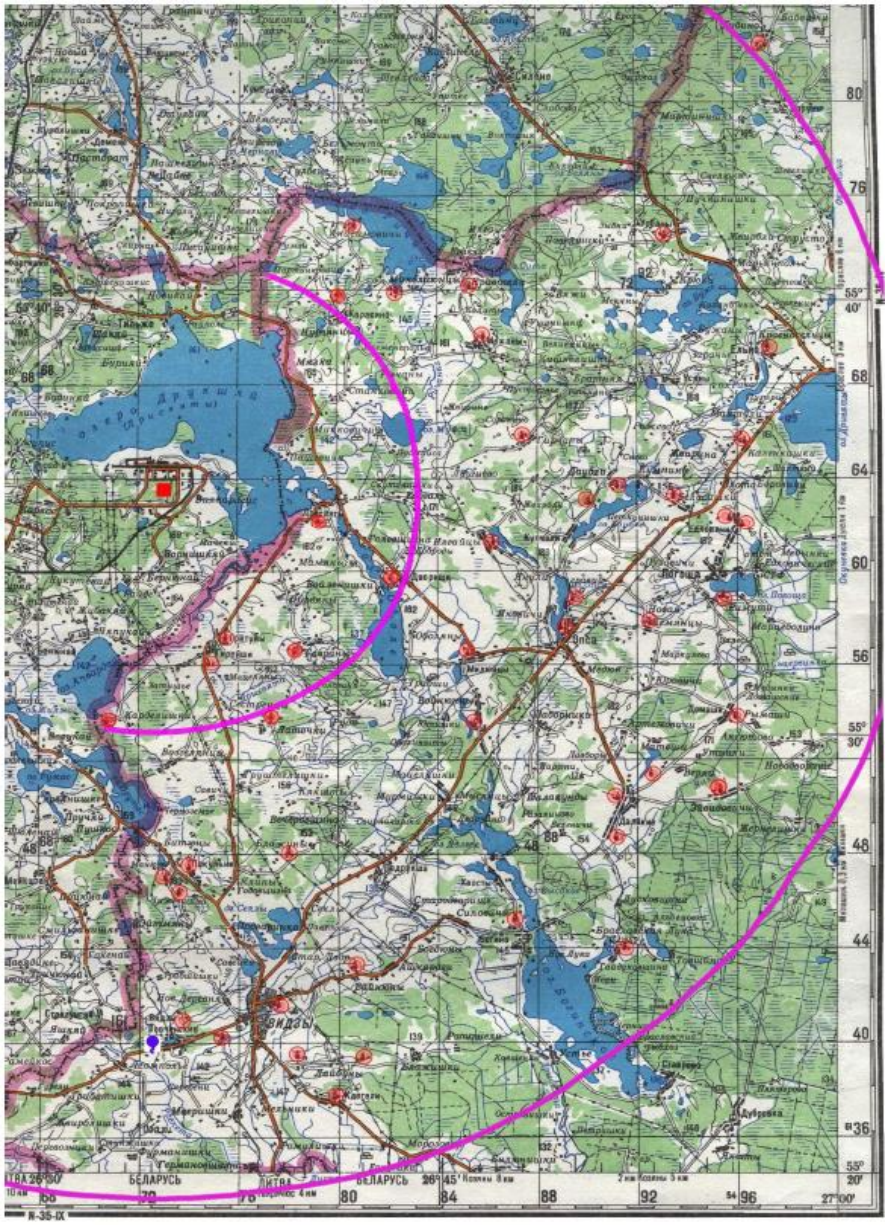



***Figure 21. The drinking water sources of the Daugavpils district of Latvia and the Braslav district of Belarus***

### 3.2. Environmental Air

***Non-radiological Impact***

During performance of the proposed economic activity the air pollutants will originate due to cutting of dismantled equipment and during transportation of dismantling and decontamination materials. The emissions from cutting of equipment (in the form of aerosols) will almost completely be caught by the existing highly efficient cleaning systems of emissions with the exception of only gaseous emissions of CO and NOx which are not trapped by the cleaning system. However, their amount will be insignificant. The concentration of pollutants in the environmental air as a result of implementation of the proposed activity neither will exceed the air pollution threshold values established by the requirements of normative documents, but will also be significantly below the established limit values.

The motor vehicles carrying dismantling and decontamination materials will not cause any significant impact on the environmental air quality. The transport traffic will be carried out only within the boundaries of the INPP industrial site. Therefore, the proposed economic activity on D&D of Units A-2 and V-2 equipment will not have negative impact on the environment of the Braslav district of Belarus and Daugavpils region of Latvia.

No special measures to mitigate the impact to the environmental air in addition to the measures that will be scheduled in the technological project of D&D of Units A-2 and V-2 equipment of are planned.

***Radiological Impact***

The possible radiological impact of the proposed economic activity on the environment components outside of SPZ is estimated as very low. Based on the completed assessment, the maximum annual effective dose to the representative (the member of the critical group of population) will be 1.08E-04 mSv which will amount to 1.08E-01% of the dose constraint for airborne discharges – 0.1 mSv. In case of the INPP, the representative are these residents who live or undertake activity on the boundary of the SPZ and the INPP monitoring zone.

### 3.3. Soil

The proposed economic activity on D&D of Units A-2 and V-2 equipment will be performed within the INPP industrial area, so the impact to the soil and the geological structure of the subsoil of the Braslav district of Belarus and the Daugavpils region of Latvia is not considered. In the absence of any impact due to the proposed economic activity no additional measures to reduce that impact are considered.

INPP Environmental Safety Division provides the continuous monitoring of the soil, groundwater, monitoring of the water discharges into Lake Drūkšiai, monitoring of Lake Drūkšiai.

### 3.4. Underground (Geology)

As any construction works, new foundations, refilling and ground movement will not be performed during the implementation of the proposed economic activity, no additional impact on the geological ground structure is expected. No hazardous materials or water discharges will be discharged directly (without seepage through the soil or subsoil) or indirectly (seepage through soil or subsoil). The underground cavities will not be used for storage or disposal of any toxic materials.

