NATIONAL ATOMIC ENERGY AGENCY

ANNUAL REPORT 2024

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 2024

PAA NATIONAL ATOMIC ENERGY

2024

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 2024

WARSAW 2025

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 (Polish Journal of Laws of 2024, item 1277, as amended). 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.

Photo by PAA

Table of contents

I. NATIONAL ATOMIC ENERGY AGENCY 6

- Role of the President of the National Atomic Energy Agency 7
- Organizational structure 8
- Employment 9
- Council for Nuclear Safety and Radiation Protection 9
- Budget 10
- Assessment of the PAA's operations 10
- National Atomic Energy Agency and the Polish Nuclear Power Programme 10
- PAA's preparations for the oversight over SMR (Small Modular Reactors) 12

II. NUCLEAR REGULATORY INFRASTRUCTURE IN POLAND 14

- Definition, structure, and functions of the nuclear safety and radiation protection system 15
- Basic provisions of law on nuclear safety and radiation protection 17

III. OVERSIGHT OVER THE USE OF IONIZING RADIATION SOURCES 22

- Tasks of the President of the PAA in terms of regulatory oversight of activities involving exposure to ionizing radiation 23
- Users of ionizing radiation in Poland 23
- Register of sealed radioactive sources 26

IV. OVERSIGHT OVER NUCLEAR FACILITIES AND THE NATIONAL RADIOACTIVE WASTE REPOSITORY 28

- Nuclear facilities in Poland 29
- General information on the operation of the MARIA reactor 32
- Licenses issued 34
- Regulatory inspections 34
- Functioning of the coordination system for inspection and oversight over nuclear facilities 35
- Nuclear power plants in the neighbouring countries 36

V. NUCLEAR SAFEGUARDS 38

- Legal basis for nuclear safeguards 39
- Users of nuclear materials in Poland 40
- Inspections of nuclear safeguards 41

VI. TRANSPORT OF RADIOACTIVE MATERIALS 42

- Transport of radioactive sources and waste 43
- Transport of nuclear fuel 44

VII. RADIOACTIVE WASTE 46

- Radioactive waste management 47
- Radioactive waste in Poland 48

VIII. RADIATION PROTECTION OF THE POPULATION AND WORKERS IN POLAND ... 52

- Exposure of the population to ionizing radiation 53
- Control of exposure to ionizing radiation .. 58
- Exposure to radon 60
- Granting personal authorizations in the area of nuclear safety and radiation protection 64

IX. NATIONAL RADIATION MONITORING 68

- Nationwide monitoring 70
- Nationwide radiation monitoring 71
- Local monitoring 73
- International exchange of radiation monitoring data 75
- Radiation emergencies 75

X. ASSESSMENT OF THE RADIATION SITUATION IN POLAND 80

- Radioactivity in the environment 81
- Radioactivity of basic foodstuffs and food products 89

XI. INTERNATIONAL COOPERATION 94

- Multilateral cooperation 95
- Bilateral cooperation 103

LIST OF ABBREVIATIONS 107

Dear Readers,

for some time now, we have been witnessing a renaissance in technologies involving ionizing radiation. This is a global trend, with visible manifestations also here in Poland. Our country continues to implement the Polish Nuclear Power Programme. It is worth recalling that the National Atomic Energy Agency (PAA) is one of the key institutions involved in this programme. The PAA will be responsible for overseeing the construction, commissioning, and operation of the nuclear power plant with regard to nuclear safety and radiation protection – which is, ultimately, the safety of us all. At the same time, Polish entities have expressed interest in the deployment of small modular reactors (SMRs). The use of ionizing radiation is also expanding in other sectors beyond energy, such as medicine and industry. As the nuclear regulatory autority in Poland, the President of the PAA must rise to the challenges posed by these developments.

The current challenges primarily concern preparing the Agency for the licensing of new activities involving ionizing radiation – particularly, the construction of nuclear facilities such as power plants. The licensing process must be conducted professionally and efficiently, while the deployment of nuclear technologies must always adhere to the highest standards of nuclear safety and radiation protection. This entails compliance with all applicable national regulations and norms, as well as the conscious adoption of good practices and lessons learned from countries with more extensive experience in nuclear technology. According to Article 110 of the Atomic Law, "The scope of activities of the President of the Agency shall include the tasks that involve ensuring the nuclear safety and radiation protection in the country". These tasks remained central to my attention as President of the PAA, as well as that of the Agency I lead, throughout all activities undertaken in 2024.

The primary responsibility of the President of the PAA, as an independent regulatory body, is to oversee and enforce compliance with safety standards among entities that use sources of ionizing radiation – including nuclear power plants. This overseeing function spans the entire lifecycle of nuclear facility: from planning, through construction, commissioning, and operation, to decommissioning. One of the upcoming regulatory challenges is the assessment of documentation submitted by the nuclear power plant investor, along with the necessary safety analyses. Effective execution of these responsibilities requires adequate organizational, financial, and human resources, as well as ongoing investment in the development of staff competencies. These priorities continued to receive special attention throughout 2024.

The PAA remains committed to recruiting highly qualified experts, training its staff, and expanding its technical infrastructure. The national radiation monitoring system, which currently comprises 58 early warning stations for radioactive contamination, is being systematically developed. By 2033, this number is expected to increase to at least 145. Site selection and station installation involve a multi-stage process supported by agreements with regional authorities. In 2024, new cooperation agreements were signed with three additional voivodeships: Pomorskie, Mazowieckie and Małopolskie.

The PAA is also intensifying international cooperation in preparation for efficiently processing applications submitted by investors planning nuclear facilities. We are strengthening ties with regulators in countries that have experience in overseeing nuclear facilities. A key element in competence development is the regular participation in meetings, workshops, and on-the-job training (OJT) programmes conducted in partner countries, in collaboration with the International Atomic Energy Agency (IAEA). In 2024, five PAA's employees took part in two OJT programmes held in the United States at the invitation of the U.S. Nuclear Regulatory Commission (US NRC). Further placements are planned for the current year, offering PAA's staff the opportunity to gain hands-on experience in regulatory bodies in the United States, Canada, and the United Kingdom.

Over the past few years, I have observed a steady increase in the PAA's standing in leading international fora – and 2024 was particularly successful in this regard. In November 2024, Warsaw hosted the jubilee plenary meeting of the Western European Nuclear Regulators Association (WENRA), of which Poland became a full member just a year earlier. At the beginning of 2024, a PAA's representative assumed the chairmanship of ENSREG Working Group 1 on Nuclear Safety and International Cooperation, comprising experts from nuclear regulators of EU Member States. In 2024, PAA employees also took part as international experts in an Integrated Regulatory Review Service (IRRS) mission to South Korea and an International Physical Protection Advisory Service (IPPAS) mission to the United States. These activities demonstrate the PAA's growing international recognition while contributing to the continuous enhancement of Poland's nuclear regulatory competence through the global exchange of good practices and experience. With regard to the PAA's preparations for evaluating the application for licenses for the construction, commissioning, and operation of a nuclear power plant, the President of the PAA will rely on support from specialized laboratories and expert organizations. To be eligible to provide such services, institutions must first obtain authorization from the President of the PAA, confirming their competence in specific areas of analysis. In 2024, four such authorizations were granted.

In addition to preparations related to the implementation of the Polish Nuclear Power Programme and the development of new ionizing radiation technologies, the PAA continued its day-to-day activities aimed at ensuring nuclear safety and radiation protection in 2024. These included round-the-clock radiation monitoring, issuing licenses for activities involving ionizing radiation, and conducting inspections. In 2024, the number of entities using ionizing radiation in Poland increased by nearly 200. By the end of 2024, there were 5,261 such entities operating in the country. The regulatory authority issued 1,714 administrative decisions related to ionizing radiation activities, including 9 in the field of nuclear safety. Over the course of the year, PAA's nuclear regulatory inspectors conducted a total of 297 inspections. These efforts aim to ensure that the use of ionizing radiation poses no threat to people or the environment.

In conclusion, the summary presented above allows me to state that the level of nuclear safety and radiation protection in Poland remained high in 2024, and that the PAA continued to strengthen its competencies in preparation for overseeing the growing nuclear energy sector. I invite you to read this report, which presents detailed information on the activities of the President of the PAA and the Agency in 2024.

Enjoy the reading!

President of the National Atomic Energy Agency

I. NATIONAL ATOMIC ENERGY AGENCY

1. Role of the President of the National Atomic Energy Agency
2. Organizational structure
3. Employment
4. Council for Nuclear Safety and Radiation Protection
5. Budget
6. Assessment of the PAA's operations
7. The National Atomic Energy Agency and the Polish Nuclear Power Programme

Photo by PAA

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.

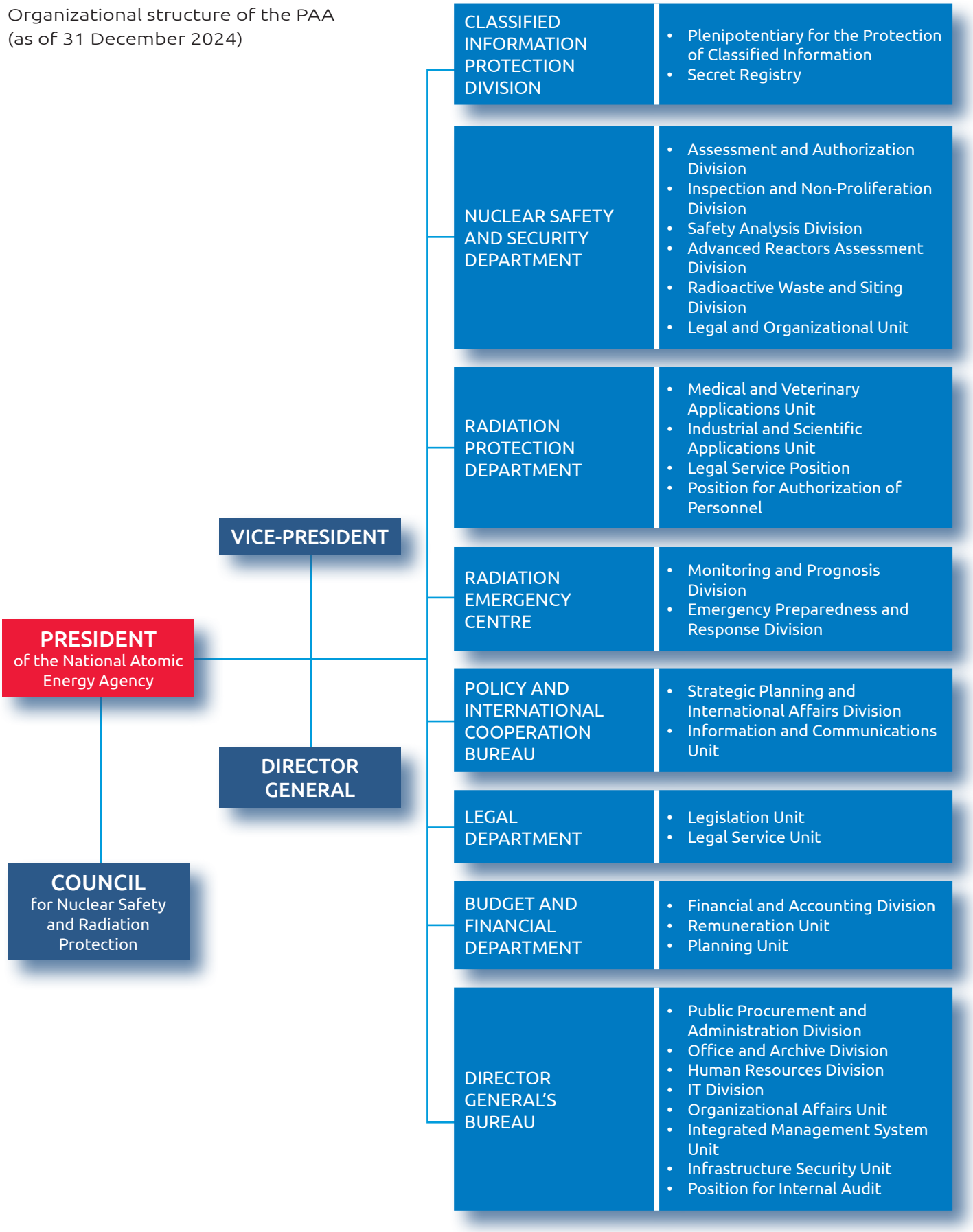
The scope of activities of the President of the PAA includes tasks which involve ensuring nuclear safety and radiation protection of Poland, in particular:

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

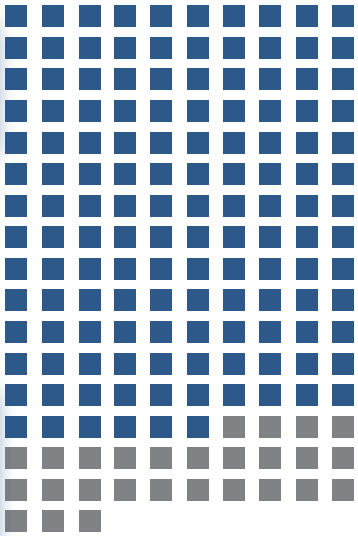
FIGURE 1
Organizational structure of the PAA
(as of 31 December 2024)



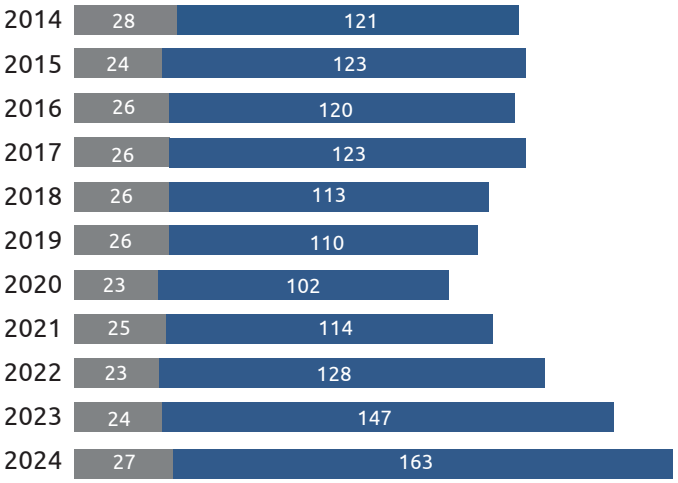
3. Employment

As of 31 December 2024, the PAA employed 163 persons. The calculation was based on the employment level without persons on unpaid and parental leaves. As of 31 December 2024, the PAA employed 27 nuclear regulatory inspectors.

