PAA

NATIONAL ATOMIC ENERGY AGENCY

2023

ANNUAL REPORT

Activities of the President of the National Atomic Energy Agency (PAA) and assessment of the state of nuclear safety and radiation protection in Poland in 2023

ANNUAL REPORT 2023

Activities of the President of the National Atomic Energy Agency (PAA) and assessment of the state of nuclear safety and radiation protection in Poland in 2023

PAA NATIONAL ATOMIC ENERGY AGENCY

WARSAW 2024

Purpose and legal basis for the publication of the Report of the President of the National Atomic Energy Agency

The report on the activities of the President of the National Atomic Energy Agency and assessment of the state of nuclear safety and radiation protection in the country was prepared pursuant to Article 110 point 13 of the Act of 29 November 2000 –Atomic Law (Dz. U. of 2023, items 1173 and 1890). In accordance with the statutory obligation, this report has been submitted to the Prime Minister.

Vision

The National Atomic Energy Agency is a modern and competent nuclear regulatory authority, which is respected and trusted by the general public, and which conducts activities significant for ensuring nuclear safety and radiation protection.

Mission

The National Atomic Energy Agency, through regulatory and supervisory activities, aims to ensure that activities involving exposure to ionizing radiation are conducted safely for the employees, society, and the environment.

TABLE OF CONTENTS

INTRODUCTION

Dear Readers,

I hereby present to you an annual report on the activities of the President of the National Atomic Energy Agency (PAA) and assessment of the state of nuclear safety and radiation protection in the country in 2023.

The events that most marked the activities of the President of the National Atomic Energy Agency in 2023 were the next steps in the implementation of the Polish Nuclear Power Programme, together with the growing interest in small modular reactor (SMR) technology.

Oversight over the safe implementation of investments in nuclear power capacity in Poland, which will be exercised by the President of the PAA at every stage of the construction and operation of nuclear facilities, requires not only adequate preparation of personnel and equipment, but, above all, a solid foundation in law. International review missions offered by multilateral institutions such as the International Atomic Energy Agency are available. In September 2023, as part of the second mission of the Integrated Regulatory Review Service (IRRS)[1], 20 foreign nuclear safety and radiation protection experts visited Poland to assess the compliance of the country's nuclear regulatory system with international standards.

A team of international experts from the IRRS mission pointed out that the PAA is a competent regulator, staffed with personnel capable of effectively carrying out nuclear regulatory tasks while meeting the highest safety standards. An action plan is being implemented to further strengthen national legislation and regulatory requirements in the area of nuclear safety and radiation protection based on the IRRS mission's recommendations.

The strengthening of the PAA's staff and expansion of its equipment continued in the past year, which you can read about on the following pages of the report. The competence building of the Agency's personnel is largely based on bilateral cooperation with countries experienced in the regulation of nuclear facilities, such as the USA and Canada. The PAA's participation in the work of international working groups at various levels is also important. On this front, the past year was full of successes in terms of recognition of the maturity of Polish nuclear regulatory activities at the international forum, as evidenced by Poland's admission as a full member to the Western European Association of Nuclear Regulators (WENRA). The aim of cooperation within the Association is to harmonize requirements and practices for the siting, design, operation, construction and decommissioning of nuclear facilities, as well as for the management of spent fuel and radioactive waste through the development of so-called Nuclear Safety Reference Levels. In order to become a full member we had to demonstrate that the above levels were reflected in our legal order. As of the beginning of 2024, the PAA’s representative has also assumed the chairmanship of the Working Group on Nuclear Safety and International Cooperation (WG1 ENSREG), which brings together nuclear regulatory experts of the EU Member States. This also demonstrates the appreciation of the PAA's experience in the areas dealt with by the group. In other words, the international importance of the PAA is steadily growing.

In connection with the Polish Nuclear Power Programme, the PAA is conducting a pre-licensing dialogue

[1] IRRS missions are carried out as part of the International Atomic Energy Agency's activities, the first mission took place in Poland in April 2013.

with Polskie Elektrownie Jądrowe, which is an investor in the project to build Poland's first nuclear power plant.

One of the legally defined pre-licensing tools is the ability to request a general opinion from the President of the PAA. This allows for dialogue between the investor and the nuclear regulatory authority to take place at a very early stage of the investment. Polskie Elektrownie Jądrowe exercised such an option – at its request, on 9 June 2023, I issued a general opinion on the scope of the description of the independent verification of the designed nuclear power plants' safety analyses.

Due to the growing interest in SMR technology, the pre-licensing dialogue with investors interested in using it in their projects is also intensifying: Orlen Synthos Green Energy or KGHM. On 23 May 2023, I issued a general opinion for selected technical assumptions for the BWRX-300 reactor at the request of OSGE, and on 22 December 2023 – for selected technical assumptions for the Nuscale reactor at the request of KGHM.

The Russian military aggression against Ukraine continued in 2023. The PAA is in constant contact with the Ukrainian nuclear regulatory authority, the State Nuclear Regulatory Inspectorate of Ukraine (SNRIU), obtaining up-to-date information on the safety of Ukrainian nuclear facilities. At the same time, the National Atomic Energy Agency is continuously strengthening the country's on-going radiation monitoring.

Last year, we installed 6 new early warning stations for radioactive contamination (PMS). The PAA is currently managing 57 such stations in Poland. These stations provide monitoring of ionizing radiation throughout the country 24 hours a day, 7 days a week. The early warning system for radioactive contamination enables an on-going assessment of the radiation situation in Poland as well as early detection of radioactive contamination in the event of a radiation emergency. We have increased the capacity to analyze incoming data and the ability to respond to possible emergencies by building a state-of-the-art emergency center at the PAA's headquarters. Among other things, the center is equipped with RSX-1 detectors, which are part of the RSI (Radiation Solutions Inc.) system used to detect radioactive materials, enabling measurements to be taken on the move both on the ground and from the air.

The use of ionizing radiation is gaining interest in our country. Approximately 9% of entities utilizing ionizing radiation are added each year. In 2023, the number of organizational entities registered in the register of organizational entities kept by the President of the PAA, whose activities require at least registration, increased from 4,895 to 5,062, where the largest growth occurred for entities conducting activities with devices generating radiation in veterinary applications.

In 2023, the aforementioned nuclear regulatory authority issued 1,761 administrative decisions on the regulation of activities related to exposure to ionizing radiation, including 20 decisions on nuclear safety.

In 2023, the PAA's inspectors conducted more than 583 inspections at organizational conducting activities with devices generating radiation in veterinary applications.

In addition, we are also expanding the network of laboratories and technical support organizations authorized by the President of the PAA, whose expertise can be used for assessing investor applications submitted to the PAA. Currently, 11 domestic and foreign entities are authorized, with further five seeking authorization.

Summing up the past year, the state of nuclear safety and radiation protection in Poland was at a high level, as you will see when reading this report.

Enjoy the reading!

President of the National Atomic Energy Agency

1. National Atomic Energy Agency

1. Role of the President of the National Atomic Energy Agency

The President of the National Atomic Energy Agency (PAA) is the central government administration authority competent in matters of nuclear safety and radiation protection. The President's activities are regulated by the Act of 29 November 2000 – Atomic Law and the relevant implementing acts. The President of the PAA is supervised by the minister competent in climate matters. The President of the PAA performs his tasks with the assistance of the National Atomic Energy Agency.

The scope of activities of the President of the PAA includes tasks which involve ensuring nuclear safety and radiation protection of Poland, in particular:

1. preparation of draft documents related to the national policy on nuclear safety and radiation protection, taking into account the programme of nuclear power engineering development, as well as internal and external threats;

2. exercise of regulatory control and oversight over activities which cause or may cause exposure of people and the environment to ionizing radiation, including inspections conducted in this scope and the issuance of decisions on licenses and authorizations as well as other decisions stipulated by the act;

3. promulgation of technical and organizational recommendations on nuclear safety and radiation protection matters;

4. performance of tasks related to the assessment of radiation situation in the country under normal conditions and in radiation emergencies as well as transmission of the relevant information to appropriate authorities and to the public;

5. performance of tasks resulting from the commitments of the Republic of Poland in the field of nuclear materials accountancy and control, physical protection of nuclear materials and facilities, special control measures for foreign trade in nuclear materials and technologies, and other commitments arising from international agreements on nuclear safety and radiation protection;

6. performance of activities related to public communication and technical and legal information on the nuclear safety and radiation protection, including the provision of information to the public about the ionizing radiation and its impact on human health and on the environment, as well as on measures possible to apply in the case of radiation emergencies, excluding the promotion of ionizing radiation use, and, in particular, in nuclear power sector, due to the principle of independence of the nuclear regulatory authority;

7. cooperation with central and local administration authorities in matters related to nuclear safety and radiation protection, and in research on nuclear safety and radiation protection;

8. performance of tasks related to the national and civil defense as well as protection of classified information, as stipulated in separate regulations;

9. preparation of opinions on nuclear safety and radiation protection with reference to planned technical activities involving the peaceful use of atomic energy, for the needs of the central and local administration authorities;

10. cooperation with competent foreign entities and international organizations on matters covered by the Atomic Law Act;

11. preparation of draft legal acts on the matters stipulated by the Atomic Law Act and consulting them pursuant to the procedure specified in the Rules of Procedure of the Council of Ministers;

12. issuance of opinions on draft legal acts developed by authorized bodies;

13. submission of an annual report on the President of the PAA's activities for the preceding year and an assessment of the state of nuclear safety and radiation protection in the country to the Prime Minister for approval by 30 June of each year.

The Prime Minister may define a detailed scope of activities of the President of the National Atomic Energy Agency by way of a regulation; so far he has not exercised this right.

2. Organizational structure

FIGURE 1
Organizational structure of the PAA (as of 31 December 2023).

PRESIDENT of the National Atomic Energy Agency

COUNCIL for Nuclear Safety and Radiation Protection

VICE-PRESIDENT

DIRECTOR GENERAL

CLASSIFIED INFORMATION PROTECTION DIVISION
- Plenipotentiary for the Protection of Classified InformaA tion
- Secret Registry

NUCLEAR SAFETY AND SECURITY DEPARTMENT
- Assessment and Authorization Division
- Inspection and Non-Proliferation Division
- Safety Analysis Division
- Advanced Reactors Assessment Division
- Radioactive Waste and Siting Division
- Legal and Organizational Unit

RADIATION PROTECTION DEPARTMENT
- Medical and Veterinary Applications Unit
- Industrial and Scientific Applications UnitA
- Legal Service Position
- Position for Authorization of Personnel

RADIATION EMERGENCY CENTRE
- Monitoring and Prognosis Division
- Emergency Preparedness and Response Division

POLICY AND INTERNATIONAL COOPERATION BUREAU
- Strategic Planning and International Affairs DivisionA
- Information and Communications Unit

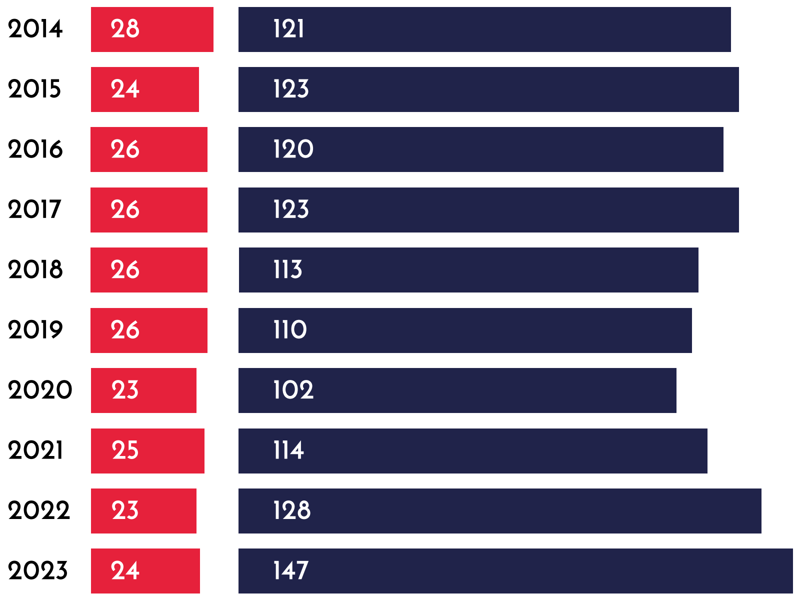
LEGAL DEPARTMENT
- Legislation Unit
- Legal Service Unit

BUDGET AND FINANCIAL DEPARTMENT
- Financial and Accounting Division
- Remuneration Unit
- Planning Unit

DIRECTOR GENERAL´S BUREAU
- Public procurement and Administration Division
- Office and Archive DivisionA
- Human Resources Division
- IT Division
- Organizational Affairs UnitA
- Integrated Management System Unit
- Infrastructure Security Unit
- Position for Internal Audit

3. Employment

As of 31 December 2023, the PAA employed 147 persons. The calculation was based on the employment level without persons on unpaid and parental leaves. As of 31 December 2023, the PAA employed 24 nuclear regulatory inspectors, including 1 on unpaid leave.



4. Council for Nuclear Safety and Radiation Protection

The Council for Nuclear Safety and Radiation Protection (the BJiOR Council) is an advisory and consultative body for the President of the PAA. Pursuant to the Atomic Law Act, the Council is composed of the Chairman, Deputy Chairman, Secretary, and no more than seven members appointed from among specialists in nuclear safety, radiation protection, nuclear security, nuclear material safeguards, and other specialties relevant to the oversight over nuclear safety.

Tasks of the Council

- Issuing opinions on licenses for activities related to ionizing radiation involving the construction, commissioning, operation, and decommissioning of nuclear facilities.
- Issuing opinions on the drafts of legislation and of technical and organizational recommendations.
- Initiating improvements in the oversight of activities related to the exposure to ionizing radiation.

The Report of the BJiOR Council for 2023 is published in the PAA's Public Information Bulletin.

Composition of the Council in 2023:

Prof. **JANUSZ JANECZEK**, D.Sc.,
Chairman of the Council

Prof. **ANDRZEJ G. CHMIELEWSKI**, D.Sc. Eng.,
Deputy Chairman of the Council

PIOTR KOCIŃSKI, PhD,
Secretary of the Council

Prof. **MAREK K. JANIAK**, D.Sc. M.D.,
Member of the Council

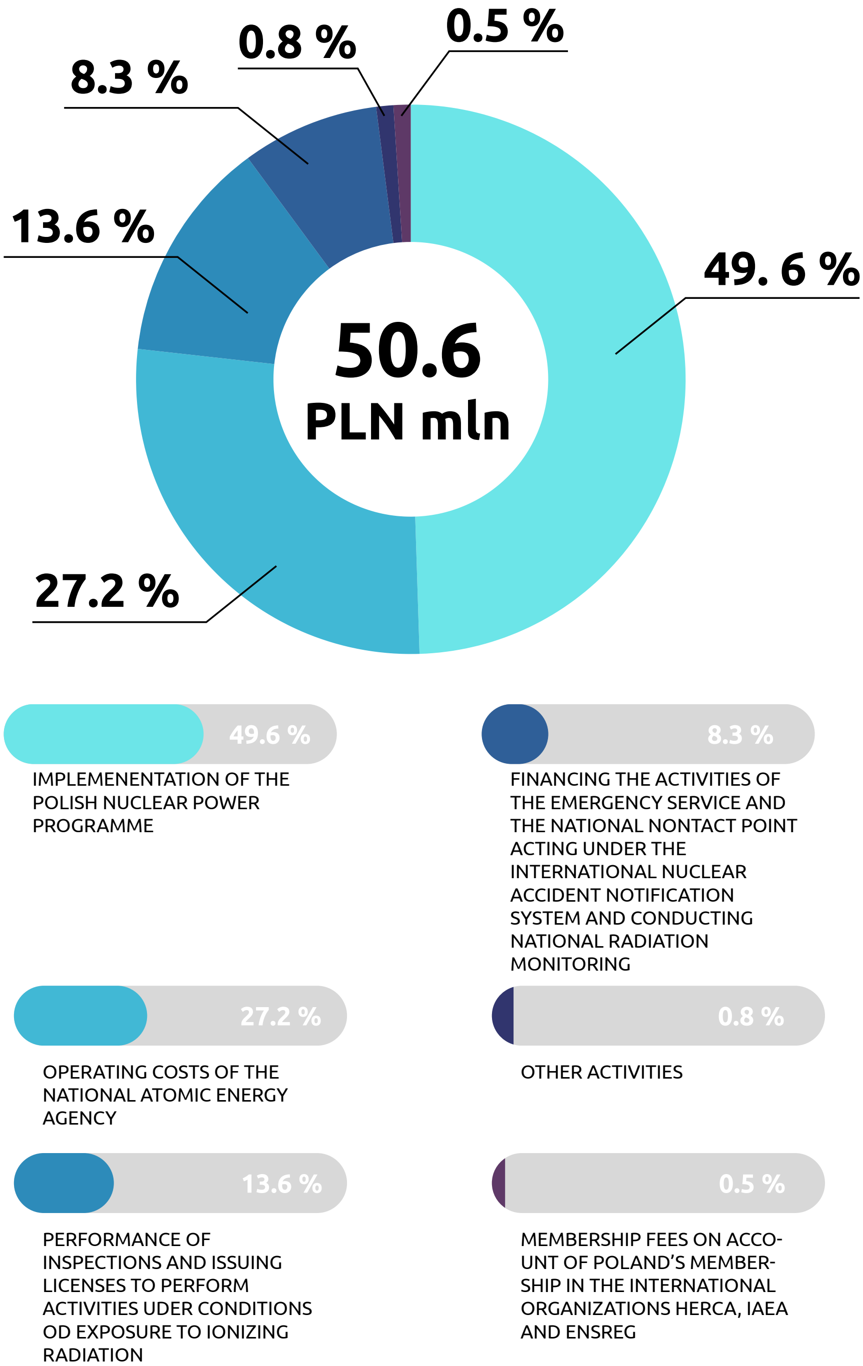
Prof. **LESZEK KRÓLICKI**, D.Sc, M.D.,
Member of the Council

TOMASZ NOWACKI, PhD (until October 2023),
Member of the Council

5. Budget

FIGURE 2

The realized budget expenditure in 2023 was PLN 50.6 million, including:



Additional information:

The budgetary expenses in 2023 amounted to PLN 50.6 million, including PLN 256,000 of budgetary expenses from European funds.

In 2023, the full range of tasks planned to be carried out in the substantive departments was carried out. The PAA's budgetary expenditure was incurred in a targeted manner and in accordance with its planned purpose based on the expenditure schedule.

6. Assessment of the PAA's operations

Judicial-administrative review of administrative decisions issued by the President of the PAA

In 2023, the President of the PAA issued 1,741 administrative decisions on the regulation of activities related to exposure to ionizing radiation and 20 decisions on nuclear safety, including five decisions concerning the authorization of laboratories and expert organizations to take part in the inspection of nuclear power plants. Last year no complaints to the Regional Administrative Court were filed against the decisions issued by the aforementioned nuclear regulatory authority, however, this year one complaint was filed against the decision issued last year.

Audits carried out by the Supreme Audit Office

In the period January-April 2023, the Supreme Audit Office conducted an audit aimed at assessing budget spending in 2022 in terms of legality, purposefulness, reliability and economy of the activities undertaken by the National Atomic Energy Agency, which is the administrator of the budget part 68. The Supreme Audit Office gave a positive opinion of the PAA's state and European budget spending in 2022 in terms of expenditures and found no irregularities in terms of budget revenues. The expenses incurred were made correctly and served the PAA's statutory tasks within the framework of the envisaged state functions related to ensuring nuclear safety and radiation protection of the country.

An audit is being conducted in April-July 2024 by the Fiscal Administration Chamber in Zielona Góra to assess the management of public funds in the period 2020-2023.

7. National Atomic Energy Agency and the Polish Nuclear Power Programme

On 2 October 2020, the Council of Ministers adopted Resolution no. 144 updating the multi-annual programme named "Polish Nuclear Power Programme" (M.P. item 946). The Polish Nuclear Power Programme (PPEJ) is aimed at constructing from 6 to 9 GWe of installed capacity in Poland based on proven, large-scale, generation III and III+ pressurized water reactors. The schedule assumes the construction and commissioning of two nuclear power plants, each with 3 reactors. On 2 November 2022, the Council of Ministers adopted a resolution to construct the first nuclear power plant with an electric output of up to 3,750 MWe based on the US AP1000 reactor technology. The first nuclear power plant is to be built in northern Poland. The implementation of the nuclear project will take place in cooperation with the US government.

The National Atomic Energy Agency is one of the main stakeholders of the PPEJ. As a regulatory authority, it will oversee the safety and operation of nuclear facilities, perform safety inspections and assessments, issue licenses and impose possible sanctions.

Over the past 2 years, the PAA has launched an extensive recruitment campaign as part of the PPEJ's implementation. The newly employed persons will be performing nuclear regulatory tasks related primarily to the oversight and inspection of the construction of the first nuclear power plants in the country. In accordance with the PPEJ assumptions, the PAA is to recruit 97 new employees by 2026, and in 2033 reach employment of 110 persons hired for nuclear regulatory tasks under the PPEJ.

The Agency is enabling its staff to follow a training programme in connection with the preparation for the licensing of nuclear power plants in Poland. An important element of this programme are on-the-job trainings at foreign regulatory authorities, including the U.S. Nuclear Regulatory Commission, involving training at the Vogtle Nuclear Power Plant, Georgia. The PAA also held talks in 2023 with nuclear regulatory authorities experienced in overseeing the construction of a nuclear power plant. (France, South Korea, the USA) to develop cooperation in strengthening

the PAA's competencies for the nuclear programme. In 2023, the President of the PAA issued decisions to authorize five laboratories and expert organizations to act as technical support organizations during the construction and operation of a nuclear power plant in Poland. All of the authorized institutions have qualified personnel and technical facilities that will allow them to impartially and reliably conduct specialized analyses and give expert's opinions related to the assessment of the nuclear power plant license application or its inspection. In September 2022, the company Polskie Elektrownie Jądrowe (PEJ) applied to the President of the PAA to obtain the President's general opinion on the description of the verification of safety analyses for the planned nuclear power plants. During the process of obtaining a license to construct a nuclear power plant, the investor is required not only to provide analyses confirming the safety of the designed nuclear facility, but also to provide independent verification of the analyses conducted. Based on the application submitted by the PEJ, the President of the PAA has assessed the proposed scope and detail of the verification description, taking into account both national and international nuclear safety requirements. The opinion was issued afterwards.
Last year also saw the continuation of the expansion of the national radiation monitoring system – in 2023, we upgraded or put into operation six early warning stations for radioactive contamination, bringing the number of stations in the national system to 57. By the time the first nuclear power plant is operational, the national radiation monitoring system is expected to include 145 stations.

Summary

The National Atomic Energy Agency is one of the main stakeholders of the PPEJ and plays the role of a regulatory authority – it is to oversee the safety and operation of nuclear facilities, perform safety inspections and assessments, issue licenses, and impose possible sanctions.

2. Nuclear regulatory infrastructure in Poland

1. Definition, structure, and functions of nuclear safety and radiation protection system
2. Basic provisions of law on nuclear safety and radiation protection

1. Definition, structure, and functions of nuclear safety and radiation protection system

The nuclear safety and radiation protection system comprises all the legal, organizational, and technical projects which ensure the highest standards of nuclear and radiation safety of nuclear facilities and activities performed with the use of ionizing radiation sources in Poland. The safety hazard may result from the operation of nuclear facilities both in the country and abroad, and from other activities involving the use of ionizing radiation sources. In Poland, all issues related to radiation protection and radiation monitoring of the environment, pursuant to the legislation in force, are examined together with the issue of nuclear safety, as well as nuclear security and nuclear safeguards. Such a solution guarantees that there is one common nuclear regulatory approach and a single, common approach to the aspects of nuclear safety, radiation protection, nuclear safeguards and radioactive sources.

LEGAL BASIS

The nuclear safety and radiation protection system functions in accordance with the Act of 29 November 2000 – Atomic Law and its implementing acts, as well as applicable directives and regulations of the EU Council/Euratom, international treaties and conventions, of which Poland is a cosignatory.

Nuclear regulatory authorities in Poland:

- President of the PAA,
- nuclear regulatory inspectors.

Essential elements of the nuclear safety and radiation protection system include the following:

- oversight of activities involving nuclear materials and ionizing radiation sources, carried out through:
  - regulatory safety verification of the activities applied for and issuing licenses for their performance or accepting registrations and notifications of their performance,
  - inspection of the manner of the performance of such activities and application of sanctions if the safety rules are breached,
  - control of the doses received by workers,
  - oversight over training of radiation protection officers (experts in nuclear safety and radiation protection, working in entities performing activities based on the granted licenses), workers holding positions of significant importance for the nuclear safety and radiation protection, and workers exposed to ionizing radiation,
  - control of trade in radioactive materials,
  - keeping the register of radioactive sources, the register of their users, and a central dose register, and in the case of activities involving the use of nuclear materials – keeping detailed records and accountancy for such materials, providing approvals for their physical protection systems, and control of the nuclear technologies applied,
- identification and assessment of the radiation situation in the country, through coordination (including standardization) of the work performed by local stations and units, which measure the level

of radiation dose rate, the contents of radionuclides in selected components of the natural environment and in drinking water, food products and fodder;

- maintaining the service prepared to identify and assess the radiation situation and to respond in the case of radiation emergencies (in cooperation with other competent authorities and services operating under the national emergency response system);
- carrying out work aimed at fulfilling Poland's obligations resulting from its membership in international organizations, as well as from treaties, conventions and international agreements on nuclear safety and radiation protection, as well as bilateral agreements on mutual assistance in the event of nuclear accidents, cooperation in the field of nuclear safety and radiation protection with Poland's neighboring countries, as well as assessing the condition of nuclear installations, radioactive sources and waste management, nuclear safety and radiation protection systems outside Poland.

Nuclear regulatory tasks are performed by the President of the PAA with the assistance of nuclear regulatory inspectors and employees of the specialized organizational units of the PAA. In the performance of these tasks, the President of the PAA also relies on the expert support from the Members of the Council for Nuclear Safety and Radiological Protection.

The oversight of the President of the PAA over the activities performed under conditions of exposure to ionizing radiation comprises:

- Determination of the conditions required to ensure nuclear safety and radiation protection;
- Safety assessment as the basis for granting licenses and formulating their conditions, and for taking other administrative decisions;
- Issuing licenses for the performance of exposure-related activities, involving:
  - production, processing, storage, transport, or use of nuclear materials, radioactive materials, or radioactive sources (excluding waste containing radioactive materials, which is not radioactive waste) and trade in such materials or sources,
  - storage, transport, processing, or disposal of radioactive waste,
  - storage, transport, and reprocessing of spent nuclear fuel and trade in this fuel,
  - isotopic enrichment,
  - operation or closure of a uranium ore mine,
  - construction, commissioning, operation, or decommissioning of nuclear facilities,
  - construction, operation, or closure of radioactive waste repositories,
  - production, installation, use, and operation of equipment containing radioactive sources or trade in such equipment,
  - commissioning or using the equipment generating ionizing radiation,
  - commissioning of laboratories, where sources of ionizing radiation are to be used, including X-ray or medical X-ray laboratories,
  - intentional addition of radioactive substances in the manufacturing process of consumer products and medical devices, in vitro diagnostic medical devices, medical device equipment, in vitro diagnostic medical device equipment, active implantable medical devices within the meaning of the provisions of the Act of 20 May 2010 on medical devices (Dz. U. of 2021, item 1565), the trade in such devices and the import into or export from the territory of the Republic of Poland of such devices or equipment and consumer products to which radioactive substances have been added,
  - intended administration of radioactive substances to people or animals for the purpose of medical or veterinary diagnostics, therapy, or scientific research,
  - activation of the material causing an increased activity in a consumer product, which cannot be disregarded from the point of view of radiation protection,

- Inspection of the aforementioned activities with regard to compliance with the criteria specified in the applicable regulations and with the requirements of the licenses granted;
- Imposition of sanctions enforcing the observation of the aforementioned requirements as a result of implemented administrative proceedings;
- With regard to activities with nuclear materials and nuclear facilities, the oversight of the President of the PAA also includes approval and control of nuclear security systems and performance of activities provided for in the Republic of Poland's obligations with regard to nuclear safeguards.

An exception to the principle of the oversight of the President of the PAA with regard to activities using sources of ionizing radiation is the exercise of such oversight by state voivodeship sanitary inspectors (or the relevant bodies of the military sanitary inspection subordinate to the Minister of National Defense), in relation to the commissioning or use of X-ray devices for medical diagnosis, interventional radiology, surface radiotherapy and radiotherapy of non-oncological diseases, as well as the commissioning of medical X-ray laboratories.

2. Basic provisions of law on nuclear safety and radiation protection

Atomic Law Act

The Act of 29 November 2000 – Atomic Law, effective as of 1 January 2002, introduced a uniform legal framework to ensure nuclear safety and radiation protection of workers and the public in Poland.

The most important of its provisions are related to the licensing of activities involving exposure to ionizing radiation (i.e. licenses issued for activities listed in the sub-chapter “Definition, structure and functions of the nuclear safety and radiation protection system”), receiving registrations and notifications about such activities, the duties of heads of organizational entities performing activities involving ionizing radiation, and the powers of the President of the National Atomic Energy Agency to exercise inspections of and oversight over such activities.

The Act also specifies other tasks of the President of the PAA, including those related to the assessment of national radiation situation and proceeding in the case of radiation emergencies.

The rules and methods of procedure specified in the Act apply, among others, to the following issues:

- justification for undertaking activities involving exposure to ionizing radiation, its optimization and the establishment of dose limits for workers and members of the public,
- procedure for obtaining licenses to perform such activities as well as the procedure and method of inspecting such activities,
- activities involving naturally occurring radioactive material,
- protection against exposure to radon in workplaces and buildings intended for habitation,

- requirements for the patient's radiation protection,
- rules for exposing people to non-medical imaging,
- record keeping and inspection of ionizing radiation sources,
- siting, designing, construction, commissioning, operation, and decommissioning of nuclear facilities,
- accountancy and control of nuclear materials,
- physical protection of nuclear materials and nuclear facilities,
- management of high-activity radioactive sources,
- radioactive waste classification and management, and spent nuclear fuel management,
- classification of workers and workplaces according to the degree of hazard involved in the work and determination of protective measures appropriate to that hazard,
- training and licensing radiation protection officers as well as granting authorizations to hold positions of significant importance for ensuring nuclear safety and radiation protection,
- assessment of the country's radiation situation,
- proceeding in the case of radiation emergencies,
- development of a radiation emergency management system,
- management of existing exposure situations,
- civil liability for nuclear damage.