The proposed economic activity on D&D of Units A-2 and V-2 equipment will not impact on the underground geology of the Braslav district of Belarus and the region of Daugavpils region of Latvia.

### 3.5. Biological Diversity

The proposed economic activity on D&D of Units A-2 and V-2 equipment will be carried out in the territory of the INPP industrial site, where no species of flora and fauna that are protected by the relevant legal acts of the Republic of Lithuania and the EU are found. The impact from the

proposed economic activity on the biological diversity outside of the INPP industrial site territory will be quite small and only associated with the exhaust fumes, noise and light signals of motor vehicles. The movement of machinery is expected only at the daytime and it will not change the existing traffic intensity.

In the territories of the Braslav district of the Republic of Belarus and the Daugavpils region of Latvia the originated noise will not be heard, as these regions are at the distance not less than 5 km from the INPP site.

INPP Environmental Safety Division provides continuous monitoring of radionuclide content in samples of vegetation, vegetables and food products selected in the INPP region.

### 3.6. Landscape

The proposed economic activity will be carried out within the INPP industrial site and do not include any construction or demolition works, as well as other works which may affect the landscape of the INPP site and outside of the site. There will be no impact on residential areas and recreation areas.

### 3.7. Social and economic environment

The proposed economic activity will be carried out within the industrial area in a distant location from places of permanent residence in Latvia and Belarus. Impact on the population of Latvia and Belarus or apparent changes in the social economic conditions is not predicted.

D&D work of Units A-2 and V-2 equipment will be carried out in strict accordance with the national normative documents consistent with the legal basis of the EU, the requirements of international organizations such as the IAEA, established recommendations and conventions, and in addition, under the supervision of the regulating institutions of the Republic of Lithuania.

INPP possesses sufficient industrial resources, qualified personnel and experience in implementing similar D&D projects in order to be able to perform D&D of Units A-2 and V-2 equipment.

D&D of Units A-2 and V-2 equipment will be carried out in accordance with the latest environmental requirements, by applying the state-of-the-art technology, the principles of radioactive waste management defined by the IAEA, and the existing good practices of the European Union countries.

### 3.8. Cultural Heritage

The proposed economic activity will be carried out within the INPP industrial site and will not affect the objects and the zone of cultural heritage of Latvia and Belarus.

### 3.9. Public Health

***Non-radiological Impact***

The proposed economic activity will be carried out within the INPP industrial site. The SPZ with the radius of 3 km is defined around the INPP. There are no permanent residents in this zone. The nearest settlements are at a considerable distance from INPP, therefore the impact from D&D work or transportation of freights on the site will be insignificant.

The potential impact from the proposed economic activity will be minimized using of high-efficiency filters; in addition, good conditions for the dispersion of pollutants will be assured. Considering the fact that the nearest settlements are at a more distant location from the site of the proposed economic activity, the impact on the health of the population in the INPP region is not expected.

Other important factors that may affect the health of the population in the INPP region during the implementation of the proposed economic activity is not expected.

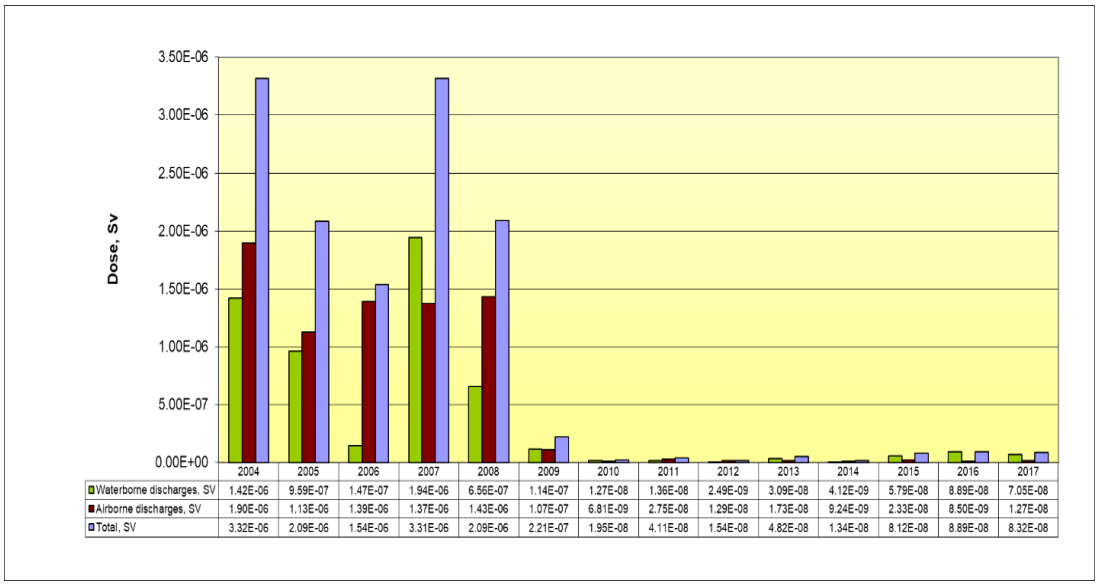
Therefore it could be stated that the proposed economic activity will not have a significant negative

impact on the health of the population of the Braslav district of Belarus and the Daugavpils region of Latvia.

***Radiological Impact***

Based on the performed assessment of radiological exposure of the population due to the potential emissions of radioactive substances into the atmosphere during the proposed economic activity, the maximum annual effective dose to the representative (the member of the critical group of population) will be 1.08E-04 mSv, which will amount to 1.08E-01% of the annual dose constraint set for the emissions – 0.1 mSv, i.e. half of the dose constraint of 0.2 mSv. The potential radiation exposure of the population in neighboring states will be even lower due to the more distant location of it from the source of emission.