163
employees, including:



27
nuclear regulatory inspectors



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 recommendation.
- Initiating improvements in the oversight of activities related to the exposure to ionizing radiation.

The Report of the BJiOR Council for 2024 is published in the PAA's Public Information Bulletin.

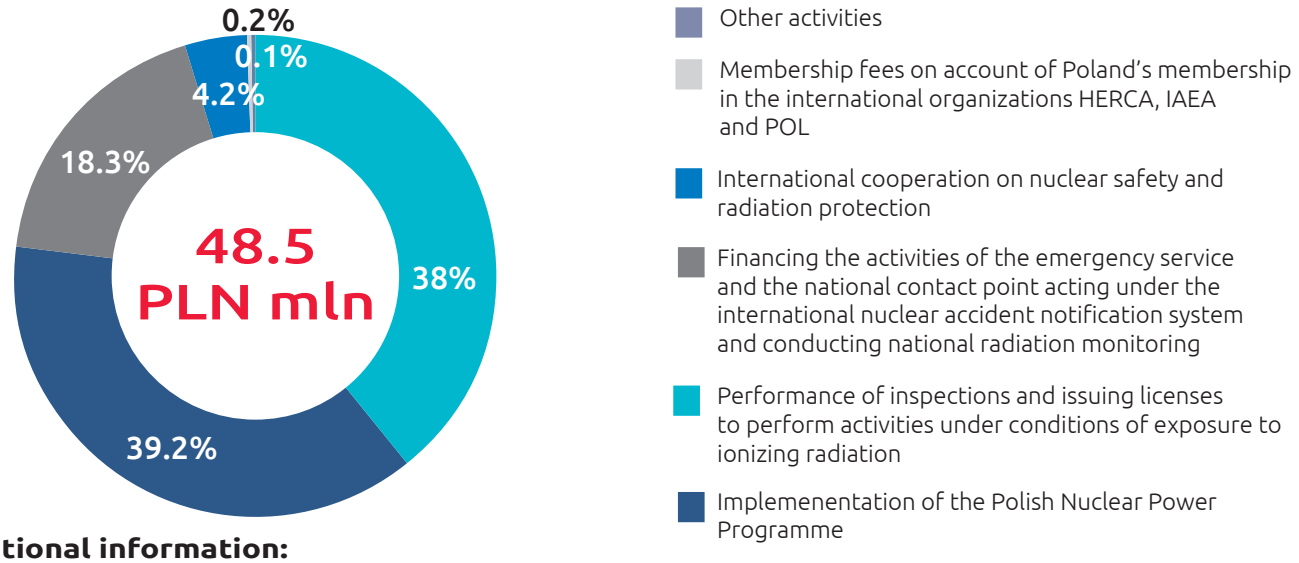
Composition of the Council in 2024:

- 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

5. Budget

FIGURE 2

The realized budget expenditure in 2024 was PLN 48.5 million, including:



Additional information:

The budgetary expenses of the PAA were incurred in a deliberate manner and in accordance with the planned purpose.

6. Assessment of the PAA's operations

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

In 2024, the President of the PAA issued 1741 administrative decisions on the regulation of activities related to exposure to ionizing radiation and 20 decisions on nuclear safety, including four decisions concerning the authorization of laboratories and expert organizations to take part in the inspection of nuclear power plants. Last year, two complaints were filed to the Regional Administrative Court against the decisions issued by the President of the PAA. The complaints have been dismissed. The judgments are not final, as cassation appeals have been lodged with the Supreme Administrative Court.

Audits carried out by the Supreme Audit Office

Between July and December 2024, the Supreme Audit Office conducted an audit aimed at assessing the compliance of the implementation of tasks by the President of the National Atomic Energy Agency with the objectives set out in the Polish Nuclear Power Programme.

In terms of finances, since April 2024, an audit of public funds has been conducted by the Tax Administration Chamber in Zielona Góra regarding the management of public funds in the years 2020, 2021, 2022, and 2023.

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

On 2 October 2020, the Council of Ministers adopted Resolution no. 141 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 Lubiatowo-Kopalino, in the commune of Choczewo. 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 3 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 number of PAA specialists involved in the implementation of PPEJ tasks is expected to increase to 97 in 2026 and reach 110 in 2033.

A key component of the PAA's training program aimed at assessing licence applications is the offering of on-the-job training at foreign nuclear regulatory authorities, including the U.S. Nuclear Regulatory Commission, which involve training at the Vogtle nuclear power plant. The PAA is also currently in discussions with nuclear regulators experienced in overseeing the construction of nuclear power plants (including those from France, South Korea, and the United States) to develop cooperation aimed at strengthening PAA's competencies in support of the nuclear power programme.

In 2024, the President of the National Atomic Energy Agency issued decisions granting authorization to four laboratories and expert organizations, which will be able to serve as technical support organizations during the construction and operation of a nuclear power plant in Poland. All institutions that received authorization have qualified personnel and technical facilities that will enable them to conduct impartial and reliable specialized analyses and expert opinions related to the assessment of the application for a nuclear power plant construction license.

In 2024, the Agency continued its dialogue with the company Polskie Elektrownie Jądrowe (PEJ) to ensure that the subsequent process of issuing a construction license for a nuclear power plant by the President of the National Atomic Energy Agency proceeds more efficiently and in accordance with the highest nuclear safety standards. One form of this dialogue included regular technical and status meetings. In March 2023, PEJ submitted an application for a general opinion on the methodology for safety classification of systems, structures, and components of the planned nuclear power plant. The application was supplemented multiple times in 2023 and 2024. The purpose of safety classification is to identify systems, structures, and components that play a key role in ensuring nuclear safety. Each system, structure, or component is assigned a safety class based on its importance for ensuring nuclear safety and radiation protection. Each class is characterized by specific quality and reliability requirements. The President of the National Atomic Energy Agency reviewed the submitted documentation, taking into account both national and international nuclear safety requirements. The general opinion was issued on August 30, 2024. Subsequently, in October 2024, PEJ submitted another application to the President of the National Atomic Energy Agency for a general opinion. This application concerned the correctness of classifying the Circulating Water System as a system, structure, or component of a nuclear facility that is not significant in terms of nuclear safety and radiation protection.

Last year, the expansion of the national radiation monitoring system was also continued – in 2024, four early warning stations for radioactive contamination were modernized, maintaining the total number of stations in the national system at 57. By the time the first nuclear power plant is commissioned, the national radiation monitoring system is expected to comprise 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.

8. PAA's preparations for the oversight over SMR (Small Modular Reactors)

In 2024, the National Atomic Energy Agency (PAA) continued its intensive efforts to prepare for the oversight of Small Modular Reactor (SMR) technology. As part of these efforts, the Agency conducted regulatory analyses and actively participated in international initiatives aimed at reviewing national regulations and, if necessary, adapting them to the specific characteristics of this technology.

One of the key tools used by the PAA in the prelicensing dialogue with potential SMR investors is the issuance of general opinions by the President of the PAA.

On April 22, 2024, the President of the PAA issued a general opinion regarding the application submitted by KGHM Polska Miedź S.A., concerning the safety analysis methodologies applied by the NuScale NPM-20 technology provider in the area of nuclear safety.

In 2024, the PAA continued its involvement in international initiatives such as the Joint Early Review (JER) for the NUWARD reactor, observation of the Generic Design Assessment (GDA) process for the Rolls-Royce SMR reactor, the IAEA NHSI (Nuclear Harmonization and Standardization Initiative), and the six-party initiative "6-party working group" (NRC-CNSC-GEH-TVA-OPG-ONR). These initiatives enable the review of key safety assumptions and solutions of various SMR technology projects and provide insight into the licensing processes for these facilities.

Since 2023, the Advanced Reactor Assessment Division (DBJ/WOZR) has been operating within the National Atomic Energy Agency (PAA), responsible for preparing the Agency for the SMR licensing process. In 2024, DBJ/WOZR staff enhanced their competencies through training, analyzed various safety aspects of SMRs and participated in international working groups. From October 21 to 25, 2024, the PAA representatives, led by President Andrzej Głowacki, took part in the International Conference on Small Modular Reactors and their Applications at the IAEA in Vienna.

Dialogue with investors and international initiatives

In 2024, the National Atomic Energy Agency (PAA) engaged in dialogue with investors planning to implement SMR technology in Poland. The dialogue was conducted with:

- ORLEN Synthos Green Energy (OSGE) – BWRX-300: in 2024, the PAA continued its prelicensing dialogue with ORLEN Synthos Green Energy (OSGE). This dialogue aims to prepare for the assessment of the construction licence application for the BWRX-300 reactor. In May 2023, the PAA issued a general opinion by the President of the PAA regarding selected technical assumptions of the BWRX-300 technology. The dialogue also takes place through regular technical, operational, and status meetings between the investor's representatives and the President of the PAA.
- KGHM – NuScale: in April 2024, the PAA completed the evaluation of the application for the second general opinion concerning the safety analysis methodologies for the NuScale reactor. This opinion was issued on April 22, 2024, and represents an important step in the ongoing prelicensing process.
- Last Energy – PWR-20: in 2024, the PAA continued preliminary talks with Last Energy regarding the possibility of implementing the PWR-20 reactor in Poland, analyzing its potential safety aspects and compliance with national regulations.

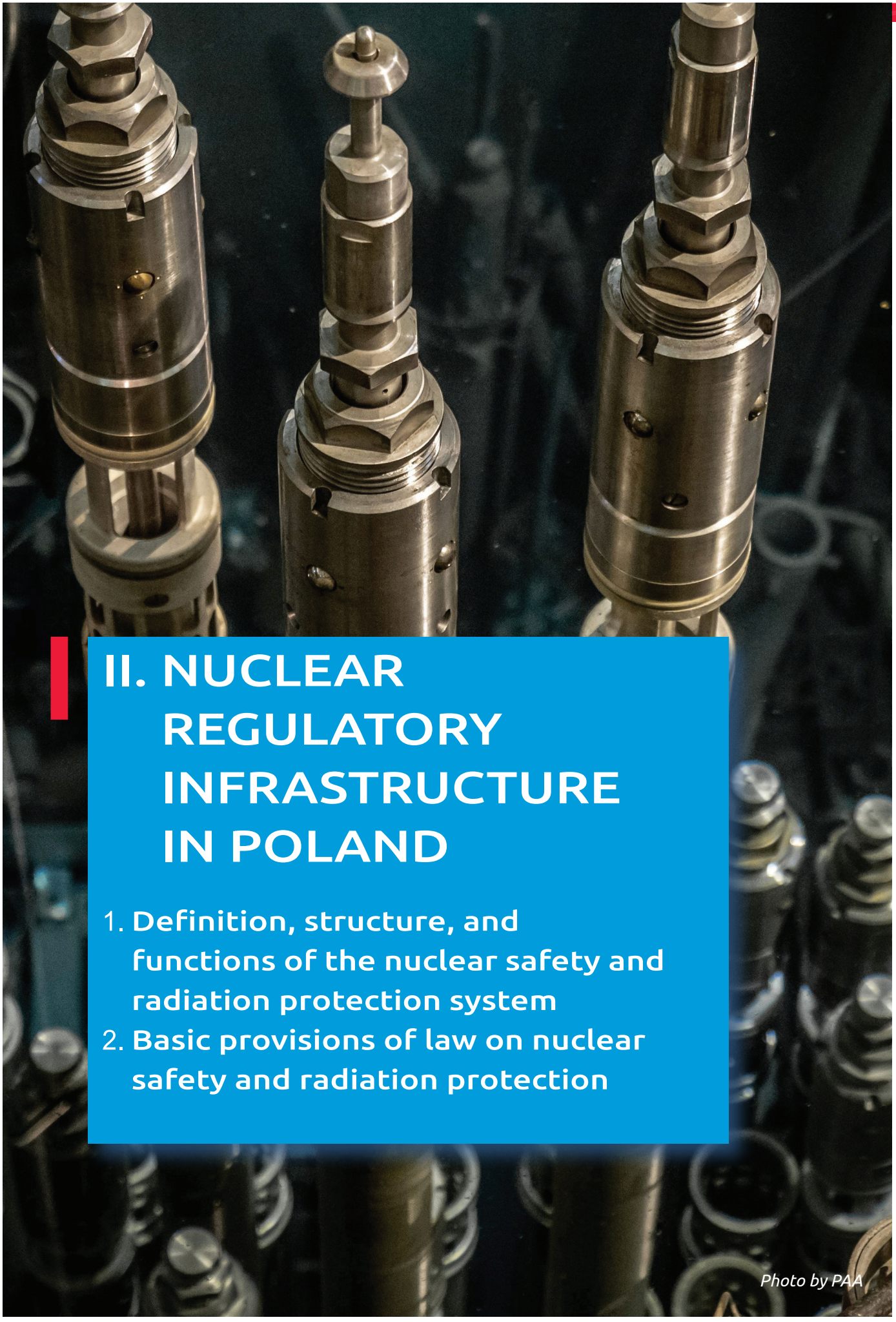
Moreover, the PAA actively participated in international initiatives supporting the licensing process of SMRs in Poland:

- Joint Early Review (JER) – NUWARD: in 2024, the PAA continued its participation in the second phase of the JER project, which aims to jointly assess key technological aspects of the NUWARD SMR reactor by six European nuclear regulatory authorities: Polish (PAA), French (ASN), Finnish (STUK), Czech (SUJB), Swedish (SSM), and Dutch (ANVS). This project has provided valuable insights into new and innovative technological solutions for nuclear reactors and has strengthened the PAA's international cooperation with other European regulators.
- Rolls-Royce SMR – Generic Design Assessment (GOA): The PAA actively participated in observing the second stage of the GOA process conducted by the UK regulatory authorities (Office for Nuclear Regulation – ONR, Environment Agency – EA, and Natural Resources Wales – NRW). Through this involvement, the PAA gained valuable experience that may be applied in future licensing processes for SMR technologies in Poland.
- Cooperation with the Canadian Regulator CNSC: The PAA remains in regular contact with the Canadian Nuclear Safety Commission (CNSC) regarding SMR technology, specifically the BWRX-300 reactor. As part of this partnership, the PAA and CNSC developed a detailed action plan in 2024, which includes numerous working meetings enabling the exchange of experience. These regular meetings allow for the identification of differences and potential areas for regulatory harmonization, which may streamline future implementation processes.
  - One of the key elements of the dialogue is the ongoing work on comparing the regulatory systems of both countries in the context of the planned construction of the BWRX-300 reactor.
  - The PAAis analyzing the Canadian approach to the licensing process, taking into account, among other things, methods for assessing safety systems and requirements for design documentation.
  - In addition, the PAA is engaged in regular exchange of experience with the Canadian nuclear regulator CNSC and the Belgian regulator FANC regarding approaches to licensing small modular nuclear reactors (SMRs).
  - Valuable insights are also drawn from so-called public hearings, i.e., meetings organized by the Canadian regulator to engage with the public.
  - In 2025, the PAA staff will complete on-the-job trainings at the Canadian regulator CNSC, participating in the work of the team responsible for the licensing process of small modular nuclear reactors.

Thanks to this cooperation, Poland benefits from Canada's experience, which will facilitate the licensing process in Poland in the future.

Summary

In 2024, the PAA focused on building a solid regulatory foundation and on close cooperation with investors and international partners. The actions undertaken contributed to increasing the Agency's readiness to effectively oversee the implementation of SMR technology in Poland and to enhancing its competencies in the regulation and licensing of advanced nuclear technologies.



II. NUCLEAR REGULATORY INFRASTRUCTURE IN POLAND

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

Photo by PAA

1. Definition, structure, and functions of the 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 are as follows:

- 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 Radiation 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 exposurerelated 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:
    a) consumer products,
    b) medical devices and accessories for medical devices, as defined by the provisions of Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009, and repealing Council Directives 90/385/EEC and 93/42/EEC (OJ EU L 117 of 05.05.2017, p. 1, as amended), as well as products listed in Annex XVI to that Regulation, and in vitro diagnostic medical devices and accessories for in vitro diagnostic medical devices, as defined by the

provisions of Regulation (EU) 2017/746 of the European Parliament and of the Council of 5 April 2017 on in vitro diagnostic medical devices and repealing Directive 98/79/EC and Commission Decision 2010/227/EU (OJ EU L 117 of 05.05.2017, p. 176, as amended), the trade in such devices or accessories, and the import into or export from the territory of the Republic of Poland of such devices or accessories, as well as 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, as well as accepting notifications and registrations related to the performance of such activities;

- 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 2024, the Act of 29 November 2000 – Atomic Law was amended three times:

1. on 1 July 2024, amendments to the Atomic Law Act entered into force, introduced by the Act of 15 May 2024 amending certain acts related to the functioning of public administration (Journal of Laws, item 834), taking into account the transfer of matters concerning the use of nuclear energy for socio-economic purposes from the field of government administration area of energy to the government administration area of energy raw materials management, and consisting in the replacement of previous references to the exercise of specific competencies by the minister responsible for energy, as contained in Article 33(1), (6), (8), (10) and (21)(2); Article 35a(16) and (17); Article 38d(5)–(7); Article 39n(9); Article 41o(1); Article 53(2), (5) and (7); Article 57^{1}(4); Article 57b(2) and (3); Article 57c(1); Article 57d(1); Article 57e(1)–(3); Article 57f(1) and (2); Article 57g(1) and (2); Article 73(1); Article 74(1); Article 103(10); Article 108a; Article 108d(1) and (3); Article 108e(1) and (2); Article 116(1)–(5), in Article 117(2) and (3), Article 118(2b), Article 119(1b) and (3), Article 119a, Article 120(1), (1b), (1c), (1f), (1g), (1i), (1k) and (2), Article 121(3), and Article 129 of the Act of 29 November 2000 – Atomic Law, with the relevant references to the exercise of these competencies by the minister responsible for energy raw materials management;
2. pursuant to the provisions of the Act of 27 November 2024 amending the Act on the Medical Centre of Postgraduate Education and certain other acts (Journal of Laws, item 1897), as of 1 January 2025, the Medical Centre of Postgraduate Education changed its name to the Centre for Postgraduate Medical Education, which necessitated reflecting this change in Article 33h(8)(3)(a) of the Act of 29 November 2000 – Atomic Law;

3. the Act of 5 December 2024 on Civil Protection and Civil Defence (Journal of Laws, item 1907) discontinued the use of the term 'civil defence of the country' in favor of the term 'civil defence', and accordingly introduced, as of 1 January 2025, a corresponding terminological change in Article 110 point 8 of the Act of 29 November 2000 – Atomic Law.

Other acts

Provisions directly related to nuclear safety and radiation protection are also included in the Act of 29 June 2011 on the Preparation and Implementation of Investments in Nuclear Power Facilities and Accompanying Investments (Journal of Laws of 2024, items 1410 and 1572), hereinafter referred to as the 'Nuclear Special Act', which introduced the institution of a preliminary siting report. An investor intending to construct a nuclear power facility (such as a nuclear power plant) has been given the option, if deemed necessary, to request an opinion from the President of the National Atomic Energy Agency regarding nuclear safety and radiation protection in relation to the preliminary siting report prepared by the investor following an initial assessment of the land intended for the facility's site.

In connection with the necessity to implement investments in nuclear power facilities and accompanying investments, and in execution of the statutory authorization set out in Article 5b(8) of the Nuclear Special Act, the National Atomic Energy Agency, under a power of attorney granted to its President by the Minister of Climate and Environment, developed a draft regulation of the Council of Ministers concerning the detailed scope of conducting a preliminary assessment of land intended for the site of a nuclear power facility that is also a nuclear facility, the cases excluding the possibility of recognizing such land as suitable for the site of a nuclear power facility that is also a nuclear 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 power 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 human-induced (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 2024, the draft was subjected to arrangements, opinioning and public consultation procedures conducted by the President of the National Atomic Energy Agency. On 23 September 2024, the agreed draft was submitted to the Ministry of Climate and Environment for further processing, during

which the National Atomic Energy Agency provided substantive support to the ministry. The draft was adopted by the Government Committee for European Affairs (on 23 October 2024), and subsequently by the Standing Committee of the Council of Ministers (on 28 November 2024). Following the Legal Committee (on 10 December 2024), the draft regulation was submitted to the Council of Ministers for preliminary approval on 30 December 2024.

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 (Journal of Laws of 2024, item 643), the Act of 18 August 2011 on maritime safety (Journal of Laws of 2024, items 1068 and 1933), the Act of 21 December 2000 on technical inspection (Journal of Laws of 2024, item 1194) and the Act of 5 August 2022 on the transport of dangerous goods by air (Journal of Laws., item 1715).

Implementing acts to the Atomic Law Act

In 2024, internal work was carried out at the National Atomic Energy Agency on the following draft regulations:

1. amendments to the Regulation of the Council of Ministers of 17 December 2002 on early warning stations for radioactive contamination and facilities taking measurements of radioactive contamination (Journal of Laws, item 2030);
2. amendments to the 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 (Journal of Laws, item 1048);
3. a new Regulation of the Council of Ministers to replace the Regulation 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 (Journal of Laws, item 1043);
4. amendments to the Regulation of the Council of Ministers of 30 August 2021 on the 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 (Journal of Laws, item 1667).

Summary

The primary legal act in the field of nuclear safety and radiation protection is the Act of 29 November 2000 – Atomic Law.

In 2024, amendments to this Act entered into force, introduced by the Act of 15 May 2024 amending certain acts related to the functioning of public administration (Journal of Laws, item 834).

The purpose of these amendments was to reflect, within the content of the Act of 29 November 2000 – Atomic Law, the transfer of competencies in matters concerning the use of nuclear energy for socio-economic purposes to the minister responsible for energy raw materials management. In addition, in 2024, two acts were adopted introducing terminological corrections to the provisions of the Atomic Law, which entered into force on 1 January 2025:

– the Act of 27 November 2024 amending the Act on the Medical Centre of Postgraduate Education and certain other acts (Journal of Laws, item 1897), and

– the Act of 5 December 2024 on Civil Protection and Civil Defence (Journal of Laws, item 1907)

In order to implement the statutory authorization set out in Article 5b(8) of the Act of 29 June 2011 on the preparation and implementation of investments in nuclear power facilities and accompanying investments, the National Atomic Energy Agency developed a draft regulation of the Council of Ministers concerning the detailed scope of conducting a preliminary assessment of land intended for the site of a nuclear power facility that is also a nuclear facility, the cases excluding the possibility of recognizing such land as suitable for the site of a nuclear power facility that is also a nuclear facility, and the detailed scope of the preliminary siting report for such a facility. The draft underwent arrangements, opinioning and public consultation process. Work on this draft continued at the Ministry of Climate and Environment. In 2024, the National Atomic Energy Agency also carried out internal work on four draft regulations of the Council of Ministers, which are implementing acts to the Atomic Law.

III. 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

Photo by the PAA

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.

BASIS TO BE GRANTED A LICENSE

Application, referred to in Article 5, Section 1 of the Act of November.

Documents specified in the Regulation of the Council of Ministers of 30 August 2021 on the 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.

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's President, is **5,261** (as of 31 December 2024).

The number of all registered activities involving exposure to ionizing radiation is **8,692** (as of 31 December 2024).

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.

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 (Journal of Laws 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. In 2024, a total of 297 such inspections were carried out (of which 224 were conducted by inspectors from Warsaw and 73 by inspectors from Katowice), including:

- 200 inspections in accordance with the 2024 inspection plan,
- 76 inspections resulting from previous inspection plans,
- 20 reactive inspections,
- 1 inspection of compliance with nuclear safety and radiation protection (BJiOR) conditions in connection with a licence application

The Radiation Protection Department's inspection plan for 2024 was therefore implemented in 100%. 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 2012-2024.

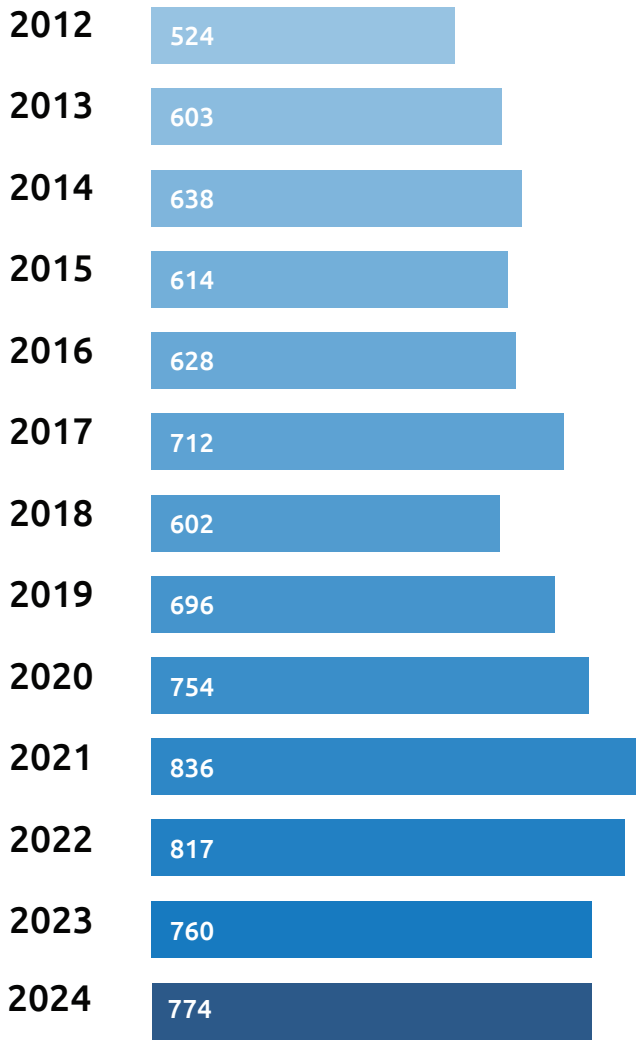


FIGURE 4
Implementation of the Radiation Protection Department's inspection plan in 2012-2024.