In 2023, the Act of 29 November 2000 – Atomic Law was amended twice:

1. on 13 April 2023, amendments to the Atomic Law Act –introduced by the Act of 9 March 2023 amending the Act on the preparation of and carrying out investments in nuclear power facilities and accompanying investments, and certain other acts (Dz. U., item 595) came into force and were aimed at:
   a) clarifying the regulation of a nuclear facility and a radioactive waste repository construction and commissioning phases:
   - introducing a definition of a nuclear power plant (added Article 3 Item 6f)
   - clarifying that construction work on buildings that do not cover systems, structures and components of a nuclear facility falling within the scope of the preliminary safety analysis report for nuclear facilities does not require a license of the President of the PAA (new Article 36d Section 2a),
   - specifying that an organizational entity performing exposure-related activities involving the construction, commissioning, operation or decommissioning of a nuclear facility shall bear the costs of the opinion given to the nuclear regulatory authorities in the course of inspections at contractors or suppliers of systems, structures and components for a nuclear facility and at contractors carrying out work on the construction, equipping or decommissioning of a nuclear facility, and specifying the modalities for imposing the obligation to bear these costs and the rules for meeting this obligation by the organizational entity (added Article 37 Sections 7 to 9),
   - introducing provisions on pre-operational tests carried out during the construction of a nuclear facility (added Article 36e Sections 6 and 7, repealed Article 37a Section 2 Item 1),
   - allowing the submission of an application for a license for the construction or commissioning of a nuclear facility and for the construction of a radioactive waste repository before obtaining the opinion of the European Commission issued under Article 43 or Article 37 of the Euratom Treaty respectively, while stating that the license is conditional on the investor's submitting the relevant opinion of the European Commission after it has been obtained (repealed Articles 39i Section 1 Item 2 and Article 55r Section 1 Item 2 and Section 2, added Articles 39 Section 4 and Article 55r Section 4 and amended Article 39j),
   - moving to Article 77 Section 1 Item 5 of the Act of 3 October 2008 on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments (Dz. U. of 2023, item 1094, as amended), the obligation for the General Director for Environmental Protection to consult the President of the PAA before issuing a decision on environmental conditions of an investment in the case of nuclear facilities and radioactive waste repositories (repealed Article 39 Sections 2 and 3),
   - imposing an obligation on the head of an organizational entity to submit to the President of the PAA a permit for the use of a nuclear facility no later than 7 months from the submission date of the application for a nuclear facility commissioning license (new Article 39ja),

- allowing the investor to submit a license for the construction of a nuclear facility, once obtained, during the proceedings for the issuance of a construction permit for that facility by the voivode (amended Article 39k),
- introducing an obligation for the President of the PAA to immediately notify the locally competent voivode of the initiation of proceedings to issue a license for the construction of a nuclear facility which is also a nuclear power facility (new Article 33 Section 4a),

b) unequivocally regulating the authorization to continue operating a nuclear facility after approval of the commissioning report, pending the operation license of the President of the PAA, based on the terms of the commissioning license and the approved nuclear facility commissioning report (added Article 37b Sections 5 and 6),

c) clarifying the provisions on the restricted use area (repealed Article 36f Section 2 and amended Article 36f Section 3 Items 1 and 4),

d) strengthening the independence and systemic position of the President of the PAA by restoring the previously applicable procedure for the dismissal of the Vice-Presidents of the PAA, i.e. by a motion of the President of the PAA (amended Article 109 Section 3) and restoring the competence of the President of the PAA to shape the composition of the Council for Nuclear Safety and Radiological Protection (amended Article 112),

e) extending the catalogue of activities for which the allocated subsidy granted by the minister in charge of energy to ensure the country's nuclear safety and radiation protection may be allocated pursuant to Article 33 of the Act – Atomic Law: radiation monitoring of the environment in Otwock – Świerk (added Article 33 Section 2 Item 4a), measurement of the dose rate or radioactive contamination (added Article 33 Section 2 Item 5a), measurement of the absorbed dose in persons irradiated as a result of a radiation emergency by means of biological dosimetry (added Article 33 Section 2 Item 5b),

f) in the context of the awarding of subsidies intended for investments in connection with the operation of research reactors, introducing exceptions to:

- the obligation of the applicant to have the financial capacity to co-finance the proposed activities; and
- the limitation of the amount of the subsidy to a maximum of 50% of the investment's planned costing value (added Article 33 Section 4a),

g) for applications for a license for a nuclear facility, applications for a license for the construction of a radioactive waste repository, applications for an advance opinion on the planned site of a nuclear facility (amended Article 36a Section 5) and applications for a general opinion on the planned organizational and technical solutions for future operations and draft documents to be submitted with the application for a license (added Art. 39b Sections 1a and 1b) – regulating the procedure for the application for the aforementioned licenses or opinions and to charge the applicant for the costs of justified activities carried out by authorized laboratories and expert organizations, and experts and laboratories in the course of examining the application (added Article 39e Sections 2a to 2e, amended Article 39e Section 3 and Article 55o Section 2),

h) clarifying issues related to the approval of nuclear security systems for nuclear materials and nuclear facilities by the President of the PAA (amended Articles 41 and 41m),

i) tightening the obligation of a municipality that has received a payment from the state budget for the site of a National Radioactive Waste Repository on its territory to disseminate information on the use of the payment by excluding the choice of means of dissemination specified in Article 57[1] Section 2 (posting on the municipality's website, notice at the municipal office, delivery of a leaflet together with the decision on the real property tax),

j) clarifying the provisions concerning the prohibition of exports of radioactive waste and spent nuclear fuel from the country and the conclusion of an agreement on the disposal of radioactive waste in another country (amended Article 57b Sections 1 and 3, and Article 62e Section 1a),

k) defining the procedure for charging the organizational entity with the costs of laboratory tests and other activities indicated in the course of the inspection by the nuclear regulatory authorities and the rules for the payment by the organizational unit of fees to bear these costs (added Article 67d Sections 2 and 3) by the organizational unit of fees to bear these costs (added Article 67d Sections 2 and 3),

l) extending from four to eight years the period after which the mandatory update of the National Plan for Radioactive Waste and Spent Fuel Management takes place (amended Article 57c Section 4),

m) the coverage, in the event of a radiation emergency, of workers and emergency team members with individual retrospective dosimetry where there is no other means of determining the ionizing radiation dose received by the worker or the emergency team member (added Article 86i Sections 9 and 10)

n) excluding activities related to scientific, technical and legal information from the scope of the information activities of the minister in charge of energy undertaken in connection with the development of the nuclear power sector (amended Article 108a Item 3),

o) changing the rules for drafting the Polish Nuclear Power Programme, including deletion of the requirement to include a research cooperation plan in the Programme, extension of the Programme update period from 4 to 8 years and extension of the period for which the Programme implementation report is drawn up from 2 to 4 years (amended Articles 108b - 108e),

p) taking into account, in the periodic review of the existing legislation, the question of its adequacy to ensure nuclear security, nuclear safeguards and security of radioactive sources (amended Article 113a Section 1),

q) amending the provisions concerning the operation of the Radioactive Waste Management Plant (ZUOP) as regards the appointment and removal of deputy directors and legal representatives of the ZUOP, the granting of subsidies and the payment of the costs of unscheduled collection, transport, treatment, storage or disposal of radioactive waste or other radioactive substances (amended Articles 117 Section 3, Article 119 Section 1b, Article 119a and Article 120 Section 2 Item 1 and added Article 117 Section 3a and Article 119 Section 1aa);

2. as of 16 October 2023, amendments to Article 36a of the Atomic Law Act by the Act of 13 July 2023 amending the Act on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments, and certain other acts (Dz. U., item 1890) came into force and added the option to apply to the President of the PAA for an advance opinion on certain aspects of the site of a nuclear facility, thereby:
   a) introducing the obligation to specify the scope in the application for an advance opinion,
   b) enabling the attachment to an application for an advance opinion only the part of the siting report corresponding to the scope of the application submitted,
   c) limiting the obligation to pay a fee for the advance opinion to instances where the application for an advance opinion relates to the planned site of a nuclear power plant or to certain aspects of its site (a return to the state before the entry into force of the Act of 9 March 2023 indicated in item 1, which introduced a fee for a preliminary opinion on the planned site of any nuclear facility); and
   d) dropping the condition of prior payment of a fee, which was a prerequisite for the processing of an application for an advance opinion.

Other acts

Provisions directly related to nuclear safety and radiation protection are also contained in the Act of 29 June 2011 on the preparation of and carrying out investments in nuclear power facilities and accompanying investments (Dz. U. of 2024, item 412), hereinafter referred to as the "Nuclear Special Act", which was amended twice in 2023 in this respect. The first amendment to the Nuclear Special Act was made by the Act of 9 March 2023 amending the Act on the preparation of and carrying out investments in nuclear power facilities and accompanying investments, and certain other acts. In order to streamline the proceedings for the issuance of a siting decision for the construction of a nuclear power facility, which is also a nuclear facility, the institution of a preliminary siting report was introduced into the Nuclear Special Act. A condition for issuing a decision to determine the site for the construction of a nuclear power facility, which is also a nuclear facility, was the submission by the investor of an opinion of the President of the PAA in the field of nuclear safety and radiation protection on the preliminary siting report prepared by the investor following a preliminary assessment of the area intended for the facility's site. The opinion of the President of the PAA was to be attached by the investor to the application for a decision on the site of the investment or submitted in the course of the proceedings for a siting decision.

The Act of 13 July 2023 amending the Act on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments, and certain other acts modified the solutions adopted earlier. Article 5b of the Nuclear Special Act was amended to repeal the obligation for the investor to submit an opinion of the President of the PAA on nuclear safety and radiation protection on the preliminary siting report for the issuance of a decision on the siting of the investment. Consequently, it is optional for the investor both to prepare a preliminary siting report and to possibly apply for an opinion from the President of the PAA. It is up to the investor to decide whether he needs to have confirmed in the opinion of the President of the PAA the absence of factors that exclude a given site based on the assessment of the preliminary siting report, or whether he wants to do so at a later stage, i.e. in the procedure for assessing the application for a construction license.

In view of the need to implement the provisions of the Act of 9 March 2023 amending the Act on the preparation of and carrying out investments in nuclear power facilities and accompanying investments, and some other acts, and to implement the statutory authorization contained in Article 5b Section 8 of the Nuclear Special Act, a draft regulation was prepared at the National Atomic Energy Agency, specifying the detailed scope of conducting a preliminary assessment of a site intended for the location of a nuclear power facility, which is also a nuclear facility, and the cases excluding the given site as suitable for such a facility and the detailed scope of the preliminary siting report for such a facility.

The draft regulation defines a group of common criteria that will be subject to a preliminary assessment at each type of nuclear energy facility, which is also a nuclear facility, although the way in which they will be assessed may vary depending on the facility's type (amount and type of radioactive substances, size, nature of activities, etc.). These criteria were grouped according to the following ranges:

1) seismology and tectonics,
2) geological and engineering conditions,
3) hydrogeological conditions,
4) hydrology and meteorology,
5) external events resulting from human activities,
6) external events resulting from natural forces,
7) the rate, quantity and pathways of dispersion of radioactive substances outside the facility and the ability to efficiently perform intervention measures in the event of a radiation emergency during normal operation, anticipated operational occurrences and emergency conditions,
8) population density and land use,
9) identification of the subsoil's geological structure.

The draft regulation also distinguishes factors that exclude a site due to excessive external hazards at the site, both natural (e.g. threat of large seismic shocks, unstable ground, threat of large flooding) and man-made (e.g. inability to intervene in the event of a radiation emergency, danger of a large aircraft crash). The draft regulation also defines the detailed scope of the preliminary siting report for a nuclear power facility, which is also a nuclear facility. In September 2023, the draft regulation was submitted for arrangements, consultation and opinion-giving procedures.

Provisions indirectly related to nuclear safety and radiation protection are also contained in other acts, specifically: the Act of 19 August 2011 on the transport of dangerous goods (Dz. U. of 2022, item 2147 and of 2023, item 1123), the Act of 18 August 2011 on maritime safety (Dz. U. of 2023, items 1666 and 2005), the Act of 21 December 2000 on technical inspection (Dz. U. of 2023, item 1622) and the Act of 5 August 2022 on the transport of dangerous goods by air (Dz. U., item 1715).

Implementing acts to the Atomic Law Act

In 2023, internal work was carried out at the National Atomic Energy Agency to amend the following regulations:

1. Regulation of the Council of Ministers of 17 December 2002 on early warning stations for radioactive contamination and facilities taking measurements of radioactive contamination (Dz. U., item 2030);
2. Regulation of the Council of Ministers of 31 August 2012 on nuclear safety and radiation protection requirements to be met by a nuclear facility design (Dz. U., item 1048);
3. Regulation of the Council of Ministers of 31 August 2012 on the scope and manner of safety analyses carried out prior to applying for a license to construct a nuclear facility and the scope of the preliminary safety report for a nuclear facility (Dz. U., item 1043).

Summary

The Act of 29 November 2000 – Atomic Law is the basic piece of legislation in the field of nuclear safety and radiation protection.
In 2023, amendments to this Act made by the Act of 9 March 2023 amending the Act on the preparation of and carrying out investments in nuclear power facilities and accompanying investments, and certain other acts (Dz. U., item 595), and the Act of 13 July 2023 amending the Act on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments, and certain other acts (Dz. U., item 1890) entered into force.

3. Oversight over the use of ionizing radiation sources

1. Tasks of the President of the PAA in terms of regulatory oversight of activities involving exposure to ionizing radiation
2. Users of ionizing radiation sources
3. Register of sealed radioactive sources

1. Tasks of the President of the PAA in terms of regulatory oversight of activities involving exposure to ionizing radiation

- granting licenses and taking other decisions concerning nuclear safety and radiation protection, following the analysis and assessment of documentation submitted by users of ionizing radiation sources,
- preparing and carrying out inspections in organizational entities performing exposure-related activities, keeping records of these entities.

2. Users of ionizing radiation sources in Poland

The number of registered organizational entities performing activities (one or more) involving exposure to ionizing radiation, subject to oversight of the PAA President, is **5,062** (as of 31 December 2023).

The number of all registered activities involving exposure to ionizing radiation is **8,243** (as of 31 December 2023).

Issuing licenses and receiving registrations or notifications

Draft licenses of the President of the PAA to perform activities related to exposure to ionizing radiation and in the field of nuclear safety and radiation protection are prepared in the Radiation Protection Department (DOR) and the Nuclear Safety and Security Department (DBJ) at the PAA.

BASIS TO BE GRANTED A LICENSE

- Application, referred to in Article 5 Section 5 of the Act of November
- Documents specified in the Regulation of the Council of Ministers of 30 August 2021 on documents required when submitting an application for the issuance of a license to perform an activity related to exposure to ionizing radiation, or when registering the performance of this activity.
- Additional information, referred to in Article 5 Section 1b Item 3 of the Atomic Law Act, if the content of documents attached to the application is insufficient to demonstrate that the conditions required by law for performing exposure-related activities have been satisfied.

The issuance of a license, its amendment, the acceptance of a registration or notification must be preceded by an analysis and assessment of documentation, which is delivered by the users of ionizing radiation sources.

In particular, the rationale for undertaking an exposure-related activity, the proposed dose constraints, the quality assurance programme for the activities, including the on-site emergency response plan for radiation emergencies, shall be analyzed.

If the activities involving ionizing radiation sources do not require a license, decisions to accept registration of activities involving exposure to ionizing radiation are issued or notifications are accepted. These cases are defined in the Regulation of the Council of Ministers of 29 April 2021 on cases in which activities involving exposure to ionizing radiation do not require a license, registration or notification, and cases in which they may be performed on the basis of a registration or notification (Dz. U. of 2021, item 796).

Regulatory inspections

Inspections in organizational entities other than those having nuclear facilities and radioactive waste repositories are carried out by nuclear regulatory inspectors from the Radiation Protection Department of the PAA who work in Warsaw and Katowice. The number of inspections carried out in 2023 was 495, including 6 re-inspections (second inspection in the same year), of which 375 inspections were carried out by inspectors from Warsaw, and 120 by inspectors from Katowice. The Radiation Protection Department's inspection plan for 2023 was therefore implemented in 82.09%. Each inspection was preceded by a detailed analysis of collected documentation related to the inspected organizational entity and its activity.

FIGURE 3
Number of licenses for performing activities in conditions of exposure to ionizing radiation and amendments to licenses granted by the President of the PAA in 2012-2023.

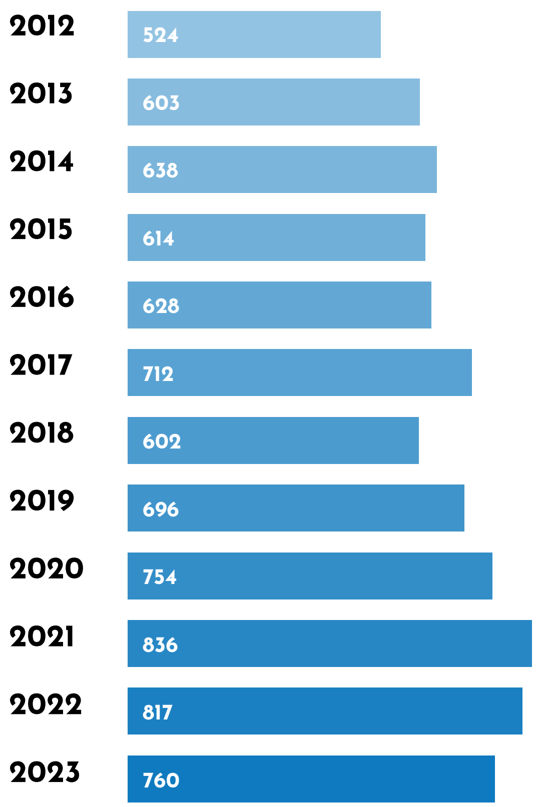


FIGURE 4
Implementation of the Radiation Protection Department's inspection plan in 2012-2023.

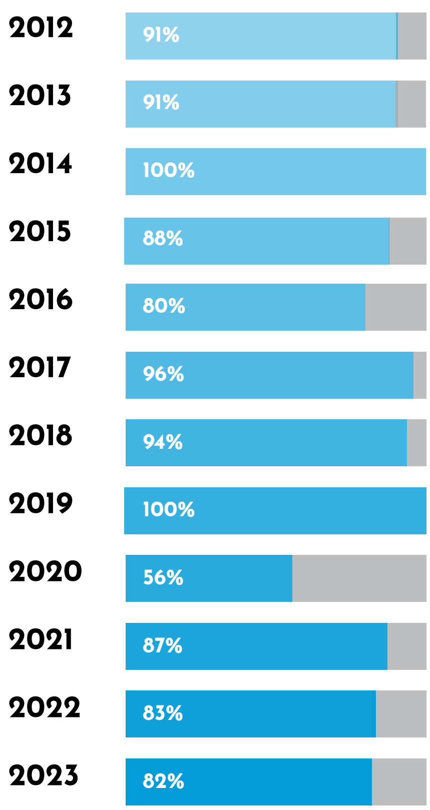


TABLE 1

Users of ionizing radiation sources in Poland in numbers (as of 31 December 2023).

				Issued in 2023					Inspections	
TYPE OF ACTIVITIES	SYMBOL	NUMBER OF ENTITIES	NUMBER OF ACTIVITIES	LICENSES	AMENDMENTS TO LICENSES	REGISTRATION ACCEPTANCE DECISIONS	AMENDMENTS TO REGISTRATIONS	NOTIFICATIONS	INSPECTIONS IN 2023	INSPECTION FREQUENCY
Class I laboratory	I	2	2	0	0	0	0	0	0	annually
Class II laboratory	II	97	129	8	20	0	0	0	9	every 2 years
Class III laboratory	II	115	223	4	4	1	1	0	8	every 4 years
Class Z laboratory	Z	155	276	12	1	11	0	0	13	every 4 years
Smoke detector installer	UIC	333	337	5	7	0	0	0	26	every 5 years
Device installer	UIA	263	372	46	93	0	0	0	17	every 5 years
Isotope device	AKP	494	698	1	3	34	2	0	17	every 5 years
Manufacturing of isotope sources and devices	PRO	23	29	0	1	0	0	0	3	every 3 years
Trade in isotope sources and devices	DYS	83	88	6	6	0	1	0	3	every 5 years
Accelerator	AKC	83	262	19	4	1	0	0	47	every 4 years
Isotopic applicators	APL	39	51	0	2	0	0	0	4	every 2 years
Telegammatherapy	TLG	4	4	0	0	0	0	0	1	annually
Instruments for irradiation	URD	29	31	0	0	0	0	0	0	every 3 years
Gammagraphic apparatus	DEF	99	101	9	7	0	0	0	15	every 2 years
Storage facility for radioactive sources	MAG	190	241	11	7	3	0	0	17	every 3 years
Work with sources outside laboratory	TER	104	127	10	1	2	0	0	5	every 3 years
Transport of sources or waste	TRN	504	512	3	6	3	0	0	6	every 5 years
Chromatograph	CHR	235	291	0	0	4	0	0	0	every 10 years
Veterinary X-ray instrument	RTW	1,746	1,978	285	21	0	0	0	83	every 10 years
X-ray scanner	RTS	814	1,229	14	16	205	22	0	95	every 10 years
X-ray defectoscope	RTD	219	265	23	36	0	0	0	46	every 2 years
Other X-ray instrument	RTG	642	997	54	15	82	3	3	69	every 10 years
Additional inspections									11	additionally
Total			8,243	510	250	346	29	3		

Regular and ad hoc inspections

Guided by the necessity to ensure an appropriate frequency of inspections depending on the hazard created by the performed activity, the inspection cycles were established for particular groups of activities.

Additional inspections are carried out in organizational entities in which activities resulting or likely to result in exposure of people and the environment to ionizing radiation may be performed without a license of the President of the PAA.

In addition, inspections were carried out by nuclear regulatory inspectors from the Radiation Protection Department (DOR) in relation to applications for a license to perform activities related to exposure to ionizing radiation.

The data on inspections carried out by nuclear regulatory inspectors from the PAA's Radiation Protection Department in 2023 are presented in Table 1.

3. Register of sealed radioactive sources

The obligation of keeping a register of sealed radioactive sources is specified in Article 43c Section 1 of the Act of 29 November 2000 – Atomic Law.

Heads of organizational entities performing activities involving the use or storage of sealed radioactive sources or devices containing such sources based on a license submit copies of records of radioactive sources to the President of the PAA. Such documents include record sheets containing the data on sources: name of the radioactive isotope, activity level according to the source certificate, date of activity determination, certificate number and source type, type of container or name of instrument and the place of source use or storage.

Data from the record sheets are entered into the register of sealed radioactive sources, which is used to verify the information on sources. The information included in the register is used for inspections of organizational entities performing activities involving exposure to ionizing radiation. The inspection consists in the comparison of entries in the record sheet with the scope of the issued license. The data from the register is also used to prepare information and lists within the framework of cooperation and collaboration with the government administration and local government for statistical purposes.

The register comprises the data on 29,817 sources, including disused radioactive sources (decommissioned and handed over to the Radioactive Waste Management Plant), and also information on their movements (i.e. receipt and hand-over dates), and related documents.

29,817

RADIOACTIVE SOURCES IN THE REGISTER OF THE PRESIDENT OF THE PAA

In Poland, sources are classified under categories, depending on the source purpose, its activity, and the radioactive isotope present.

Category 1 – sealed radioactive sources used in radioisotope thermoelectric generators (RTGs), instruments for irradiation, in particular for irradiation of tissues and blood, and in telegammatherapy instruments.

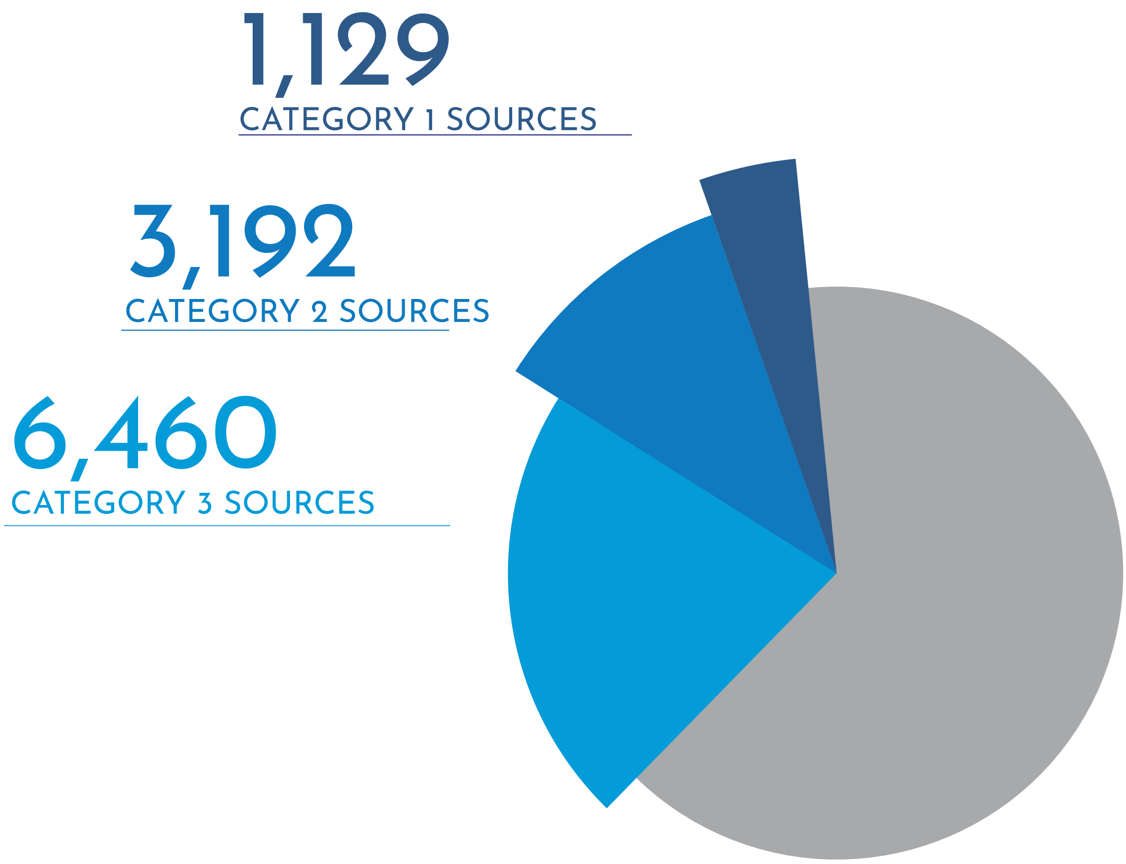
The register contains 1,129 Category 1 sources currently in operation.

Category 2 – sealed radioactive sources used in industrial radiography (defectoscopy) instruments and in HDR brachytherapy instruments.

The register contains 3,129 Category 2 sources currently in operation.

Category 3 – sealed radioactive sources used in stationary industrial meters, which contain high-activity sources, and in geophysical probes.

The register contains 6,460 Category 3 sources currently in operation.



The remaining sealed radioactive sources have been classified as category 4 and 5 of sealed adioactive sources.

TABLE 2
Selected radioactive isotopes and sources containing them, currently in operation (as of 31 December 2023).

	Number of sources in the register		
ISOTOPE	CAT. 1	CAT. 2	CAT. 3
Co-60	770	1,092	1,360
Cs-137	74	189	2,035
Am-241	14	341	651
Ir-192	143	865	9
Sr-90	-	36	604
Co-57	3	31	217
Se-75	108	251	4
Ni-63	-	7	238
Th-232	-	5	261
Kr-85	5	61	138
Pu-239	2	82	87
inne	10	232	856
TOTAL	1,129	3,192	6,460

Summary

In 2023, the number of organizational entities, registered in the register of organizational entities whose activities require at least regi stration, increased from 4,895 to 5,062, where the largest growth occurred for entities using devices generating ionizing radiation in veteri nary medicine. The number of sealed radioacti ve sources, used in organizational entities and registered in the register of the President of the PAA, increased by 634. A large part of them comprised sealed radioactive sources classified as Category 2 and used in defectoscopic me asurements. At the same time, the number of inspections of activities involving exposure to ionizing radiation carried out in 2023 was 495. The Radiation Protection Department's inspec tion plan for 2023 was therefore implemented in more than 82%.

4. Oversight over nuclear facilities and the National Radioactive Waste Repository

1. Nuclear facilities in Poland
2. Licenses issued
3. Regulatory inspections
4. Functioning of the coordination system for inspection and oversight over nuclear facilities
5. Nuclear power plants in neighboring countries

1. Nuclear facilities in Poland

The nuclear facilities in Poland are as follows:

• MARIA research reactor – at the National Centre for Nuclear Research (NCBJ),

• EWA research reactor (under decommissioning) and two spent fuel storage facilities – at the Radioactive Waste Management Plant (ZUOP).

These facilities are located in Świerk near Otwock, in two organizational entities. Figure 5 presents their location.

MARIA reactor

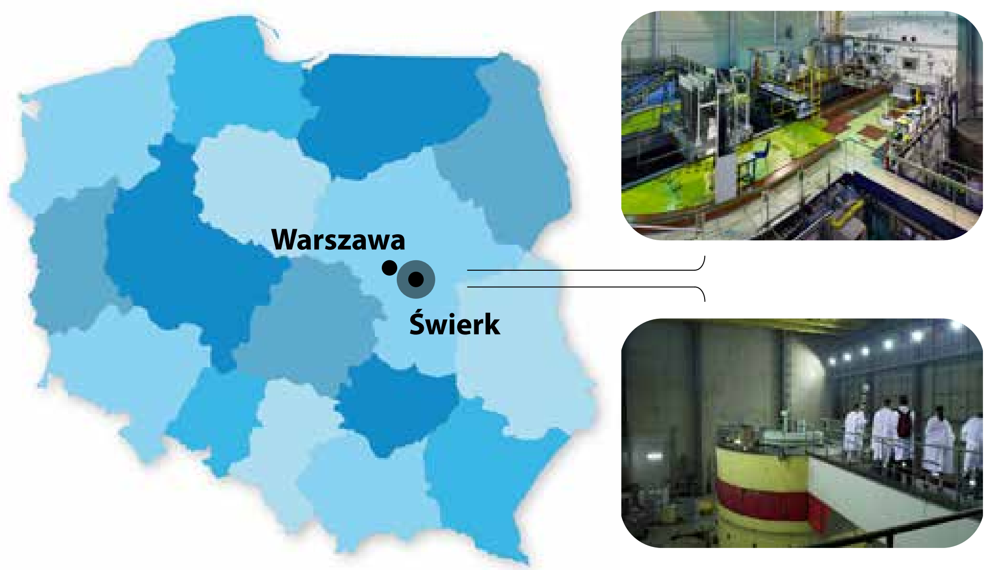
The MARIA research reactor is the second nuclear reactor built in Poland (excluding critical assemblies ANNA, AGATA, and MARYLA); currently the only reactor operating in the country. It is a high flux pool type reactor with a nominal thermal power of 30 MWt and a maximum core thermal neutron flux density of $3.5 \cdot 10^{18}$n/($m^2 \cdot$s). The MARIA reactor started to operate in 1974 and was shut-down between 1985 and 1993 for necessary upgrades, including the installation of a system for passive emergency core cooling using water from the reactor pool. From April 1999 to June 2002, a conversion of the reactor core was carried out, reducing the fuel enrichment from 80% to 36% of the U-235 isotope content (HEU - High Enriched Uranium fuel). In 2014, as part of the implementation of the international Global Threat Reduction Initiative (GTRI), the MARIA reactor was adapted to operate using low enriched uranium (LEU) fuel with less than 20% of the U-235 isotope.

In 2023, the reactor operation schedule was adapted to the following purposes:

- the irradiation requirements of uranium targets for the production of the molybdenum isotope (Mo-99);
- the irradiation of target materials for the Radioisotope Centre POLATOM, i.e. tellurium dioxide, lutetium chloride, samarium trioxide, cobalt and ytterbium, intended for the production of radioactive materials used in nuclear medicine (Figure 6);
- the irradiation of holmium targets in the form of 165Ho-PLLA MS microspheres, which are used in selective brachytherapy;
- the irradiation of various target materials for research purposes, conducted by the NCBJ or the Institute of Nuclear Chemistry and Technology in Warsaw;
- the mineral irradiation in the reactor reflector;
- the start-ups as part of test cycles, following core configuration changes and modernizations;
- the research work and measurements of core reactivity parameters.

FIGURE 5

Illustrative location of the MARIA research reactor, the EWA reactor (under decommissioning) and spent nuclear fuel storage facilities within the premises of the Nuclear Research Centre in Świerk near Otwock.



In 2023, the MARIA reactor was in service for 1,004 hours, operating in 7 cycles at power outputs ranging from 18 to 23 MW (Figure 7). In 2023, only MR-6 fuel with 19.7% U-235 isotope enrichment and MC-5 fuel with 19.75% U-235 isotope enrichment were used in the MARIA reactor.

There were 4 unscheduled reactor shutdowns in 2023, including one that forced a shortened reactor cycle. In 2023, the reactor was shut down due to a short-lived power outage in the external power grid, a disruption in the measurement of the coolant flow rate, a control valve seal failure and a malfunction of the control rod drive cart position sensor during routine decontamination. None of the unscheduled shutdowns created a hazard for the nuclear safety and radiation protection.

Between 5 September 2022 and October 2023, the MARIA reactor was shut down for necessary modernization and repair works.

The standard operation of the reactor was resumed after the NCBJ obtained the decisions of the President of the PAA that allowed the reactor to be restarted after the work's completion. The MARIA reactor modernization programme aims to maintain efficiency and the required level of nuclear safety and radiation protection during continued operation. The overall programme is scheduled to run until 2027.

Key works completed during the 2023 repair break included the following:

- Modernization of the main electrical switchboards with replacement of power cables;
- Modernization of the reactor control room with a state-of-the-art visualization system;
- Modernization of liquid radioactive waste tanks;
- Modernization of the aerosol measurement system in Building B of the reactor facility;
- Modernization of the transmitters for measurements of water flow intensity in the fuel channel cooling system and in the reactor pool cooling system;
- Modernization of the water level measurement system in the reactor pool and storage pool;
- Renovation of the experimental hall;
- Installation of the components of the new neutron monitoring start-up safety channel.

The MARIA reactor can also be used to carry out physical research, using six horizontal channels (H-3 to H-8). In 2023, such research was not carried out due to the fact that these channels were shut down to prepare the experimental hall for modernization.

As part of this modernization, it is planned to install modern research equipment acquired from another foreign research reactor.

The technological pool of the MARIA reactor is currently used for storage of spent MC and MR nuclear fuel, originating from the current operation of the reactor.

In 2023, a review of fire safety and fire protection systems was carried out at the MARIA reactor as part of the European Topical Peer Review (TPR) of Nuclear Installations, coordinated by the European Nuclear Safety Regulators Group (ENSREG).