A comparative evaluation of the negative impact of the INPP activity on the environment during the operation period and during the period after the final shutdown of the power units and the transition period to the decommissioning is presented in the diagram evaluating the exposure dose to the representative due to gas-aerosol discharges and waterborne discharges from INPP (Figure 22).




| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Waterborne discharges, SV | 1.42E-06 | 9.59E-07 | 1.47E-07 | 1.94E-06 | 6.56E-07 | 1.14E-07 | 1.27E-08 | 1.36E-08 | 2.49E-09 | 3.09E-08 | 4.12E-09 | 5.79E-08 | 8.89E-08 | 7.05E-08 |
| Airborne discharges, SV | 1.90E-06 | 1.13E-06 | 1.39E-06 | 1.37E-06 | 1.43E-06 | 1.07E-07 | 6.81E-09 | 2.75E-08 | 1.29E-08 | 1.73E-08 | 9.24E-09 | 2.33E-08 | 8.50E-09 | 1.27E-08 |
| Total, SV | 3.32E-06 | 2.09E-06 | 1.54E-06 | 3.31E-06 | 2.09E-06 | 2.21E-07 | 1.95E-08 | 4.11E-08 | 1.54E-08 | 4.82E-08 | 1.34E-08 | 8.12E-08 | 8.89E-08 | 8.32E-08 |

***Figure 22. Calculated exposure dose to the representative due to gas-aerosol and waterborne discharges from INPP for 2004-2017 years***

It is obvious that since 2010, when the main activity of the INPP became the decommissioning process, the radiation exposure to the representative significantly decreased.

During the period since 2010, several projects on D&D of INPP Units 1 and 2 equipment either have been implemented or are continued to be implemented (Building 117/1, Building 117/2, Units G-1, G-2, V-1, D-1, D-2, D-0) and have not caused or do not cause currently any noticeable increase in the negative impact on the environment both within the INPP industrial site and in more remote areas of the neighboring countries.

The total activity of all planned releases constitutes about 10 % of the estimated permissible limit release values based on the Plan on Release of Radionuclides into the Environment.

Based on the exposure dose calculations, the total exposure dose of the representatives of the public group resulting from the radionuclide releases into the atmosphere from the INPP in 2018 constituted 2.165E-03 mSv and it makes up 2.165 % of the dose constraint.

The estimated dose of the representatives of the critical public group due to radionuclide discharges into Lake Drūkšiai (including debalanced waters) in 2018 was equal to 1.23E-03 mSv and it makes up 1.23 % of the dose constraint.

The total estimated dose received by the representative of the critical public group during 2018 due to airborne and waterborne discharges from the INPP is equal to 3.395E-03 mSv, which is 58.91 times less than the dose constraint for the representative of the critical public group equal to 0.2 mSv/year and makes up 2% of the background value.

## 4. Analysis of Incidents

The analysis of incidents that may arise during the implementation of the proposed activity on D&D of Units A-2 and V-2 equipment proved that their possible negative effects will impact only the personnel directly performing the works at the workplaces within the premises of the main building of Unit 2 – Building 101/2. Considering that all workplaces in Units A-2 and V-2 premises are equipped with highly efficient emission cleaning systems, in case of any incidents the increased impact to the environment will not be originated. The maximum impact to the personnel in case of incidents during the radiation-hazardous work will be the following: *due to radioactive substances contact with the skin – the maximum exposure dose to the skin amounts to 3.41 mSv,* which is 0.7% of the permissible annual value (500 mSv). The works associated with transportation of RAW packages generated during the proposed economic activity by the inner INPP site roads – from Building 101/2 to the RAW treatment facilities (B10, B3/4, B19, B25 facilities) are not included into the scope of the project on D&D of Units A-2 and V-2 equipment. The analysis of the incidents related to damage of RAW packages during their transportation by the internal INPP site roads is performed for specific classes of RAW in the previously prepared documents approved in accordance with the established procedure: EIA Reports and SARs for the RAW treatment and storage facilities in B10, B3/4, B19, B25. In relation to this project, it can be noted that in case of the most severe incident associated with the drop and damage of the transport container G-2 filled with waste of Classes B and C, the potential impact to the representative (the members of the critical group) at the borders with the Republic of Latvia and the Republic of Belarus will be the following:

- the effective exposure dose at the border with the Republic of Latvia – 7.67E-04 mSv;
- the effective exposure dose at the border with the Republic of Belarus – 1.03E-03 mSv.

In order to protect the personnel, residents of the Republic of Lithuania and the neighboring states against the consequences of the potential radiological accidents outside the SPZ boundary, INPP is continuously planning and developing the emergency preparedness measures. In case of exceeding of radioactive substances dispersion norms established for the normal conditions of nuclear facility operation outside the SPZ, the INPP Emergency Preparedness Plan will enter into force and the radiological situation survey within the SPZ and outside its boundaries will be performed. Based on the current state of affairs, measures dedicated for protection of the inhabitants outside of the SPZ shall be performed, as well as the measures related to limitation of the personnel exposure doses.

Considering that the radiological impact due to the proposed economic activity to the environment is significantly below the radiological impact estimated in case of beyond design basis accidents in the INPP Emergency Preparedness Plan, it can be stated that the proposed economic activity will not have effect on the environment components of the Braslav district of Belarus and Daugavpils region of Latvia, which are located at a more distant location from the source of possible emissions.

The proposed project solutions include the concept of different barriers for localization, containment and collection of airborne radioactivity in order to prevent any significant radioactive releases into the industrial environment and/or atmosphere.

During the implementation of the proposed activity the monitoring of the actual radioactive emissions into the working premises and the environmental air will be carried out.

## 5. Methodology for Incident Analysis

The risk analysis is performed following the requirements of the Recommendations for Risk Assessment of the Potential Accidents during Implementation of the Proposed Economic Activity, R 41-02 [approved by the Order No 367 of the Minister of the Environment of the Republic of Lithuania, dated 16 July 2002, Informational Releases, 2002, No 61-297]. Screening of incidents during the proposed economic activity that might have the maximum impact to the personnel, population and the environment have been performed.