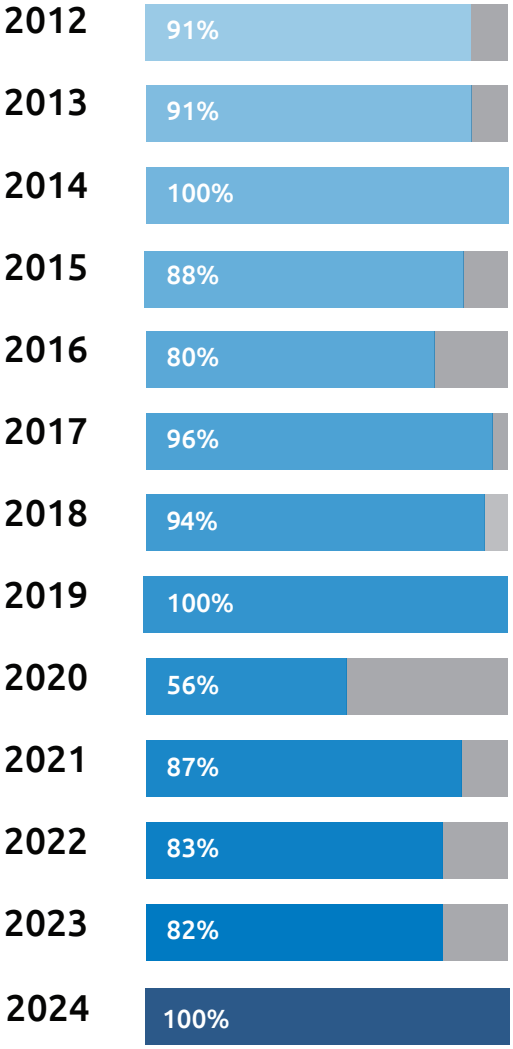


TABLE 1
Users of ionizing radiation sources in Poland in numbers (as of 31 December 2024).

				Issued in 2024					Inspections	
TYPE OF ACTIVITIES	SYMBOL	NUMBER OF ENTITIES	NUMBER OF ACTIVITIES	LICENSES	AMENDMENTS TO LICENSES	REGISTRATION ACCEPTANCE DECISIONS	AMENDMENTS TO REGISTRATIONS	NOTIFICATIONS	INSPECTIONS IN 2024	INSPECTIONS FREQUENCY
Class I laboratory	I	2	2	0	0	0	0	0	2	annually
Class II laboratory	II	99	134	4	20	0	0	0	9	every 2 years
Class Ill laboratory	III	115	224	3	9	4	0	0	8	every 4 years
Class Z laboratory	Z	157	280	7	5	3	1	0	26	every 4 years
Smoke detector installer	UIC	236	330	1	6	0	0	0	10	every 5 years
Device installer	UIA	268	383	22	85	0	0	0	11	every 5 years
Isotope device	AKP	483	696	0	3	24	6	0	12	every 5 years
Manufacturing of isotope sources and devices	PRO	23	30	0	2	0	0	0	3	every 3 years
Trade in isotope sources and devices	DYS	81	86	0	4	0	0	0	5	every 5 years
Accelerator	AKC	86	268	14	12	0	0	0	15	every 4 years
Isotopic applicators	APL	39	56	5	4	0	0	0	3	every 2 years
Telegammatherapy	TLG	4	4	0	0	0	0	0	2	annually
Instruments for irradiation	URD	23	24	0	0	0	0	0	3	every 3 years
Gammagraphic apparatus	DEF	99	101	4	14	0	0	0	15	every 2 years
Storage facility for radioactive source	MAG	193	245	7	11	1	0	0	15	every 3 years
Work with sources outside laboratory	TER	107	138	13	7	1	0	0	6	every 3 years
Transport of sources or waste	TRN	505	512	2	1	2	0	0	11	every 5 years
Chromatograph	CHR	233	287	0	0	2	1	0	2	every 10 years
Veterinary X-ray instrument	RTW	1,855	2,164	351	16	0	0	0	59	every 10 years
X-ray scanner	RTS	885	1,360	16	9	152	30	0	20	every 10 years
X-ray defectoscope	RTD	215	265	18	26	0	0	0	23	every 2 years
Other X-ray instrument	RTG	709	1,103	54	19	83	10	0	31	every 10 years
Additional inspections									6	additionally
Total			8,692	521	253	272	48	0	297	

Regular and reactive 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.

Reactive 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, one inspection was 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 2024 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.

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

The register comprises the data on 30,563 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 handover dates), and related documents.

30,563

RADIOACTIVE SOURCES IN THE REGISTER OF THE PRESIDENT OF THE PAA

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 1,301 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 3,511 Category 2 sources currently in operation.

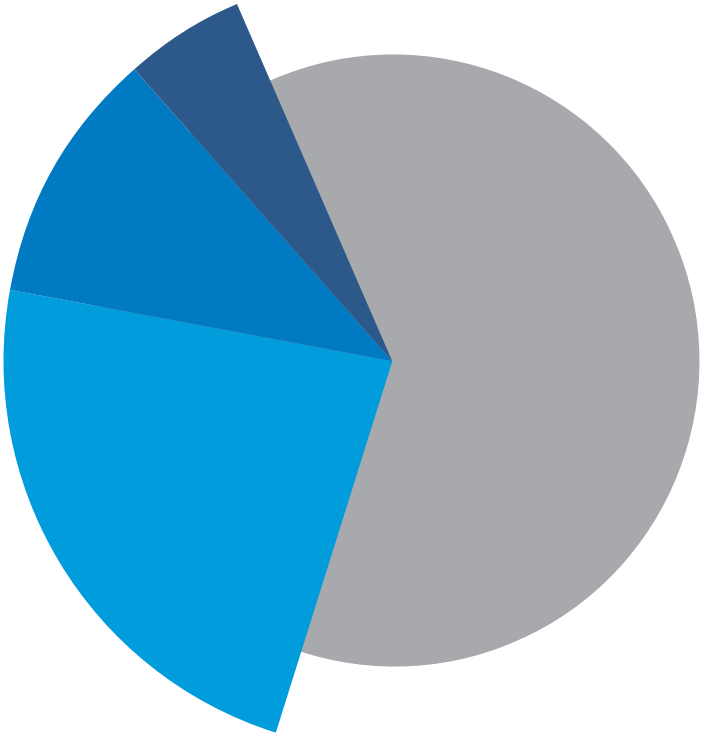
Category 3 – sealed radioactive sources used in stationary industrial meters, which contain high-activity sources, and in geophysical probes.

The register contains 6,415 Category 3 sources currently in operation.

1,301
CATEGORY 1 SOURCES

3,511
CATEGORY 2 SOURCES

6,415
CATEGORY 3 SOURCES



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

TABLE 2
Selected radioactive isotopes and sources containing them, currently in operation (as of 31 December 2024).

	Number of sources in the register		
ISOTOPE	**CAT. 1**	**CAT. 2**	**CAT. 3**
Co-60	962	1,089	1,368
Cs-137	58	188	2,024
Ir-192	137	1,082	5
Am-241	14	335	642
Sr-90	–	36	590
Se-75	109	364	4
Co-57	3	29	211
Ni-63	–	7	237
Th-232	–	5	260
Kr-85	5	61	130
Pu-239	2	78	86
other	11	237	858
TOTAL	**1,301**	**3,511**	**6,415**

Summary

In 2024 the number of organizational entities, registered in the register of organizational entities whose activities require at least registration, increased from 5,062 to 5,261, where the largest growth occurred for entities using devices generating ionizing radiation in veterinary medicine. The number of sealed radioactive sources, used in organizational entities and registered in the register of the President of the PAA, increased by 746. A large part of them comprised sealed radioactive sources classified as Category 2 and used in defectoscopic measurements. At the same time, the number of inspections of activities involving exposure to ionizing radiation carried out in 2024 was 297. The Radiation Protection Department's inspection plan for 2024 was therefore implemented in 100%.

IV. 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

Photo by PAA

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); in 2024, it was the only reactor operating in the country. It is a high flux pool type reactor with a nominal thermal power of 30 MW_t 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 shutdown 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 2024, 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.

In 2024, the operation of the MARIA reactor included 4,531 hours of operation over 32 cycles at power levels ranging from 18 to 26 MW (Figure 7). In 2024, only MR-6 fuel enriched to 19.7% and MC-5 fuel enriched to 19.75% in the U-235 isotope were used in the MARIA reactor.

In 2024 six unplanned reactor shutdowns were recorded. The reactor was shut down due to: exceeding the limit of readings from the Fuel Elements Leakage Detection System (WNEP), damage to a fuel channel cladding, a temporary loss of power and erroneous readings from measuring instruments. None of the unplanned shutdowns posed a threat to nuclear safety or radiation protection.

The MARIA research reactor was restarted following decisions issued by the President of the National Atomic Energy Agency (PAA) authorizing its restart after the completion of modernization works: the aerosol measurement system in Building B (SA B) and the first stage of modernization of the Impulse Startup Line Circuit. The most important modernization activities in 2024 involved the control and visualization system of the WNEP system.

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.

The MARIA reactor can also be used for conducting physical research using six horizontal channels (from H-3 to H-8). In 2024, no such research was carried out.

As part of the modernization programme, advanced research equipment acquired from another foreign research reactor is planned to be installed.

The technological pool of the MARIA reactor is currently used for storing spent nuclear fuel of the MC and MR types originating from the reactor's ongoing operation.

In 2024, a fire safety review and an assessment of fire protection systems were 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). In 2024, the second phase of the review – peer assessment by EU member states – was completed. As part of this process, a technical visit by an ENSREG expert team took place at the MARIA reactor on May 21, 2024.

A summary of general information on the operation of the reactor is presented on pages 32-33.

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.

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.

FIGURE 5
Materials irradiated in the MARIA reactor by 2024 (data: NCBJ).

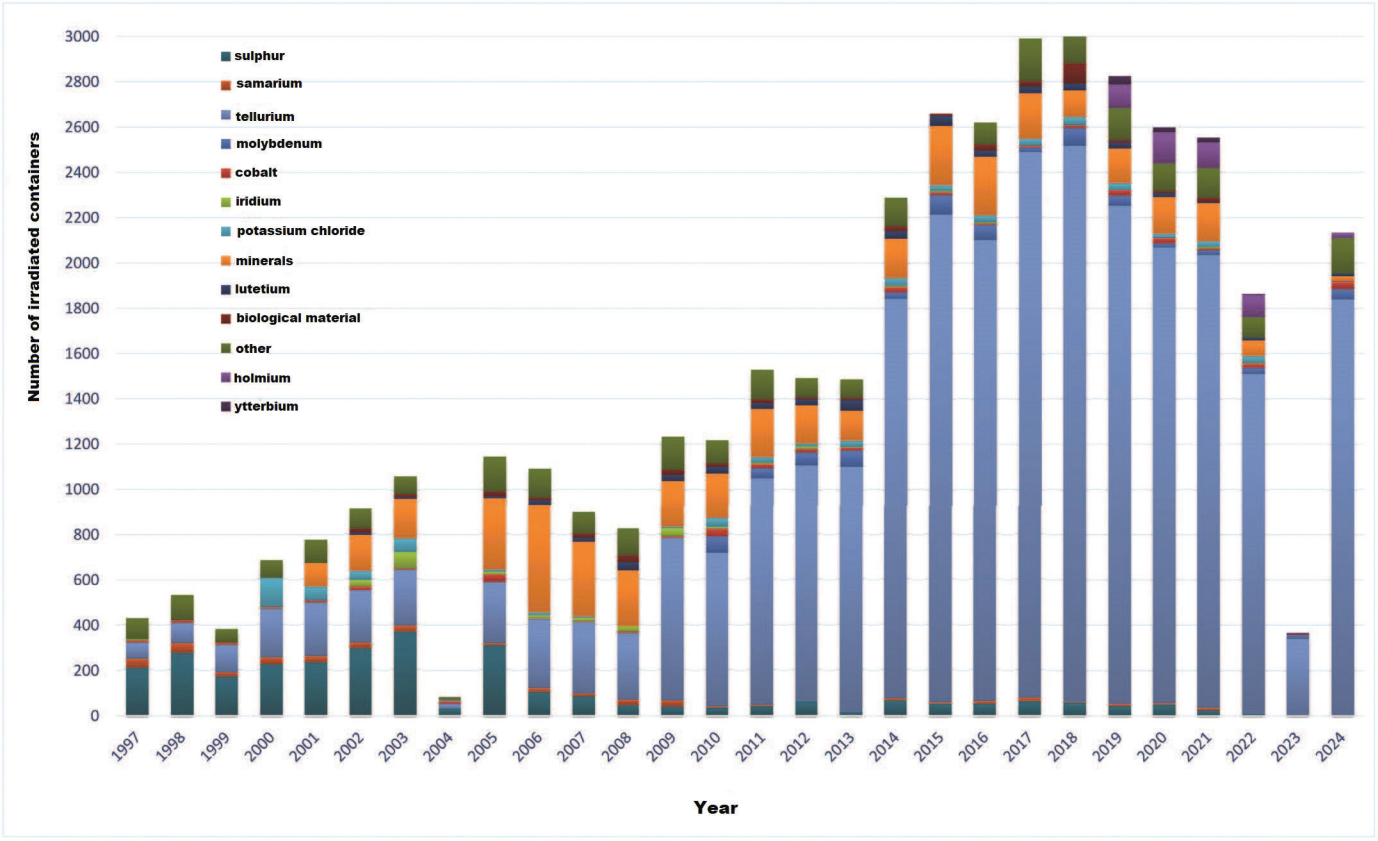
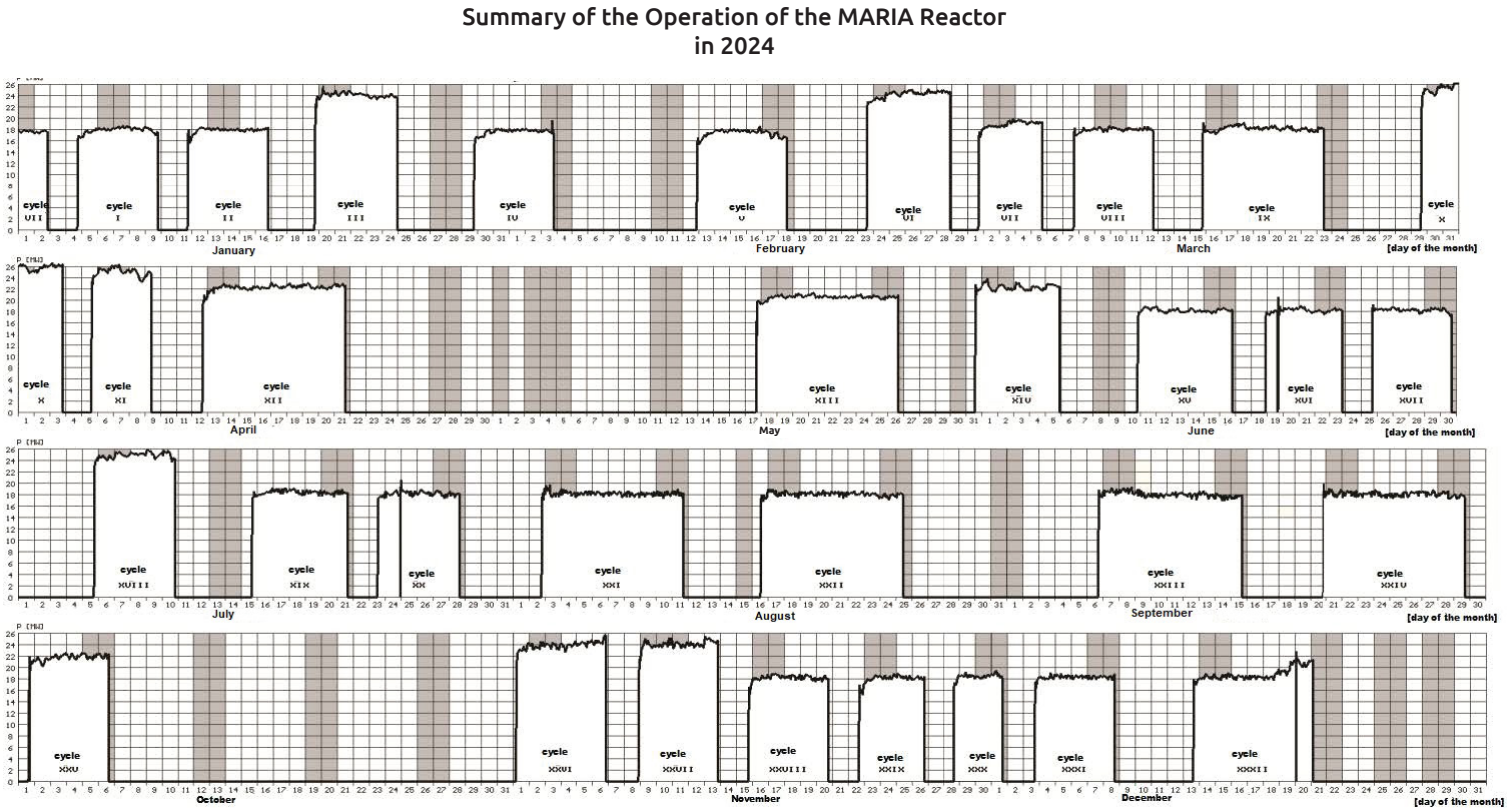