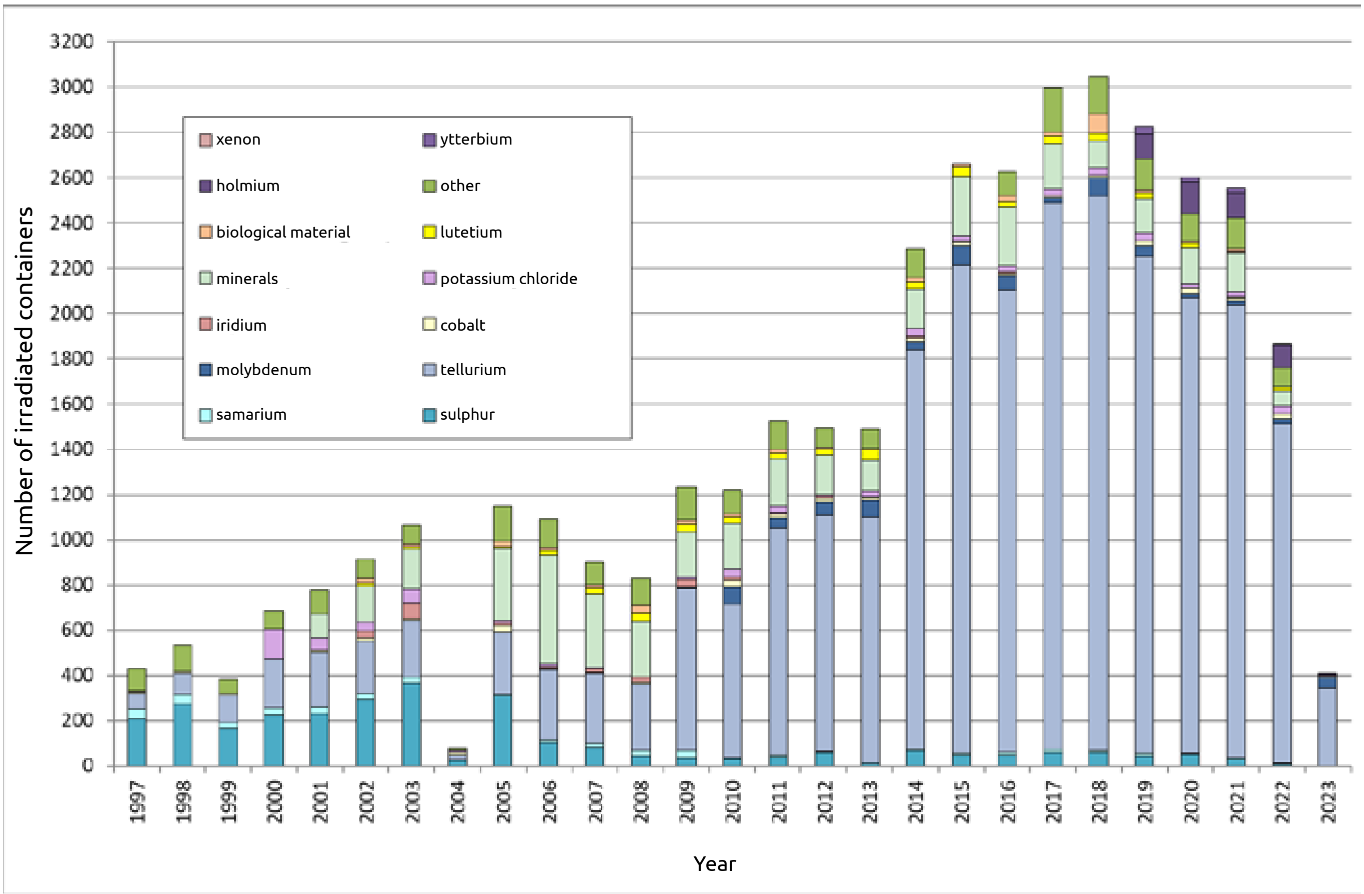
A summary of general information on the operation of the reactor is presented on pages 34-36.

Summary

There are four nuclear facilities in Poland, including MARIA, the only operational research reactor. During its operation, the reactor was used to irradiate target materials and to conduct material and technological research. Pre-planned repair, maintenance and modernization works were carried out at the reactor in order to increase the level of reliability and to ensure safe working conditions.

FIGURE 6

Materials irradiated in the MARIA reactor by 2023 (data: NCBJ).



EWA reactor under decommissioning

The EWA research reactor was in operation in the years 1958-1995. The reactor's initial thermal power was 2 MW_t and was later increased to 10 MW_t.
The decommissioning process of this reactor, which started in 1997, reached the "completion of phase two" stage in 2002. This means that the nuclear fuel and all irradiated equipment components, the activity level of which could be important in terms of radiation protection, were removed from the reactor. The EWA reactor does not therefore emit radioactive substances into the environment. The building of the reactor was refurbished and is currently used by the ZUOP.

The building of the former EWA reactor now houses the following:

- class I isotope laboratory,
- radiometric analyses laboratory,
- chemical laboratory,
- contaminated clothing laundry.

Summary

The EWA reactor, which was the first nuclear reactor used in Poland, is now under decom missioning. The EWA reactor is now safe for the environment as a result of the decommissio ning work performed so far and its infrastruc ture may be still used by the ZUOP.

Spent nuclear fuel storage facilities

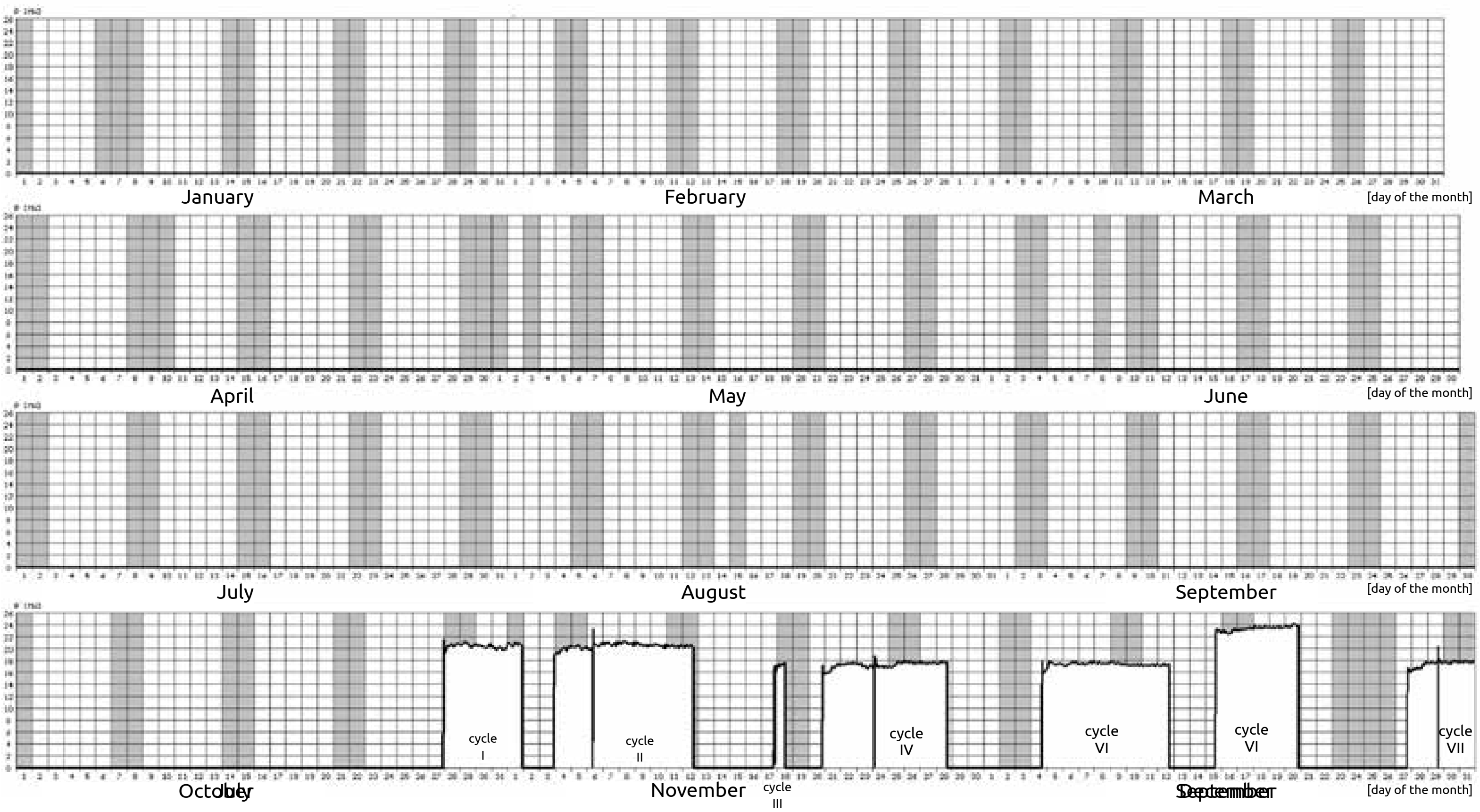
Spent nuclear fuel storage facilities also constitute nuclear facilities in Poland, including facilities no. 19 and 19A, which have belonged to the ZUOP since January 2002. These facilities are classified as wet storage facilities, i.e. they are adapted for the storage of spent nuclear fuel in the water environment.

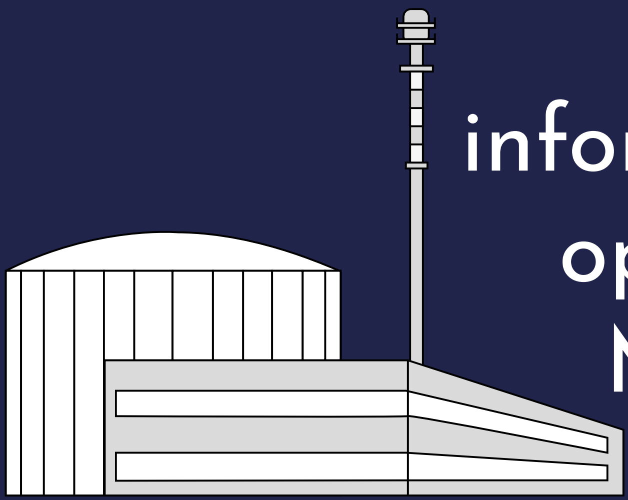
Storage facility no. 19 was used for the storage of encapsulated low-enriched spent nuclear fuel EK-10 from the EWA reactor, which was returned to the country of origin, i.e. the Russian Federation, in September 2012.

The facility is currently used as a storage site for certain radioactive waste (structural components) from the decommissioning of the EWA reactor and from the operation of the MARIA reactor, and also spent high-activity gamma-radiation sources.

FIGURE 7

Summary of the operation cycles of the MARIA reactor in 2023 (data: NCBJ), compiled and prepared by Andrzej Frydrysiak – DOM EJ2.





General information on the operation of the MARIA reactor

Number of operation cycles

I. 0	II. 0
III. 0	IV. 7

Nominal operation time [h]

1,004

I. 0	II. 0
III. 0	IV. 1,004

Average reactor power in cycles [MWt]

I. 0	II. 0
III. 0	IV. 16-23

16-23

Number of fuel elements in the core

21-22

In individual quarters of 2023

OFF

Shutdowns

Equipment malfunction (I.)	Instrumentation errors (II.)	Short-lived power outage
1	2	1

malfunctions

I.	II.	III.	IV.	Total
0	0	4	2	6

repair and maintenance works

I.	II.	III.	IV.	Total
13	22	25	15	75

tests, inspections, and checks

I.	II.	III.	IV.	Total
28	16	56	37	137

Storage facility no. 19A was used for storage of high-enriched spent nuclear fuel, marked with symbols WWR-SM and WWR-M2, from the operation of the EWA reactor in the years 1967-1995, and also encapsulated spent MR nuclear fuel from the operation of the MARIA reactor in the years 1974–2005. Following the export of all spent nuclear fuel from storage facility no. 19A to the Russian Federation in 2010, this storage facility is now used as a reserve in case of a need to store spent nuclear fuel from the MARIA reactor.

Summary

There are two spent nuclear fuel storage facilities located at the Świerk site which are operated by the ZUOP. Currently, none of them contains spent nuclear fuel, and the facility no. 19A serves as a reserve in case there is a need to store spent nuclear fuel from the MARIA reactor.

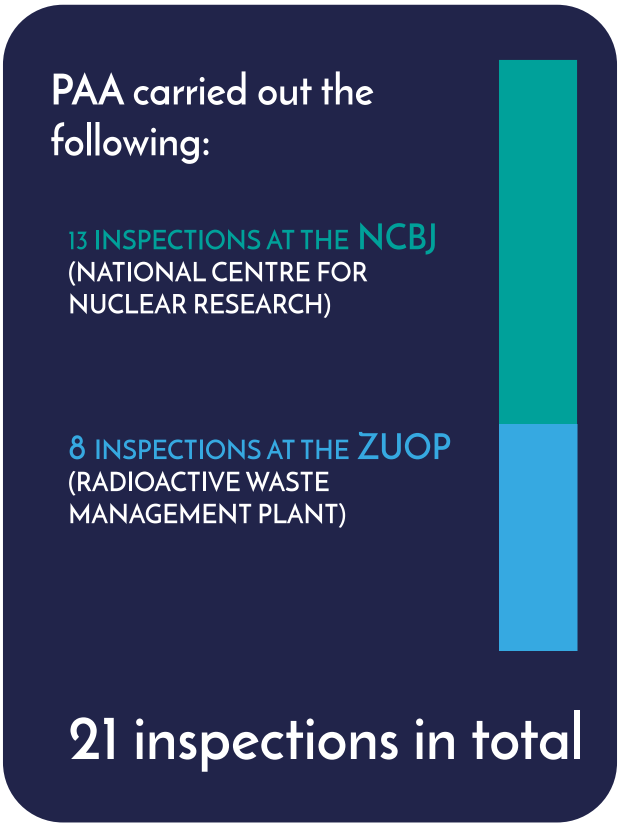
2. Licenses issued

The MARIA reactor is operated by the National Centre for Nuclear Research under the license no. 1/2015/Maria of the President of the PAA, dated 31 March 2015. This license is valid until 31 March 2025. The NCBJ has started work on an application for a new license for the MARIA reactor to enable its safe operation in the future. This application will be submitted to the PAA for assessment. In addition, the PAA is preparing intensely for the processing of applications for the construction and operation of new nuclear power facilities in Poland, which are expected in the coming years.
Other licenses issued by the President of the PAA for the operation of the MARIA reactor, which are not licenses to operate a nuclear facility, include the following:

- License no. 1/2015/NCBJ of 3 April 2015 for the storage of nuclear materials,
- License no. 2/2015/NCBJ of 3 April 2015 for the storage of spent nuclear fuel.

In 2023, the President of the PAA issued the decision no. 1/2023/Maria of 17 July 2023 and the decision no. 2/2023/Maria of 27 October 2023 amending the license no. 1/2015/Maria due to a change in the documentation under which the reactor is operated. The need to update this documentation was dictated by the modernization work carried out at the MARIA reactor in 2023.

The decommissioning of the EWA reactor and the operation of the spent nuclear fuel storage facilities by the ZUOP are carried out based on the license no. 1/2002/EWA of 15 January 2002, which is valid for an indefinite period of time.
No decision changing the above license was issued in 2023.



3. Regulatory inspections

In 2023, nuclear regulatory inspectors of the PAA carried out 21 inspections on nuclear safety, radiation protection and physical protection at nuclear facilities. The inspections did not show hazards for nuclear safety and radiation protection, however, in a few cases nuclear regulatory inspectors found violations of provisions on nuclear facilities and KSOP in terms of conducting day-to-day operation and breaching the terms of the license.
The inspections were mainly related to the MARIA reactor at the NCBJ, and included checking and assessing the following:

- compliance of the MARIA reactor's day-to-day operation and operating records with the terms of the license,
- training programmes,
- functioning of the integrated management system,
- carrying out repair and maintenance works,
- the ageing management system,
- fuel and control ducts, absorber rod drives,
- the ventilation system,
- amendments to the license, modernizations, modifications,
- radiation protection,
- reactor start-up and shutdown,
- the process measurement system,
- the electrical power system,
- the fuel channel cooling system and the pool cooling system,
- nuclear security system.

The inspections conducted in the ZUOP (8) concerned the following:

- decommissioning of the EWA nuclear facility,
- joint record-keeping of radioactive waste,
- implementation of regulatory decisions,
- collection of radioactive waste at the KSOP,
- integrated management system implementation,
- the technical condition of facilities, including spent fuel storage facilities,
- technological processes for the disposal of radioactive waste,
- functioning of the physical protection.

Twelve deficiencies were identified during the inspections – 10 at the NCBJ and 2 at the KSOP. In 2023, the President of the PAA issued 2 decisions ordering to remedy the deficiencies found and 4 post-inspection notices related to the infringements found during the aforementioned inspections.

Summary

In 2023, the oversight over exposure-related activities carried out at the nuclear facilities and the KSOP proceeded as planned. The operation of the MARIA research reactor proceeded without significant interruptions, while the modernizations and other repair works, as well as unscheduled shutdowns, did not create a hazard to nuclear safety or radiation protection. In 2023, the PAA inspectors carried out a total of 21 inspections related to nuclear facilities and the KSOP. The inspections conducted in 2023 confirmed that there were no hazards for the nuclear safety and radiation protection, despite several instances of violations of the provisions on day-to-day operation and a breach of the license terms.

4. Functioning of the coordination system for inspection and oversight over nuclear facilities

In accordance with provisions of the Atomic Law Act, when carrying out oversight and inspection in terms of nuclear safety and radiation protection at nuclear facilities, the nuclear regulatory authorities cooperate with other administration authorities through the coordination system. The cooperating authorities include the Office of Technical Inspection (UDT), the State Fire Service, the environmental protection authorities, construction supervision, the State Sanitary Inspection (PIS), the State Labour Inspection (PIP), as well as the Internal Security Agency (ABW). Joint training courses involving two or more parties to the coordination system, including the PAA, and UDT or PAA and ABW, take place regularly.

5. Nuclear power plants in neighboring countries

There are 9 nuclear power plants operating 22 power reactors with a total capacity of about 15.5 GWe within 300 km of the Polish borders.

SWEDEN

Oskarshamm NPP

PL — 298 km

1 BWR-3000 unit
1450 MWe

CZECHIA

Dukovany NPP

PL — 119 km

4 V-213 units
500 MWe
500 MWe
500 MWe
500 MWe

CZECHIA

Temelin NPP

PL — 192 km

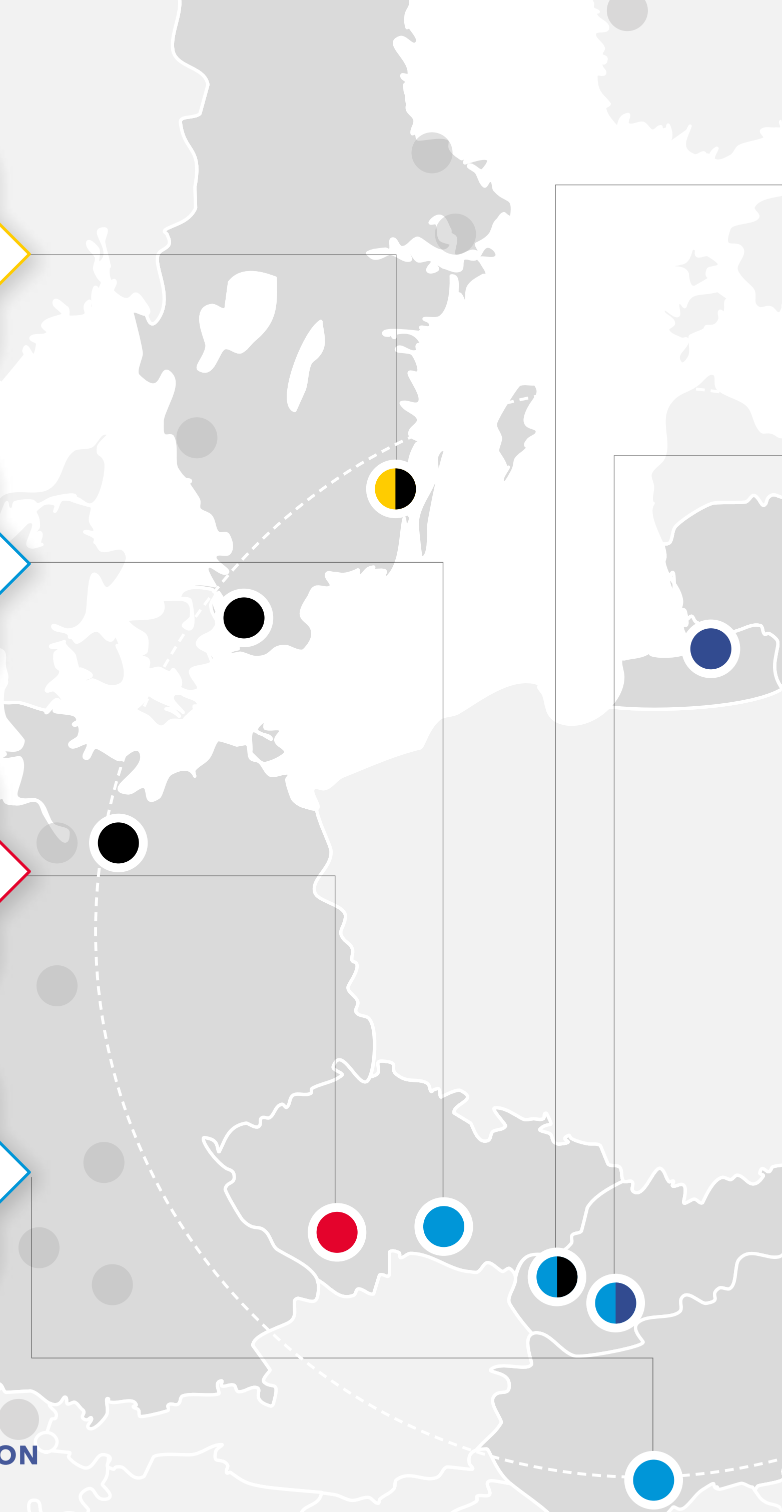
2 V-320 units
1082 MWe
1082 MWe

HUNGARY

Paks NPP

PL — 300 km

4 V-213 units
506 MWe
506 MWe
506 MWe
506 MWe



NUCLEAR REACTORS UNDER CONSTRUCTION

2 V-213 reactors at the **Mochovce NPP** (Slovakia)

2 V-320 reactors at the **Khmelnytskyi NPP** (Ukraine)

1 V-491 reactor at the **Baltic NPP** (Russia) (construction halted since 2013)

CERTAIN POWER PLANTS AT A DISTANCE LARGER THAN 300 KM FROM POLAND

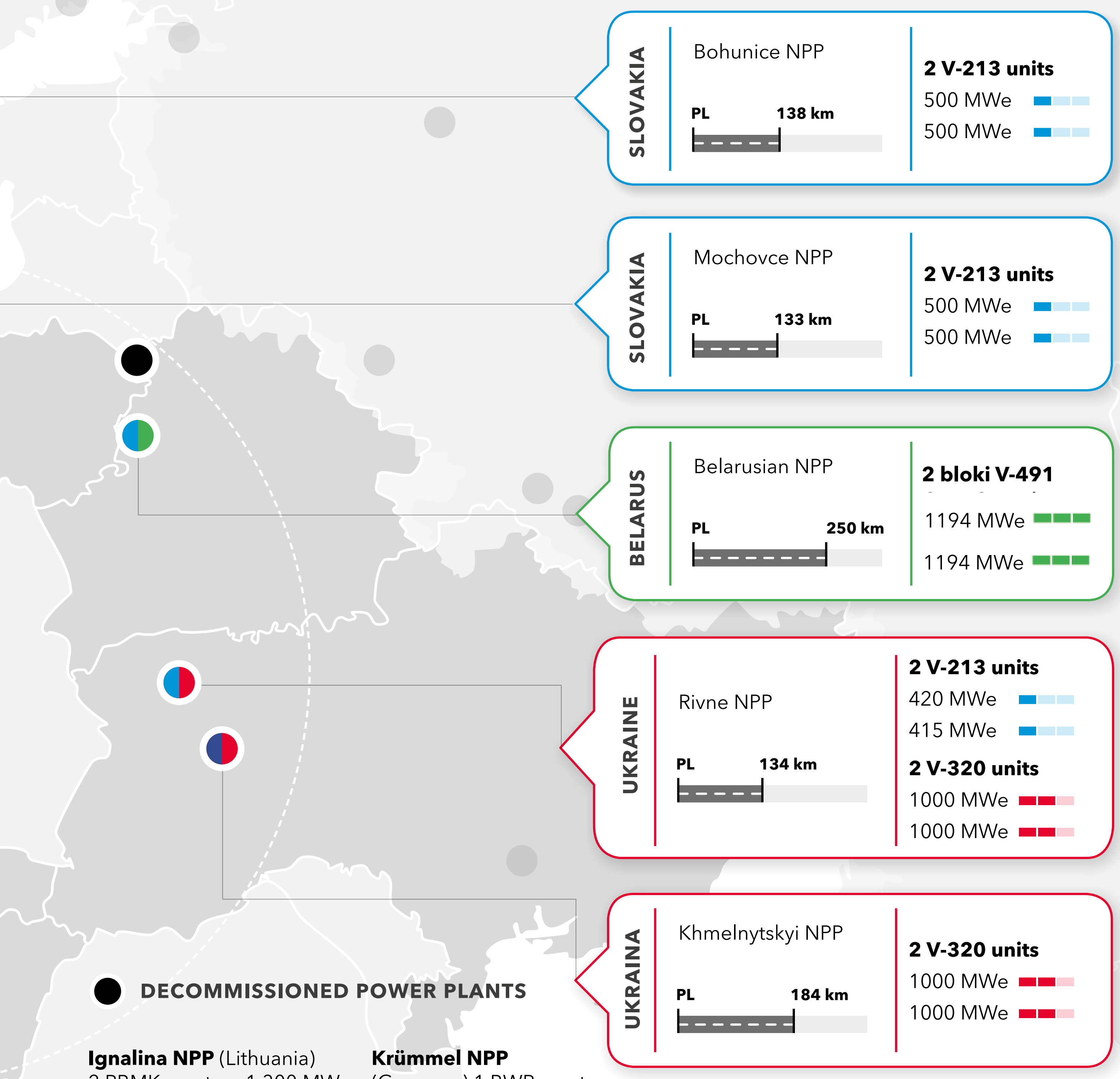
9 OPERATING NPP

14 V-213 REACTORS

6 V-320 REACTORS

1 V-491 REACTORS

1 BWR-3000 REACTORS



DECOMMISSIONED POWER PLANTS

Ignalina NPP (Lithuania)
2 RBMK reactors,1,300 MWe
shut down in 2004 and 2009

Krümmel NPP
(Germany) 1 BWR reactor,
1,402 MWe, shut down in 2011

Bohunice NPP (Slovakia)
2 V-213 reactors,440 MWe,
shut down in 2006 and 2008

Barsebäck NPP (Sweden)
2 BWR reactors, 615 MWe,
shut down in 1999 and 2005

Oskarshamn NPP (Sweden)
2 BWR reactors,
492 MWe and 661 MWe
Shut down in 2017 and 2016, respectively.

5. Nuclear safeguards

1. Legal basis for nuclear safeguards
2. Users of nuclear materials in Poland
3. Inspections of nuclear safeguards

1. Legal basis for nuclear safeguards

Legal basis

In terms of nuclear safeguards, Poland meets its commitments arising from the following international regulations:

- Treaty establishing the European Atomic Energy Community (Euratom Treaty) of 25 March 1957. The Treaty provisions have been in force in Poland since the accession to the European Union;
- Article III of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). The NPT entered into force on 5 March 1970. In 1995, its validity was extended indefinitely. Poland ratified the NPT on 3 May 1969. The NPT came into force in Poland on 5 May 1970;
- Agreement between Poland, the European Atomic Energy Community, and the International Atomic Energy Agency in relation to the implementation of Article III of the Treaty on the Non-Proliferation of Nuclear Weapons, also referred to as the Tripartite Safeguards Agreement (INFCIRC/193). The agreement has been in force in Poland since 1 March 2007;
- Additional protocol to the Tripartite Safeguards Agreement on the implementation of Article III of the Treaty on the Non-Proliferation of Nuclear Weapons (INF-CIRC/193/Add.8). The protocol came into force on 1 March 2007;
- Commission Regulation (Euratom) no. 302/2005 of 8 February 2005 on the application of Euratom safeguards (EU OJ L 54 of 2 February 2005).

The most common nuclear safeguards agreement under the Non-Proliferation Treaty between non--nuclear-weapon states and the International Atomic Energy Agency (IAEA) is the one based on the IAEA's model document no. INFCIRC/153.

On its basis, a comprehensive nuclear safeguards agreement was concluded in 1972 between the People's Republic of Poland and the International Atomic Energy Agency, as presented in the IAEA's document no. INFCIRC/179.

The bilateral agreement on nuclear safeguards between Poland and the IAEA was in force till the end of February 2007. After Poland's accession to the European Union, the agreement between Poland and the IAEA was suspended. The tripartite agreement between the Republic of Poland, the European Atomic Energy Community and the International Atomic Energy Agency has been in force since 1 March 2007. This has become possible after providing the IAEA with all the relevant information on nuclear safeguards. On this basis, the IAEA stated that nuclear materials were only used in Poland for peaceful purposes. The President of the PAA is responsible for the implementation of this agreement.

Pursuant to the concluded trilateral agreement, the IAEA and EURATOM are entitled to carry out inspections of nuclear safeguards in Poland. Such inspections are aimed at checking the compliance of reports with the operator's documentation, identifying and checking the place of nuclear materials storage, verifying the amount and composition of nuclear materials covered by safeguards, explaining the reasons for the occurrence of unaccounted-for-materials, if any, and differences in the information submitted by the sender and recipient of the nuclear materials. The inspections are also carried out before or after nuclear materials are exported from or imported into Poland.

2. Users of nuclear materials in Poland

The tasks of the national system for nuclear material accountancy and control are performed in the PAA by the Nuclear Safety and Security Department, which is responsible for the collection and storage of information on nuclear materials and for carrying out inspections in all material balance areas.

The national system for nuclear material accountancy and control is based on the so-called material balance areas (MBAs). Nuclear materials are used in Poland in the following organizational entities, which are separate MBAs:

- the MARIA Reactor Operations Division and related scientific laboratories of the National Centre for Nuclear Research (NCBJ) – **WPLC**;
- POLATOM Radioisotope Center at **NCBJ – WPLD**;
- 27 medical and scientific facilities that use small amounts of nuclear materials and 82 industrial, diagnostic and service facilities that mainly have depleted uranium shielding. All those facilities constitute a material balance area, i.e. Locations outside Facilities– **WPLE**;
- Institute of Nuclear Chemistry and Technology (IChTJ) in Warsaw – **WPLF**;
- Radioactive Waste Management Plant (ZUOP), which is responsible for spent nuclear fuel storage facilities, the shipping warehouse, and the National Radioactive Waste Repository in Różan – material balance area – **WPLG**.

There is also a WPLB material balance area defined for the partially dismantled ANNA and AGATA critical assemblies at the NCBJ. There are no nuclear materials in the area.

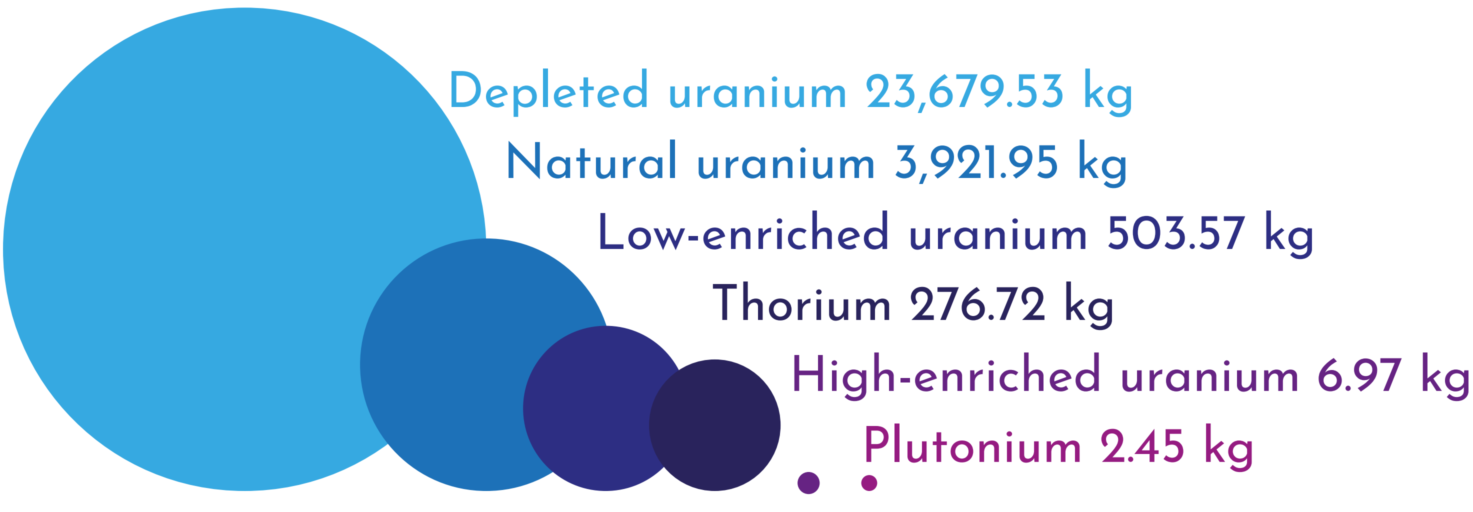
The reports on quantitative changes in the stock of nuclear materials in individual MBAs (the so-called Inventory Change Report) are submitted monthly to the Nuclear Material Accounting and Control System maintained by the European Commission's Nuclear Safeguards Office in Luxembourg. A copy of this information is also provided by the organizational entities to the PAA. Monthly reports on changes in the nuclear material balance in the WPLE area are prepared at the PAA, and then sent to the European Commission.

In matters concerning control over exports and imports of nuclear materials, strategic goods and dual-use technologies, the PAA cooperates with the Department of Sensitive Goods Trade and Technical Safety of the Ministry of Development, Labour, and Technology. The Ministry of Development, Labour, and Technology issues decisions on matters related to the export and import control of nuclear materials, goods, and technologies based on opinions provided within the Tracker system by the PAA and other ministries.

The European Commission's Nuclear Safeguards Office provides copies of the reports to the International Atomic Energy Agency in Vienna.

INFOGRAPHICS

Nuclear material balance in Poland, kg (as of 31 December 2023).



3. Inspections of nuclear safeguards

In 2023, the PAA's nuclear regulatory inspectors carried out, individually or jointly with the IAEA and EURATOM inspectors, 56 inspections of nuclear safeguards in all material balance areas in Poland. EURATOM inspectors took part in 11 inspections, 10 of which were carried out with the joint participation of IAEA, EURATOM, and the PAA's inspectors.

During all the inspections, the IAEA and EURATOM inspectors did not identify any significant concerns related to nuclear safeguards.

A declaration updating information on the technical or research activities related to the nuclear fuel cycle performed in Poland, information on non-export of goods listed in Annex II to that Protocol, and a declaration regarding users of small quantities of nuclear materials in Poland were submitted to EURATOM, thereby meeting the commitments arising from the Additional Protocol to the Tripartite Agreement.