The risk classification considering the incident consequences, its development speed and the origination probability is indicated in Table 4. The experience of the EIAR and SAR development of the previous decommissioning projects was applied for risk assessment. It should be noted that there were no incidents or emergency situations during the work performance within the scope of the specified projects which proves a good quality of the design documents of the project.

**Table 4**

| **Classification of consequences to human life and health (L)** | | |
|---|---|---|
| No | Class | Description |
| 1 | Insignificant | Temporary light discomfort |
| 2 | Limited | A few traumas, long-term discomfort |
| 3 | Extensive | A few severe traumas, very significant discomfort |
| 4 | Very extensive | Several (more than 5) lethal cases, several dozen of severe traumas, up to 500 evacuated persons |
| 5 | Catastrophic | More than 10 lethal cases, several hundreds of severe traumas, more than 500 evacuated persons |
| **Classification of consequences to the environment (E)** | | |
| No | Class | Description |
| 1 | Insignificant | No contamination, local impact |
| 2 | Limited | Insignificant contamination, local impact |
| 3 | Extensive | Insignificant contamination, spread impact |
| 4 | Very extensive | Significant contamination, local impact |
| 5 | Catastrophic | Extremely significant contamination, spread impact |
| **Classification of consequences to property (P)** | | |
| № | Klasė | Damage sum, KEur |
| 1 | Insignificant | <30 |
| 2 | Limited | 30–60 |
| 3 | Extensive | 60–300 |
| 4 | Very extensive | 300–1500 |
| 5 | Catastrophic | >1500 |
| **Classification of the incident spread speed (S)** | | |
| No | Class | Description |
| 1 | Preliminary and clear warning | Local impact, no damage |
| 2 | Average | Slightly spread, insignificant damage |
| 3 | Without warning | Develops secretly until the impact is completely revealed, extremely sudden effect (explosion) |
| **Classification of Incident origination probability (Pb)** | | |
| No | Class | Frequency (approximate estimate) |
| 1 | Impossible | Less than 1 per 1000 years |
| 2 | Almost impossible | 1 per 100–1000 years |
| 3 | Absolutely likely | 1 per 10–100 years |
| 4 | Likely | 1 per 1–10 years |
| 5 | Very likely | More frequent than 1 per year |

| Priority of consequences (Pr) | | |
|---|---|---|
| No | Class | |
| 1 | Insignificant | |
| 2 | Limited | |
| 3 | Extensive | |
| 4 | Very extensive | |
| 5 | Catastrophic | |

## 6. Description of the Measures Provided to Prevent, Reduce, Compensate for or Eliminate the Negative Effects on the Environment

In order to ensure fire safety, the EIA report includes the following measures:

- fire safety schemes for workplaces are developed for each floor of the Unit where equipment dismantling works will be performed indicating the directions of evacuation routes, locations of evacuation direction signs, locations of fire extinguishers, emergency numbers of dismantled emergency equipment and storage of dismantled equipment and tools storage places, electric welding and cutting tool connection and earthing places, storage places for flammable gas cylinders, etc.;
- permission for employees to carry out dismantling and decontamination works must be officially draw up after personnel briefing and after the practical introduction to the fire safety scheme of the floor on which the dismantling and decontamination works will take place;
- at the entrance door to each dismantling and decontamination facility at least two fire extinguishers, a non-combustible cloth and the telephone numbers for the emergency call must be provided;
- during the preparatory work and dismantling and decontamination of the main equipment, at least two evacuation exits must be provided on all floors, signs must be displayed for the emergency exit and the direction of evacuation;
- the doors and gates of all rooms in the building must be marked (indicate the room number, person responsible for fire safety, category according to fire and explosion hazard);
- fire-safe storage areas for flammable gas cylinders, welding consumables and equipment, and clean and rag-free storage areas must be established;
- fire safety requirements must be established for welding and other fireworks.

In order to reduce the impact of the PEA on ambient air and the public health, the EIA report foresees that air pollutants will be cleaned during cutting using mobile filtration equipment as well as existing aerosol filters installed in the ventilation system. In order to reduce the potential radiological impact on the environment and the public health, the EIA report envisages decontamination of equipment by means of shot-blasting or high-pressure water treatment.

The EIA report provides for the monitoring of the actual radioactive releases from the building 101/1 to the ambient air, as well as the exposure of the workplaces. The PEA is not related to the territories of the European Ecological Network Natura 2000 and their immediate environment, as the PEA is located from the nearest important area for habitat protection (hereinafter - BAST) and the area important for the bird protection - Lake Drūkšiai (code LTZAR0029, LTZARB003) at the distance of 0.4 km. Due to the implementation of PCV, the volumes of wastewater discharged into the environment will not change, the PEA will not have a thermal impact on Lake Drūkšiai. For these reasons, the territories of the European ecological network Natura 2000 will not be affected by the PEA.

## 7. Environmental Monitoring

The system of environmental monitoring consists of monitoring at different levels: state monitoring carried out by state institutions, monitoring performed by local governments, monitoring performed by business entities. When carrying out monitoring at all levels, information on the state of environmental elements and their change is accumulated and analyzed.

Environmental monitoring is carried out as one of the areas of the general activity of the enterprise, aimed at protecting the environment.

The INPP environmental activities are carried out aimed at protecting people, living organisms, natural resources (land, forests, water) and other environmental components, from the possible negative impact of the INPP activities.

The environmental monitoring has been carried out by the INPP since the start of operation of the nuclear power plant.

The environmental monitoring is carried out within the boundaries of the INPP industrial site, sanitary protection zone and 30 km radius monitoring zone. Monitoring of airborne and waterborne radionuclide discharge sources of all INPP buildings and facilities is also conducted.