FIGURE 6
Summary of the operation cycles of the MARIA reactor in 2024 (data: NCBJ), compiled and prepared by Andrzej Frydrysiak – DOM EJ2.



Summary

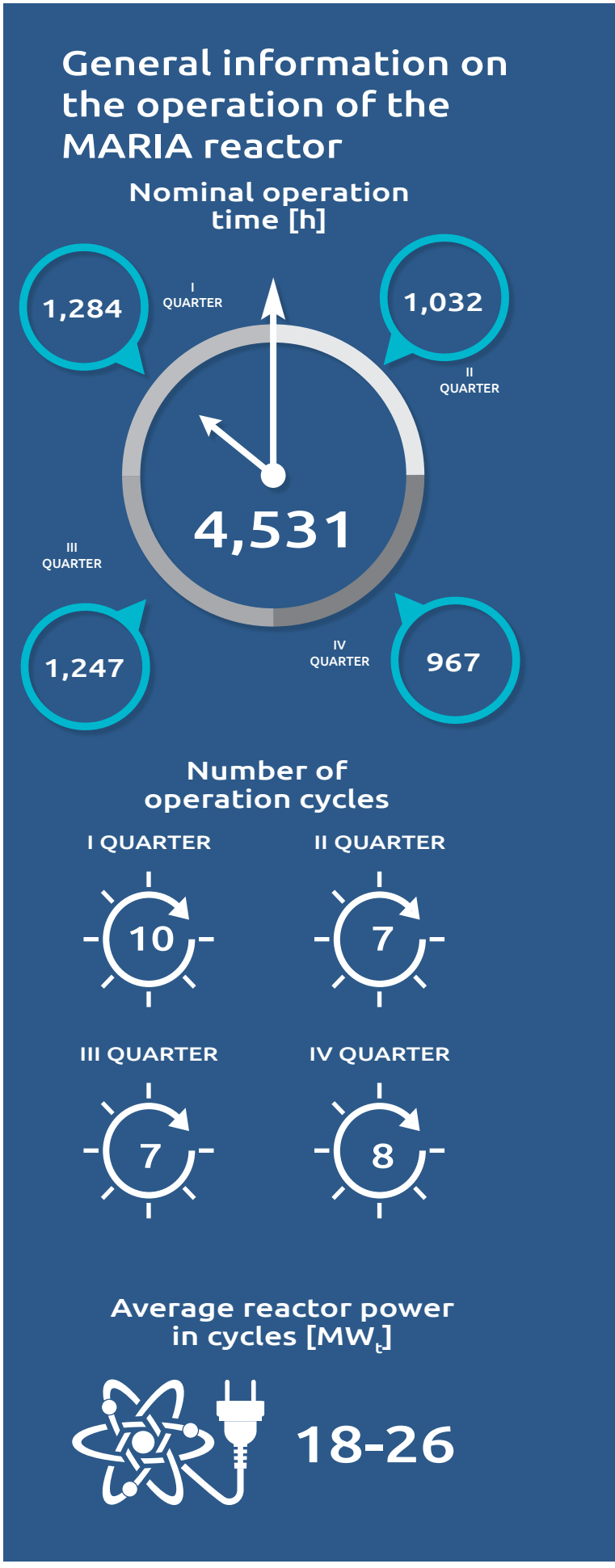
The EWA reactor, which was the first nuclear reactor used in Poland, is now under decommissioning. The EWA reactor is now safe for the environment as a result of the decommissioning work performed so far and its infrastructure may be still used by the ZUOP.

Spent nuclear fuel storage facilities

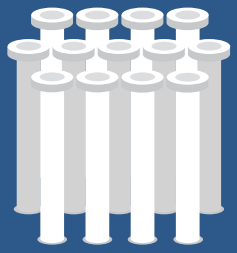
Spent nuclear fuel storage facilities also constitute nuclear facilities in Poland, including facilities no. 19 and 19A which have belonged to the ZUOP since January 2002. These facilities are classified as wet storage facilities, i.e. they are adapted for the storage of spent nuclear fuel in the water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



Number of fuel elements in the core



20-25

In individual quarters of 2024

	I QUARTER	II QUARTER	III QUARTER	IV QUARTER	2024
identified malfunctions	1	2	1	2	6
repair and maintenance work carried out	14	16	7	20	57
tests, inspections, and reviews carried out	27	61	19	78	185

Shutdowns

Equipment malfunction (I.)	2
Instrumentation errors (II.)	2
Temporary loss of power	2

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 was valid until 31 March 2025. In 2024 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 was submitted to the PAA for assessment on 20 August 2024. 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 thestorage of nuclear materials,
- License no. 2/2015/NCBJ of 3 April 2015 for the storage of spent nuclear fuel.

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 2024.

The PAA, in the area of nuclear facilities and nuclear materials, carried out:

11 INSPECTIONS AT THE NCBJ

(NATIONAL CENTRE FOR NUCLEAR RESEARCH)

5 INSPECTIONS AT THE ZUOP

(RADIOACTIVE WASTE MANAGEMENT PLANT)

16 inspections in total

3. Regulatory inspections

In 2024, nuclear regulatory inspectors of the PAA carried out 16 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 12 cases nuclear regulatory inspectors found violations of provisions on nuclear facilities and radioactive waste repositories 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:

- reactor core and vessel:
- graphite and beryllium units;
- fuel and control channels;
- horizontal channels, experimental devices;
- absorber rod drive mechanism;
- the fuel channel cooling system and the pool cooling system;
- main and shutdown pumps along with associated piping and valves;
- heat exchangers, pipelines, and valves; pressure stabilizer tank and expansion tank along with associated valve;
- mechanical and ion-exchange filters along with associated valves;
- discharge, recirculation, and filling system along with tanks;
- emergency pool flooding system;
- neutron instrumentation system;
- reactor shutdown and startup;
- carrying out repair and maintenance work;
- implementation of corrective actions;

- conducting safe operation based on the operational experience of other nuclear facilities;
- fire safety;
- radiation emergency management system;
- state of radiation protection.

Inspections conducted in the spent nuclear fuel storage facilities and in the radioactive waste repository (5) included, among other things, verification and evaluation of:

- radiation emergency management system;
- state of radiation protection;
- the technical condition of the facilities at the National Radioactive Waste Repository;
- the joint inventory of radioactive waste;
- the status of the decommissioning of the EWA research reactor facility;
- integrated management system;
- 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 – 8 at the NCBJ, 4 at the ZUOP, including 2 at the KSOP. In 2024, the President of the PAA issued one decision ordering to remedy the deficiencies found and 1 post-inspecton notices related to the infringements found during the aforementioned inspections.

Summary

In 2024, the oversight over exposure-related activities carried out at the nuclear facilities and the nuclear radioactive waste repository 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 2024, the PAA inspectors carried out a total of 16 inspections related to nuclear facilities and the nuclear radioactive waste repository. The inspections conducted in 2024 confirmed that there were no hazards for the nuclear 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

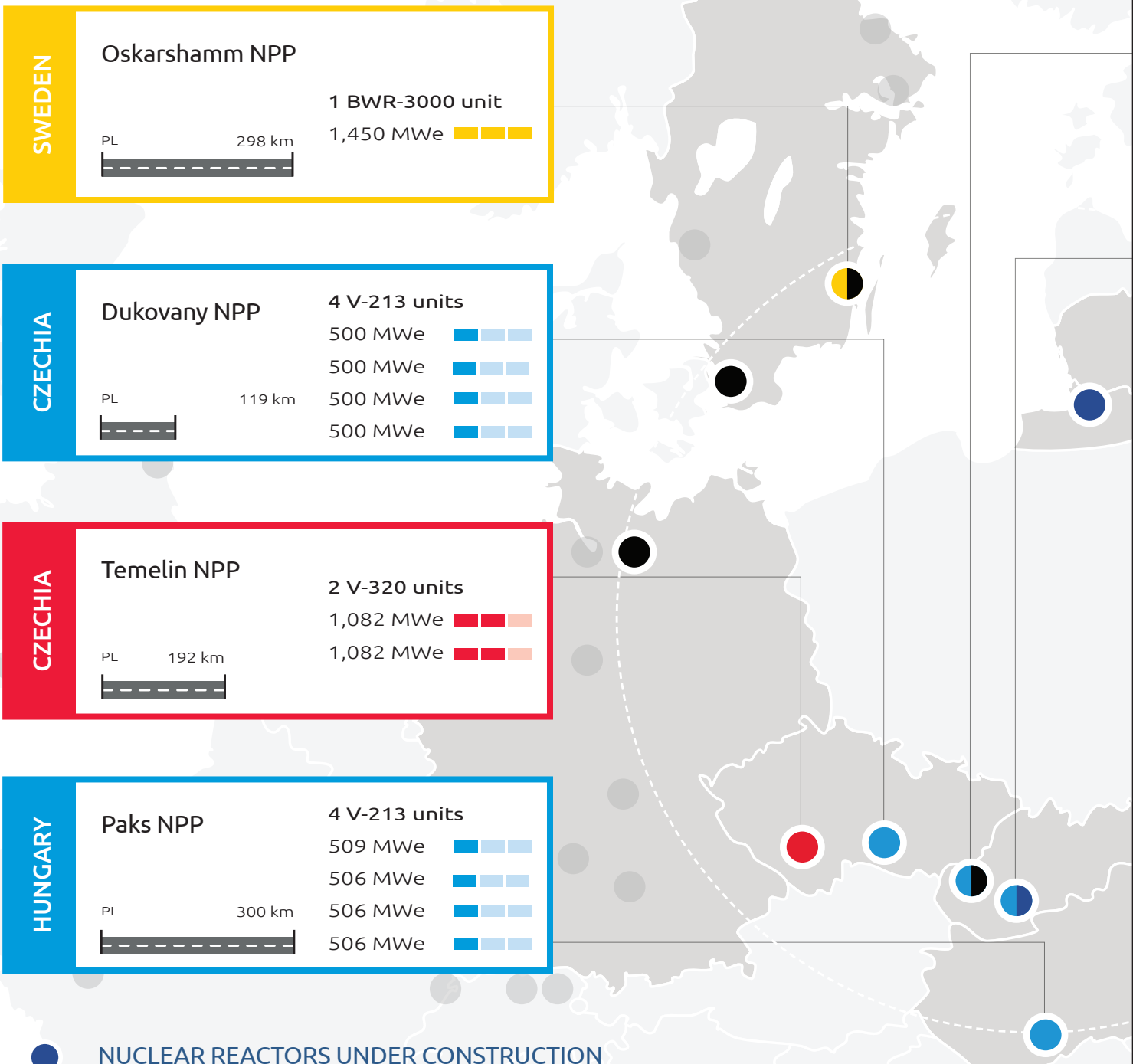
According to the provisions of the Atomic Law Act, in performing oversight and inspection in terms of nuclear safety and radiation protection at nuclear facilities, nuclear regulatory authorities cooperate with other administrative bodies through a **coordination system** established by the President of the Agency in agreement with the Head of the Internal Security Agency, the Office of Technical Inspection, the Chief Inspector of Environmental Protection, the Chief Sanitary Inspector, the Commander-in-Chief of the State Fire Service, the Chief Inspector of Building Supervision, and the Chief Labour Inspector. Within this system, at the beginning of each year, the President of the Agency informs the administrative bodies forming the coordination system about the inspections carried out in the previous year by the nuclear regulatory authorities in nuclear facilities, their results, identified irregularities, decisions and actions taken in this regard, as well as plans for inspections for the current year. At the same time, the President of the Agency requests these administrative bodies to provide corresponding information regarding their activities during the past year and plans for the current year in the field of oversight and inspection of nuclear facilities.