All safeguards inspections confirmed that all nuclear materials located in Poland were used for peaceful purposes.

6. Transport of radioactive materials

1. Transport of radioactive sources and waste
2. Transport of nuclear fuel

1. Transport of radioactive sources and waste

Legal basis

Radioactive materials are transported based on the following provisions:

- Act of 29 November 2000 –Atomic Law,
- Act of 19 August 2011 on the transport of dangerous goods,
- Act of 18 August 2011 on maritime safety,
- Act of 3 July 2002 – the Aviation Law,
- Act of 5 August 2022 on the transport of dangerous goods by air,
- Act of 15 November 1984 – the Transport Law.

The Polish provisions are based on international modal provisions, such as:

- European Agreement concerning the International Carriage of Dangerous Goods by Road – **ADR** (French: Accord européen relatif au transport international des marchandises dangereuses par route);
- The Regulations applying to the international carriage of dangerous goods by rail – **RID** (fr. Règlement concernant le transport international ferroviaire des marchandises dangereuses);
- European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways – **ADN** (French: Accord européen relatif au transport international des marchandises dangereuses par voie de navigation intérieure);
- International Maritime Dangerous Goods Code – **IMDG Code**;
- Technical Instructions for the Safe Transport of Dangerous Goods by Air, International Civil Aviation Organization **(ICAO)**;
- International Air Transport Association Dangerous Goods Regulations **(IATA DGR)**.

TRadioactive materials are transported based on the SSR-6 transport guidelines prepared by the IAEA. The guidelines constitute the basis for international organizations involved in the preparation of modal provisions or are directly implemented to the national legislation and constitute the basic legal form in international transit.

In line with Poland's commitments to the IAEA, radioactive sources classified into appropriate categories are transported in accordance with the rules specified in the Code of Conduct on the Safety and Security of Radioactive Sources and the supplementary Guidance on the Import and Export of Radioactive Sources.

In terms of the transport of radioactive materials, it is particularly important to prevent all attempts of illegal (i.e. without a license or a registration) import into Poland of radioactive substances and nuclear materials. Such attempts are primarily countered by the Border Guards, which has 400 stationary radiometric devices, so-called radiometric portal monitors, installed at border crossings, nearly 1,500 portable signaling and measuring devices, as well as 2 vehicles with a system of ionizing radiation detectors to measure ionizing radiation in the field.

As a result of the inspections carried out in 2023, due to exceeded permissible levels of ionizing radiation doses, among others, the Border Guards did not allow further transport in seven cases. The Border Guards, as in previous years, received equipment support from the USA under Memorandum of Understanding signed in 2009 between the US Department of Energy (DoE) and the Minister of Internal Affairs and Administration and the Minister of Finance of the Republic of Poland on cooperation in combating illicit trafficking in special nuclear and other radioactive materials.

Since 2010, a total of 156 radiometric portal monitors have been installed, more than 700 portable radiometric devices and 2 vehicles with ionizing radiation detector systems have been supplied to the Border Guards.

Further installation of radiometric portal monitors at one of the road border crossings on Poland's eastern border, training of Border Guard officers in radiometric control and radiation protection, and further transfer of portable dosimetry equipment are planned.

2.Transport of nuclear fuel

Shipments of fresh and spent nuclear fuel are licensed by the President of the PAA. In 2023, 5 shipments (in transit) of fresh nuclear fuel and 5 shipments of fresh nuclear fuel took place on the territory of the Republic of Poland. In 2023, no shipment of spent nuclear fuel took place on the territory of the Republic of Poland.

The Radioactive Waste Management Plant also carried out 10 shipments of radioactive waste to the National Radioactive Waste Repository in Różan. No accidents occurred during the transport of radioactive materials and radioactive waste.

Fresh nuclear fuel

Since 2007, fresh nuclear fuel has been imported into Poland 14 times, including: MR fuel from the Russian Federation – twice, and MC fuel from France – 12 times, in connection with the operation of the MARIA research reactor at the National Centre for Nuclear Research in Świerk; 19 transits and 2 exports.

Spent nuclear fuel

The last export of spent nuclear fuel from the MARIA and EWA research reactors to the Russian Federation took place in 2016. There were 9 such exports (8 of high-enriched and 1 of low-enriched fuel) between 2007 and 2016.

Transport of radioactive materials

In 2023, 38,075 shipments of radioactive materials and 177,899 shipments were transported by road, rail, inland waterways, sea, and air on the territory of Poland, covering a distance of 7,204,319 km. The ten most frequently transported isotopes included: Se-75, Ir-192, Cs-137, Am-241, Co-60, I-131, Mo-99, Am-241+Be, Kr-85, Sr-90.

Summary

The Commander-in-Chief of the Border Gu ard and the President of the PAA, under the agreement on cooperation in the field of radia tion protection, undertake to provide informa tion to prevent illicit trafficking of radioactive materials across the state border. The officer on duty at the Radiation Emergency Centre sys tematically cooperates with Border Guard offi cers in cases where radiometric portal monitors are activated, and gives recommendations on further action. The shipments were carried out in accordance with legal provisions and no dose limits were exceeded. Materials which were not permitted to be further transported did not create a hazard to the health and life of the pu blic or to the environment. However, they ex ceeded the permissible radioactive concentra tions specified in the Atomic Law Act.

INFOGRAPHICS
Number of inspections carried out by Border Guard units.

	IMPORTS INTO POLAND	TRANSIT, EXPORT FROM POLAND	TRANSFER AT AIRPORTS
TRANSPORT OF RADIOACTIVE SOURCES – 3,850 INSPECTIONS, **(THE ITEM DID NOT CROSS POLAND'S BORDER IN A SINGLE CASE)** ESPECIALLY:	1,200 inspections	2,374 inspections	275 inspections
TRANSPORT OF MATERIALS CONTAINING NATURAL RADIOACTIVE ISOTOPES – **25,384 INSPECTIONS, (THE ITEM DID NOT CROSS POLAND'S BORDER IN 181 CASES)** ESPECIALLY:	12,075 inspections	13,117 inspections	11 inspections
TRANSPORT OF OTHER UNDECLARED ITEMS (E.G. ITEMS CONTAINING COMPONENTS PAINTED WITH RADIUM PAINT, CONTAMINA TED CLOTHING, SCRAP METAL) – **76 INSPECTIONS (THE ITEM DID NOT CROSS POLAND'S BORDER IN 2 CASES)** ESPECIALLY:	20 inspections	51 inspections	3 inspections
PERSONS AFTER TREATMENT OR EXAMINATION WITH RADIOACTIVE ISOTOPES **11,260 INSPECTIONS**	1,260 inspections		

In 2023, the Border Guards carried out: **30,570 inspections**

7. Radioactive waste

1. Radioactive waste management

Radioactive waste is produced from activities involving radioactive sources in medicine, industry, research facilities and during the operation of a research reactor. This waste exists in a gaseous, liquid, and solid form.

INFOGRAPHICS

Radioactive waste may appear in the following states:

SOLID WASTE

includes disused sealed radioactive sources, personal protection equipment contaminated with radioactive substances r(rubber gloves, protective clothing, footwear), laboratory materials and equipment (glass, pieces of apparatus, lignin, cotton wool, foil), used tools and elements of technological equipment (valves, pipeline segments, parts of pumps), used sorption and filtration materials used in the process of cleaning radioactive solutions or air released from reactors and isotope laboratories (used ion-exchange resins, post-precipitation sludge, filtration cartridges, etc.). The qualification of radioactive waste takes into account the radioactive concentration and the half-life of the radioactive isotopes contained in the waste.

LIQUID WASTE

consists mainly of water solutions and suspensions of radioactive substances.

GASEOUS WASTE

consists mainly of noble gases (argon, xenon, krypton) and iodine.

The following categories of radioactive waste are distinguished: low-, intermediate-, and high-level radioactive waste, classified into three subcategories: transitional and short- and long-lived. Disused sealed radioactive sources, which represent a separate category of radioactive waste, are classified according to their activity level into three sub-categories: low-, intermediate-, and high-level sources which may be further divided into short- and long-lived, based on the half-life of the relevant radioactive isotopes.

Radioactive waste containing nuclear material and spent nuclear fuel, which becomes high-level waste when a decision is made to dispose of it, are subject to specific, separate provisions for management at all stages (including storage and disposal).

Pursuant to the Atomic Law Act, all organizational entities performing activities involving exposure to ionizing radiation must plan and conduct these activities in such a way as to prevent the generation of radioactive waste (the so-called waste minimization principle). If impossible, the generated radioactive waste shall be properly processed (i.e. segregated, reduced in volume, solidified, and packaged) and then stored or disposed in such a way that the undertaken measures and provided barriers effectively isolate the waste from people and the environment.

Radioactive waste shall be temporarily stored in such a manner as to ensure the protection of people and the environment, under normal conditions and in radiation emergencies, for example by providing protection against spillage, dispersion or release. Specially dedicated facilities or rooms (radioactive waste storage facilities) are used for this purpose and are equipped with mechanical or gravitational ventilation and purification of the air discharged from the room.

2. Radioactive waste in Poland

The Radioactive Waste Management Plant (ZUOP) is involved in the collection, transport, processing, and disposal of waste generated by users of radioactive materials in Poland).

Oversight over waste management safety, including oversight over waste disposal safety by the ZUOP is exercised by the President of the PAA.

TABLE 3

Quantities of radioactive waste collected by the ZUOP in 2023.

Sources of waste	Solid waste [m³]	Liquid waste [m³]
Outside the National Centre for Nuclear Research in Świerk (medicine, industry, scientific research)A	1.35	0.003
National Centre for Nuclear Research, POLATOMA	8.50	0.17
National Centre for Nuclear Research + MARIA reactor*A	12.15	0.00
Radioactive Waste Management Plant (ZUOP)A	0,20A	15.48
Total	22.20	15,65A

* total value of radioactive waste from the MARIA reactor and the National Centre for Nuclear Research

The ZUOP owns facilities at the site of the National Centre for Nuclear Research in Świerk, equipped with radioactive waste treatment installations.

The radioactive waste in Poland is disposed in the National Radioactive Waste Repository (KSOP), situated in Różan (Maków county). The KSOP is a near surface repository, intended for the disposal of short-lived, low- and intermediate-level radioactive waste (with a radionuclide half-life of less than 30 years). It is also used for the storage of long-lived waste, mainly alpha-radioactive materials, awaiting disposal in a deep geological repository (named otherwise geological or under-ground). The KSOP was established in 1961 and is the only facility of this kind in Poland.

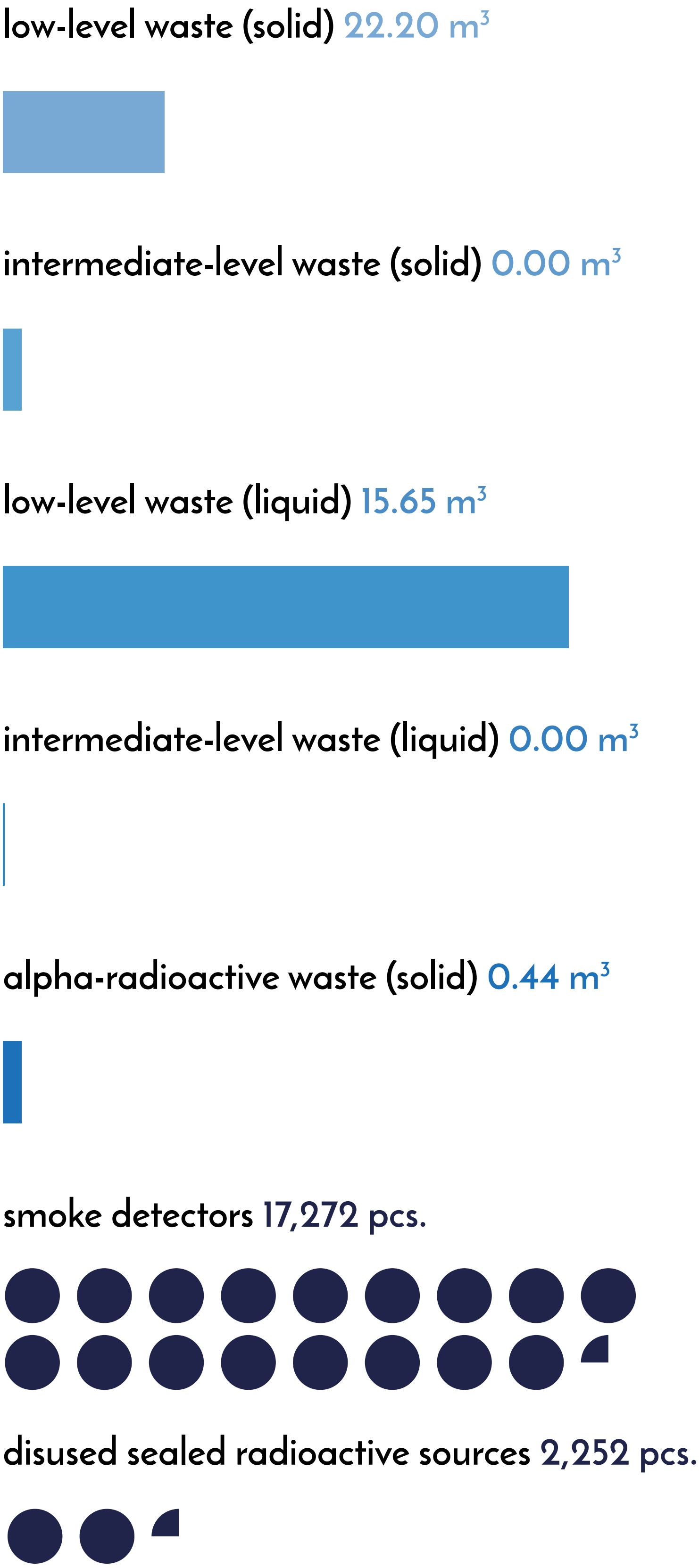
In 2023, the ZUOP received 219 orders from 147 institutions to collect radioactive waste. Table 3 presents the quantities of collected radioactive waste (including the waste generated at the ZUOP).

After treatment, the radioactive waste is placed in drums of 200 and 50 dm³ capacity, and then it is handed over in solidified form for disposal.

In 2023, 126 200-litre drums of treated radioactive waste, three pieces of reusable (returnable) shielding containers with radioactive sources and two pieces of abnormal and large size packaging, all together with a total activity of 346.3 GBq, were transferred to the KSOP (data as of 31 December 2023).

Also, the waste originating from disassembling of smoke detectors is sent to the ZUOP for storage.

FIGURE 8
The collected solid and liquid waste by type and category may be broken down as follows:



The radioactive waste management at the ZUOP is carried out on the basis of licenses issued by the President of the PAA:

- License no. D-14177 of 17 December 2001 for nuclear activities consisting in: transporting, processing and storing on the premises of the Świerk national center for nuclear research of radioactive waste received from organizational entities performing activities involving nuclear power from all over the country,
- License no. 1/2002/KSOP – Różan of 15 January 2002 for the operation of the KSOP in Różan,
- License no. 1/2016/ZUOP of 15 December 2016 for performing activities related to exposure to ionizing radiation involving the storage of radioactive waste in the Facility no. 8A at the National Radioactive Waste Repository in Różan,
- License no. D-19866 of 4 July 2016 for the performing the activities referred to in Article 4 Section 1 Item 1a of the Atomic Law Act, involving the storage of radioactive waste generated in a Class III isotopic laboratory operated under license number D-18527 and radioactive waste received from other entities under license number D-14177 in the Radioactive Waste Shipping Warehouse (buildings 35A and 35B on the premises of the Radioactive Waste Management Plant in Otwock-Świerk).

These licenses are valid indefinitely, and the two first require submitting reports (the first – annual, the second – quarterly), which are analyzed by the PAA's staff. The information provided in the reports is then verified during inspections.

Nuclear regulatory inspectors from the PAA carried out five inspections on radioactive waste management at the ZUOP in 2023, including the following:

- four inspections were carried out at the KSOP, which included checking: the technical condition of the KSOP facilities, the integrated management system, the joint accountancy of radioactive waste and the implementation of the oversight decisions of the President of the PAA: the implementation of orders, prohibitions and post-inspection notices;

- one inspection at the ZUOP facilities at the Świerk nuclear site, which concerned the processing of radioactive waste, the technical condition of the ZUOP facilities and the state of radiation protection, as well as the implementation of oversight decisions of the President of the PAA: orders, prohibitions and post-inspection notices.

The conclusions and observations from the performed inspections were implemented by the management of the ZUOP on an ongoing basis, while deficiencies and infringements identified by nuclear regulatory inspectors were remedied in accordance with the provisions included in the inspection reports or post-inspection notices.

Summary

The amount of radioactive waste handed over to the ZUOP in 2023 was at a level comparable to previous years.

In accordance with the report submitted by the ZUOP, in 2023 the radioactive waste was managed according to the terms of valid licenses. No radiation emergencies occurred; the presented results of environmental and radiation monitoring do not deviate from the levels recorded in the previous year and show that there was no radiation hazard to the personnel and environment.

The inspections of radioactive waste disposed and stored at the KSOP and ZUOP did not show any hazard to the public and environment.

INFOGRAPHICS

Classification of radioactive waste.

RADIOACTIVE WASTE

The following categories of radioactive waste are distinguished:

Classified in three sub-categories:

- **Transitional**
- **Short-lived**
- **Long-lived**

NUCLEAR MATERIALS AND SPENT NUCLEAR FUEL

Radioactive waste containing nuclear material and spent nuclear fuel, which becomes high-level waste when a decision is made to dispose of it, are subject to specific, separate provisions for management at all stages (including storage and disposal).

DISUSED SEALED RADIOACTIVE SOURCES

Constituting an additional category of radioactive waste, are classified by the level of activity into three sub-categories: low-, intermediate-, and high-level waste.

8. Radiation protection of the population and workers in Poland

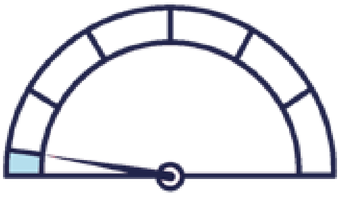
1. Exposure of the population to ionizing radiation
2. Control of exposure to ionizing radiation
3. Exposure to radon
4. Granting of personal authorizations in the area of nuclear safety and radiation protection

1. Exposure of the population to ionizing radiation

For members of the public, the dose limit, expressed as an effective dose, amounts to 1 mSv per calendar year.

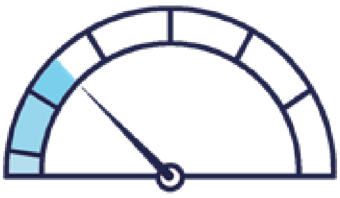
For occupational workers with exposure to ionizing radiation and for school students, tertiary education students, and apprentices aged 18 or older, the dose limit is 20 mSv per calendar year. In the case of workers, this dose may be exceeded up to 50 mSv per year, if such an excess is authorized by the President of the National Atomic Energy Agency or another authority competent to issue licenses or accept a registration or a notification concerning the relevant activity.

The dose limit for school students, tertiary education students and apprentices aged 16 to 18 is 6 mSv. The dose limit for the general population applies to school students, tertiary education students and apprentices under the age of 16.



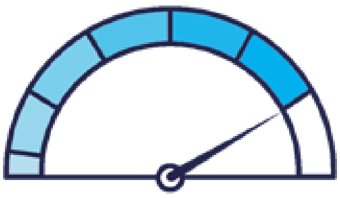
1 mSv

for members of the public



6 mSv

for school students, tertiary education students and apprentices aged 16 to 18



20 mSv

for workers, school students, tertiary education students and apprentices aged 18 and older

The dose limit value consists of three elements:

- the presence of artificial radionuclides in food and the environment from nuclear explosions and radiation accidents,
- the use of consumer goods emitting radiation or containing radioactive substances,
- professional activities involving the use of ionizing radiation sources.

Human exposure to ionizing radiation results from two main sources:

- natural radiation sources – ionizing radiation emitted by radionuclides which are natural components of all elements of the environment, and cosmic radiation;
- artificial (man-made) radiation sources – all artificial radiation sources, such as radioactive isotopes of elements and radiation generating instruments, e.g. X-ray devices, accelerators, nuclear reactors, and other radiation devices.

Ionizing radiation is a phenomenon that has always been present in the human environment, and therefore its presence cannot (and does not have to) be eliminated, but can be limited. This results from the fact that people cannot have influence on, for example, the level of cosmic radiation, the contents of natural radionuclides in the Earth's crust, or even in their bodies. For this reason, the established dose limit (the limit of the effective dose for the general population) takes into account only artificial radiation sources, and excludes doses received:

- by patients as a result of the use of radiation for medical purposes;
- during radiation emergencies (i.e. when the radiation source is not under control).

LEGAL BASIS

The primary national normative act establishing this limit is the Atomic Law Act, specifically Appendix 4 thereto.

NATIONAL
ATOMIC ENERGY
AGENCY

INFOGRAPHICS

The percentage of different ionizing radiation sources in the annual average effective dose.

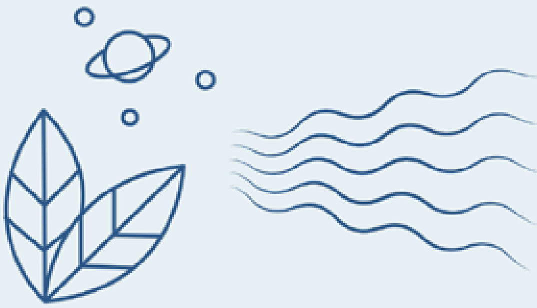
4.36 mSv

annual total effective dose of ionizing radiation received per capita in Poland in 2023.A

NATURAL SOURCES

58.53%

2.55% mSv



222
Rn
86

RADON
27.53% 1.20 mSv

GAMMA RADIATION
15.34% 0.67 mSv

COSMIC RADIATION
7.34% 0.32 mSv

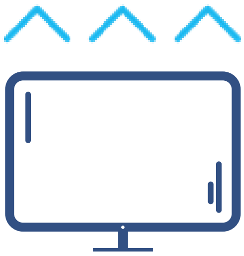
RADIATION FROM THE HUMAN BODY
6.03% 0.26 mSv

Tn

THORON
2.29% 0.10 mSv

Exposure to natural sources:

- radon and products of its decay,
- cosmic radiation,
- terrestrial radiation, i.e. radiation emitted by natural radionuclides existing in the intact Earth's crust,
- natural radionuclides contained in the human body (approx. 0.001 mSv).



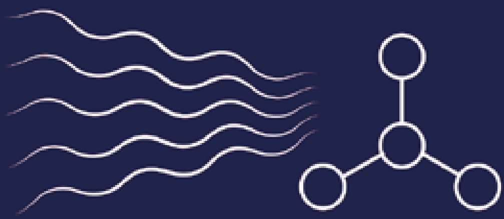
approx. 0.001 mSv
exposure dose to ionizing radiation from consumer goods (e.g. TV, isotope smoke detectors).

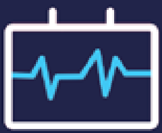
approx. 0.092 mSv
exposure dose from radionuclides naturally occurring in food (Ra-226, Pb-210, Po-210 and U+Th).

ARTIFICIAL SOURCES

41.47%

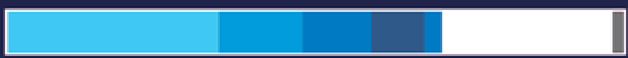
1.81 mSv





MEDICAL DIAGNOSTICS

41.27% 1.80 mSv



This overall dose predominantly includes doses received during tests performed with the use of:

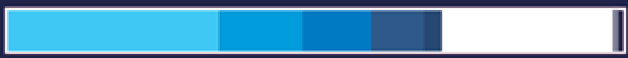
- computer tomography 1.40 mSv,
- conventional radiography and fluoroscopy 0.20 mSv.

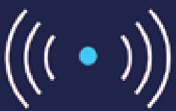
For other diagnostic examinations, the single doses are as follows

- mammography 0.02 mSv,
- X-ray 1.20 mSv,
- chest radiograms 0.11 mSv,
- spinal column and lung scans 3 mSv – 4.30 mSv.

ACCIDENTS

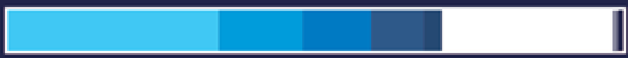
0.1% 0.005 mSv





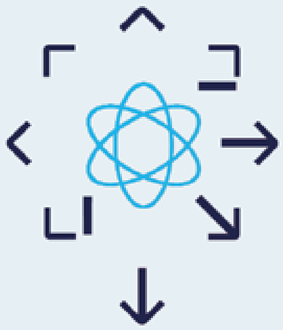
OTHER

0.1% 0.005 mSv



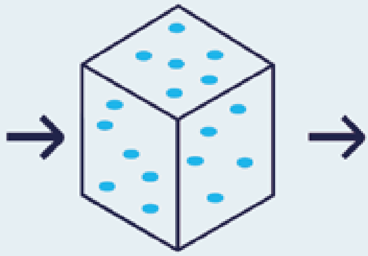
INFOGRAPHICS

Basic terms and units used in radiation protection.



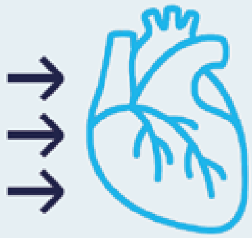
Bq
BECQUEREL

RADIOACTIVITY
Determines the number of radioactive decays in a given material per unit time.



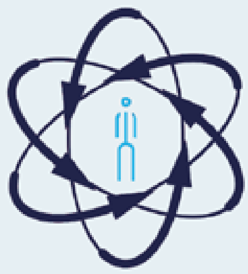
Gy
GRAY

ABSORBED DOSE
Determines the average energy absorbed by the medium, through which the radiation passes.



Sv
SIEVERT

EQUIVALENT DOSE
Determines the dose absorbed in the tissue or organ, taking into account the radiation type and energy. It allows to determine the biological effects of radiation impact on the exposed tissue.



Sv
SIEVERT

EFFECTIVE DOSE
Illustrates the exposure of the whole body to radiation. Determines the degree of whole body exposure to radiation, even when only certain parts of the body are irradiated.

Exposure limits for members of the public take into account external irradiation and internal irradiation caused by radionuclides that enter the human body by oral or inhalation routes, and are defined as:

- effective dose, illustrating the whole body exposure,
- equivalent dose, expressing the exposure of individual body organs and tissues.

The annual total effective dose of ionizing radia tion received per capita in Poland has remained at a similar level for several years.

In 2023, taking into account radiation from natural and artificial sources of ionizing radiation (including those used in the medical diagnostics), this value was **4.36 mSv on average**. The percentage share of this exposure to various radiation sources is shown in the infographics on pages 56-57[1].

Exposure of the public to ionizing radiation sources

Exposure to the following natural sources constitutes **58.53%** of the total effective dose and amounts to approx. **2.55 mSv per year:**

1. The sources of data obtained included the Central Laboratory for Radiological Protection in Warsaw, the National Centre for Radiation Protection in Łódź, the Institute of Meteorology and Water Management in Warsaw, the Institute of Occupational Medicine in Łódź, and the Central Mining Institute in Katowice.

- radon and products of its decay,
- cosmic radiation,
- terrestrial radiation (radiation emitted by natural radionuclides existing in the intact Earth's crust),
- natural radionuclides contained in the human body.

Radon and its decay products account for the largest share of this exposure, with an average per capita dose of approx. **1.20 mSv per year.**

In 2023, the average per capita exposure to medical radiation sources in Poland, mainly in medical diagnostics including X-ray examinations and in vivo examinations (i.e. administration of radioactive agents to patients) is estimated at **1.80 mSv.**

This dose consists primarily of doses received during examinations in which computed tomography was used (**1.40 mSv**) and conventional radiography and fluoroscopy (**0.20 mSv**). For other diagnostic tests, the doses are much smaller.

The average effective dose per X-ray examination is 1.2 mSv, and for the most frequently carried out examinations these values are as follows[2]:

- chest radiographs – approx. 0.11 mSv,
- spinal column and lung scans from 3 mSv to 4.30 mSv.

It should also be reminded that the public exposure limits do not cover exposure resulting from the therapeutic use of ionizing radiation.

Annual effective dose

National regulations set an effective annual dose limit of 1 mSv for the population. The value of the effective dose per capita, comprised by this limit consists of three elements:

- the presence of artificial radionuclides in food and the environment from nuclear explosions and radiation accidents,
- the use of consumer goods emitting radiation or containing radioactive substances,
- professional activities involving the use of ionizing radiation sources.

2. The range of variability in individual examinations reaches up to two orders of magnitude and results from both the quality of the instrument and the use of maximally different examination conditions.

The average per capita exposure to radionuclides of natural origin (Ra-226, Pb-210, Po-210 and U+Th) in food in Poland has been estimated at 0.091 mSv based on measurements carried out in previous years (this constitutes **9%** of the dose limit for the population). These values were determined based on measurements of radionuclide content in foodstuffs and food products constituting the basic components of an average diet, taking into account current data on the intake of its individual components. Dairy, meat, vegetables (mainly potatoes) and cereals account for the largest share of this exposure, while mushrooms, forest fruit and game, despite their elevated cesium isotope content, do not contribute significantly to this exposure due to their relatively low consumption. Since the concentration of post-Chernobyl Sr-90 in food products is virtually unmeasurable at present, it was assumed that the dose from food products was from Cs-137 only.

The values illustrating exposure to radiation, emitted by artificial radionuclides contained in such components of the environment as soil, air, and open waters, were determined based on measurements of particular radionuclides content in samples of environmental materials collected in various regions of the country (the results of the measurements are given in Chapter 10 “Assessment of the radiation situation in the country”). Considering local differences in the level of Cs-137 isotope content, which is still present in soil and in food, it can be estimated that the maximum dose may be approx. 4-5 times higher than the average value, which means that the exposure due to artificial radionuclides does not exceed 5% of the dose limit.

Exposure to ionizing radiation from consumer goods in **2023 was approx. 0.002 mSv, which is 0.1%** of the dose limit for the population. The provided value was determined mainly based on measurements of the radiation emitted by cathode-ray tubes, isotope smoke detectors as well as gamma radiation emitted by artificial radionuclides used in the coloring of ceramic tiles or porcelain. The calculated value also takes into account the dose from cosmic radiation received by passengers during airplane flights.

In connection with the increasingly widespread use of LCD screens and monitors instead of the previously used CRTs, the dose per capita received from these devices is systematically reduced.

In 2023, the per capita exposure during occupational activity with sources of ionizing radiation (presented in more detail in Chapter 8.2 “Control of exposure to ionizing radiation”) amounted **approximately to 0.002 mSv, which is 0.01% of the dose limit (for an occupationally exposed person).**

In 2023, the total per capita radiation exposure to artificial sources of ionizing radiation, excluding medical exposure (and with the dominant share of exposure to Cs-137, present in the environment as a result of nuclear explosions and the Chernobyl accident), in Poland was approx. **0.01 mSv, i.e. 1%** of the artificial radioisotope dose limit for members of the public of 1 mSv per year, and only **0.2%** of the per capita dose from all sources of ionizing radiation.

In light of the radiation protection regulations adopted worldwide and in Poland, the per capita radiation exposure in Poland in 2023, resulting from the use of artificial sources of ionizing radiation, is low.A

2. Control of exposure to ionizing radiation

Occupational exposure to artificial sources of ionizing radiation

Performance of occupational duties associated with work in nuclear facilities, radioactive waste management entities, and entities performing activities involving exposure to ionizing radiation result in radiation exposure to workers.

LEGAL BASIS

The requirements for nuclear safety, radiation protection and health protection of workers are set out in Chapter 3 of the Atomic Law Act.

In accordance with the principles of control of exposure to ionizing radiation, the primary responsibility for compliance with the requirements in this regard rests with the head of the organizational entity responsible for controlling the doses received by their subordinate workers. Such controls must be carried out based on the results of environmental measurements or individual dosimetry, performed by a specialized, accredited radiometric laboratory. The following accredited laboratories conducted individual dose measurements and assessments at the request of the concerned organizational entities in 2023:

- Laboratory of Individual and Environmental Dosimetry of the Henryk Niewodniczański Institute of Nuclear Physics in Krakow (IFJ),
- Department of Radiation Protection of the J. Nofer Institute of Occupational Medicine in Łódź (IMP),
- Dose Control and Calibration Department of the Central Laboratory for Radiological Protection (CLOR) in Warsaw,
- Dosimetry Laboratory of the National Centre for Nuclear Research (NCBJ) in Świerk,
- For the monitoring of doses from natural radioactive isotopes received by miners working underground – Silesian Centre for **Environmental Radioactivity, Central Mining Institute (GIG) in Katowice**.

Provisions of the Atomic Law Act introduced the obligation to keep a register of doses and to provide individual control to category A workers exposed to ionizing radiation, i.e. those who may under normal working conditions be exposed to an effective dose from artificial radiation sources exceeding 6 mSv per year or to an equivalent dose exceeding 15 mSv per year for eye lenses or 150 mSv per year for skin or limbs, according to the assessment of the head of the organizational entity.

The assessment of the doses for category B workers, i.e. those workers who are not classified as category A, is based on measurements performed in the working environment. At the discretion of the head of the organizational entity, workers in this category may (but are not required to) be subject to exposure monitoring with personal dose meters.

For workers, the dose limit, expressed as an effective dose, amounts to 20 mSv per calendar year. In view of the special conditions or circumstances of performing activities involving exposure to ionizing radiation, it may be possible to exceed this dose limit up to 50 mSv per year only with the consent of the authority competent to issue licenses or accept a registration or notification referred to in Article 4 Section 1 or Section 1a of the Atomic Law Act, and provided that the annual average effective dose in any period of five consecutive calendar years, including years in which the dose limit has been exceeded, may not exceed 20 mSv. This makes it necessary to check the sum of doses received in the current year and the previous four calendar years when controlling the exposure of workers who work with ionizing radiation sources. This means that heads of organizational entities have to keep a record of doses of exposed workers and transfer the data on exposure of category A workers to the central dose register kept by the President of the PAA.