### National environmental radiological monitoring program - Environmental Protection Agency

Automated monitoring network (gamma dose rate and gamma spectroscopy) including 5 stations in vicinity of INPP

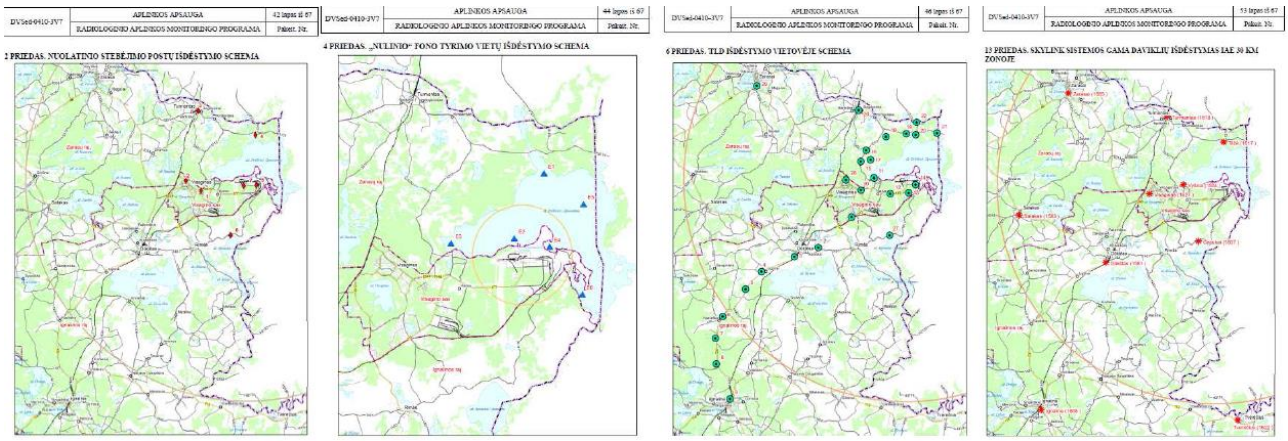
- Continuos monitoring of radionuclides in aersols and deposition (including 3 stations in vicinity of INPP)
- Monitoring of radionuclides in water, bottom sediments and biota (including Drūkšiai lake used for cooling)

### Ignalina NPP radiological monitoring of the environment

Radiological condition of the environmental components and the radiological situation within the Ignalina NPP region sanitary protection area and the observation area is evaluated on the basis of radionuclide concentrations measurement results in taken samples of the environmental components. The environmental components, their sampling periodicity and sequence are established in the Radiological environmental monitoring programme.

The INPP environment monitoring program includes:

- Monitoring of the radionuclides concentration in the air and fallouts;
- Monitoring of the radioactivity of the sewage and drainage water from the INPP site;
- Monitoring of the radioactive releases to the air;
- Meteorological observations;
- Monitoring of the radionuclides concentration in the lake and groundwater;
- Dose and dose rate monitoring in the sanitary protection zone (3 km) and observation area (30 km);
- Monitoring of the radionuclides concentration in fish, algae, soil, grass, sediments, mushrooms, leaves;
- Monitoring of the radionuclides concentration in food products (milk, potatoes, cabbage, meat, grain-crops).



The radiation doses received by population are measured by thermoluminescent dosimeters, which are located in different places of sanitary protection area (3 km around INPP) and radiation control area (30 km around INPP). Furthermore, the dose rate is measured by 22 stationary sensors of "Skylink" system.There are 10 measurement sensors located in radiation control area and 12 sensors in sanitary protection area, which enable to control dose rates on a real time basis.

Supervisory authorities of the Republic of Lithuania have the opportunity to constantly monitor the results of these measurements.

The readings of the current dose rate measurements can be observed on the INPP website ([https://www.iae.lt/en/enviromental-protection/180](https://www.iae.lt/en/enviromental-protection/180))


1. Salakas - 10.33 *mkRval*
2. IAE LPBKS - 11.28 *mkRval*
3. IAE p.186 - 10.40 *mkRval*
4. Tilžė - 10.50 *mkRval*
5. Čepukai - 10.95 *mkRval*
6. Vyšnia - 10.20 *mkRval*
7. Visaginas - 11.70 *mkRval*
8. Tverečius - 10.48 *mkRval*
9. Turmantas - *** *mkRval*
10. Zarasai - 11.58 *mkRval*
11. Dūkštas - 14.10 *mkRval*
12. Ignalina - *** *mkRval*
13. IAE PBKSS - 11.70 *mkRval*

## 8. Following project: Reactor core dismantling

R3 reactor core dismantling is the key project for INPP decommissioning critical pass.

**Name of Project:** Units 1 and 2 Reactor Facility Dismantling in area R3 (UP01/R3).

**Project objective:**

- to develop the dismantling technologies for structures and equipment from INPP Units reactor shaft (in the R3 area);
- to develop the technologies for radioactive waste management generated as a result of both units graphite stacks dismantling;
- to dismantle the reactor structures and equipment from INPP Units reactor shaft applying the developed technologies.