The collected information is used by the President of the Agency to carry out tasks related to the oversight and inspection of nuclear facilities, particularly to enhance the effectiveness of actions, including through the possibility of organizing joint inspections and training by the administrative bodies.

Additionally, in 2024, a form of coordination agreement was developed and agreed upon, with its signing scheduled for 2025.

5. Nuclear power plants in neighboring countries

There are 9 nuclear power plants operating 24 power reactors with a total capacity of about 17.0 GWe within 300 km of the Polish borders.



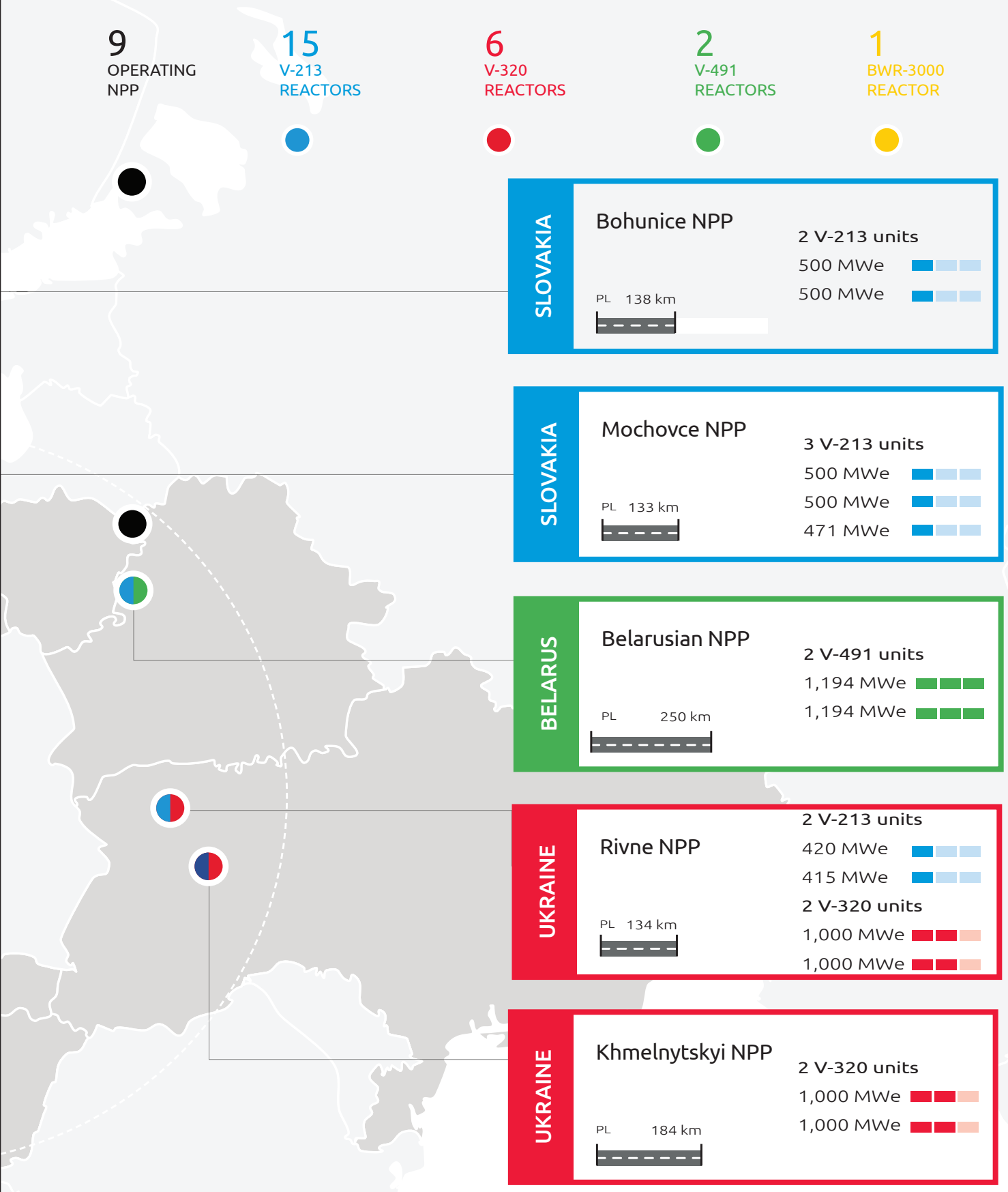
NUCLEAR REACTORS UNDER CONSTRUCTION

1 V-213 reactor
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



DECOMMISSIONED POWER PLANTS

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

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

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

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

V. NUCLEAR SAFEGUARDS

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

Photo by PAA

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 Ill 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 (INFCIRC/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 28 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**;
- 25 medical and scientific facilities that use small amounts of nuclear materials and 81 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.

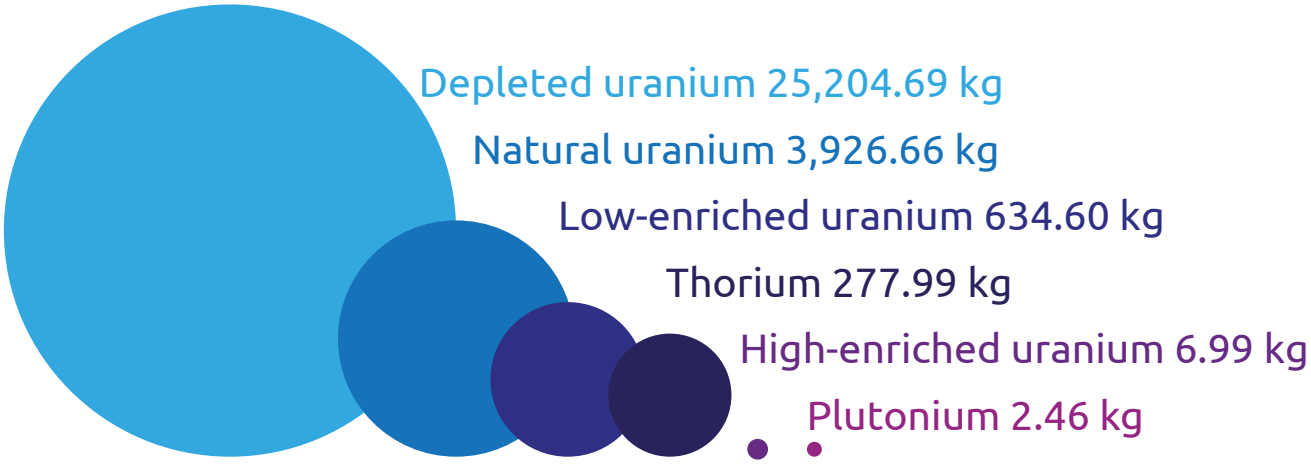
The reports on quantitative changes in the stock of nuclear materials in individual MBAs (the so-called Inventory Change Report) are submitted monthly to the Nuclear Material Accounting and Control System maintained by the European Commission's Nuclear Safeguards Office in Luxembourg. A copy of this 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 dualuse technologies, the PAA cooperates with the Department of Sensitive Goods Trade and Technical Safety of the Ministry of Development and Technology. The Ministry of Development 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 2024).



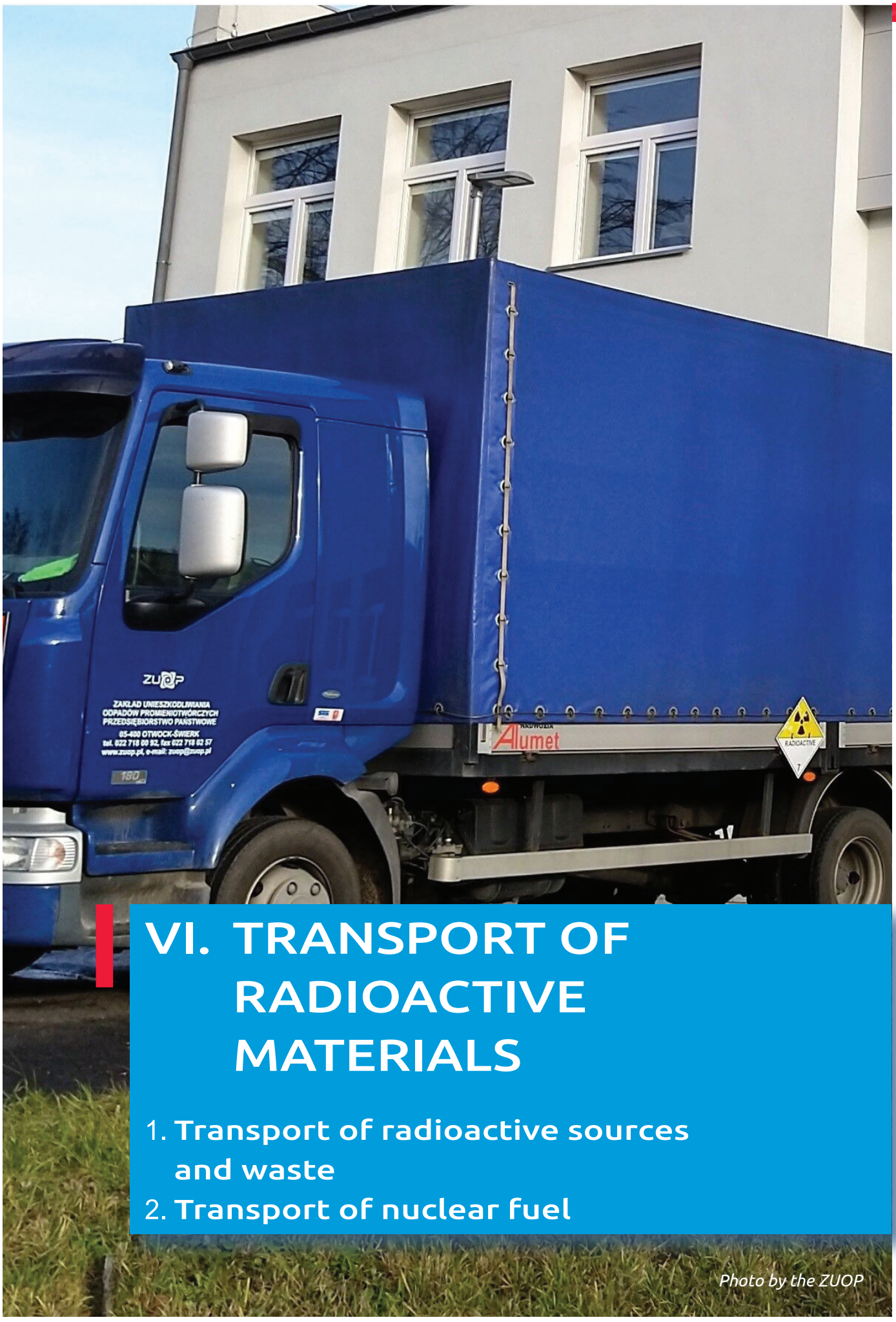
3. Inspections of nuclear safeguards

In 2024, the PAA's nuclear regulatory inspectors carried out, individually or jointly with the IAEA and EURATOM inspectors, 34 inspections of nuclear safeguards in all material balance areas in Poland. EURATOM inspectors took part in 20 inspections, 17 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.



VI. TRANSPORT OF RADIOACTIVE MATERIALS

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

Photo by the ZUOP

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 (French: 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.

Radioactive 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 Guard, which has 413 stationary radiometric devices, so-called radiometric portal monitors, installed at border crossings, over 1,500 portable signalling and measuring devices, as well as 2 vehicles with a system of ionizing radiation detectors to measure ionizing radiation in the field. As in previous years, the Border Guard received equipment support from the United States under the cooperation agreement signed in 2009 between the U.S. Department of Energy (DoE) and the Minister of the Interior and Administration as well as the Minister of Finance of the Republic of Poland, concerning cooperation in combating the illicit trafficking in special nuclear materials and other radioactive materials. Since 2010, more than 160 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 Guard. Further installation of radiometric portal monitors at border crossings is planned.

2. Transport of nuclear fuel

Shipments of fresh and spent nuclear fuel are licensed by the President of the PAA. In 2024, 8 shipments (in transit) of fresh nuclear fuel and 1 shipment of fresh nuclear fuel took place on the territory of the Republic of Poland. In 2024, no shipment of spent nuclear fuel took place on the territory of the Republic of Poland

Fresh nuclear fuel

Since 2007, fresh nuclear fuel has been imported into Poland 15 times, including: MR fuel from the Russian Federation – twice, and MC fuel from France – 13 times, in connection with the operation of the MARIA research reactor at the National Centre for Nuclear Research in Świerk; 27 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 2024, 47,282 shipments of radioactive materials and 198,430 shipments were transported by road, rail, inland waterways, sea, and air on the territory of Poland, covering a distance of 8,317,524 km. The ten most frequently transported isotopes included: Se-75, Ir-192, Am-241, Cs-137, Co-60, I-131, Mo-99, Kr-85, U-235, Ge-68.