The work under exposure to ionizing radiation affects tens of thousands of people. However, only a small percentage of workers routinely work with significant exposure to ionizing radiation. For most people, dose monitoring is conducted to confirm that the use of radiation sources does not pose a threat and is not expected to cause adverse health effects.

This ionizing radiation exposure group is classified as category B workers.

Summary

Two categories of workers, i.e. categories A and B, are introduced in order to adapt the way the risk of workers in organizational entities is asses sed to its expected level, depending on the ma gnitude of the risk. The assessment of workers' exposure is carried out based on the results of environmental measurements or individual do simetry. The Atomic Law Act defines the dose li mit, which is expressed as an effective dose and equals 20 mSv in a calendar year for workers and only in exceptional situations may be exceeded up to 50 mSv per year provided that the annual average effective dose in any period of five con secutive calendar years, including years in which the dose limit has been exceeded, may not ex ceed 20 mSv.

Central Dose Register of the President of the PAA

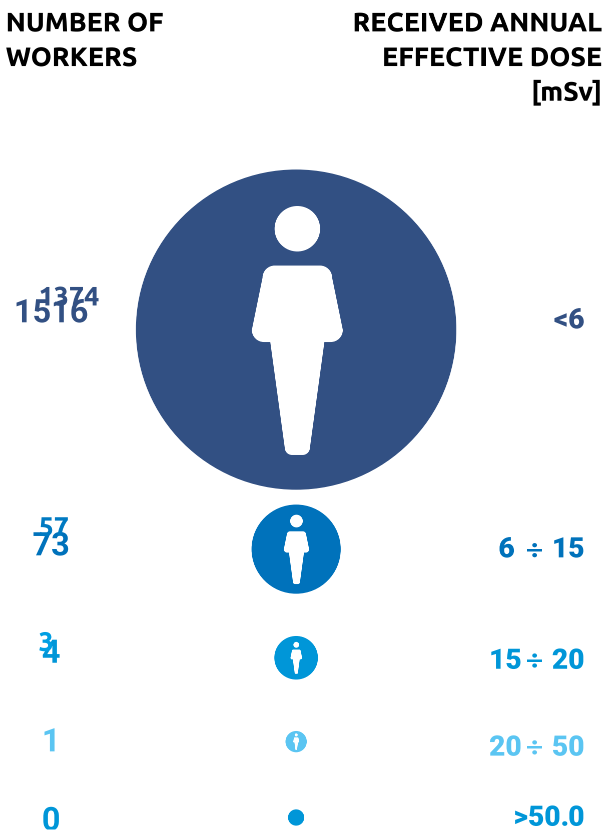
LEGAL BASIS

Detailed information on the procedure for recording, reporting, and registering individual doses is provided in the Regulation of the Council of Ministers of 25 May 2021 on requirements for the registration of individual doses (Dz. U. item 1053).

The data on doses for workers classified by heads of individual entities as category A workers are collected in the Central Dose Register of the President of the PAA. Workers from this ionizing radiation risk category are required to undergo measurement of effective doses to the whole body and/or to a specific, most exposed part of the body (e.g. hands).

INFOGRAPHIC

Statistics on individual annual effective doses of workers classified as category A exposure to ionizing radiation in 2023.



* According to registrations submitted to the Central Dose Register by 30 April 2024.

An assessment of the internal contamination committed dose is performed by way of exception in cases of exposure to contamination by dispersive radioactive substances called open sources.

A total of 7,901 individuals were registered since the creation of the Central Dose Register, i.e. from 2002 to 30 April 2024. The data for 2,911 of those registered were updated over the past four years. By 30 April 2024, 1,435 individuals had been reported to the Central Dose Register, for whom 1,478 dose information received for 2023 had been submitted.

As a result of the proper radiation protection, 1,374 category A individuals received effective doses not exceeding 6 mSv per year (the lower limit of exposure assumed for Category A workers), and doses above 6 mSv were received by 61 individuals with only one case measured exceeding an annual dose of 20 mSv (the dose limit that can be received for a calendar year from routine work with ionizing radiation). In cases where the dose limit was exceeded, working conditions and causes of radiation exposure were analyzed in detail.

Summary data for 2023 on exposures of category A workers reported to the Central Dose Register by individual organizational entities is provided in the infographics on page 62.

These data show that in the group of Category A workers, the percentage of persons who did not exceed the lower limit specified for this exposure category, that is 6 mSv per year, was 95.7% in 2023, and the percentage of workers who did not exceed the limit of 20 mSv per year was 99.9%.

Summary

A single case of exceeding the effective dose limit (20 mSv per year) was recorded. One case of exceeded dose limit for the eye lens was also recorded. The problem involved an interventional radiologist. A new annual limit dose for the eye lens, 20 mSv per year, has been effective since the implementation of the new directive 2013/59/Euratom. Exceeding this dose poses the risk of a post-radiation deterministic effect in the form of lens opacity or cataracts. In addition, two cases of exceeding the extremity dose were recorded, which involved electro radiologists.

3. Exposure to radon

Radon (Rn) is a radioactive noble gas which naturally exists in the environment. It is present in various activity concentrations in every building and dwelling, depending on the geological structure of the ground, on which the building is founded. Materials used for construction are also of significance. Radon permeates inward together with the air sucked from the ground through cracks in foundations, building's walls, sewer manholes, leaks around sewer pipes, from building materials, etc.

The most common isotope found in nature is radon-222 (designated Rn-222), which makes up about 80% of all isotopes and is also considered the most dangerous to the environment. Its short-lived products of decay account for approx. 30% of the ionizing radiation dose received by inhabitants of Poland from natural sources.

Radon does not directly affect our body. However, its short-lived progeny can enter our respiratory system as dust and undergo radioactive decay there. Thus, they may increase the risk of lung cancer.

Pursuant to the Atomic Law Act the reference level for the average annual activity concentration of radon in indoor workplaces and in rooms intended for human habitation amounts to 300 Bq/m3.

The provisions of the Act of 13 June 2019 amending the Atomic Law Act and the Act on Fire Protection came into force in 2019, and introduced a number of changes also in the field of protection against exposure to radon, including the following:

- establishment of reference levels for annual average concentration of radon in the air,
- introduction of an obligation to measure radon concentrations or the potential alpha energy concentration of short-lived radon decay products in workplaces located at ground or basement level and in workplaces related to groundwater remediation in areas where annual average concentrations of radon in the air in a significant number of buildings may exceed the reference level,
- introduction of an obligation to provide, at the buyer's or tenant's request, information on the value of annual average concentrations of radioactive radon in the air in a building, premises or room,
- imposition on the President of the National Atomic Energy Agency of an obligation to monitor measures preventing radon ingress into new buildings and to carry out information campaigns in this regard.

Summary

Radon can pass from the ground into a building, which means that the risk of radon exposure can occur in residences, workplaces, and mixed-use buildings. The provisions of the Atomic Law Act introduced by the Act of 13 June 2019 amending the Atomic Law Act and the Act on Fire Protec tion changed the guidelines for protection from exposure to radon.

Control of exposure in mining industry to natural sources of ionizing radiation

Contrary to radiation hazards from artificial radioactive isotopes and radiation emitting devices, the radiation hazard in the mining industry (coal mining and mining of other natural resources) is primarily posed by an increased level of ionizing radiation in mines, caused by natural radioactivity. Sources of this hazard include:

- radon and products of its decay in mine air,
- gamma radiation emitted by natural-radioactive isotopes (mainly radium), contained in rock masses,
- mine waters (and their sediments) with an increased content of radium isotopes.

The first two aforementioned factors apply practically to all miners working underground. This means that when making the calculations necessary to classify the workings into individual classes of radiation hazard, from the dose resulting from the natural background on the surface for the assumed operation time should be subtracted from the dose calculated on the basis of measurements.

Table 4 presents limit values for occupational hazard indicators for both classes of radiation-prone workings. The suggested values result from the developed and implemented model for the calculation of committed doses, caused by specific working conditions in underground mines.

The following factors of radiation hazardare examined:

- concentration of potential energy of alpha short-lived products of radon decay in the air of mine workings,
- dose rate of gamma radiation at a work station in mine workings,
- radium concentrations in mine waters,
- radium concentrations in sediments precipitated from mine waters.

The assessment of miners' exposure to natural radiation sources is performed by the Central Mining Institute – National Research Institute (GIG-PIB) in Katowice based on commercial agreements between the mining companies and the institute. Special methods of work organization have been introduced to prevent exceeding the dose limit of 20 mSv in radiation-prone workings in underground mines (featuring possible annual effective doses exceeding 1 mSv).

Table 5 shows the number of mines which (based on the determined excess values of particular radiation hazard factors) may feature workings classified as class A and B radiation hazard. It should be emphasized that the classification of a particular category of radiation-prone workings is made by the heads of relevant mines based on the sum of effective doses for all radiation risk factors in real working time. Therefore, the number of workings included in particular radiation hazard categories is actually lower.

LEGAL BASIS

In terms of radiation hazards, in addition to the implementing acts to the Atomic Law Act, in 2023 the following implementing acts to the Act of 9 June 2011 – Geological and Mining Law (Dz. U. of 2021, items 1420 and 2269) were in force:

- Regulation of the Minister of Energy of 23 November 2016 on requirements for underground mining operations (Dz. U. of 2017, item 1118, as amended),
- Regulation of the Minister of Environment of 29 January 2013 on natural hazards in mines (Polish Journal of Laws; Dz. U. of 2021, item 1617), which defined workings as:
    - class A – located in controlled areas within the meaning of the Atomic Law Act, in which the working environment creates the potential for the worker to be exposed to an annual effective dose exceeding 6 mSv,
    - class B – located in supervised areas within the meaning of the Atomic Law Act, in which the working environment creates the potential for exposure to an annual effective dose higher than 1 mSv, but not exceeding 6 mSv.

According to the State Mining Authority's (WUG) figures as of 31 December 2023, the total employment in hard coal mines amounted to: 75,541 persons.A

TABELA 4

Limit values of working hazard indicators for both classes of radiation-prone workings (GIG-PIB).

Hazard indicator	Class A*	Class B*
Concentration of potential energy of alpha short-lived products of radon decayA (C_α), µJ/m³	$C_\alpha > 2.5$	$0.5 < C_\alpha \leq 2.5$A
Radiation kerma rate γ (K), µGy/hA	K > 3.1A	0.6 < K ≤ 3.1A
Specific activity of radium isotopes in sediments (C_{RaO}), kBq/kgA	$C_{RaO} > 120$	$20 < C_{RaO} \leq 120$A

*The values provided correspond to doses of 1 mSv or 6 mSv, under the additional assumption of no cumulative effect from individual hazard sources and that the annual operating time is 1,800 hours.

The percentage of people working in workings belonging to particular hazard classes was also estimated. The result of this evaluation is shown in Figure 9.

The process of analysis considered the number of mines with radiation-prone workings, type of working, hazard source, and the number of mining personnel working there. The share of miners working in workings and potentially at risk from radiation was determined based on information collected by the State Mining Authority. This in particular applies to sites that may have waters and sediments with elevated radium isotope concentrations, elevated alpha potential energy concentrations, and higher than average gamma dose rates.

In 2023, the Central Mining Institute – National Research Institute carried out 3,773 measurements of the concentrations of potential alpha energy of short-lived radon decay products, 926 measurements of exposure to external gamma radiation in underground mines and 574 analyses of the radioactivity of mine waters collected in underground workings of hard coal mines and 227 analyses of the concentrations of radioactive nuclides in samples of sediment deposited from underground water.

In 2023, the measurements of individual gamma radiation doses were carried out in six hard coal mines. In the remaining mines no such measurements were carried out. Controlled persons, 147 in total, were employed mainly in the disposal of radioactive mine water sediments or worked in places where such sediments could accumulate.

The annual dose, estimated based on the results of individual dose measurements, exceeded 1 mSv, but was lower than 6 mSv (category B), in three hard coal mines.

In 2023, the dose did not exceed 6 mSv (category A) in any case. For environmental measurements, assuming an annual exposure time of 1,800 hours, a dose of 1 mSv would be exceeded at four mining facilities, but would not be higher than 6 mSv. The dose estimated in this manner would be exceeded, reaching 23.5 mSv, only in one case and at one location.

Based on the control of radiation hazards carried out, it was stated that under unfavorable conditions (lack of appropriate ventilation) a hazard may occur in almost every mine working.

The hazard assessment performed by the GIG-PIB for hard coal mines has shown that class A workings were active in one mine (hazard applies to 0.4% of the total number of employed miners), while class B workings were active in nine mines (hazard applies to 2.5% of the total number of employed miners). Mining workings with a slightly increased natural radiation background (but below the level corresponding to class B) are worked by 8.0% of the total number of employed miners, while 89.0% of miners work in non-hazardous workings.

The Silesian Centre for Environmental Radioactivity of the Central Mining Institute, has precise information about the working time in individual workings only for calculating effective committed doses. The hazard magnitude for the remaining radiation hazard factors was analyzed with certain assumptions: nominal working time of 1,800 hours and frequently reported working time in mine water galleries of 750 hours.

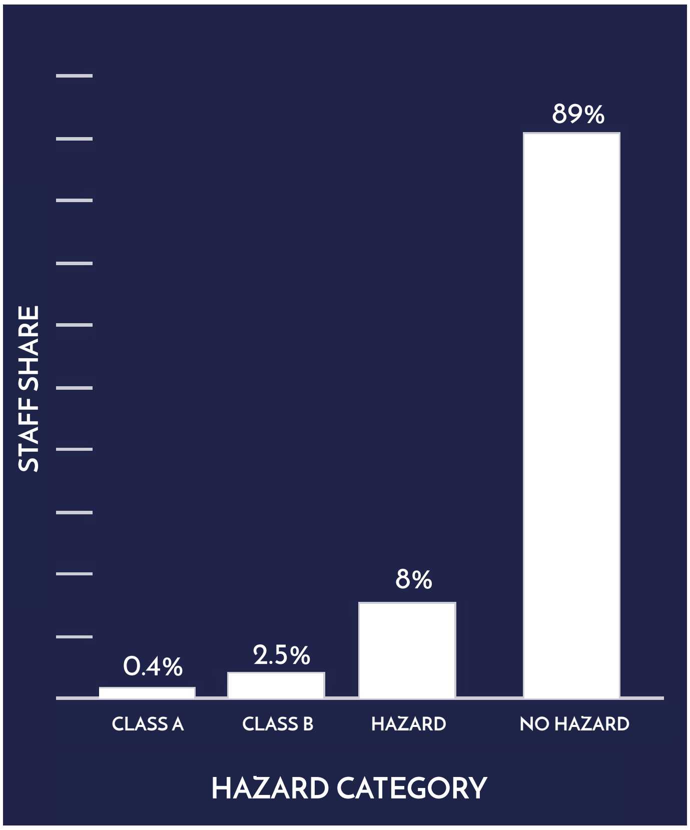
In 2023, the maximum annual additional effective dose, related to each hazard source, was:

- for short-lived radon decay products Eα = 21 mSv (assuming that the annual working time is 1,800 hours), or 3.5 mSv for an annual working time of 300 hours,
- for environmental measurements of gamma radiation Eα = 9.8 mSv (assuming that the annual working time in mine water galleries is 750 hours),

TABLE 5
Number of hard coal mines with radiation-prone workings (GIG).

Hazard class	A	B
Number of minesA	1	9
Hazard from short-lived products of radon decay	-	5
γ radiation hazard	1	4
External γ radiation (individual dosimetry)A	-	3

FIGURE 9
Percentage share of hard coal miners employed in workings classified in particular radiation hazard classes. Employment as of 31 May 2023 – 75,541 persons in total.



- and, expressed as the effective committed dose, ERa = 0.76 mSv for penetration of radium isotopes (for the declared working time equal to 213 hours per year).

Pursuant to the requirements of the Atomic Law Act, concerning controlled and supervised areas, category B (supervised area) underground workings should be reclassified to category A (controlled area) in cases where it is possible for the contamination to spread, e.g. during removal of sediments or sewage.

An analysis of the measurement results against data from recent years has shown that underground mines (with assumed working times for individual hazard factors) always have class B radiation hazard workings, which include sites where the dose exceeds 1 mSv. Workings which should be classified as class A radiation hazards, i.e. those where the dose received by miners could exceed 6 mSv are sporadic.

In 2023, the main reasons for the existence of increased effective doses for miners mainly included the exposure to external gamma radiation and to the short-lived products of radon decay.

Summary

- From the data obtained, it can be concluded that in 2023 the gamma radiation hazard was present for class A workings, and the risk of short-lived radon decay products prevailed for class B workings.
- The annual dose, estimated based on the results of individual dose measurements, exceeded 1 mSv (taking uncertainty into account), but was lower than 6 mSv (category B), in three hard coal mines. In 2023, the dose did not exceed 6 mSv (category A) in any case.

4. Granting of personal authorizations in the field of nuclear safety and radiation protection

Individuals with authorization granted by the President of the PAA are employed at positions with a given specialization in nuclear facilities and in other entities where exposure to ionizing radiation occurs. In order to obtain an authorization, a person must complete a training course for individuals applying for a radiation protection officer authorization or an authorization to hold a position of significant importance for ensuring nuclear safety and radiation protection within the scope adjusted to the type or specialization of the required authorization, and passing an exam before the examination board of the President of the PAA.

LEGAL BASIS

Article 12 Sections 3 and 10, and Article 12 Section 1 of the Act of November 29, 2000 – the Atomic Law; Regulation of the Council of Ministers of 5 March 2021 on positions of significant importance for ensuring nuclear safety and radiation protection, and Regulation of the Council of Ministers of 5 March 2021 on radiation protection officers.

The required training courses are conducted by organizational entities authorized to carry out such activities by the President of the PAA, which provide lecturers and appropriate technical facilities to carry out practical exercises based on training programmes developed for each entity and consistent with the type of training approved by the President of the PAA. In 2023, the training courses were attended by 1,006 persons in total. Table 6 specifies the information on entities that provided such courses in 2023.

Two examination boards, appointed by the President of the PAA, pursuant to Article 71 Section 1 and Article 12a Section 6 of the Atomic Law Act, were working in 2023:

- examination board competent to grant a radiation protection officer authorization (IOR),
- examination board competent to grant authorizations enabling employment for positions of significant importance for nuclear safety and radiation protection.

Forty seven exams were organized in 2023: 11 exams for a radiation protection officer authorization (IOR) and 36 for an authorization to hold a position of significant importance for ensuring nuclear safety and radiation protection, which were taken by a total of 1,223 people. Compared to 2022, the number of people taking training courses and exams was higher.

The process of issuing decisions granting the authorization in question depended on the number of submitted applications to grant such an authorization. At the same time, to ensure continuity of fulfilment of the radiation protection officer's duties, and the performance of work by persons employed on positions of significant importance for ensuring nuclear safety and radiation protection, pursuant to Article 15zzzzn of the Act of 2 March 2020 on special solutions related to the prevention, counteracting and combating COVID-19, and other infectious diseases and crisis situations caused thereby (Dz. U. of 2021, item 2095, as amended), radiation protection officer authorizations and authorizations to hold a position of significant importance for ensuring nuclear safety and radiation protection that expire within 30 days after the end of the epidemic emergency or disease outbreak remain valid for further 18 months from the date of their expiry during an epidemic emergency or an outbreak of disease.

TABLE 6

Entities providing training courses in 2023 for persons applying for radiation protection officer authorizations and for positions of significant importance for ensuring nuclear safety and radiation protection.

AUTHORIZATION TYPE	ENTITY NAME	NUMBER OF TRAINING COURSES	NUMBER OF PARTICIPANTS	NUMBER OF AUTHORIZATIONS GRANTED*
Radiation protection officer	Central Laboratory for Radiation ProtectionA	5	88	160A
	War Studies UniversityA	1	15	
Position of significant importance for ensuring nuclear safety and radiation protection	Association of Radiation Protection OfficersA	12	271	999
	Central Laboratory for Radiation ProtectionA	11	326A	
	National Oncology InstituteA (Cracow Branch)A	1	31	
	National Oncology InstituteA (Gliwice Branch)A	2	88	
	Henryk Niewodniczański Institute of Nuclear PhysicsA	1	23	
	National Centre for Nuclear Research	11	164A	

* Also includes individuals who received training prior to 2023 or were eligible to take the exam without attending the course.

INFOGRAPHICS

Number of granted radiation protection officer authorizations and authorizations to hold positions of significant importance for ensuring nuclear safety and radiation protection.

Radiation protection authorizations and authorizations to hold positions of significant importance for ensuring nuclear safety and radiation protection were granted in total to:

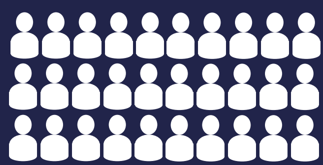
As a result of passing the examination and meeting other authorization requirements, 160 persons obtained a radiation protection officer authorization, whereas 999 persons obtained authorizations to hold positions of significant importance for ensuring nuclear safety and radiation protection, including:

980
PERSONS

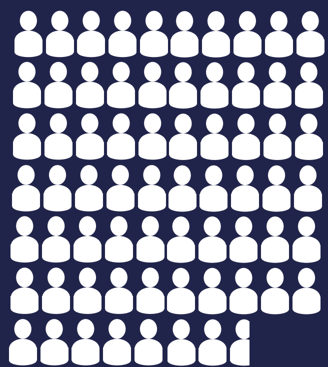
1,140
AUTHORIZATIONS

160 AUTHORIZATIONS
for a radiation protection officerA

301 AUTHORIZATIONS
for a non-medical accelerator operator



679 AUTHORIZATIONS
for a medical accelerator and teleradiotherapy equipment operator and/or radioactive source brachytherapy equipment operator



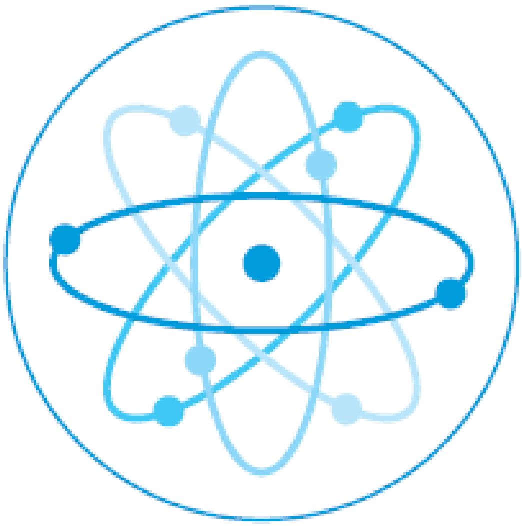
19 authorizations to hold a position of significant importance for ensuring nuclear safety and radiation protection in an organizational entity performing activities involving the construction, commissioning, operation or decommissioning of a nuclear facility were granted, including the following specializations:

research reactor operator – 1 decision, research reactor manager – 2 decisions, research reactor shift manager – 6 decisions, research reactor dosimetrist – 3 decisions, Radioactive Waste Management Plant manager – 1 decision, nuclear material accountancy specialist – 6 decisions.

9. National radiation monitoring

1. Nationwide monitoring
2. Local monitoring
3. International exchange of radiation monitoring data
4. Radiation emergencies

Poland is continuously monitoring the gamma dose rate and conducting measurements of ra dioactive isotope content in the environment and in food products. The monitoring system operates 24 hours a day, 7 days a week, and al lows for an on-going tracking of the country's radiation situation, and early detection of po tential hazards.



Monitoring is divided into two types:

- **nationwide** – allows to obtain data needed to assess the radiation situation throughout the country under normal conditions and in radiation emergencies. It serves as a basis for studying long-term changes in the radiation situation of the environment and food products;
- **local** – allows to obtain data from areas where activities are (or were) performed that may cause a local increase of the population's radiation exposure (this applies to the National Centre for Nuclear Research in Świerk, National Radioactive Waste Repository in Różan, and areas of former uranium ore mining and processing facilities in Kowary).

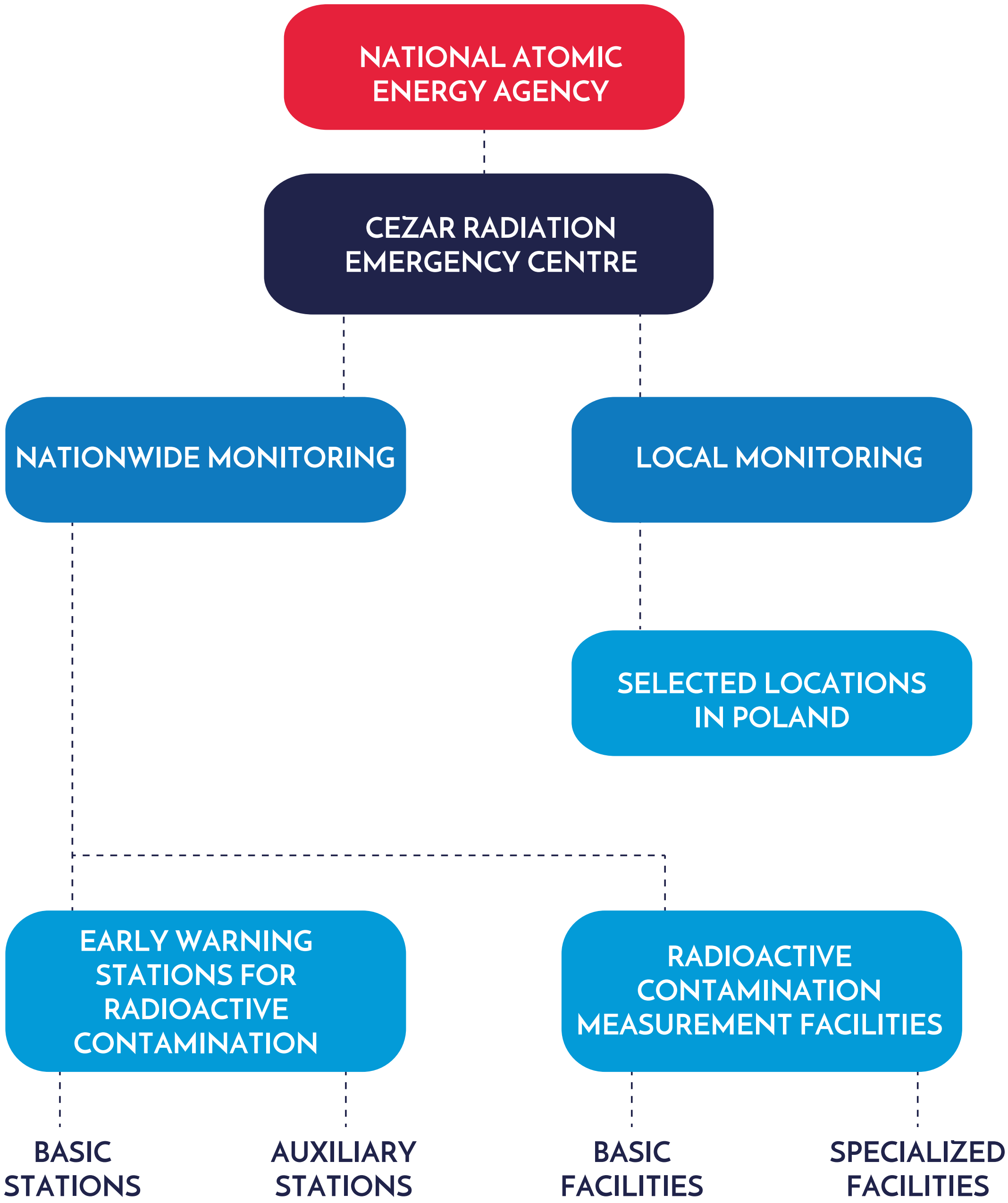
Measurements taken as part of the monitoring are conducted by:

- **measurement stations**, composing the early warning network for radioactive contamination;
- **measurement facilities,** measuring the radioactive contamination of the environment and foodstuffs;
- **services of entities operating nuclear facilities and nuclear regulatory authorities** conducting local monitoring.

The PAA's Radiation Emergency Centre (CEZAR) is responsible for coordination of the network of measurement stations and facilities.

Figure 10 presents a general diagram of this system structure.

FIGURE 10
Radiation monitoring system in Poland.



The results of radiation monitoring are the basis for the evaluation of Poland's radiation situation published regularly by the President of the PAA:

- at the website https://monitoring.paa.gov.pl/maps-portal/,
- in quarterly notices published in Monitor Polski (the Official Gazette of the Government of the Republic of Poland) – the gamma dose rate and the Cs-137 isotope content in the air and milk,
- in the annual report of the President of the PAA – a full scope of measurement results.

In the case of emergency situations, the frequency of information published is determined on an individual basis. The information presented is the basis for assessing the radiation risk for the population and for implementing intervention measures, if required by the situation.

1. Nationwide monitoring

Early warning stations for radioactive contamination

The task of the early warning stations for radioactive contamination is to enable an on-going assessment of the radiation situation in Poland as well as early detection of radioactive contamination in the event of a radiation emergency. This system consists of so-called basic and auxiliary stations (see infographics on page 74).

Basic stations:

39 PMS stations (Permanent Monitoring Stations) owned by the PAA, which perform the following continuous measurements of:

- dose rate and the gamma-ray spectrum from radioactive elements in the air and on the ground,
- basic weather parameters (precipitation and ambient temperature), which allows verifying the correctness of readings of radiometric devices in variable weather conditions.

13 ASS-500 stations owned by the Central Laboratory for Radiation Protection, which carry out the following:

- continuous collection of atmospheric aerosols on filters
- spectrometric determination of individual radioisotopes in samples taken twice a week (its frequency was increased compared to previous years due to potential hazards caused by the situation in Ukraine).

9 IMiGW stations owned by the Institute of Meteorology and Water Management, which carry out the following:

- continuous measurement of the gamma dose rate,
- continuous measurement of the alpha activity of atmospheric aerosols from natural isotopes as well as alpha and beta activity of these aerosols due to isotopes of artificial origin (7 stations),
- measurement of total beta activity in daily and monthly samples of total fallout,
- determination of Cs-137 (spectrometrically) and Sr-90 (radiochemically) content in combined monthly samples of total fallout from all 9 stations (once a month).

Auxiliary stations:

18 GM stations owned by the PAA, which carry out the following:

- continuous measurement of the gamma dose rate.

13 MON stations owned by the Ministry of Defence, which carry out the following:

- continuous measurements of the gamma dose rate, recorded automatically in the Centre of Contamination Analysis (COAS).

Since 2016, the PAA has been expanding the network of early warning stations. A total of three new stations – Hajnówka, Waliły and Sidra – were installed and commissioned in 2023. One PMS station (Zielona Góra) was undergoing modernization. Two stations installed in 2022 have also been commissioned: Krasnystaw, Horodyszcze. Further expansion of the entire station network is planned for the coming years.

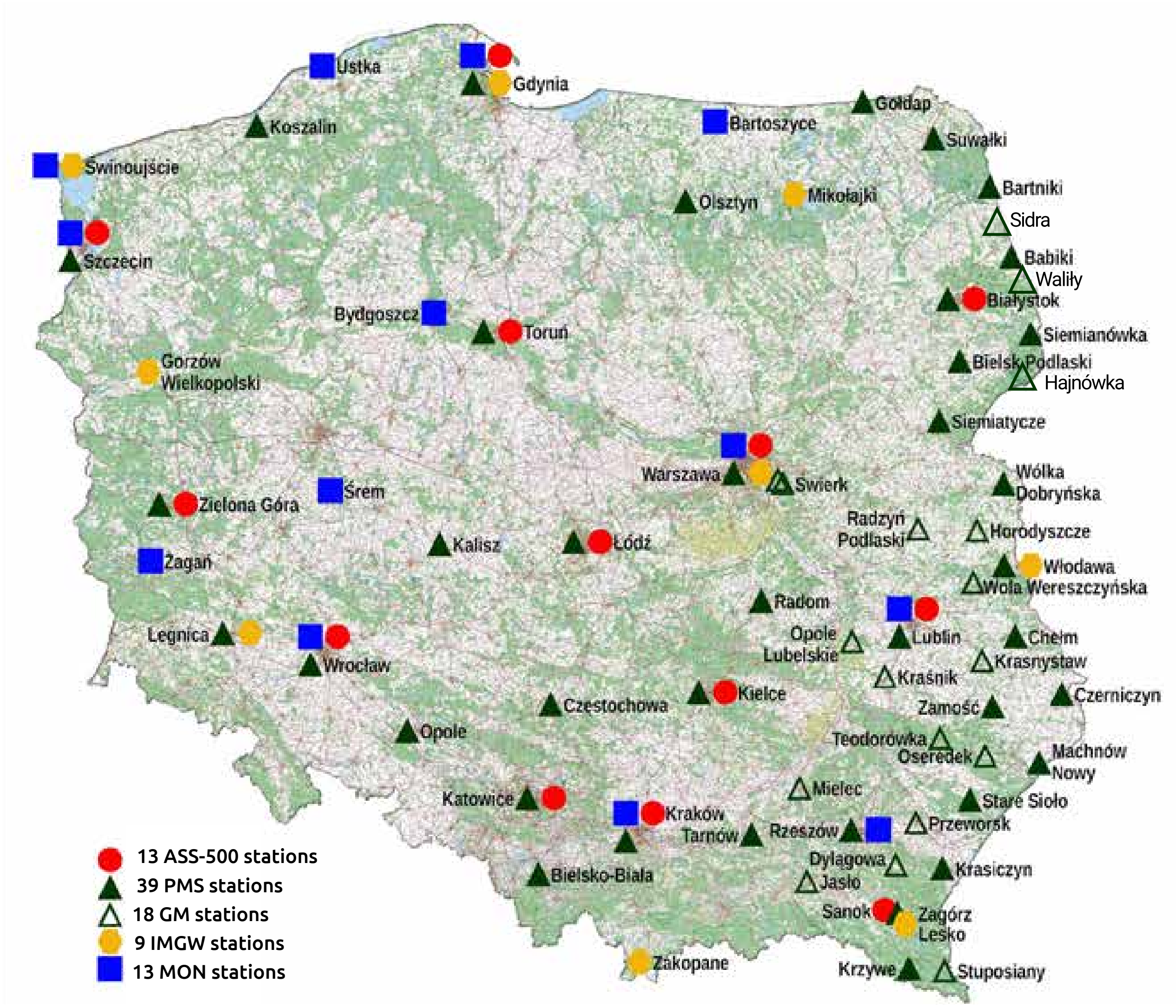
Facilities conducting measurements of radioactive contamination of the environment and foodstuffs

It is a network of facilities which conduct measurements of radioactive contamination content in samples of environmental materials, foodstuffs and animal feed, using laboratory methods. The network includes:

- 28 basic facilities, operating at Voivodeship Sanitary and Epidemiological Stations, and cooperating with subordinate stations carrying out :
  - determination of Cs-137 content in samples of milk and food products (once a quarter),
  - determination of the Cs-137 and Sr-90 content in selected agricultural and food products (twice a year on average),
- specialized facilities, which carry out more extensive contamination analyses of environmental samples.