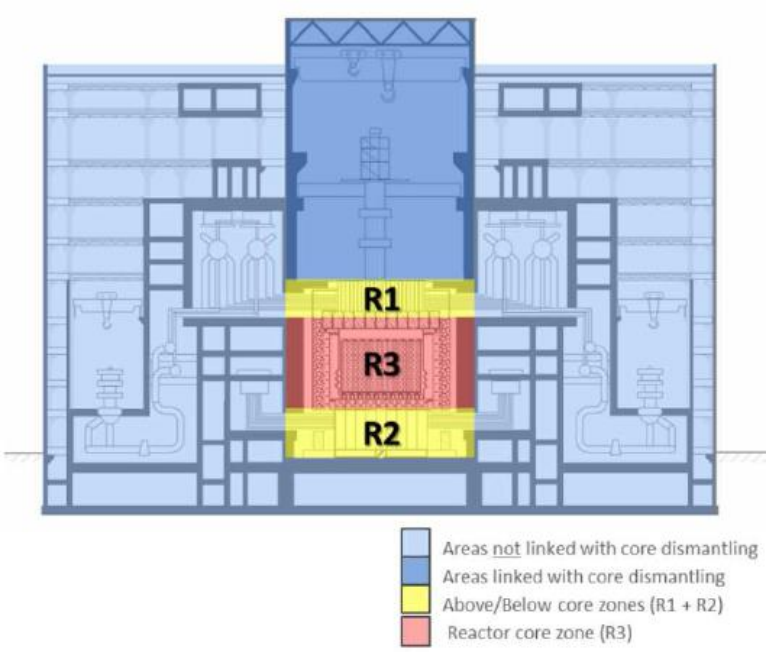



*Figure 23. RBMK-1500 reactor core dismantling*

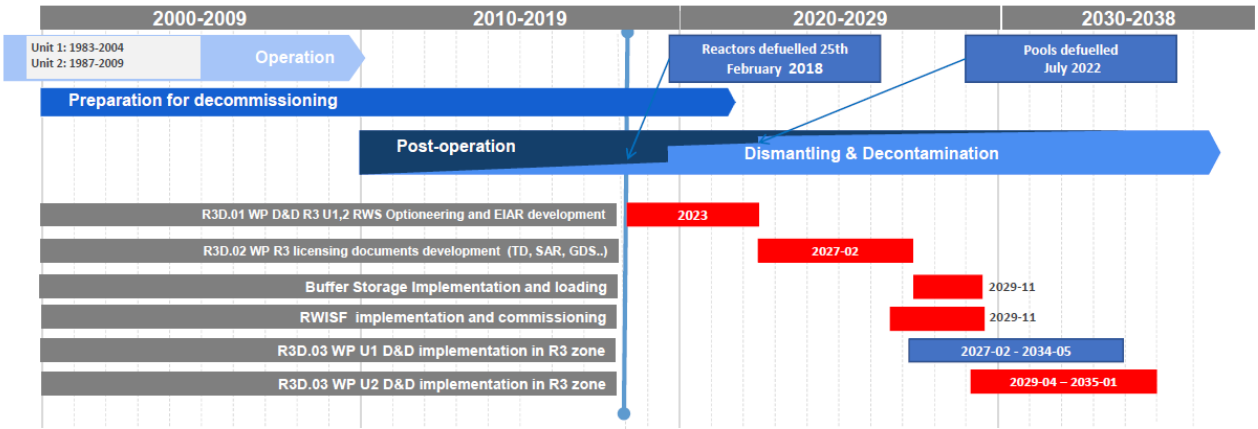



*Figure 24. Next main steps*

The project shall be a subject to the procedures of transboundary environmental impact assessment and neighbouring countries will be notified about the project in accordance with requirements of Espoo Convention.

## 9. Nontechnical Summary

On 31 December 2009 the State Enterprise Ignalina Nuclear Power Plant completely ceased generation of electricity as a consequence of fulfilment of the obligations of Lithuania under the Treaty of Accession to the European Union. Since 1 January 2010 the main activity of INPP is decommissioning. The legal basis for Ignalina NPP decommissioning is the Law on Decommissioning of Ignalina NPP, No XII-914 [TAR, 2014-06-16 No 2014-07639 1].

INPP corporate activity strategy was approved on 30 January 2019 by the Order of the Minister of Energy of the Republic of Lithuania No 1-34 [Corporate Activity Strategy of the State Enterprise Ignalina Nuclear Power Plant, approved on 30 January 2019 by the Order of the Minister of Energy of the Republic of Lithuania No 1-95 34]. According to this strategy, the mission of INPP is to implement safely and efficiently a unique project - decommissioning of Ignalina Nuclear Power Plant with two RBMK-1500 reactors and safe management of radioactive waste, ensuring that the future generations do not inherit the unjustified burden of radioactive waste management.

All INPP decommissioning activities are included into one large project - INPP Decommissioning Megaproject. The works are financed from the budget of the Republic of Lithuania and the European Union funds.

The proposed economic activity, according to which this environmental impact assessment is performed, is called “Dismantling and Decontamination of the equipment of INPP Units A-2 and V-2 (Phase 1)” and is specified in the Megaproject as project 2210. Dismantled equipment and the sequence of dismantling and decontamination works under Project 2210 (Phase 1) is provided in Chapter 1.2 of this document.

EIA Report for the Project on A-2 and V-2 Units Equipment Dismantling and Decontamination (Project 2210, Phase 1) provides the analysis of the alternatives of the proposed economic activity and selection of the technological solutions for its implementation. Two main cutting methods will be used for the main dismantling and fragmentation works: mechanical cutting and thermal cutting. Thermal cutting encompasses acetylene-oxygen cutting and plasma cutting. Decontamination of dismantled equipment is planned to be carried out according to previously tested technologies during implementation of other dismantling and decontamination projects (Projects B9-0, B9-1, B9-7), as well as on the basis of the prepared Technological Design of Unit A-1 (Project 2203). In order to select the specific decontamination methods, the results of engineering survey carried out in within the scope of the Project 2203 will be used, considering the experience of INPP in performing decontamination works. Additional engineering survey may be performed under Project 2210 to obtain missing initial data for Project 2210 or to specify the existing data.

Upon completion of the proposed activity, all dismantled equipment (primary waste) as well as the secondary waste generated during the works will be removed from Building 101/2 as radioactive waste for further treatment, storage and disposal in appropriate repositories. Tools and equipment used to perform the works within the scope of the proposed activity after decontamination (if necessary) may be used for the implementation of other INPP decommissioning projects.

During the proposed economic activity about 10923.3 tons of primary waste will be generated. According to the classification of radioactive waste established in the Nuclear Safety Requirements BSR-3.1.2-2017 “Radioactive Waste Management in Nuclear Power Facilities prior to their Disposal in a Radioactive Waste Repository”, the waste classified as classes 0, A, B, C will be generated. Waste management will be carried out in accordance with the provisions of the documents applicable at INPP.