The Radioactive Waste Management Plant also carried out 6 shipments of radioactive waste to the National Radioactive Waste Repository in Różan. No accidents occurred during the transport of radioactive materials and radioactive waste.

Summary

The Commander-in-Chief of the Border Guard and the President of the PAA, under the agreement on cooperation in the field of radiation protection, undertake to provide information to prevent illegal movement of radioactive materials across the state border. The officer on duty at the Radiation Emergency Centre systematically cooperates with Border Guard officers 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 public or to the environment. However, they exceeded the permissible radioactive concentrations 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 – **4,404** INSPECTIONS, (THE ITEM DID NOT CROSS POLAND'S BORDER IN A SINGLE CASE) ESPECIALLY:	**987** inspections	**3,148** inspections	**267** inspections
TRANSPORT OF MATERIALS CONTAINING NATURAL RADIOACTIVE ISOTOPES – **22,217** INSPECTIONS, (THE ITEM DID NOT CROSS POLAND'S BORDER IN 99 CASES) ESPECIALLY:	**11,622** inspections	**10,491** inspections	**5** inspections
TRANSPORT OF OTHER UNDECLARED ITEMS (E.G. ITEMS CONTAINING COMPONENTS PAINTED WITH RADIUM PAINT, CONTAMINATED CLOTHING, SCRAP METAL) – **73** INSPECTIONS, ESPECIALLY:	**17** inspections	**56** inspections	**0** inspections
PERSONS AFTER TREATMENT OR EXAMINATION WITH RADIOACTIVE ISOTOPES – 1,277 INSPECTIONS	**1,277** inspections		
IN 2024, THE BORDER GUARD CARRIED OUT:	**27,970** inspections		

VII. RADIOACTIVE WASTE

1. **Radioactive waste management**
2. **Radioactive waste in Poland**

Photo by the PAA

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 (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.)

LIQUID WASTE

consists mainly of water solutions and suspensions of radioactive substances.

GASEOUS WASTE

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

When classifying radioactive waste, the radioactive concentration of the radionuclides contained in the waste and their half-life are taken into account.

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.

In 2024, the President of the PAA issued the Technical Recommendations of the President of the PAA concerning the safety of radioactive waste storage.

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 2024.

Sources of waste	Solid waste [m³]	Liquid waste [m³]
Outside the National Centre for Nuclear Research in Świerk (medicine, industry, scientific research)	6.81	0.23
National Centre for Nuclear Research, POLATOM	11.12	0.19
National Centre for Nuclear Research + MARIA reactor*	8.61	65.00
Radioactive Waste Management Plant (ZUOP)	1.98	26.60
Total	**28.52**	**92.02**

*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 shortlived, low- and intermediate-level radioactive waste (with a radionuclide half-life of less than 30 years) as well as short-lived, low- and intermediate-level disused sealed radioactive sources with an activity of up to 4×10^{11} Bq. 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 2024, the ZUOP received 239 orders from 165 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 2024, 76 200-litre drums of treated radioactive waste, three pieces of reusable (returnable) shielding containers with radioactive sources, all together with a total activity of 6.39 TBq, were transferred to the KSOP (data as of 31 December 2024).

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

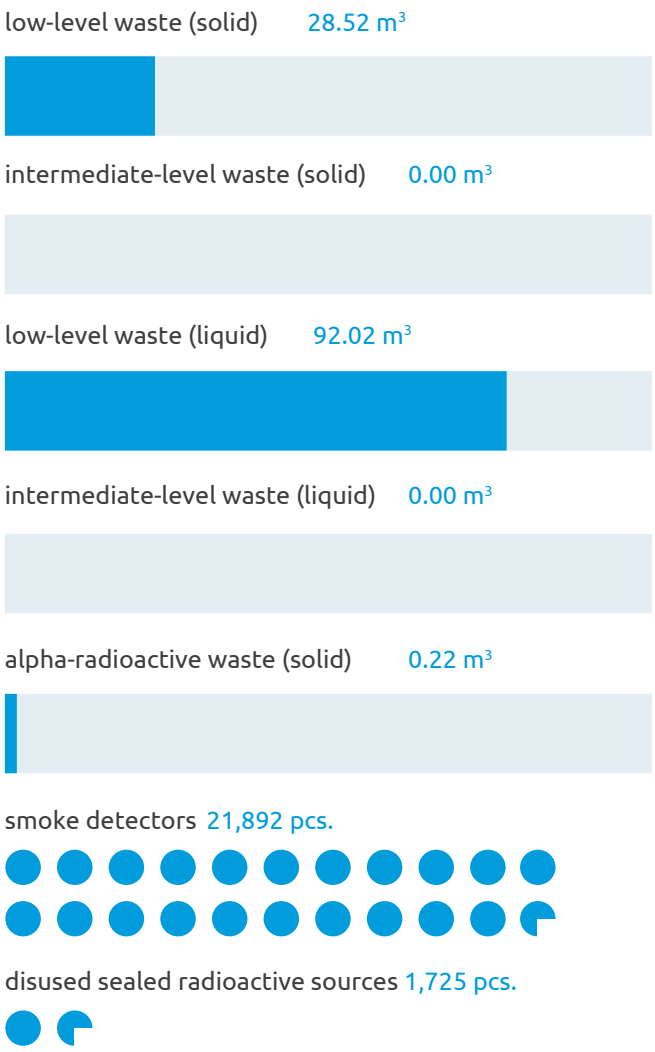
The radioactive waste management at the ZUOP is carried out on the basis of licenses issued by the President of the PAA:

- 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, as amended by Decision No. 1/2024/KSOP – Różan of 20 May 2024,
- 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 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.

FIGURE 7
The collected solid and liquid waste by type and category may be broken down as follows:



Nuclear regulatory inspectors from the PAA carried out four inspections on radioactive waste management at the ZUOP in 2024, including the following:

- two inspections were carried out at the KSOP, which included checking: the radiation emergency management system, the status of radiation protection, the technical condition of the KSOP facilities, and the joint accountancy of radioactive waste,
- two inspections at the ZUOP facilities at the Świerk nuclear site, which concerned the decommissioning of the EWA research reactor facility, the integrated management system, and the technical condition of the spent nuclear fuel storage facilities.

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 2024 was at a level comparable to previous years.

In accordance with the report submitted by the ZUOP, in 2024 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:

Low-level

Intermediate-level

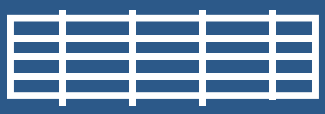
High-level

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.

Photo by PAA

VIII. 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

Photo by the NCBJ

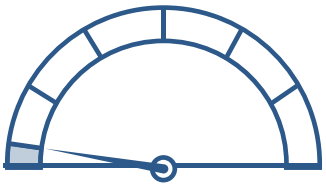
1. Exposure of the population to ionizing radiation

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

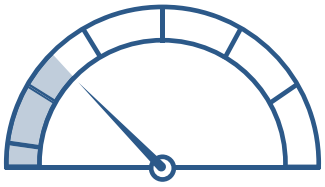
For occupational workers with exposure to ionizing radiation and for school students, tertiary education students, and apprentices aged 18 or older, the dose limit is 20 mSv per calendar year. In the case of workers, this dose may be exceeded up to 50 mSv per year, if such an excess is authorized by 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.

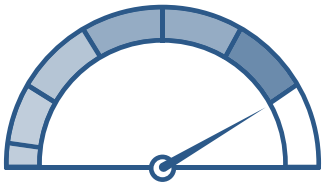
INFOGRAPHICS



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.

INFOGRAPHICS

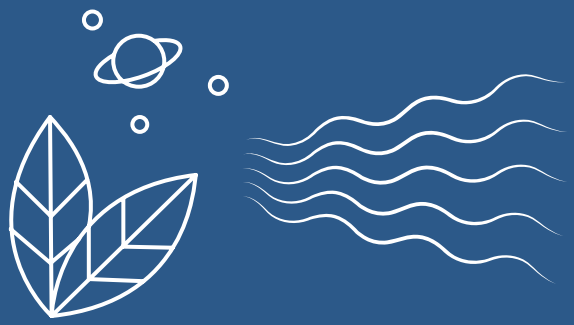
The percentage of different ionizing radiation sources in the annual average effective dose.

4.86 mSv

annual total effective dose of ionizing radiation received per capita in Poland in 2024.

NATURAL SOURCES 52.52%

2.55 mSv



RADON

24.72% 1.20 mSv

222 Rn 86

GAMMA RADIATION

13.74% 0.67mSv

COSMIC RADIATION

6.59% 0.32 mSv

RADIATION FROM THE HUMAN BODY

5.41% 0.26 mSv

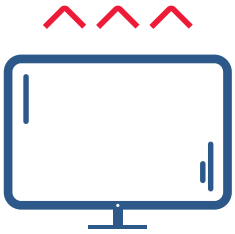
THORON

2.06% 0.10 mSv

Tn

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).

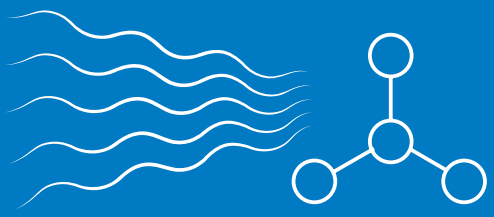
approx. 0.092 mSv

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

ARTIFICIAL SOURCES

47.48%

2.31 mSv



MEDICAL DIAGNOSTICS

47.36% 2.30 mSv

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

computer tomography **1.70 mSv**,
conventional radiography and fluoroscopy **0.20 mSv**,
interventional radiology **0.40 mSv**.

For other diagnostic examinations, the approximate 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

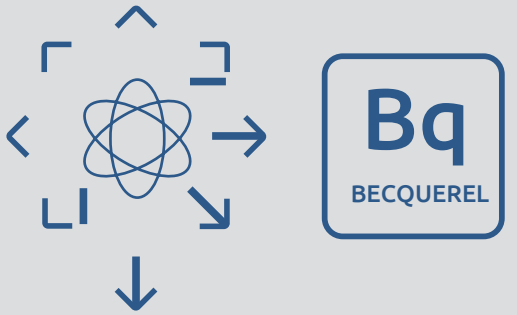
0.03% 0.0014 mSv

OTHER

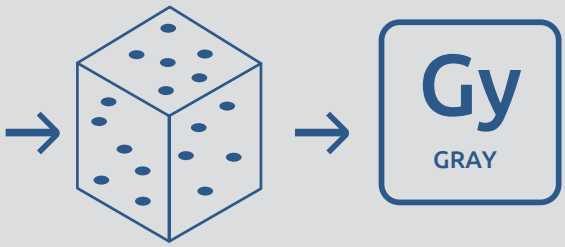
0.09% 0.0045 mSv

INFOGRAPHICS

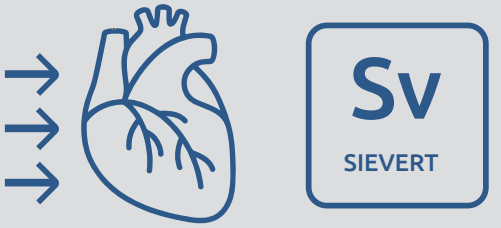
Basic terms and units used in radiation protection



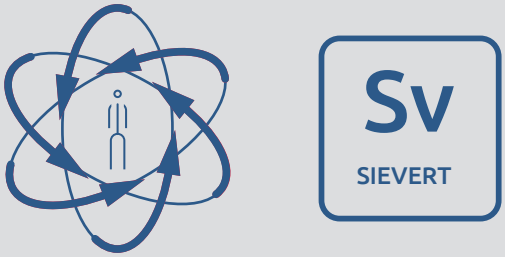
RADIOACTIVITY
Determines the number of radioactive decays in a given material per unit time.



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



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.



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 radiation received per capita in Poland has remained at a similar level for several years.

This value, which includes radiation from both natural and artificial sources of ionizing radiation (including those used in medical diagnostics), amounted to an average of 4.86 mSv in 2024.

The percentage contribution of various radiation sources to this exposure is presented in the infographics on pages 54–55 [1].

Exposure of the public to ionizing radiation sources

Exposure to the following natural sources constitutes 52.52% of the total effective dose and amounts to approx. 2.55 mSv per year:

- 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.

[1] The sources of data obtained included the Central Laboratory for Radiation 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 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 2024, 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 2.30 mSv.

This dose consists primarily of doses received during examinations in which computed tomography was used (1.70 mSv), conventional radiography and fluoroscopy (0.20 mSv) and for interventional radiology (0.40 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 4.3 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.

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 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.

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 X "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 2024 was approx. 0.001 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 2024, the per capita exposure during occupational activity with sources of ionizing radiation (presented in more detail in Chapter VIII 2 "Control of exposure to ionizing radiation") amounted approximately to 0.002 mSv, which is 0.02% of the dose limit (for an occupationally exposed person).

[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.

In 2024, 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 0.1% 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 2024, resulting from the use of artificial sources of ionizing radiation, is low.

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 2024:

- 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 Radiation Protection (CLOR) in Warsaw,
- Dosimetry Laboratory of the National Centre for Nuclear Research (NCBJ) in Świerk,
- Silesian Centre for Environmental Radioactivity, Central Mining Institute (GIG) in Katowice,
- EX-POLON Wojciech Kwieciński.

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.

Heads of organizational entities are required to maintain a record of individual doses received by workers. In addition, data on the exposure of category A workers, as well as of other individuals who are not category A workers in the event of accidental or emergency exposure, must be submitted to the central dose register maintained by the President of the PAA.