The infographics on page 75 presents the locations of the basic measurement facilities.

Nationwide radiation monitoring



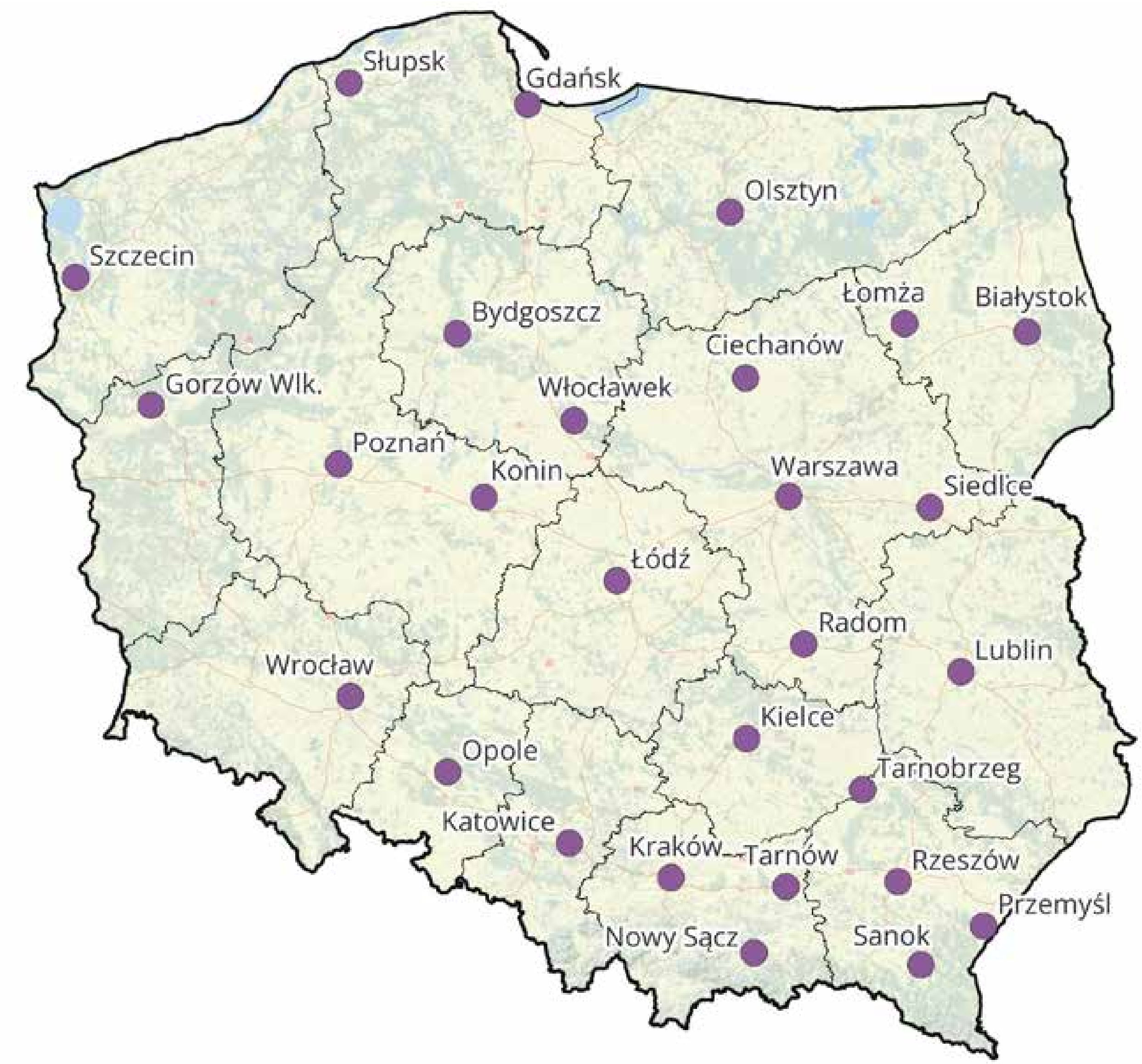
PMS stations – Permanent Monitoring System (PMS) stations provide 24/7 monitoring of ionizing radiation levels throughout the country. Through spectrometric measurements (gamma-ray spectrum), they allow detection of artificial isotopes in the environment.

ASS-500 stations – the ASS-500 high-performance atmospheric aerosol sampling stations are designed to control radioactive air contamination. The station pumps air through a special filter at an average velocity of about 500 m^3/h. Aerosols collect on this filter, after which it is subjected to a detailed laboratory analysis that can detect even trace amounts of radioisotopes present in the air. In normal circumstances, the filter is replaced once a week.

IMiGW stations – stations at the Institute of Meteorology and Water Management measure the dose rate, atmospheric aerosol activity and total fallout.

MON stations – stations of the Ministry of Defence carry out gamma radiation dose rate measurements (auxiliary stations).

Basic facilities operating at Sanitary and Epidemiological Stations – carry out measurements of radioisotopes in agricultural and food products.



The current results of the ionizing radiation dose rate monitoring may be found at:

https://monitoring.paa.gov.pl/maps-portal/ for Poland
https://remap.jrc.ec.europa.eu/Advanced.aspx for Europe

2. Local monitoring

TABLE 7

Measurements of radioactive isotopes on-site and around the National Centre for Nuclear Research in Świerk.

Measurement and sample types	Monitored isotopes	On-site	Around the facility
Air (aerosols)	γ spectrumA	●	●
Drainage waters	gross α gross β γ spectrum Sr-90 H-3	●	
Tap water	gross β	●	
River waters (Świder, Vistula)A	gross β γ spectrumA		●
Well waters	gross β γ spectrumA		●
Total falloutA	gross β γ spectrumA	●	
Process water	gross α, β gross γ Sr-90 HTO γ spectrum	●	
Sanitary wastewater	gross γ gross α γ spectrum gross β Sr-90	●	●
Wastewater from treatment plants	gross α,β gross γ Sr-90 HTO γ spectrumA	●	
Milk	γ spectrumA		●
Cereals	γ spectrumA		●
Grasses	γ spectrumA	●	●
Soils	γ spectrumA	●	●
SludgeA	Sr-90 γ spectrum	●	●

Summary

The data obtained in 2023 and in previous years confirm that there is no negative impact of the Świerk Nuclear Centre's and KSOP's operation on the natural environment, and the radioacti vity of wastewater, drainage and rainwater di scharged from the Świerk Nuclear Centre site was significantly below the applicable limits in 2023.

National Centre for Nuclear Research in Świerk

The radiation monitoring of the environment and the radiation oversight over the premises of the National Centre for Nuclear Research (NCBJ) in Otwock-Świerk is conducted by the NCBJ's Dosimetry Measurements Laboratory. It is carried out as follows:

- in online mode (measurements every 2 minutes) – covers gamma radiation fields at the gates of the facility, selected points in the area, and radioactive concentrations of media released to the environment (sanitary wastewater);
- in offline mode (according to the measurement schedule) – conducted on-site and in the Centre's surrounding area. The NCBJ's Dosimetry Measurements Laboratory measured the radioactive isotopes' content listed in Table 7.

Furthermore, gamma radiation measurements were also conducted for selected locations in and around the site using thermoluminescent dosimeters (TLD) to determine annual dose rates.

At the request of the President of the PAA, independent monitoring is carried out to include:

- measurements of natural and artificial radioisotopes in:
  - water from the nearby Świder river,
  - water from the wastewater treatment plant in Otwock,
  - well water,
  - soil,
  - grass.
- gamma dose rate measurements at five selected locations,

- artificial gamma radioisotope measurements in atmospheric aerosols,
- measurements of gaseous iodine isotopes,
- measurements of radioactive noble gases.

National Radioactive Waste Repository

The radiation monitoring of the environment within the KSOP premises and in its surroundings is conducted by the repository's operator (ZUOP) in accordance with the license requirements.

In 2023, the on-site monitoring covered the following:

- measurements of radioactive substances in tap water and ground water (measurement of beta and tritium activity),
- measurements of radioactive substances in atmospheric aerosols (spectrometric analysis of filters),
- measurements of radioactive substances in soil and grass (spectrometric analysis),
- measurements of photon background using thermoluminescent detectors.

Monitoring of the KSOP's surroundings covered the following:

- measurement of radionuclide concentrations in tap water, surface water (Narew river), ground water (water intake from piezometers and wells) and spring water for total beta and tritium activity,
- ambient dose equivalent measurements using thermoluminescent detectors (1 location) and gamma dose rate measurements (4 locations),
- measurements of radioactive substances in soil and grass,
- dose rate measurement,
- measurements of photon background using thermoluminescent detectors.

Furthermore, measurements ordered by the President of the PAA are carried out in the repository's vicinity. The range of the measurements conducted in 2023 was as follows:

- measurements of radioactive substances in spring water (measurement of gamma spectrum, measurement of total cesium (Cs-137 and Cs-134) concentrations, measurement of tritium and Sr-90 concentrations);
- measurement of radioactive substances in groundwater (piezometers; measurement of total beta activity, measurement of potassium K-40 and tritium concentrations);
- measurement of gamma radioisotope concentrations in soil and grass;
- measurement of artificial gamma radioisotope in atmospheric aerosols;
- measurement of the gamma dose rate at five fixed inspection locations.

The most important measurement results and the data illustrating the radiation situation on-site and in the surroundings of the National Centre for Nuclear Research in Świerk and KSOP are presented in Chapter 10 “Assessment of the radiation situation in the country”.

Former uranium ore mining and processing sites

The “Radiation Monitoring Programme for Areas Degraded by Mining and Processing of Uranium Ores” has been carried out in former uranium ore mining sites since 1998. The following works were performed under this programme in 2023:

- measurements of alpha and beta radioisotope content in drinking water (public drinking water intakes) in the area of the Union of Karkonosze Municipalities and the city of Jelenia Góra, and in surface and ground waters (outflows from underground workings);
- determination of radon concentrations in water from public intakes, in water supplying residential premises, and in surface and ground waters (outflows from underground workings).

The results of the measurements are presented in Chapter 10 “Assessment of the radiation situation in the country”.

3. International exchange of radiation monitoring data

The National Atomic Energy Agency takes part in the international exchange of radiation monitoring data. The PAA's Radiation Emergency Centre prepares and publishes the data on radiation monitoring carried out in Poland, and also receives and analyses the data on the radiation situation in other countries, within the framework of implementing the provisions of Article 36 of the EURATOM Treaty.

Exchange of data from early warning stations for radioactive contamination in the EURDEP system as part of the European Union

The European Radiological Data Exchange Platform (EURDEP) system involves the automatic exchange of data from early warning stations for radioactive contamination. The main publications in the system include the results of gamma dose rate measurements. Many countries also publish measurements of atmospheric aerosol activity and other measurements relevant to assessing the radiation situation, which are available in the automatic mode. The current radiation situation in Europe is published on an on-going basis on the EURDEP map.

Poland transmits the following measurement results on an hourly basis:

- gamma does rate (PMS and IMiGW stations),
- total alpha and beta activity from artificial radionuclides atmospheric aerosols (IMiGW stations).

Exchange of data from early warning stations for radioactive contamination in the Council of the Baltic States' system

The scope and format of data provided by Poland as part of the exchange within the Council of the Baltic Sea States (CBSS), i.e. the regional exchange, is the same as in the European Union's EURDEP system. Due to the limitation of the Council's activities in the area of nuclear safety and radiation protection, it is considered to stop the measurement data exchange within the CBSS and to focus primarily on the data exchange within the European Union.

4. Radiation emergencies

Principles of proceeding

A radiation emergency, as defined in the Atomic Law Act, is an abnormal situation or event associated with a source of ionizing radiation requiring urgent intervention to mitigate serious adverse effects on human health, safety, quality of life, property or the environment or to reduce the risks that could lead to such consequences. Radiation emergencies are classified by the extent of the effects:

- limited to the area of organizational entity ('on-site' emergencies),
- extending beyond the organizational entity ('regional' emergencies),
- extending beyond the territory of the voivodeship or with cross-border effects ('national' emergencies).

The National Atomic Energy Agency plays an informative and consultative role in the assessment of dose and contamination levels and other expertise and activities performed at the scene of an emergency. In addition, it disseminates information on radiation hazards to communities affected by the incident and to international organizations and neighboring countries. The above procedure is also applied when detecting illicit trafficking in radioactive substances (including attempts to illegally transport them across the state border).

INFOGRAPHICS

Classification of radiation emergencies.

On-site emergencies

The remedial actions to eliminate the consequences of the emergency are managed by the head of the organizational entity according to the on-site emergency response plan.

Regional emergencies

The remedial actions to eliminate the consequences of the emergency are managed by the voivode in cooperation with the state voivodeship sanitary inspector according to the voivodeship emergency response plan.

National emergencies

The remedial actions to eliminate the consequences of the emergency are managed by the minister in charge of internal affairs with the assistance of the President of the PAA.

The President of the PAA manages a dosimetry team which can perform on-site measurements of the dose rate and of radioactive contamination, identify contaminants and abandoned radioactive substances, and secure the area around the scene of the emergency.

The PAA's Radiation Emergency Centre (CEZAR) fulfils a number of functions, such as: emergency service of the President of the PAA, National Contact Point (NPC) for the International Atomic Energy Agency (USIE system – Unified System for Information Exchange in Incidents and Emergencies), for the European Commission (ECURIE system – European Community Urgent Radiological Information Exchange), for the Council of the Baltic Sea States system, NATO and countries connected with Poland by bilateral agreements, including in the field of notification and cooperation in case of radiation emergencies – is on duty 7 days a week, 24 hours a day. The Centre carries out assessments of the country's radiation situation on a regular basis, and, in the case of a radiation emergency, uses computer decision support systems (RODOS and RASCAL).

Radiation emergencies in Poland

The Dosimetry Team of the President of the PAA was dispatched twice to support the activities of local services in situations that are not radiation emergencies within the meaning of the Atomic Law Act. The trips concerned assistance in taking radiometric measurements in a public place and at a maritime border crossing.

On-duty CEZAR officers provided 778 consultations (not related to the elimination of radiation emergencies and their consequences), and most of them (713 cases) were addressed to Border Guards, in connection with the detection of elevated radiation levels. The consultations concerned transit transport, exports or imports for domestic customers of ceramic materials, minerals, charcoal, chamotte bricks, propane-butane, electronic and mechanical components, chemicals, radioactive sources (416 cases in total), as well as border crossing by persons subject to diagnostics or treatment with the use of radiopharmaceutical products (297 cases). Furthermore, on-duty CEZAR officers provided 65 consultations to other institutions or individuals.

On-duty CEZAR officers also received 9,824 notifications (e.g. reports on the radiometric inspections, messages provided by the official information exchange channels at the international level).

No radiation emergency was registered in Poland in 2023.

No radiation emergency registered abroad in 2023 caused a threat to people and the environment in Poland.

Radiation emergencies outside the country

The National Contact Point has not received any notifications of emergencies classified as level 3 or higher on the INES scale through the USIE Radiation Emergency Information Exchange System.

However, 27 reports on incidents related to ionizing radiation sources or nuclear facilities, mainly unplanned exposures of staff to ionizing radiation, were received. Moreover, the National Contact Point received several dozen notifications of an organizational and technical nature or notifications related to international exercises.

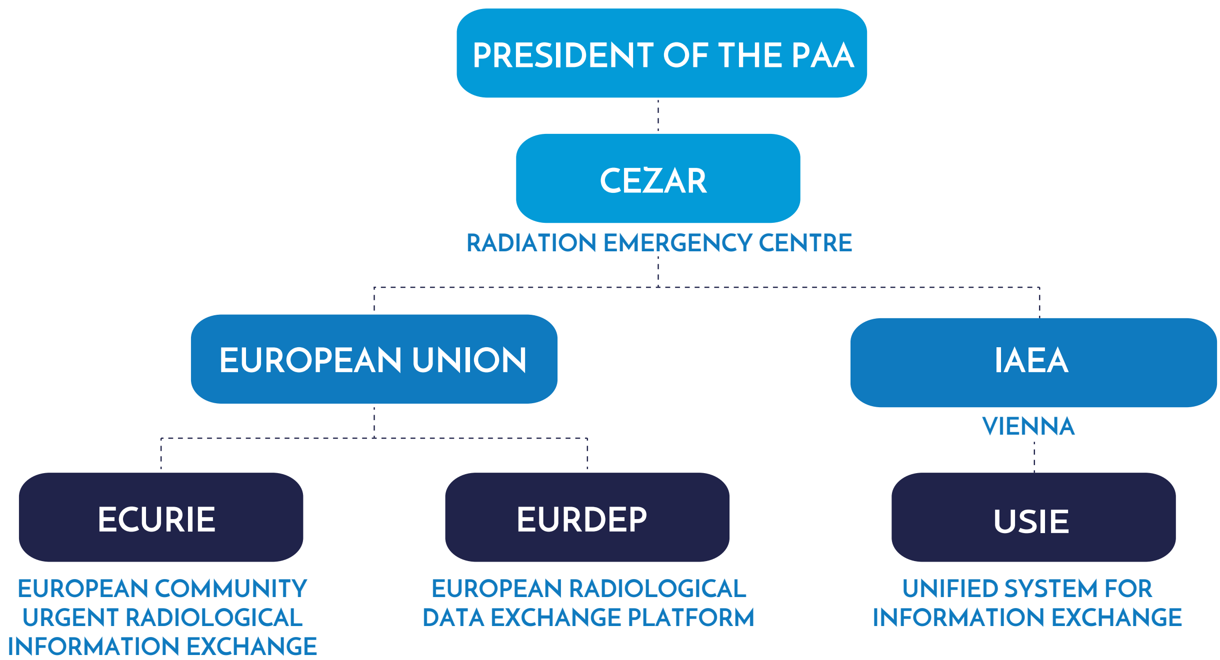
Summary

In 2023, no radiation emergency was registered in the country, while the emergencies registered worldwide had no impact on the health and life of the population or the environment in Poland.

Situations which are not radiation emergencies did not pose a threat to the health or life of the population or to the environment. These were incidents concerning materials demonstrating increased ionizing radiation dose rates detected by dosimetric portal monitors operated by the Border Guard or located at the entrances to enterprises dealing with metal trade or municipal waste management.

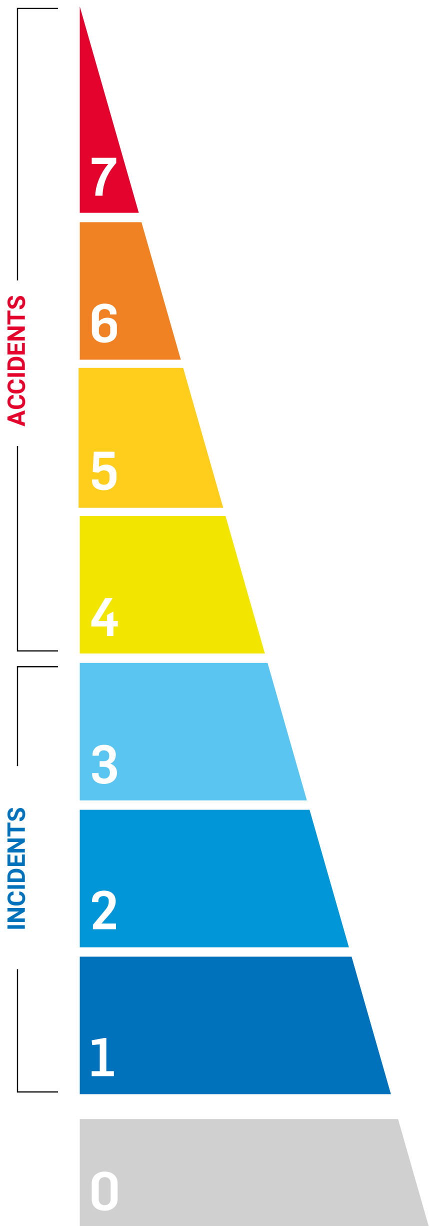
The National Contact Point, operating at the Radiation Emergency Centre, was working without disturbances, 24 hours a day, 7 days a week.

INTERNATIONAL NOTIFICATION AND INFORMATION EXCHANGE SYSTEMS



INFOGRAPHICS

INES scale.



INES scale

The International Nuclear and Radiological Event Scale is used to illustrate the impact of events related to ionizing radiation on safety. Events are classified on levels from 0 (no effect on safety, below the scale) to 7 (most serious nuclear accident). It was introduced for use in 1990 and it is updated and developed on a regular basis. The scale is widely used by member states of the International Atomic Energy Agency (IAEA) and the OECD Nuclear Energy Agency (OECD NEA).

7 MAJOR ACCIDENT

Fukushima, Japan 2011
Release of large amounts of radioactive substances into the environment
Chernobyl, USSR 1986
Release of large amounts of radioactive substances into the environment

6 SEVERE CRISIS

Kyshtym, USSR 1957
Release of significant amounts of radioactive substances into the environment after the explosion of a high-level radioactive waste tank

5 ACCIDENT WITH WIDER CONSEQUENCES

Goiania, Brasil 1987
Death of 4 people due to contact with an abandoned high-level radioactive source
EJ Three Mile Island, USA 1979
Severe damage to the reactor core

4 ACCIDENT WITH LOCAL CONSEQUENCES

Stamboliyski, Bulgaria 2011
Exposure of 4 workers of the radiation plant to high doses of ionizing radiation
New Delhi, India 2010
Irradiation of a person due to contact with a radioactive substance in scrap

3 SERIOUS INCIDENT

Fleurus, Belgium 2008
Release of radioactive iodine into the environment from a production plant
Lima, Peru 2012
Irradiation of an industrial radiography worker

2 INCIDENT

Laguna-Verde-2 NPP, Mexico 2011
Automatic reactor shutdown due to the increased pressure in the reactor pressure vessel
Paris, France 2013
Exceeded annual radiation dose limit

1 ANOMALY

Rajasthan-5 NPP, India 2012
Exceeded usable dose limits by 2 nuclear power plant workers
Olkiluoto-1 NPP, Finland 2008
Quick stoppage of main circulation pumps with simultaneous disconnection of the flywheel at reactor shutdown

0 BELOW SCALE

No effect on radiation safety

10. Assessment of the radiation situation in Poland

1. Radioactivity in the environment
2. Radioactivity of basic foodstuffs and food products

1. Radioactivity in the environment

Levels of gamma radiation in Poland and in the vicinity of the National Centre for Nuclear Research and the National Radioactive Waste Repository in 2023 did not differ from the previous year's level.

Concentrations of natural radionuclides in the environment have remained at similar levels over the past several years. On the other hand, the concentrations of artificial isotopes (mainly Cs-137), with sources in the Chernobyl accident and earlier nuclear weapon tests, are gradually decreasing, in accordance with the natural process of radioactive decay. The detected radionuclide content does not pose a radiation hazard to people and the environment in Poland.

Gamma dose rate

Levels of gamma radiation in Poland and in the vicinity of the Nuclear Centre in Świerk and the KSOP in 2023 did not differ from the previous year's level. The variation in gamma dose rate (even for the same location) is due to the local geological conditions that determine the level of terrestrial radiation.

The ambient dose equivalent rates, including cosmic radiation and radiation from radionuclides contained in the ground (terrestrial component), are shown in Table 8 and Figure 11.
The daily average values ranged from 39 to 170 nSv/h, while the annual average from all stations was 74 nSv/h.

The values of ambient dose equivalent rate in the area of the National Centre for Nuclear Research in Świerk ranged from 65 to 91 nSv/h (79 nSv/h on average), and in the area of the KSOP – from 63 to 107 nSv/h (86 nSv/h on average).
The values do not substantially differ from the dose rate measurement results obtained in other regions of the country.

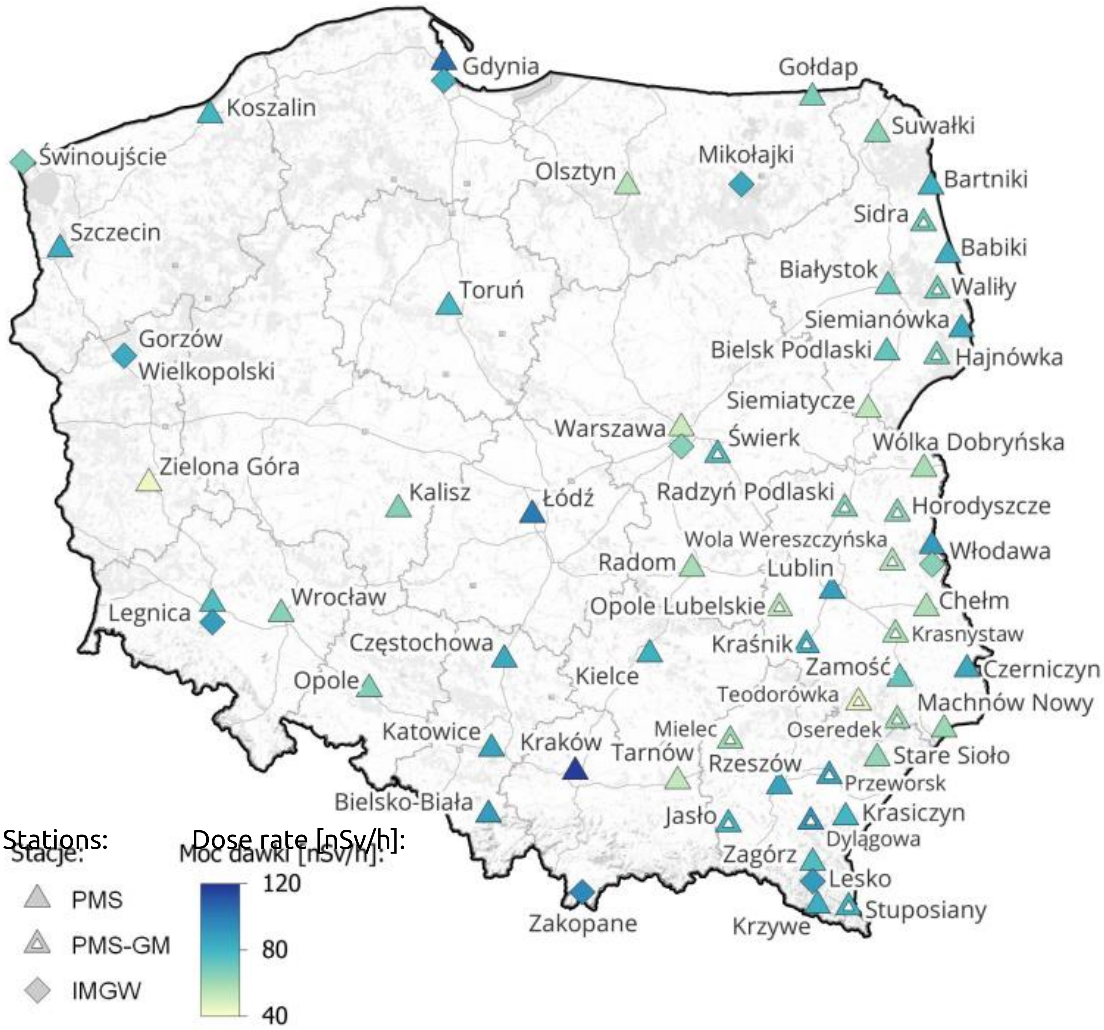
TABLE 8

Dose rates obtained from early warning stations for radioactive contamination in 2023.
(PAA).

Stations*	Place (location)	Range of average daily dose rate [nSv/h]	Annual average [nSv/h]
PMSA	Babiki	71-105	83
	Bartniki	74-105	82
	BiałystokA	63-95	72
	Bielsk PodlaskiA	60-90	72
	Bielsko Biała	72-114	89
	ChełmA	47-77	57
	CzerniczynA	65-106	85
	CzęstochowaA	78-97	84
	GdyniaA	100-118	104
	GołdapA	59-83	67
	Kalisz**A	59-88	65
	KatowiceA	77-100	86
	Kielce	61-100	81
	KoszalinA	70-97	80
	KrakówA	112-132	117
	KrasiczynA	64-104	80
	Krzywe***A	58-108	82
	Legnica	67-98	76
	ŁódźA	83-97	89
	Lublin	95-110	101
	Machnów NowyA	50-94	61
	OlsztynA	47-146	55
	OpoleA	57-98	66
	RadomA	52-70	59
	RzeszówA	71-111	86
	SanokA	64-107	85
	SiemianówkaA	48-78	53
	SiemiatyczeA	58-80	63
	Stare SiołoA	50-92	64
	SuwałkiA	72-95	82
	Szczecin	47-69	53
	TarnówA	63-99	79
	ToruńA	43-77	51
	WarszawaA	86-104	90
	WłodawaA	51-75	58
	Wólka DobryńskaA	57-84	65
	WrocławA	67-100	77
	Zamość	58-92	72
	Zielona GóraA	39-91	44
IMIGW	GdyniaA	77-97	81
	GorzówA	78-93	84
	Legnica	78-108	89
	LeskoA	65-115	90
	MikołajkiA	75-106	85
	ŚwinoujścieA	64-82	68
	WarszawaA	55-79	65
	WłodawaA	57-80	65
	ZakopaneA	62-117	96

Stations*	Place (location)	Range of average daily dose rate [nSv/h]	Annual average [nSv/h]
PMS-GM	DylągowaA	65-120	92
	HajnówkaA	63-86	69
	HorodyszczeA	57-83	64
	JasłoA	68-104	80
	KraśnikA	51-70	58
	KrasnystawA	70-96	82
	MielecA	54-80	61
	Opole LubelskieA	50-67	54
	OseredekA	51-82	60
	PrzeworskA	71-102	87
	Radzyń PodlaskiA	59-81	66
	SidraA	63-90	70
	StuposianyA	63-102	81
	ŚwierkA	68-170	76
	TeodorówkaA	40-67	46
	WaliłyA	62-85	68
	Wola WereszczyńskaA	50-69	56

FIGURE 11
Annual average dose rates obtained from individual early warning stations for radioactive contamination in Poland in 2023 (PAA).



Atmospheric aerosols

In 2023, the artificial radioactivity of ground-level aerosols, determined from the measurements taken at 13 early warning stations for radioactive contamination (ASS-500), has indicated the presence of trace amounts of Cs-137 radionuclide, as in the last few years. Its average concentrations during that period ranged from less than 0.06 to 7.92 μBq/m^3 (0.42 μBq/m^3 on average). Average concentrations of I-131 radionuclide in this period ranged from less than 0.07 to less than 3.41 μBq/m^3 (0.59 μBq/m^3 on average), whereas the average concentrations of naturally occurring radionuclide Be-7 amounted to a few thousand μBq/m^3.

Figures 12 and 13 present the average annual concentrations of Cs-137 in atmospheric aerosols in the years 2011-2023 for the entire country and Warsaw, respectively.

Measurements of the radioactive isotope concentrations in the air in a weekly cycle were also carried out at the National Centre for Nuclear Research in Świerk, in its area (Wólka Mlądzka), and at the KSOP. The results of the measurements at the NCBJ in 2023 are presented in Table 9, while the average annual concentrations of the Cs-137 isotope in the air at the KSOP were below the detection limit.

FIGURE 12
Average annual concentration of Cs-137 in aerosols in Poland in 2011-2023 (μBq/m^3); (PAA, CLOR data).