It is planned that a major part of radioactive waste ~ 84% will be decontaminated to free release condition (class 0). The waste of Class 0, after the confirmative measurements on the free-release equipment (in B10 facility or building 159B on the INPP site) are exempted from the further control and managed in accordance with the provisions of the Law of the Republic of Lithuania on Waste Management and the Waste Management Rules and the Rules on Waste Generation and Accounting and Submission of Reports.

The waste assigned to class A (will account for ~ 13% of the mass of dismantling waste) will be transported to the Buffer Storage Facility B19-1 in appropriate packages and stored in the Landfill facility (constructed according to Project B19-2, the planned commencement of industrial operation is in 2020).

The waste assigned to classes B and C (will account for ~ 0.6% of the mass of dismantling waste) is transported in G-2 containers to the SWTSF (Project B3,4). After appropriate treatment, characterization and packaging into containers (for final disposal in a repository) in the Solid Radioactive Waste Treatment Facility (SWTF) and for interim storage in the Solid Radioactive Waste Storage Facility (SWSF) or immediately they will be finally disposed of in a Near Surface Repository (constructed according to Project B25, planned commissioning in 2023).

EIA Report for the Project on A-2 and V-2 Units Equipment Dismantling and Decontamination (Project 2210, Phase 1) contains risk assessment of incidents during the dismantling and decontamination of Units A-2 and V-2 equipment in accordance with the Recommendations for Risk Assessment of the Potential Accidents during Implementation of the Proposed Economic Activity. A detailed risk analysis justifying the safety in case of all potential incidents and accidents is carried out to substantiate the safety of the Project. During assessment of risks, the experience of previous decommissioning projects, namely: B9-0, B9-1, B9-7, B9-12, 2203 projects, EIAR and SAR, was applied for the purpose of the proposed economic activity. It should be noted that there were no incidents or accidents during the work on the specified projects, which confirms the sufficient number and correct selection of the planned organizational and technical measures for radiation protection and occupational safety and health.

Risks that may occur during the proposed economic activity are managed by proper preparation of appropriate decisions on the organization of works in the Technological Design, during the dismantling and decontamination of the equipment of Unit 1 A-1 and V-1. Considering that radiological impact on the environment is considered to be extremely low, these risks can be minimized and managed through preventive measures to ensure safety and health of employees, including personnel training, the use of personal protective equipment, dosimetric control during performance of works, monitoring, etc.

Potential environmental impacts due to the proposed economic activity include non-radiological impacts and radiological impacts.

The analysis of potential non-radiological impacts has shown that the proposed activities can only affect the ambient air due to nitrogen and carbon oxides emissions during thermal cutting, dismantling and fragmentation of equipment, as well as emissions from vehicles transporting dismantling materials as radioactive waste. Maximum particulate emissions from thermal and mechanical cutting (~ 0.151 kg per year) were assessed as insignificant and having no environmental impact. The main source of the ambient air pollution with nitrogen and carbon oxides in the INPP region is the SE “Visagino Energija” boiler house and INPP steam boiler house. Due to the proposed activity, the concentration of pollutants in the ambient air, even taking into account the background pollution, will neither exceed the air pollution threshold values established by the requirements of normative documents, but will also be significantly below the established limit values.

The proposed economic activity will not have any other significant non-radiological impact on environmental elements or public health.

The analysis of possible radiological impact showed that under normal operating conditions the impact may be caused by direct irradiation from equipment dismantling materials, release of airborne radioactive materials, as well as radiation emitted by radioactive waste containers during transportation at the INPP industrial site. No wastewater discharge is planned during the proposed economic activity.

The main works of the proposed economic activity are radiologically dangerous works, therefore, when organising and carrying out dismantling and decontamination of Units A-2 and V-2 equipment, the requirements of the INPP radiation protection normative technical documents will

be fulfilled. A detailed assessment of employees' exposure, calculating doses according to individual workplaces and operations, applying the ALARA principle, will be carried out in the Technological Design and Safety Analysis Report. This document sets out the main aspects affecting the safety of employees in order to demonstrate that the conditions under which personnel doses will be within the prescribed radiation protection standards will be ensured during the work.

According to the results of the assessment, the annual effective dose of the representative due to radioactive releases into the air will be 1.08E-04 mSv, which is 1.08E-01% of the limited exposure dose - 0.1 mSv [11]. Potential radiological impact on environmental components outside the INPP industrial site due to radioactive releases is assessed as very low.

The proposed economic activity will not have any significant radiological impact on environmental elements or public health. The total impact of all nuclear power facilities located in the INPP sanitary protection zone during the planned economic activity under Project 2210 (Phase 1) will also not exceed the permissible limits.

The proposed economic activity will not affect either the social and economic or natural components of the environment of the neighbouring countries (Belarus and Latvia), as well as the health of the population of these countries.

***The Impact from All the Ignalina NPP Decommissioning Activity on the Environment***

Evaluation of the annual effective dose to the representative (the member of the critical group of the population) due to the radiological impact (airborne and waterborne discharges) on the environment from all the Ignalina NPP decommissioning activity for the period of years 2019-2029, is presented (in mSv) in Table 5.

The total annual effective dose to the representative from all the Ignalina NPP decommissioning activity does not exceed the annual dose constraint for airborne and waterborne discharges – 0.2 mSv, which is established by the normative documents for the NF, and the maximum estimated value for the year 2019 is 0.02 mSv.

The maximum estimated annual dose of the representative due to the proposed economic activity impact for the year 2023 will be equal to 1.08E-04 mSv, that will amount to 0.66% of the total annual effective dose to the representative due to radioactive exposure (airborne and waterborne discharges) on the environment from all the Ignalina NPP decommissioning activity – 0.0163 mSv in the year 2023.

Therefore, it can be stated that the impact of the proposed economic activity to the environment within the INPP SPZ is negligible. Consequently, the additional radiological impact on the population of the neighbouring states as a result of the implementation of the proposed economic activity will not occur.