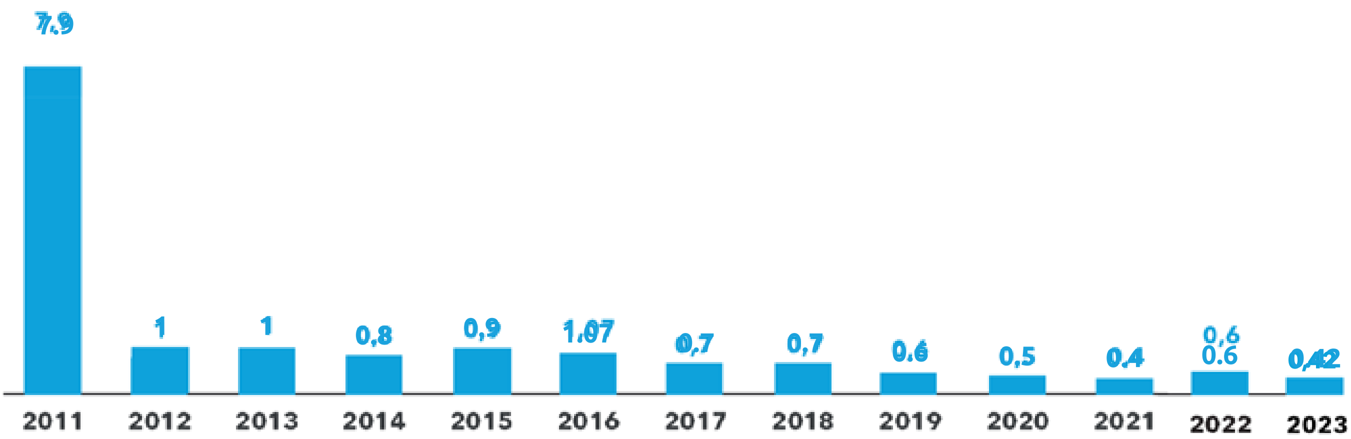


FIGURE 13
Average annual concentration of Cs-137 in aerosols in Warsaw in 2011-2023 (μBq/m^3) (PAA, CLOR data).

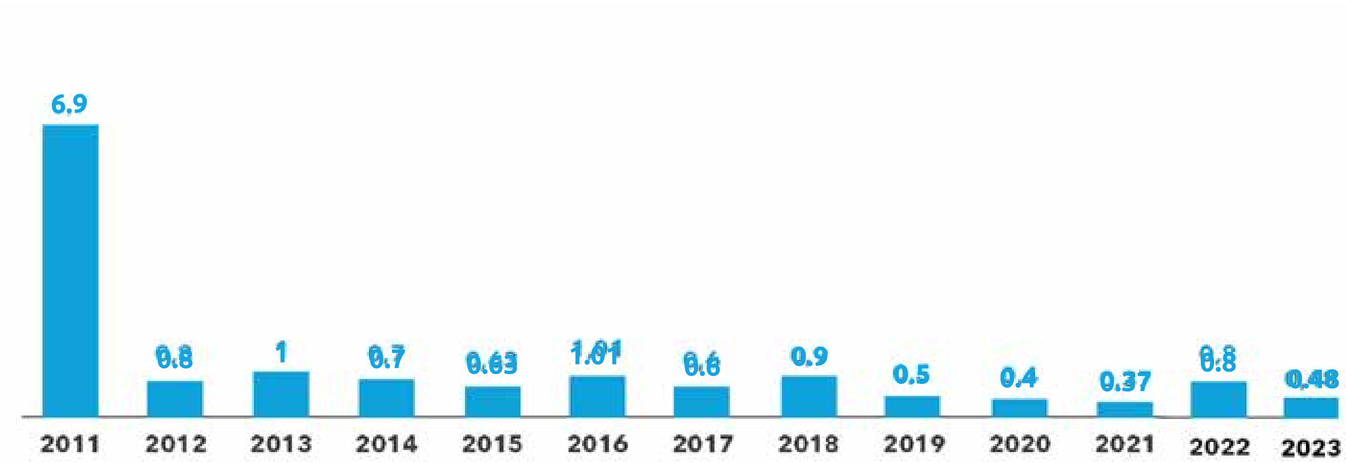


TABLE 9

Summary of weekly measurement results of radionuclide concentrations in atmospheric aerosols at the Centre in Świerk site and its surroundings in 2023 (μBq/m³; PAA, CLOR data).

	ON-SITE		WÓLKA MŁODZKA	
	I-131 [μBq/m³]	Cs-137 [μBq/m³]	I-131 [μBq/m³]	Cs-137 [μBq/m³]
Average	35.0	1.30	18.0	1.50
Minimum	2.13	0.69	0.69	0.56
Maximum	319.0	3.1	146.0	4.15

TABELA 10

Average Cs-137 and Sr-90 activity and average beta activity in the total annual fallout in Poland in 2008-2023 (Chief Inspectorate of Environmental Protection (GIOŚ), measurements taken by IMiGW).

YEAR	Activity [Bq/m²]		Beta activity [kBq/m²]
	Cs-137	Sr-90	
2008	0.5	0.1	0.3
2009	0.5	0.1	0.33
2010	0.4	0.1	0.33
2011	1.1	0.2	0.34
2012	0.3	0.1	0.32
2013	0.3	0.2	0.31
2014	0.5	0.1	0.32
2015	0.6	0.1	0.31
2016	0.5	0.1	0.31
2017	0.3	0.2	0.32
2018	0.4	0.1	0.33
2019	0.3	0.2	0.31
2020	0.2	0.1	0.31
2021	0.3	0.1	0.31
2022	0.4	0.1	0.32
2023	0.2	0.1	0.33

Total fallout

Total fallout is the dust contaminated with isotopes of radioactive elements that is deposited on the earth's surface due to the gravitational field and precipitation.

Results of measurements presented in Table 10 show that the contents of artificial radionuclides Sr-90 and Cs-137 in the annual total fallout in 2023 were the same as observed in the previous years.

TABLE 11

Concentrations of Cs-137 and Sr-90 radionuclides in waters of Polish rivers and lakes in 2023 [mBq/dm³] (GIOŚ, measurements taken by CLOR).

		Wisła, Bug and Narew	Odra and Warta	Lakes
Sr-90	range	1.90-3.67	2.31-6.38	1.12-8.47
	average	2.62	2.72	2.70
Cs-137	range	0.62-5.03	1.42-4.97	0.68-11.97
	average	2.22	2.80	3.89

Waters and bottom sediments

The radioactivity of waters and bottom sediments was defined based on designations of selected artificial and natural radionuclides in samples collected at fixed sampling points.

Open waters

Concentrations of cesium Cs-137 and strontium Sr-90 remain at the previous year's levels and at levels observed in other European countries.

In 2023, the radioactive concentrations in surface waters of the southern part of the Baltic Sea were determined for Cs-137, Ra-226 and K-40 isotopes (PAA, measurements taken by CLOR). The average concentrations of the listed isotopes were as follows: for Cs-137 – 15.0 Bq/m^3 – surface waters – and 12.5 Bq/m^3 – bottom waters, for Ra-226 – 2.60 Bq/m^3 – surface waters – and 3.75 Bq/m^3 – bottom waters – and several thousand Bq/m^3 on average for K-40, and do not differ from the results from previous years.

The last radionuclide concentration measurement cycle in river and lake water samples was carried out by GIOŚ in 2023. Table 11 presents the measurement results.

The total Cs-134 and Cs-137 content in open water samples, taken in 2023 from sampling points located near the National Centre for Nuclear Research in Świerk was as follows:

- Świder river 1.57 mBq/dm^3 (upstream from the Centre) and 2.68 mBq/dm^3 (downstream from the Centre),
- waters from the wastewater treatment plant in Otwock discharged to the Vistula River: 6.48 Bq/dm^3.

The average tritium concentration in open water samples taken in 2023 from sampling points located near the National Centre for Nuclear Research in Świerk was as follows:

- Świder river 1.5 mBq/dm^3 (upstream from the Centre) and 3.2 mBq/dm^3 (downstream from the Centre),
- waters from the wastewater treatment plant in Otwock discharged to the Vistula River: 1.3 Bq/dm^3.

Ground waters – local monitoring

The results of radioisotope concentration measurements in waters taken as part of local monitoring in 2023 do not substantially differ from the previous years' results.

National Centre for Nuclear Research in Świerk

The average concentrations of radioactive cesium and strontium isotopes in well waters of the farms situated around the Centre in Świerk amounted to 4.66 mBq/dm^3 for cesium isotopes (Cs-134, Cs-137) and 15.21 mBq/dm^3 for Sr-90. The concentrations of tritium (H-3) were also designated and averaged 1.65 mBq/dm^3.

National Radioactive Waste Repository (KSOP) in Różan

The concentrations of radioisotopes Cs-137 and Cs-134 in spring waters in the vicinity of the National Radioactive Waste Repository in Różan averaged 6.62 mBq/dm^3.

In 2023, tritium concentrations were also investigated in ground waters in the vicinity of the KSOP in Różan, and averaged less than 1.37 Bq/dm^3.

Former uranium ore mining and processing sites

The recommendations of the World Health Organization (WHO) – Guidelines for drinking water quality, Vol. 1 Recommendations. Geneva, 1993 (item 4.1.3, p. 115), introducing the so-called reference levels for drinking water, were used to interpret the measurement results. They state that, in principle, the total alpha activity of drinking water should not exceed 100 mBq/dm^3, while the beta activity should not exceed 1,000 mBq/dm^3. It should be noted that these levels are indicative only – if exceeded, it is recommended to identify the radionuclides.

Alpha and beta activity measurements were conducted for 28 water samples in former uranium ore mining sites with the following results:

- public intakes of drinking water:
  - total alpha activity – from 2.84 to 48.1 mBq/dm^3,
  - total beta activity – from 31.2 to 213.0 mBq/dm^3.
- waters flowing from mine workings (mine adits, rivers, ponds, springs, wells):
  - total alpha activity – from 12.4 to 571.3 mBq/dm^3,
  - total beta activity – from 50.3 to 3185.2 mBq/dm^3.

The radon concentrations in water from public intakes and domestic wells in the localities comprised by the Union of Karkonosze Municipalities ranged from 3.9 to 212.9 Bq/dm^3. The radon concentrations in waters flowing form mining facilities, which featured the highest total alpha and beta radioactivity, had the highest value of 254.5 Bq/dm^3 in water flowing from mine adit no. 17 of the "Pogórze" mine.

Requirements applicable to the quality of water intended for human consumption, in terms of radioactive substances content, 88 National Atomic Energy Agency were specified in the Regulation of the Minister of Health of 7 December 2017 on the quality of water intended for human consumption (Dz. U., item 2294). The parametric value, established as 100 Bq/l of radon activity concentrations, determines the content of radioactive substances in water above which it is necessary to assess whether the presence of radioactive substances poses a risk to human health that requires action and, if necessary, to take remedial action to improve the water quality to a level compatible with the requirements for the protection of human health against radiation.

Bottom sediments

The last measurement cycle of radionuclide concentrations in samples of dry matter of bottom sediments in rivers and lakes was completed in 2022. Radionuclide concentrations in samples of dry matter of river and lake bottom sediments in 2022 and of the Baltic Sea in 2023 were at levels observed in previous years. Tables 12 and 13 present the measurement results.

TABLE 12

Concentrations of cesium and plutonium radionuclides in bottom sediments of Polish rivers and lakes in 2023 [Bq/kg of dry mass] (GIOŚ, measurements taken by CLOR).

		Wisła, Bug and Narew	Odra and Warta	Lakes
PU-239, 240	range	0.004-0.065	0.003-0.059	0.004-0.017
	average	0.018	0.003	0.009
Cs-137	range	0.32-6.01	0.58-8.05	1.28-6.47
	average	2.28	2.12	2.84

Soil

The monitoring of radioactive isotope concentrations in the soil is conducted in a 2-year measurement cycle.
The last completed measurement cycle was carried out between 2022 and 2024.

The number of sampling points for measurements changed in 2022. Sampling points (144 points) are located in seven voivodeships (Dolnośląskie, Lubelskie, Małopolskie, Mazowieckie, Opolskie, Śląskie and Świętokrzyskie).

TABLE 13

Concentrations of artificial radionuclides Cs-137, Pu-238, Pu-239, 240 and Sr-90, and natural radionuclide K-40 in the bottom sediments of the southern part of the Baltic Sea in 2023 (PAA, measurements taken by CLOR).

Isotope		Layer thickness 0-19 cm
Cs-137	kBq/m^2	2.12
Pu-238A	Bq/m^2	2.15
Pu-239, 240A	Bq/m^2	95.30
K-40A	kBq/m^2	39.21
Sr-90A	Bq/m^2	167.83A

The samples were taken from the meteorological gardens of stations and posts of the Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB).

A total of 149 samples were collected in 2022, including 144 soil samples from the 10 cm layer and 5 samples, at selected points, from the 25 cm layer, to determine the concentrations of Cs-137 and natural radionuclides: Ra-226, Ac-228, K-40.

Average Cs-137, Cs-134 concentrations in soil

The tests carried out indicate that the average concentrations of the Cs-137 isotope in the surface soil layer in Poland range from <0.20 kBq/m^2 to 16.63 kBq/m^2 and are 1.96 kBq/m^2 on average.

In comparison, the average surface contamination in Świerk and the KSOP in Różan in 2023 was 4.53 Bq/kg and 12.26 Bq/kg, respectively. The deposition of the Cs-134 isotope in soil samples varied during the monitoring period in accordance with its half-life and this isotope is not present in measurable amounts in Polish soils.

The average Cs-137 isotope deposition by voivodeship is shown in Table 14, whereas the average concentrations of natural radioisotopes in soil in 2022 – in Table 15.

The average Cs-137 deposition in soil in Poland for 1988-2022 is given in Figure 13.

TABLE 14

Average, minimum and maximum Cs-137 radioisotope concentrations in soil samples taken in each voivodeship and in Poland for soil samples taken in autumn 2022. (GIOŚ, measurements taken by CLOR).

Voivodeship	Cs-137 concentration [kBq/m²]		
	Average value	Range	
		Minimum	Maximum
dolnośląskie	2.33 ± 0.77	0.44	16.63
lubelskie	0.95 ± 0.23	0.20	3.55
małopolskie	2.11 ± 0.09	0.29	9.64
mazowieckie	1.58 ± 0.39	0.25	7.09
opolskie	3.58 ± 0.78	0.33	7.61
śląskie	1.91 ± 0.27	0.51	4.95
świętokrzyskie	1.13 ± 0.18	0.39	2.33
Polska	1.96 ± 0.19	0.20	16.63

FIGURE 14

Average Cs-137 deposition in Poland for 1988-2022 (PAA, based on data provided by GIOŚ, measurements taken by CLOR).

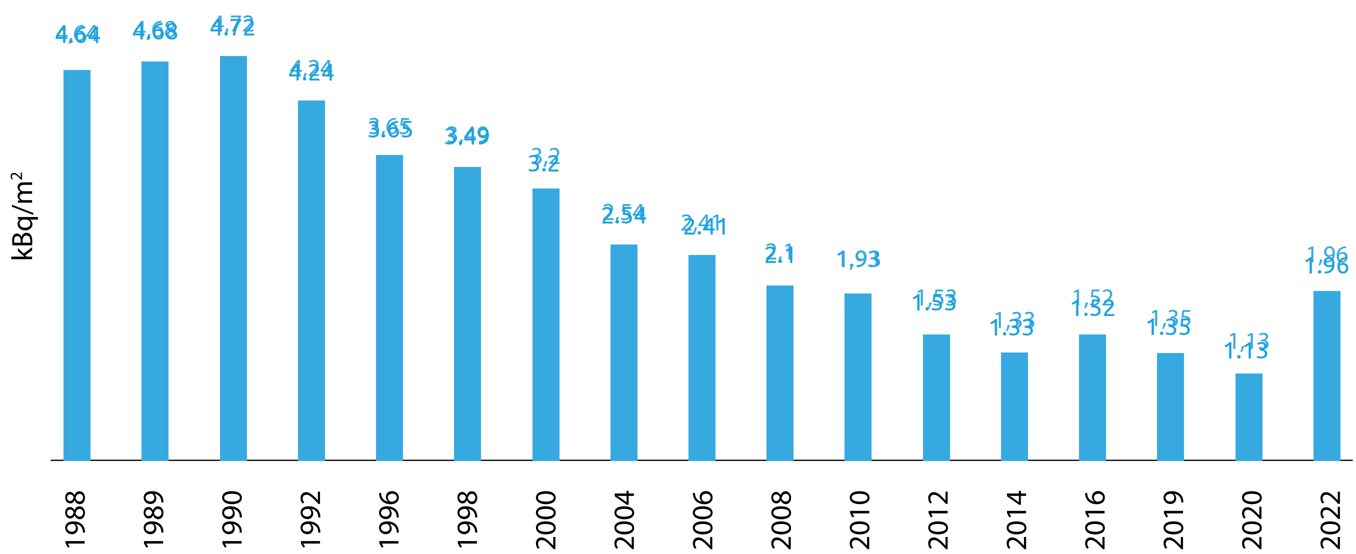


TABLE 15
Average concentrations of natural radioisotopes in soil in 2022 (Bq/kg; GIOŚ, measurements taken by CLOR).

	Ra-226	Ac-228	K-40
RANGE	6.4 - 154.7	6.0 - 129.2	138 - 1046
AVERAGE	31.0	30.5	497

TABLE 16
Average, minimum and maximum natural isotope concentrations in soil samples taken in each voivodeship in autumn 2022. (GIOŚ, measurements taken by CLOR).

VOIVODESHIP	Concentrations [Bq/kg]								
	Ac-228			K-40			Ra-226		
	AVERAGE	MIN.	MAX.	AVERAGE	MIN.	MAX	AVERAGE	MIN.	MAX
dolnośląskie	40.6 ± 5.0	8.7	129.2	609 ± 46	229	1046	45.7 ± 6.7	8.9	154.7
lubelskie	21.5 ± 2.5	11.4	38.3	413 ± 36	230	648	21.7 ± 2.1	13.0	36.3
małopolskie	37.5 ± 1.3	11.5	52.2	572 ± 22	271	996	36.7 ± 15	10.2	60.6
mazowieckie	15.9 ± 1.5	6.9	30.3	382 ± 29	194	670	15.9 ± 1.1	6.4	6.4
opolskie	29.0 ± 2.9	14.4	42.0	529 ± 44	284	757	28.1 ± 2.6	15.2	40.7
śląskie	28.5 ± 2.7	6.2	47.3	418 ± 32	145	611	26.3 ± 2.1	8.5	44.4
świętokrzyskie	21.8 ± 2.8	8.4	37.4	362 ± 50	138	612	23.5 ± 2.1	14.5	35.3
Polska	30.5 ± 1.3	6.0	129.2	497 ± 15	138	1046	31.0 ± 1.6	4.0	126.3

2. Radioactivity of basic foodstuffs and food products

Measurements of radioactive contamination in agricultural and food products are taken by sanitary and epidemiological stations.

The activity of radioisotopes in foodstuffs and food products should be compared to the values laid down in the Regulation of the Council of Ministers of 27 April 2004 on the intervention levels for different types of intervention activities and the criteria for revoking these activities. The document states, among others, that consumption of contaminated food and water should be banned or restricted if the concentrations of isotopes with a half-life greater than 10 days, mainly Cs-134 and Cs-137, exceed:

- 400 Bq/kg in foodstuffs intended for infants,
- 1,000 Bq/kg in milk and milk products, as well as water and other food liquids,
- 1,250 Bq/kg in all other foodstuffs and food products.

At the same time, foodstuffs and food products from non-EU countries affected by the Chernobyl and Fukushima accidents are subject to restrictions under Commission Regulations (EU) No. 2020/1158 and No. 2021/1533.

TABLE 17

Summary of food consumption restriction levels based on the concentrations of Cs-134 and Cs-137 isotopes in foodstuffs and food products.

PERMITTED CONTAMINATION WITH Cs-134 AND Cs-137 RESULTING FROM A RADIATION EMERGENCY [Bq/Kg]	FOODSTUFFS INTENDED FOR INFANTS	MILK AND MILK PRODUCTS	WATER AND OTHER FOOD LIQUIDS	OTHER FOODSTUFFS
IN FUKUSHIMA	50	50	10	100
IN POLAND	400	1,000	1,000	1,250
IN CHERNOBYL	370	370	600	600

Currently, the concentrations of Cs-134 in foodstuffs and food products are below 1‰ of Cs-137 activity. For this reason Cs-134 was neglected in further considerations.

The data presented in this sub-section come from the results of measurements taken by institutions measuring radioactive contamination (sanitary and epidemiological stations) provided to the PAA.

Milk

The concentrations of radioisotopes in milk are a significant indicator for the assessment of oral radiation exposure.

In 2023, Cs-137 concentrations in liquid (fresh) milk ranged from 0.06 to below 2.07 Bq/dm^3 and averaged approx. 0.79 Bq/dm^3, see infographics on pages 94-95.

Meat, poultry, fish, and eggs

In 2023, the results of the measurements of Cs-137 activity in different types of meat from livestock (beef, pork), as well as in poultry meat, fish and eggs were as follows (range and average annual concentrations of Cs-137):

- livestock meat – from below 0.1 to below 5.00, 0.79 Bq/kg on average,
- poultry – from below 0.1 to below 2.00 Bq/kg, 0.73 Bq/kg on average,
- fish – from below 0.22 to below 2.00 Bq/kg, 0.81 Bq/kg on average,
- eggs – from below 0.12 to below 2.00 Bq/kg, 0.75 Bq/kg on average.

The temporal distribution of Cs-137 activity between 2011 and 2022 in different types of livestock meat (beef, pork), as well as in poultry meat, eggs and fish is presented in the infographics on pages 94-95.

Vegetables, fruit, cereals, feed, and mushrooms

The results of artificial radioactivity measurements in vegetables and fruit taken in 2023 show that the concentrations of the Cs-137 isotope in vegetables ranged from below 0.10 to below 2.33 Bq/kg, 1.01 Bq/kg on average, and in fruit from below 0.1 to 4.72 Bq/kg, 1.00 Bq/kg on average (see infographics on page 95). In long-term comparisons, the 2023 results were at the 1985 level, and over a dozen times lower than in 1986.

Cs-137 activity in cereals in 2023 ranged from below 0.10 to below 2.00 Bq/kg (1.00 Bq/kg on average) and was similar to the activity observed in 1985.
Cs-137 activity in feed in 2023 ranged from 0.22 to 3.30 Bq/kg (1.07 Bq/kg on average).

The average activity of the Cs-137 isotope in grass around the National Centre for Nuclear Research in Świerk and KSOP (in terms of dry matter) in 2023 ranged from 0.25 to 2.34 Bq/kg (1.21 Bq/kg on average) for the Centre in Świerk and from below 0.06 to 0.90 Bq/kg (0.251 Bq/kg on average) for the KSOP.

The average cesium activity in the primary fresh mushroom species in 2023 did not differ from the activity observed in previous years. It should be emphasized that in 1985, i.e. before the Chernobyl accident, Cs-137 activity in mushrooms was also much higher than in other food products. At that time this radionuclide came from the period of nuclear weapons testing (this is confirmed by the analysis of the ratio of isotopes Cs-134 and Cs-137 in 1986).

Summary

The results of monitoring programmes taking place in Poland in 2023 show that the environment, food, and drinking water are safe for the general population.

From 2023, a change has been made to the way average concentrations of artificial radioactivity in food products are calculated. The change is to include in the average the results of measurements in which the actual radioactive concentrations were not measured due to the concentration levels being too low for the measuring instrument. This is in line with the pessimization principle, which states that the most unfavorable assumptions should always be made.

Consequently, the average concentrations of artificial radioactivity in some products are higher than in previous years.

The Cs-137 radioisotope contamination generated as a result of the Chernobyl accident generally remains at a very low level with no significant impact on human health. Higher concentrations of Cs-137 can be observed in forest products, which also do not have a significant impact on human health, and the results of the sampled food from forest areas did not exceed the limits for consumption in 2023.

FOOD RADIOACTIVITY

The activity of radioisotopes in foodstuffs and food products should be compared to the values laid down in the Regulation of the Council of Ministers of 27 April 2004 on the intervention levels for different types of intervention activities and the criteria for revoking these activities.

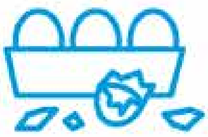
1,000 Bq/kg

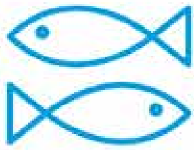
Maximum total permissible concentrations of Cs-137 and Cs-134 isotopes in milk, milk products, and infant products.

AVERAGE CONCENTRATIONS OF Cs-137	MILK	MEAT	POULTRY
2023	**0.79 Bq/dm³**	**0.79 Bq/dm³**	**0.7 Bq/dm³**
2022	0.81	0.74	0.47
2021	0.63	1.10	0.80
2020	0.63	0.87	0.50
2019	0.41	1.11	0.52
2018	0.52	1.09	0.47
2017	0.46	0.89	0.50
2016	0.40	0.63	0.54
2015	0.50	0.77	0.60
2014	0.50	0.83	0.73
2013	0.60	0.95	0.90
2012	0.60	0.90	0.70
2011	0.49	0.64	0.60
2010	0.48	0.83	0.58
2008	0.60	0.85	0.52
2009	0.60	0.70	0.52
2007	0.70	0.64	0.67

1,250 Bq/kg Cs-137

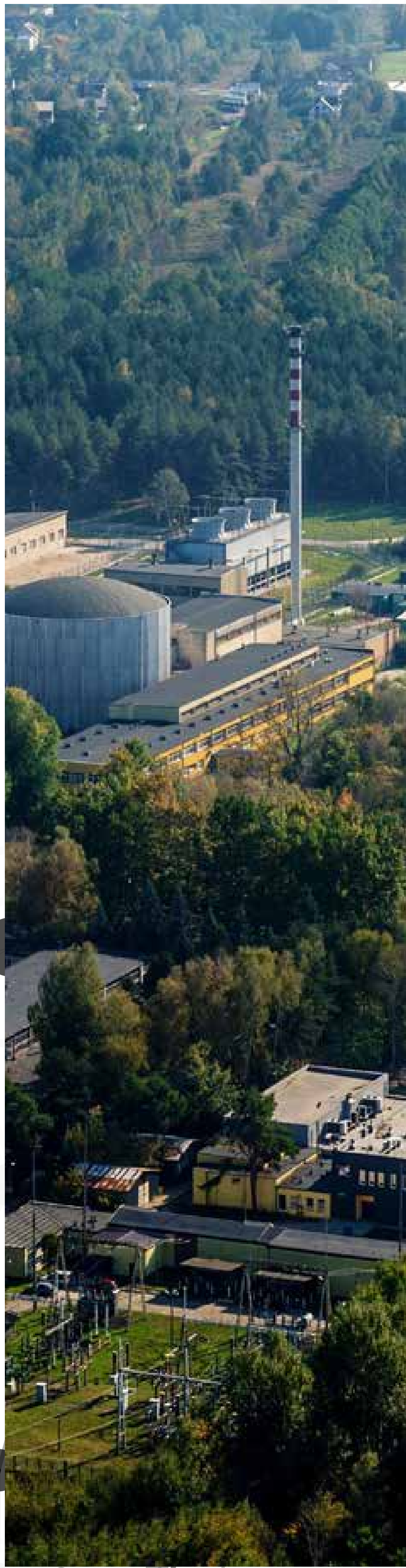
Maximum total permissible concentrations of Cs-137 and Cs-134 isotopes in all other foodstuffs and food products.





EGGS	FISH	VEGETABLES	FRUIT
0.75 Bq/kg	**0.81 Bq/kg**	**1.01 Bq/kg**	**0.851 Bq/kg**
0.54	0.61	0.39	0.85
0.69	0.74	0.64	0.97
0.55	0.77	0.93	1.69
0.56	0.67	0.48	0.31
0.57	0.85	0.40	0.75
0.49	0.61	0.42	0.38
0.42	0.77	0.39	0.33
0.40	0.77	0.41	0.27
0.45	0.86	0.46	0.50
0.60	1.10	0.50	0.60
0.70	1.00	0.50	0.40
0.45	1.00	0.49	0.40
0.43	1.00	0.47	0.35
0.42	0.70	0.45	0.37
0.39	0.84	0.54	0.28
0.43	0.96	0.46	0.25

11. International cooperation



1. Multilateral cooperation
2. Bilateral cooperation

International cooperation of Poland in the field of nuclear safety and radiation protection is a statutory task of the President of the PAA. This task is performed in close cooperation with the Minister of Foreign Affairs, Minister of Energy and Environment, and other ministers (heads of central offices), in accordance with their respective competencies.

The international cooperation conducted by the PAA is aimed at supporting the implementation of the nuclear regulatory mission, i.e. ensuring nuclear safety and radiation protection in the country.

This objective is achieved by the PAA's participation in the development of international legal instruments and international standards, through the exchange of information on nuclear safety with neighboring countries, and through the development of its own competence and the implementation of good practices as a result of the exchange of experience and knowledge with foreign partners. International cooperation is conducted through the participation of the PAA's representatives in the work of international organizations and associations, and also by bilateral cooperation.

1. Multilateral cooperation

In 2023, the President of the PAA was involved in the performance of tasks resulting from Poland's multilateral cooperation as part of the following:

- European Atomic Energy Community (EURATOM),
- International Atomic Energy Agency (IAEA),
- Organization for Economic Cooperation and Development Nuclear Energy Agency (OECD NEA),
- Western European Nuclear Regulators' Association (WENRA),
- Meetings of the Heads of the European Radiation Protection Competent Authorities (HERCA),
- European Nuclear Security Regulators Association (ENSRA),
- European Safeguards Research and Development Association (ESARDA).

Cooperation with international organizations

European Atomic Energy Community (EURATOM)

In 2023, the PAA's involvement, resulting from Poland's membership in the EURATOM, focused mainly on the work carried out in two groups within the European Nuclear Safety Regulators Group (ENSREG). The Group includes top management representatives from the national nuclear regulatory authorities of each Member State and a representative from the European Commission. ENSREG has advisory powers for the European Commission ENSREG plenary meetings were held on 24 April and 20 November 2023. Poland was represented at the meetings by the President of the PAA, Andrzej Głowacki, and the Director of the Policy and International Cooperation Bureau (BSM), Iga Pocztarek-Tofil. Among the issues discussed during the meetings were the ENSREG action plan for 2024-2026, the continuation of activities in the area of SMR, as well as the safety issues of Ukraine's nuclear installations related to military activities on its territory. In January 2023, the President of the PAA met with a delegation of representatives of the EC DG ENER, led by the Deputy Director General of the EC DG ENER, Massimo Garribba. The development of the PAA in the context of planned projects, the accessibility of the licensing process to the public ("access to justice") and cooperation with other regulatory authorities in the region were raised. As a result of discussions with the EC and other States in 2023, the Director of the Policy and International Cooperation Bureau (BSM) of the PAA has taken on the role of Chairperson of the Nuclear Safety and International Cooperation Group (WG1) as of 2024.

International Atomic Energy Agency (IAEA)

The PAA, together with the Ministry of Foreign Affairs, cooperates with the IAEA. In addition, the Ministry of Climate and Environment, which is responsible for energy development in Poland, is involved in the cooperation.

PAA's main activities related to Poland's membership in the IAEA include the following:

- coordination of the national institutions' cooperation with the IAEA,
- participation in the development of the IAEA international safety standards,
- participation in the annual IAEA General Conference, i.e. the most important statutory body of the IAEA,
- implementation of projects to strengthen nuclear regulatory activities in cooperation with the IAEA.

Cooperation in establishing the IAEA safety standards

One important element of cooperation within the IAEA is the establishment of the IAEA Safety Standards for the peaceful use of nuclear energy. The work on these standards is carried out with the participation of the PAA's experts within the following six committees:

- Nuclear Safety Standards Committees (NUSSC)[3];
- Radiation Safety Standards Committee (RASSC)[4];
- Waste Safety Standards Committee (WASSC)[5];
- Transport Safety Standards Committee (TRANSSC)[6];
- Nuclear Security Guidance Committee (NSGC)[7];
- Emergency Preparedness and Response Standards (EPRESC)[8].

In addition, the PAA takes part in working groups related to its participation in the Nuclear Harmonization and Standardization Initiative (NHSI) programme, as well as a forum with the Technical Support Organizations (TSO).

IAEA General Conference

The General Conference is the highest statutory body of the IAEA. It is composed of representatives of the 178 (as of 31 December 2023) Member States. The General Conference is held annually to consider and approve of the Agency's programme and budget, and to make decisions and resolutions on matters brought before it by the Board of Governors, Director General or Member States.

3. Nuclear Safety Standards Committee
4. Radiation Safety Standards Committee
5. Waste Safety Standards Committee
6. Transport Safety Standards Committee
7. Nuclear Security Guidelines Committee
8. Emergency Preparedness and Response Standards Committee

The 67th General Conference of the International Atomic Energy Agency was held on 25-29 September 2023.

The Polish delegation was led by the Undersecretary of State at the Ministry of Climate and Environment, Adam Guibourge-Czetwertyński. The President of the PAA, Andrzej Głowacki, who also represented the National Atomic Energy Agency, acted as the Vice--Chairman.

During the General Conference, as part of its efforts to strengthen global nuclear safety, the PAA's delegation, headed by the President of the PAA, Andrzej Głowacki, held bilateral meetings with representatives of partner nuclear regulatory authorities:

- the delegation from the U.S. Nuclear Regulatory Commission (U.S. NRC) led by Christopher T. Hanson, Chairman of the NRC Commission;
- the delegation from the Canadian Nuclear Safety Commission (CNSC) led by Rumina Velshi, Chairperson of the CNSC Commission;
- the delegation from the Slovak Nuclear Regulatory Authority (ÚJD SR) led by Marta Žiakova, the President of the ÚJD SR;
- the delegation from the Korean Nuclear Regulatory Authority (NNSC) led by Gukhee Yoo, Chairman of the NNSC Commission;
- the delegation from the French Nuclear Regulatory Authority;
- the delegation from the Ukrainian Nuclear Regulatory Authority (SNRIU) led by Oleh Korikov, Chairman of the SNRIU;
- the delegation of the United Arab Emirates Nuclear Regulatory Authority (FANR) led by Christer Viktorsson, Director General of the FANR;
- Regulatory Authority (SSM) led by Michael Knochenhauer, Acting Director General of the SSM;
- the delegation from the Dutch Nuclear Regulatory

Authority (ANVS) led by Marco Brugmans, Vice-President of the ANVS;
- the delegation of the Romanian Nuclear Regulatory Authority (CNCAN) led by Cantemir Ciurea-Ercau, President of the CNCAN;
- the delegation from the Hungarian Nuclear Regulatory Authority (OAH) led by Andrea Kádár, President of the OAH;
- the delegation from the French Nuclear Regulatory Authority's technical support organization (IRSN);
- the delegation of the Pakistan Nuclear Regulatory Authority (PNRA) led by Muhammad Rahman, the PNRA Council Member;

Furthermore, the PAA's Delegation took part in consultations with IAEA staff on their on-going cooperation, in particular with representatives of the Regulatory Activities Section at the IAEA Nuclear Safety and Security Department, a bilateral meeting with the IAEA Technical Cooperation Department, a meeting of IAEA National Technical Cooperation Liaison Officers, and a meeting on the Integrated Regulatory Review Service (IRRS) mission.

Designated members of the delegation also attended meetings accompanying the General Conference.

Nuclear Harmonization and Standardization Initiative (NHSI) Programme

At the initiative of the IAEA Director General, the Nuclear Harmonization and Standardization Initiative (NHSI) programme was established to promote harmonization and standardization of regulatory and industrial approaches to facilitate the safe and successful deployment of Small Modular Reactors (SMRs) worldwide.

The President of the PAA, Andrzej Głowacki, attended the NHSI plenary meeting held on 27 June. The progress of the working groups and presented potential solutions to key issu es such as the establishment of an internatio nal database to compare different codes and standards, as well as a platform and workshop for code experimentation and validation were discussed during the meeting. Representatives of the PAA are members of two working gro ups set up under the NHSI programme.

Expert cooperation under the auspices of the IAEA

The Technical Cooperation Programme (TCP) is an important instrument of the IAEA, and Poland has for many years participated in the Programme with a dual role: as a net contributor to the Programme and as a beneficiary of expert cooperation with the IAEA and its Member States. For many years, Polish institutions have participated in national and regional IAEA technical cooperation projects.

In 2023, the PAA coordinated the participation of Polish institutions in IAEA technical meetings, trainings, internships and conferences. As a result, 320 participants from Poland were registered to attend these events.

Polish institutions actively use the IAEA's expert support and the Technical Cooperation Programme to implement projects important for the development of Polish science, medicine, power sectors, and to ensure nuclear safety and radiation protection in the country. The IAEA offers support to develop competencies, provide advice from international experts, and assistance in the purchase of necessary equipment.

In the 2022-2023 edition of technical projects, the National Center for Radiation Protection in Healthcare was coordinating projects in the area of medicine, the Ministry of Climate and Environment – in the area of expanding the infrastructure necessary for nuclear power, while the PAA was focusing on further expanding the competencies necessary to effectively perform its regulatory function.

100 National Atomic Energy Agency International Conference on Effective Nuclear and Radiation Regulatory Systems

On 13-16 February, the PAA's delegation led by President Andrzej Głowacki attended a conference in Abu Dhabi. The aim of the conference was, among other things, to exchange experiences related to improving the effectiveness of nuclear and radiation regulatory systems, as well as regulatory approaches to innovation, emerging new technologies and international and regional cooperation in this field. During the conference, the President of the PAA was a participant in two panels.
In addition, during the Conference, the PAA's delegation held bilateral meetings with representatives of partner nuclear regulatory authorities :

- the delegation from the U.S. Nuclear Regulatory Commission (U.S. NRC) led by Christopher T. Hanson, Chairman of the NRC Commission;
- the delegation from the Canadian Nuclear Safety Commission (CNSC) led by Rumina Velshi, Chairperson of the CNSC Commission;
- the delegation from the French Nuclear Regulatory Authority (ASN) led by Oliver Gupta, Director General of the ASN;
- the delegation from the UK Nuclear Regulatory Authority (ONR) led by Mark Foy, the ONR Chief Executive;
- the delegation from the Ukrainian Nuclear Regulatory Authority (SNRIU) led by Oleh Korikov, Chairman of the SNRIU;
- with representatives from the Korea Institute for Nuclear Safety (KINS), chaired by Yeonhee Hah, Vice-President of the KINS.

IRRS review

The International Atomic Energy Agency's Integrated Regulatory Review Service (IRRS) mission took place on 3-15 September. The IRRS missions are aimed at self-assessment, review and strengthening of the nuclear regulatory system in Poland, including verification of readiness to fulfil the tasks of the state and the nuclear regulatory authority in licensing and construction of a nuclear power plant. Carrying out an IRRS mission is also an implementation of obligations under Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations and Article 113a Section 2 of the Act of 29 November 2000 – Atomic Law, which stipulates that the President of the National Atomic Energy Agency shall, at least once every 10 years, subject the national nuclear safety and radiation protection system, including the nuclear regulatory activities, to external international review.

A team of fifteen experts from fourteen countries, four International Atomic Energy Agency (IAEA) staff and one observer from the European Commission reviewed the regulatory oversight of existing nuclear facilities and activities with ionizing radiation against IAEA safety standards.

According to the IRRS team, the main challenge in Poland is to adopt solutions that strengthen the independence of the PAA in safety-related decision-making and to ensure adequate human resources. Foreign experts also made several recommendations and suggestions to the government. The international experts also pointed out good practices and the achievements of the PAA and the sanitary inspection. The PAA's 2018- 2019 Advanced Licensing Exercise Project (ALEP) was recognized as good practice. This was a simulated analysis of a nuclear power plant construction license application, carried out with international experts.

Participation in the Regulatory Cooperation Forum (RCF)

The Regulatory Cooperation Forum (RCF) was established to ensure that the countries with developed nuclear power programmes support the countries that plan to or are developing their nuclear power sectors.

The PAA's cooperation with the RCF has resulted in projects that significantly contribute to the efforts made in preparation for the implementation of the Polish Nuclear Power Programme. With the support of the Forum, the PAA is implementing the OJT (On-the-Job Training) project aimed at providing direct experience in nuclear regulation in terms of the siting, construction, commissioning and operation of nuclear power plants. Under the project, the PAA's employees completed OJTs in various foreign nuclear regulatory authorities.

On 4-6 July 2023, the President of the PAA, Andrzej Głowacki, attended the RCF meeting. RCF recipient members provided an update on their preparations for the nuclear regulatory tasks for planned nuclear power plants or plants under construction. The President of PAA presented the state of preparations of the National Atomic Energy Agency to carry out tasks resulting from the Polish Nuclear Power Programme. During the presentation, he also presented on-going projects implemented in collaboration with the RCF.

Organization for Economic Cooperation and Development Nuclear Energy Agency (OECD NEA)

The activities of the NAE are based on the cooperation of national experts in 7 committees and in subordinate working groups. Poland became a member of the NEA in 2010 and has since actively participated in the working groups. The leading national institution for the NEA is the Ministry of Climate and Environment. The PAA is involved in the work of NEA committees and working groups on nuclear safety, nuclear regulation, nuclear legislation, and new reactors. In May 2023, the President of the PAA, Andrzej Głowacki, hosted the Director General of the NEA OECD, William D. Magwood, IV, in Warsaw. The meeting addressed the implementation of the Polish Nuclear Power Programme, the main challenges of the PAA as Poland's nuclear regulatory authority, the NEA's SMR initiatives and NEA trainings. The new structure of the Committee on Nuclear Regulatory Activities (CNRA), in which the President of the PAA is Poland's representative, was also discussed. The CNRA meeting was held in December 2023. It featured a presentation of the NEA's current activities, including in the context of the armed conflict in Ukraine (e.g. a workshop on radiation protection in an armed conflict) and the work of the various working groups and committees. Strategies for the development and maintenance of competences in nuclear supervision were also discussed. Poland provided an update on its power plant licensing process.

Cooperation within associations and other forms of multilateral cooperation

Western European Nuclear Regulators' Association (WENRA)

In 2023, the PAA's involvement in WENRA included work within working groups dedicated to the harmonization of reference levels for nuclear power plants and research reactors and a working group dedicated to radioactive waste.

On 5-6 April and 14-15 November 2023, the President of the PAA, Andrzej Głowacki, attended the WENRA plenary meetings. Nuclear safety issues were raised during the meetings, including issues of further cooperation, primarily with regard to current challenges such as the limited availability of human resources in the nuclear regulatory sector. In addition, discussions covered the development of regulatory systems in the context of the growing interest in the small modular reactor (SMR) technology and the safety of Ukraine's nuclear facilities in relation to military activities on its territory.

At its November plenary meeting, WENRA members supported Poland's application to join the Association. Until then, Poland had had the status of an observer. Poland's application for full membership was approved by all members of the Association.

Heads of the European Radiological Protection Competent Authorities (HERCA)

Representatives of Poland take part in the plenary meetings of the heads of regulatory authorities and in the HERCA working groups, which are involved in such issues as radiation protection in medicine, veterinary medicine, industry, or preparedness for radiation emergencies.

On 7-9 June and 23-24 November 2023, the President of the PAA, Andrzej Głowacki, took part in the plenary meetings of the Heads of the European Radiological Protection Competent Authorities (HERCA). During the meetings, the heads of radiation protection authorities from 32 European countries discussed the organization's current and planned activities. The discussions covered the tasks carried out by the various working groups and the issues of harmonizing the actions of Member States in the event of a nuclear or radiation emergency.

In addition, an online meeting on the group's budget was held on 21 September.

Bilateral agreements signed by Poland within the areas of National Atomic Energy Agency's activities

NORWAY

Agreement between the Government of the Polish People's Republic and the Government of the Kingdom of Norway on early notification of nuclear accidents and co-operation in the field of nuclear safety and radiation protection. Signed at Oslo on 15 November 1989.

DENMARK

Agreement between the Government of the Polish People's Republic and the Government of the Kingdom of Denmark on Exchange of Information and Cooperation in the Field of Nuclear Safety and Radiation Protection. Signed at Warsaw on 22 December 1987.

UNITED KINGDOM

Memorandum of Understanding for the exchange of information and co-operation in the area of regulation of safe nuclear energy for peaceful purposes between the President of the National Atomic Energy Agency of the Republic of Poland and the Office for Nuclear Regulation of the United Kingdom. Signed at Brussels on 24 November 2022 (only in English).

GERMANY

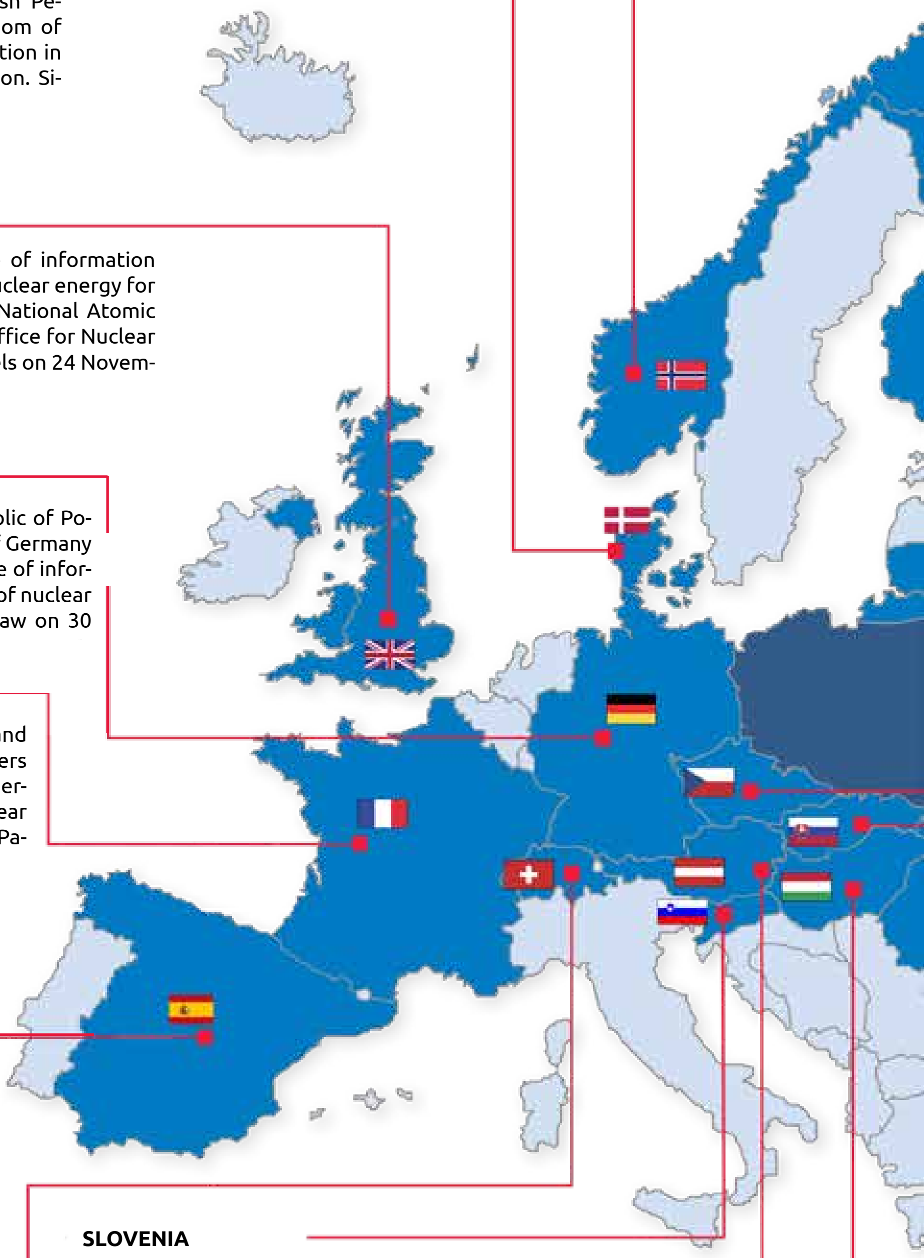
Agreement between the Government of the Republic of Poland and the Government of the Federal Republic of Germany on early notification of a nuclear accident, exchange of information and experience and cooperation in the field of nuclear safety and radiological protection. Signed at Warsaw on 30 July 2009.

FRANCE

Memorandum of Understanding for cooperation and exchange of information in nuclear regulatory matters between the President of the National Atomic Energy Agency of the Republic of Poland and the Nuclear Safety Authority of the French Republic. Signed at Paris on 6 July 2022.

SPAIN

Memorandum of understanding for cooperation and exchange of information in nuclear safety matters between the President of the National Atomic Energy Agency of the Republic of Poland and the Research Centre for Energy, Environment and Technology in Spain. Signed at Warsaw on 21 December 2017 and at Madrid on 15 January 2018 (only in English).



SLOVENIA

Memorandum of Understanding for cooperation and exchange of information in nuclear regulatory matters between the President of the National Atomic Energy Agency of the Republic of Poland and the Slovenian Nuclear Safety Administration. Signed at Ljubljana on 24 may 2022 (only in English).

SWITZERLAND

Memorandum of Understanding for cooperation and exchange of information in nuclear regulatory matters between the President of the National Atomic Energy Agency of the Republic of Poland and the Swiss Federal Nuclear Safety Inspectorate ENSI. Signed at Vienna on 26 September 2016 (only in English).

AUSTRIA

Agreement between the Government of the Polish People's Republic and the Government of the Republic of Austria on exchange of information and co-operation in the field of nuclear safety and radiation protection. Signed at Vienna on 15 December 1989.

FINLAND

Memorandum of Understanding for cooperation and exchange of information in nuclear regulatory matters between the President of the National Atomic Energy Agency of the Republic of Poland and Radiation and Nuclear Safety Authority of Finland. Signed at Vienna on 19 September 2017 (only in English).

RUSSIA

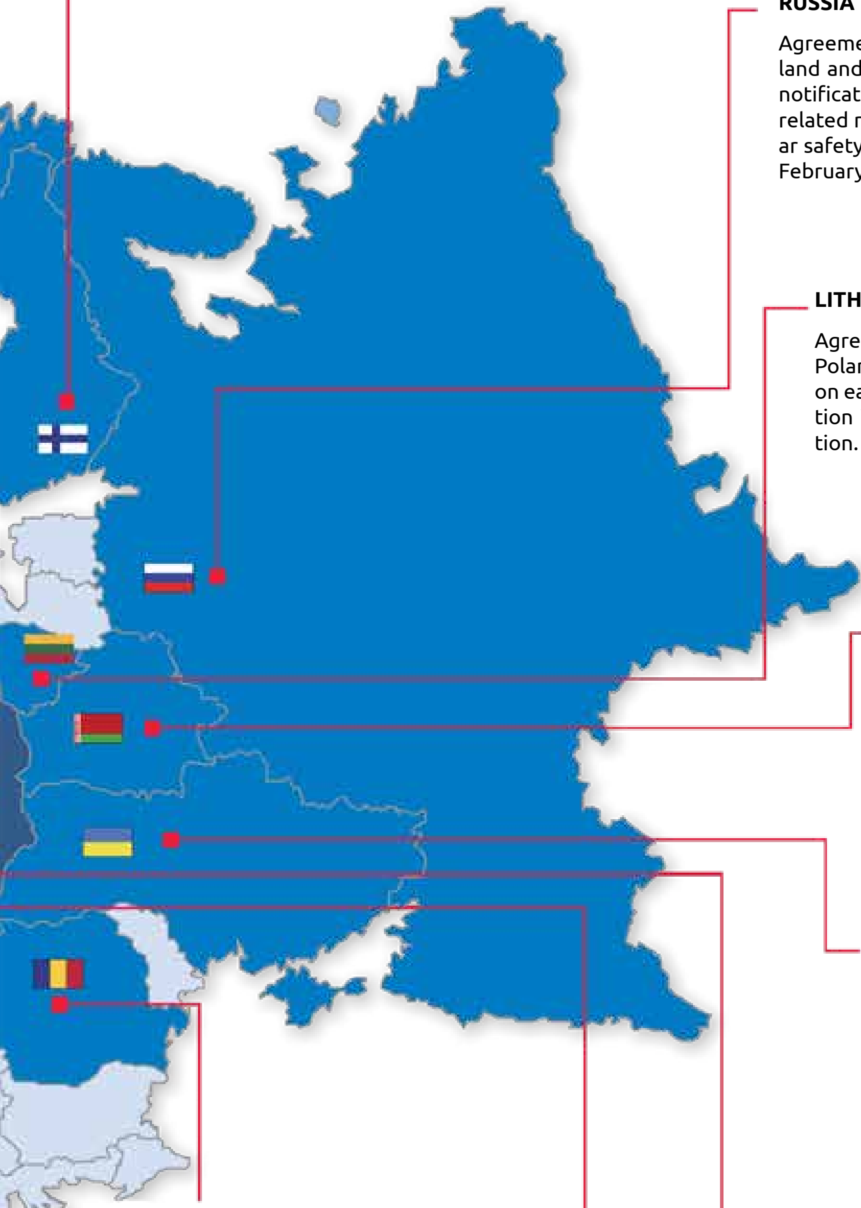
Agreement between the Government of the Republic of Poland and the Government of the Russian Federation on early notification of nuclear accidents, on exchange of information related nuclear facilities and cooperation in the field of nuclear safety and radiological protection. Signed at Warsaw on 18 February 1995.

LITHUANIA

Agreement between the Government of the Republic of Poland and the Government of the Republic of Lithuania on early notification of a nuclear accident and on co-operation in the field of nuclear safety and radiological protection. Signed at Warsaw on 2 June 1995.

BELARUS

Agreement between the Government of the Republic of Poland and the Government of the Republic of Belarus on early notification of nuclear accidents and on cooperation in the field of radiological safety. Signed at Minsk on 26 October 1994.



UKRAINE

Agreement between the Government of the Republic of Poland and the Government of Ukraine on early notification of nuclear accidents, exchange of information and co-operation in the field of nuclear safety and radiological protection. Signed at Kiev on 24 May 1993.

ROMANIA

Memorandum of Understanding between the President of the National Atomic Energy Agency of the Republic of Poland and the National Commission for Nuclear Activities Control of Romania for cooperation and exchange of information in nuclear regulatory matters. Signed at Vienna on 25 September 2014.

CZECHIA

Agreement between the Government of the Republic of Poland and the Government of Czech Republic on early notification of a nuclear accident and exchange of information on peaceful uses of nuclear energy, nuclear safety and radiological protection. Signed at Vienna on 27 September 2005.

HUNGARY

Memorandum of Understanding for cooperation and exchange of information in nuclear regulatory matters between the President of the National Atomic Energy Agency of the Republic of Poland and the Hungarian Atomic Energy Authority. Signed at Vienna on 19 September 2017 (only in English).

SLOVAKIA

Agreement between the Government of the Republic of Poland and the Government of the Slovak Republic on early notification of nuclear accidents, exchange of information and on co-operation in the field of nuclear safety and radiological protection. Signed at Bratislava on 17 September 1996.

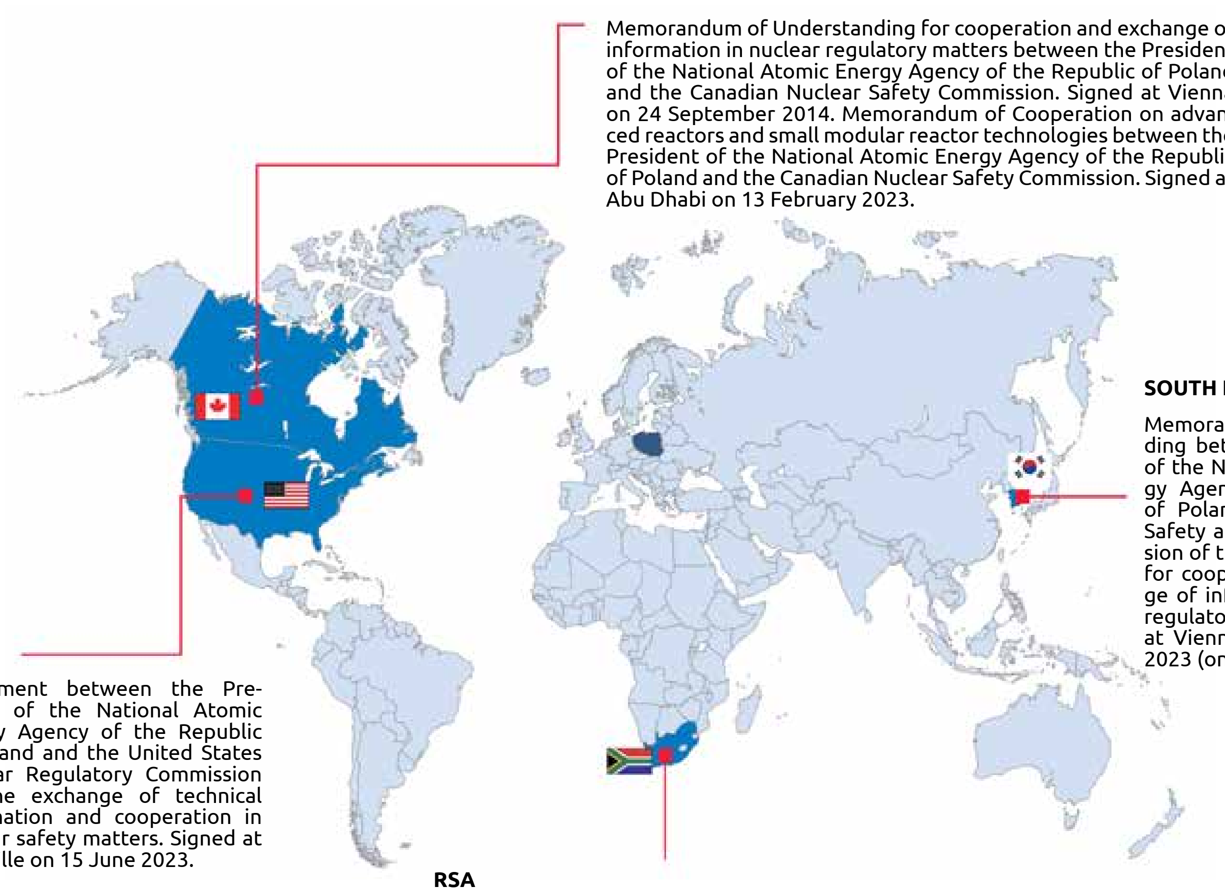
European Nuclear Security Regulators Association (ENSRA)

Regulatory authorities from 16 EU countries are currently participating in ENSRA, including the PAA (since 2012). Only countries with a nuclear power programme or a research reactor can become members of ENSRA. The Association's main objectives include the exchange of information on the physical protection of nuclear materials and nuclear facilities, and the promotion of a unified approach to nuclear security in the Association's Member States.

European Safeguards Research and Development Association (ESARDA)

The PAA has been a member of the European Safeguards Research and Development Association (ESARDA) since 2009.

It is an organization that provides a forum for the exchange of information, knowledge and experience, the dissemination of continuous development and improvement in the field of nuclear safeguards related to the fulfilment of obligations under the Treaty Establishing the European Atomic Energy Community and the Treaty on the Non-Proliferation of Nuclear Weapons and related international agreements. The organization collaborates with the IAEA, the Institute of Nuclear Materials Management (INMM) and the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), among others. It brings together scientific institutes, universities, industrial companies, experts, and state administration authorities responsible for nuclear safeguards in the EU's Member States. The organization has a Steering Committee, whose meetings are attended by representatives of all member organizations.



CANADA

Memorandum of Understanding for cooperation and exchange of information in nuclear regulatory matters between the President of the National Atomic Energy Agency of the Republic of Poland and the Canadian Nuclear Safety Commission. Signed at Vienna on 24 September 2014. Memorandum of Cooperation on advanced reactors and small modular reactor technologies between the President of the National Atomic Energy Agency of the Republic of Poland and the Canadian Nuclear Safety Commission. Signed at Abu Dhabi on 13 February 2023.

SOUTH KOREA

Memorandum of Understanding between the President of the National Atomic Energy Agency of the Republic of Poland and the Nuclear Safety and Security Commission of the Republic of Korea for cooperation and exchange of information in nuclear regulatory matters. Signed at Vienna on 26 September 2023 (only in English).

USA

Agreement between the President of the National Atomic Energy Agency of the Republic of Poland and the United States Nuclear Regulatory Commission for the exchange of technical information and cooperation in nuclear safety matters. Signed at Rockville on 15 June 2023.

RSA

Memorandum of Understanding for cooperation and exchange of information in nuclear regulatory matters between the President of the National Atomic Energy Agency of the Republic of Poland and the National Nuclear Regulator of South Africa. Signed at Centurion on 24 November 2017 (only in English).

2. Bilateral cooperation

Poland has signed agreements on the cooperation and exchange of information on nuclear safety, protection against radiation, and nuclear accidents with all neighboring countries. The President of the PAA is responsible for the implementation of these agreements.

In 2023, the PAA continued cooperation with foreign partners experienced in the oversight of large nuclear facilities. The PAA implemented a bilateral cooperation programme:

- on 21 March 2023, a bilateral meeting was held with representatives of the Korean nuclear regulatory authority NNSC;
- on 5-6 June 2023, a bilateral meeting was held with representatives of the Czech nuclear regulatory authority SUJB
- on 13-14 June 2023, a bilateral meeting was held with representatives of the Canadian nuclear regulatory authority CNSC;
- on 15-16 June 2023, a bilateral meeting was held with representative of the U.S. nuclear regulatory authority U.S. NRC;
- on 22 June 2023, a bilateral meeting was held with representatives of the German nuclear regulatory authority BMUV;
- on 21 August 2023, a meeting was held with Rumina Velshi, Chairperson of the Canadian nuclear authority CNSC;
- on 31 October 2023, representatives of the PAA took part in an online meeting with the President of Ukraine's regulatory authority, Oleh Korikov, representatives of the IAEA, the European Commission and the nuclear regulatory authorities on the nuclear safety situation in Ukraine.

The bilateral cooperation with the U.S. NRC also allowed to organise the following in 2023:

- the next edition of OJT (On-the-Job Training) trainings between 5 September and 27 October. The trainings took place at the Technical Training Center (Chattanooga, Tennessee) and the Vogtle Nuclear Power Plant;
- the next edition of a technical workshop on the licensing of nuclear power plants was held on 6-9 November 2023;
- on 5 December an online workshop on safety culture issues was held.

In addition, as part of its cooperation with the U.S. Department of Energy (DoE), the PAA has received radioactive material detection equipment – RSX-1 detectors enabling large-area measurements from ground, air or water level – on long-term loan.

Conclusions

- Poland's biggest success on the internatio nal stage was the acceptance of the PAA as a full member for the WENRA association, which allows it to actively participate in buil ding a common nuclear safety system in Eu rope.
- The completed IRRS review will bring the le gal framework for the nuclear regulatory au thority's operation in line with international standards and recommendations on nuclear safety and radiation protection.
- The PAA takes part in all remote meetings organized by associations and other forms of multilateral cooperation. The PAA's re presentatives actively participated in wor king and expert groups focused on nuclear safety, nuclear regulatory competence buil ding, nuclear law and new reactors.
- The exchange of experience and good prac tices in the field of safe licensing process by the U.S. NRC allowed the PAA to prepare more effectively for activities resulting from the implementation of tasks provided for in the Polish Nuclear Power Programme.

LIST OF ABBREVIATIONS

- **ABW** – the Internal Security Agency
- **ADN** – European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways
- **ADR** – L'Accord européen relatif au transport international des marchandises dangereuses par route – European Agreement Concerning the International Carriage of Dangerous Goods by Road
- **ASN** – Autorité de sûreté nucléaire – French Nuclear Safety Authority
- **ASS-500** – Aerosol Sampling Station – basic detection stations of radioactive air contamination, used for measurements of radioactive contamination in atmospheric aerosols
- **ANVS** – The Authority for Nuclear Safety and Radiation Protection
- **BJiOR** – nuclear safety and radiation protection
- **BSM PAA**– Policy and International Cooperation Bureau of the National Atomic Energy Agency
- **BWR** – boiling water reactor
- **CEZAR PAA** – the PAA's Radiation Emergency Centre
- **CLOR** – Central Laboratory for Radiation Protection
- **CNSC** – Canadian Nuclear Safety Commission
- **COAS** – Centre for Contamination Analysis
- **DBJ PAA** – the PAA's Nuclear Safety and Security Department
- **DoE** – U.S. Department of Energy
- **DOR PAA** – the PAA's Radiation Protection Department
- **ECURIE** – European Community Urgent Radiological Information Exchange
- **NPP** – nuclear power plant
- **ENSRA** – European Nuclear Security Regulators Association
- **ENSREG** – European Nuclear Safety Regulators Group
- **ESARDA** – European Safeguards Research and Development Association
- **EURATOM** – European Atomic Energy Community
- **EURDEP** – European Radiological Data Exchange Platform – System for data exchange from early warning stations for radioactive contamination
- **GIG** – Central Mining Institute
- **GIOŚ** – Chief Inspectorate of Environmental Protection
- **GTRI** – Global Threat Reduction Initiative
- **HERCA** – Heads of the European Radiation Protection Competent Authorities
- **HEU** – Highly Enriched Uranium
- **IAEA** –Safety Standards – International Safety Standards of the IAEA
- **IATA DGR** – International Air Transport Association Dangerous Goods Regulation
- **ICAO** – International Civil Aviation Organization
- **IChTJ** – Institute of Nuclear Chemistry and Technology
- **IMDG Code** – International Maritime Dangerous Goods Code
- **IMiGW** – Institute of Meteorology and Water Management
- **INES** – International Nuclear and Radiological Event Scale
- **IOR** – radiation protection officer
- **IRSN** – L'Institut de Radioprotection et de Sûreté Nucléaire – French Institute of Radiation Protection and Nuclear Safety
- **JRC** – European Commission's Joint Research Centre
- **KINS** – Korea Institute of Nuclear Safety
- **KSOP** – National Radioactive Waste Repository
- **LEU** – Low Enriched Uranium
- **MON** – Ministry of National Defence
- **NATO** – North Atlantic Treaty Organization
- **NCBJ** – National Centre for Nuclear Research

- **NEA OECD** – Nuclear Energy Agency of the Organization for Economic Cooperation and Development
- **NIK** – Supreme Audit Office
- **NPT** – Treaty on the Non-Proliferation of Nuclear Weapons
- **NUSSC** – Nuclear Safety Standards Committee
- **ONR** – Office for Nuclear Regulation
- **PAA** – National Atomic Energy Agency
- **PIS** – State Sanitary Inspection
- **PIP** – National Labour Inspectorate
- **PMS** – Permanent Monitoring Station – basic stations for early warning of radioactive contamination for dose rate measurement of ionizing radiation
- **POLATOM** – POLATOM Radioisotope Centre
- **PPEJ** – Polish Nuclear Power Programme
- **RASSC** – Radiation Safety Standards Committee
- **RCF** – Regulatory Cooperation Forum
- **RID** – Règlement concernant le transport international ferroviaire des marchandises dangereuses – Regulations Concerning the International Carriage of Dangerous Goods by Rail
- **CBSS** – Council of the Baltic Sea States
- **TLD** – thermoluminescent dosimeters
- **TRANSSC** – Transport Safety Standards Committee
- **ÚJD SR** – Nuclear Regulatory Authority of the Slovak Republic
- **UDT** – Office of Technical Inspection
- **USIE** – Unified System for Information Exchange in Incidents and Emergencies
- **WASSC** – Waste Safety Standards Committee
- **WENRA** – Western European Nuclear Regulators
- **WHO** – World Health Organization
- **ZUOP** – Radioactive Waste Management Plant

Cover photo:

Participants in the Integrated Regulatory Review Service - IRRS

Design and composition: Ragnarok Studio

DTP, printing and binding: Ragnarok Studio

NATIONAL
ATOMIC ENERGY
AGENCY

NATIONAL
ATOMIC ENERGY
AGENCY

CONTACT

ul. Nowy Świat 6/12
00-400 Warszawa

www.gov.pl/web/paa