Explanations to the Table 5:

- U1DP0 – Decommissioning Project for INPP Unit 1 Defueling Phase (includes all kinds of activity, except D&D of equipment and construction of new facilities);
- U2DP0 – Decommissioning Project for INPP Unit 2 Defueling Phase (includes all kinds of activity, except D&D of equipment and construction of new facilities);
- Project B9-1 – D&D of Unit G-1 equipment;
- Project B9-1(2) – D&D of Unit G-2 equipment;
- Project B9-7(1) – D&D of Units D-1 and D-2 equipment;
- Project 2203 – D&D of Unit A-1 equipment;
- Project 2101 – D&D of lower and upper communications of the reactor systems of Unit 1;
- Projects on construction of new facilities – B1, B2, B3/4, B19, and B25 are described above.

***Table 5***

| No. | Source of the impact | Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***2019*** | ***2020*** | ***2021*** | ***2022*** | ***2023*** | ***2024*** | ***2025*** | ***2026*** | ***2027*** | ***2028*** | ***2029*** |
| ***1.*** | ***Proposed activity*** | - | - | - | ***3.97E-05*** | ***1.08E-04*** | ***1.08E-04*** | ***7.93E-05*** | ***7.93E-05*** | ***7.93E-05*** | ***7.93E-05*** | ***3.97E-05*** |
| | D&D of equipment of Units A-2 and V-2, Phase 1 (2210) | - | - | - | 3.97E-05 | 1.08E-04 | 1.08E-04 | 7.93E-05 | 7.93E-05 | 7.93E-05 | 7.93E-05 | 3.97E-05 |
| ***2.*** | ***Activity performed at the INPP site*** | ***1.10E-02*** | ***8.78E-03*** | ***8.78E-03*** | ***3.40E-03*** | ***3.40E-03*** | ***3.40E-03*** | ***3.40E-03*** | ***3.40E-03*** | ***3.40E-03*** | ***3.40E-03*** | ***3.40E-03*** |
| | Liquid waste treatment facility | 3.00E-03 | 3.00E-03 | 3.00E-03 | 3.00E-03 | 3.00E-03 | 3.00E-03 | 3.00E-03 | 3.00E-03 | 3.00E-03 | 3.00E-03 | 3.00E-03 |
| | Liquid waste grouting facility, temporary storage of the grouted liquid waste | 3.78E-03 | 3.98E-04 | 3.98E-04 | 3.98E-04 | 3.98E-04 | 3.98E-04 | 3.98E-04 | 3.98E-04 | 3.98E-04 | 3.98E-04 | 3.98E-04 |
| | Project U1DP0 | 2.54E-06 | 1.60E-03 | 1.60E-03 | - | - | - | | | | | |
| | Project U2DP0 | 3.78E-03 | 3.78E-03 | 3.78E-03 | - | - | - | | | | | |
| | Storage facility for short-lived very low level waste, Project B19-1 | 2.54E-06 | 2.54E-06 | 2.54E-06 | 2.54E-06 | 2.54E-06 | 2.54E-06 | 2.54E-06 | 2.54E-06 | 2.54E-06 | 2.54E-06 | 2.54E-06 |
| | Project B9-1 | 3.93E-09 | - | - | - | - | - | | | | | |
| | Project B9-1(2) | 5.95E-11 | - | - | - | - | - | | | | | |
| | Project B9-7(1) | 4.15E-04 | 5.95E-11 | 5.95E-11 | 5.95E-11 | 5.95E-11 | | | | | | |
| | Project 2203 | - | 9.25E-09 | 9.25E-09 | 9.25E-09 | 9.25E-09 | 9.25E-09 | 9.25E-09 | 4.62E-09 | | | |
| | Project 2101 | - | 0.98E-09 | 1.96E-09 | 1.96E-09 | 1.96E-09 | 1.96E-09 | 0.98E-09 | | | | |
| ***3.*** | ***Proposed activities on the INPP site, for which EIA Report were developed previously*** | ***8.96E-03*** | ***7.84E-03*** | ***7.84E-03*** | ***7.84E-03*** | ***1.28E-02*** | ***1.28E-02*** | ***1.28E-02*** | ***1.28E-02*** | ***1.28E-02*** | ***1.28E-02*** | ***1.28E-02*** |
| | ISFSF, Project B1 | 4.48E-03 | 4.15E-04 | 4.15E-04 | 4.15E-04 | 4.15E-04 | 4.15E-04 | 4.15E-04 | 4.15E-04 | 4.15E-04 | 4.15E-04 | 4.15E-04 |
| | SWMSF, Project B3/4 | 5.60E-07 | 2.94E-03 | 2.94E-03 | 2.94E-03 | 2.94E-03 | 2.94E-03 | 2.94E-03 | 2.94E-03 | 2.94E-03 | 2.94E-03 | 2.94E-03 |
| | SWRF, Project B2 | 4.48E-03 | 4.48E-03 | 4.48E-03 | 4.48E-03 | 4.48E-03 | 4.48E-03 | 4.48E-03 | 4.48E-03 | 4.48E-03 | 4.48E-03 | 4.48E-03 |
| | Landfill facility for short-lived very low level waste, Project 19-2 | - | - | 5.60E-07 | 5.60E-07 | 5.60E-07 | 5.60E-07 | 5.60E-07 | 5.60E-07 | 5.60E-07 | 5.60E-07 | 5.60E-07 |
| | Surface repository for low and intermediate level short-lived radioactive waste, Project B25 | - | - | - | - | 5.0E-03 | 5.0E-03 | 5.0E-03 | 5.0E-03 | 5.0E-03 | 5.0E-03 | 5.0E-03 |
| ***4.*** | ***Proposed activities on the INPP site, for which EIA Report were not developed previously*** | | | | | | | | | | | |
| | D&D of equipment of Units B-1, B-2 and the reactors of Units 1 and 2 | *EIA development is planned* | | | | | | | | | | |
| | **Total dose** | **2.00E-02** | **1.66E-02** | **1.66E-02** | **1.13E-02** | **1.63E-02** | **1.63E-02** | **1.70E-02** | **1.70E-02** | **1.70E-02** | **1.70E-02** | **1.66E-02** |