LEGAL BASIS

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

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 assessed to its expected level, depending on the magnitude of the risk. The assessment of workers' exposure is carried out based on the results of environmental measurements or individual dosimetry. The Atomic Law Act defines the dose limit, expressed as the effective dose, which amounts to 20 mSv per calendar year for workers. This limit may only be exceeded in exceptional circumstances, up to a maximum of 50 mSv in a year, provided that prior approval is granted by the competent authority to issue licenses or accept a registration or notification referred to in Article 4 Section 1 or Section 1a of the Atomic Law Act.

Central Dose Register of the President of the PAA

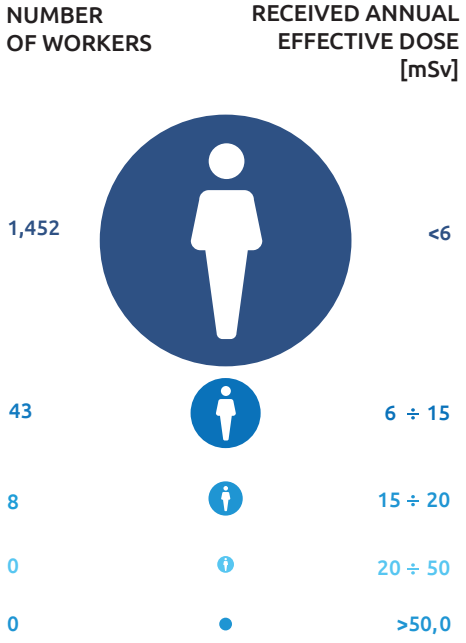
The data on doses for workers classified by heads of individual entities as category A workers are collected in the Central Dose Register of the President of the PAA. Workers from this ionizing radiation risk category are required to undergo measurement of effective doses to the whole body and/or to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

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 8,075 individuals were registered since the creation of the Central Dose Register, i.e. from 2002 to 30 April 2025. The data for 2,347 of those registered were updated over the past four years. By 30 April 2025, 1,503 individuals had been reported to the Central Dose Register, for whom 1,531 dose information received for 2024 had been submitted.

INFOGRAPHICS

Statistics on individual annual effective doses of workers classified as category A exposure to ionizing radiation in 2024.



* According to registrations submitted to the Central Dose Register by 30 April 2025.

As a result of the proper radiation protection, 1,452 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 51 individuals. In 2024, no cases were recorded of the 20 mSv dose limit being exceeded (this is the annual dose limit that may be received as a result of routine work involving ionizing radiation).

Summary data for 2024 on exposures of category A workers reported to the Central Dose Register by individual organizational entities is provided in the infographics on page 59.

These data show that in the group of category A workers, the percentage of individuals who did not exceed the lower threshold defined for this exposure category – i.e. 6 mSv per year – was 96.6% in 2024, while 100% of individuals did not exceed the 20 mSv/ year limit.

Summary

In 2024, no cases were reported of the effective dose limit of 20 mSv/year being exceeded. There were also no recorded exceedances of the dose limits for the lens of the eye or for the extremities, which had occurred in previous years.

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/m^3.

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 Act of 13 June 2019 amending the Atomic Law Act and the Act on Fire Protection 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.

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 hazard are 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.

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 2024 the following implementing acts to the Act of 9 June 2011 – Geological and Mining Law (Journal of Laws 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 (Journal of Laws of 2017, item 1118, as amended),
- Regulation of the Minister of the Environment of 20 June 2017 amending the regulation on natural hazards in mining facilities (Journal of Laws of 2015, items 1702 and 2204; of 2016, item 949; and of 2017, item 1247) defines the workings as follows:

– 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.

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.

TABLE 4
Limit values of working hazard indicators for classes of radiation-prone workings (GIG-PIB).

Hazard indicator	Class A*	Class B*
Concentration of potential energy of alpha short-lived products of radon decay (C_α), μJ/m³	$C_\alpha > 2.5$	$0,5 < C_\alpha \leq 2.5$
Radiation kerma rate γ (K), μGy/h	$K > 3.1$	$0,6 < K \leq 3.1$
Specific activity of radium isotopes in sediments (C_{RaO}), kBq/kg	$C_{RaO} > 120$	$20 < C_{RaO} \leq 120$

*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.

In 2024, the Central Mining Institute – National Research Institute carried out 3,549 measurements of the concentrations of potential alpha energy of short-lived radon decay products, 806 measurements of exposure to external gamma radiation in underground mines and 465 analyses of the radioactivity of mine waters collected in underground workings of hard coal mines and 118 analyses of the concentrations of radioactive nuclides in samples of sediment deposited from underground water.

In 2024, the Central Mining Institute (GIG) conducted 109 measurements of individual gamma radiation doses in five hard coal mining facilities. No such measurements were carried out in the remaining mining facilities. The individuals

monitored were primarily employed in the removal 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 2024, in two facilities, assuming an annual working time of 1,800 hours, the effective dose would have exceeded 6 mSv (taking into account uncertainty and background radiation). The maximum annual dose above natural background, including measurement uncertainty, would amount to 35.4 mSv for 1,800 hours of work per year.

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 three mines (hazard applies to 0.3% of the total number of employed miners), while class B workings were active in seven mines (hazard applies to 0.7% 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 7,9% of the total number of employed miners, while 91.10% of miners work in non-hazar-dous 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.

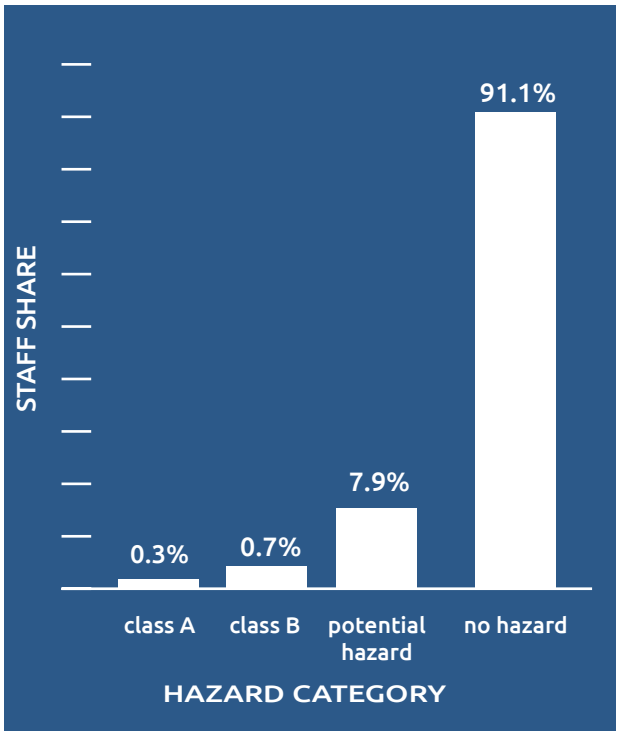
In 2024, the maximum annual additional effective dose, related to each hazard source, was:

- for short-lived radon decay products E_{α} = 21.9 mSv (assuming that the annual working time is 1,800 hours),
- for environmental measurements of gamma radiation E_{α} = 35.4 mSv (assuming that the annual working time in mine water galleries is 1,800 hours),
- and, expressed as the effective committed dose, E_{Ra} = 0.95 mSv for penetration of radium isotopes (for the declared working time equal to 865 hours per year).

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

Hazard class	A	B
Number of mines	3	7
Hazard from short-lived products of radon decay	1	3
γ radiation hazard	1	3
External γ radiation (individual dosimetry)	2	3

FIGURE 8
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.



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 2024, 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

Based on the obtained data, it can be concluded that in 2024, workings classified as class B were subject to a higher risk of gamma radiation and short-lived radon decay products compared to those classified as class A.

In three hard coal mines, 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 two facilities, assuming an annual working time of 1,800 hours, the effective dose would exceed 6 mSv, including uncertainty and background radiation.

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 7 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 2024, two new institutions were entered into the register of organizational units authorized by the President of the National Atomic Energy Agency to conduct training for individuals applying for a radiation protection officer authorization: the University of Warsaw and the University of Silesia in Katowice.

In 2024, the training courses were attended by 784 persons in total. Table 6 specifies the information on entities that provided such courses in 2024.

Two examination boards, appointed by the President of the PAA, pursuant to Artlcle 71 Section 1 and Article 12a Section 6 of the Atomic Law Act, were working in 2024:

- 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 five exams were organized in 2024: 11 exams for a radiation protection officer authorization (IOR) and 34 for an authorization to hold a position of significant importance for ensuring nuclear safety and radiation protection, which were taken by a total of 1,110 people.

TABLE 6

Entitles providing training courses in 2024 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 Protection	5	83	195
Position of significant importance for ensuring nuclear safety and radiation protection	Association of Radiation Protection Officers	12	309	1,030
	Central Laboratory for Radiation Protection	9	183	
	National Oncology Institute (Cracow Branch)	1	24	
	National Oncology Institute (Gliwice Branch)	1	17	
	Henryk Niewodniczański Institute of Nuclear Physics	2	2	
	National Centre for Nuclear Research	12	166	

*Also includes individuals who received training prior to 2024 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.

The process of issuing decisions granting a radiation protection officer authorization and an authorization to hold a position of significant importance to nuclear safety and radiation protection depended on the number of submitted applications. In total, such authorizations were granted to the following number of individuals:

1,012

PERSONS

As a result of passing the examination and fulfilling the remaining requirements, the number of authorizations granted was

1,225

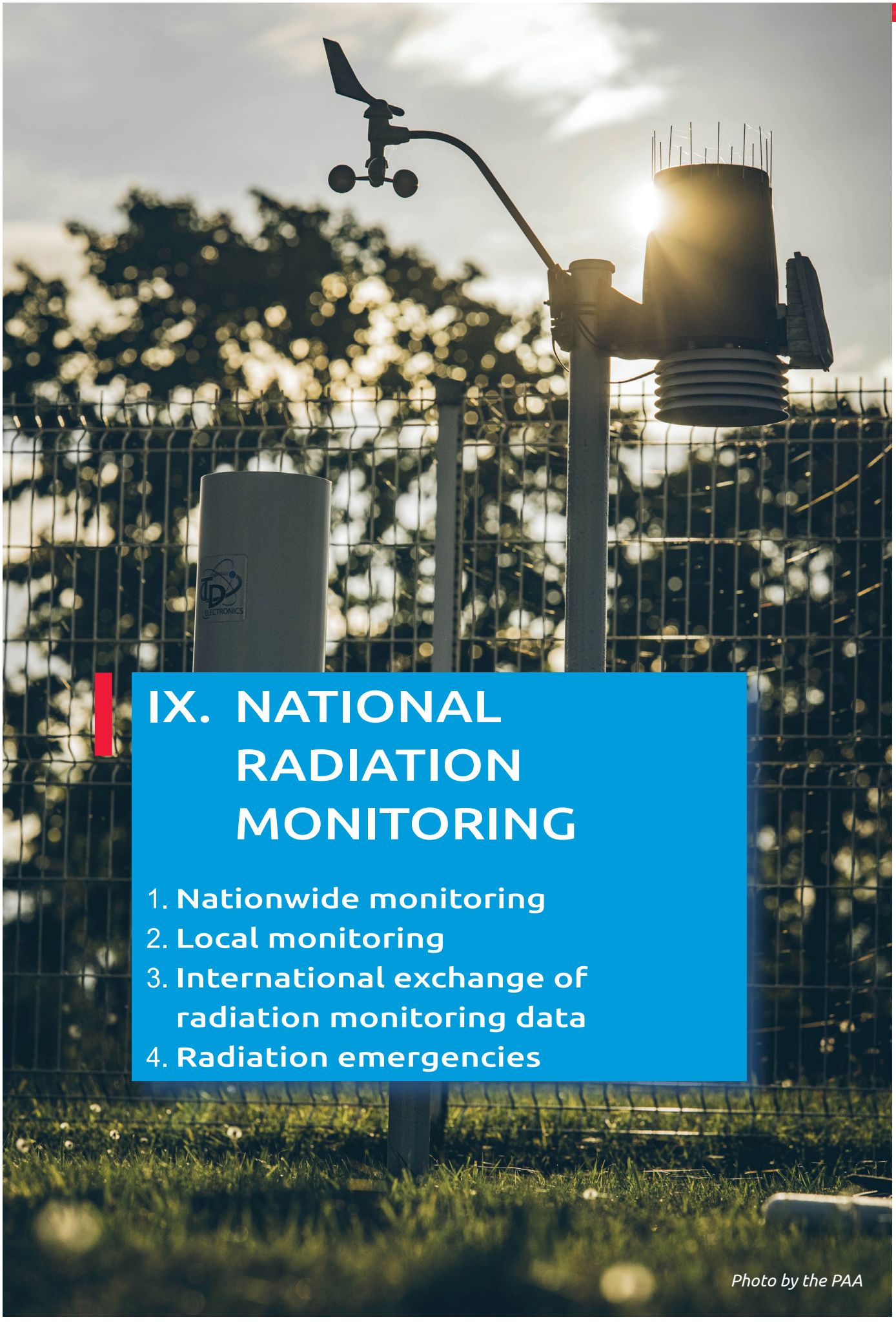
AUTHORIZATIONS

195 authorizations as radiation protection officer and 1,030 authorizations for positions of significant importance for ensuring nuclear safety and radiation protection.

	195 AUTHORIZATIONS for a radiation protection officer
	295 AUTHORIZATIONS for a non-medical accelerator operator
	730 AUTHORIZATIONS for a medical accelerator and teleradiotherapy equipment operator and/or radioactive source brachytherapy equipment operator

5 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 – 2 decisions, research reactor manager – 1 decision, research reactor shift manager – 1 decision, research reactor dosimetrist – 1 decision, operator of a spent nuclear fuel storage facility – 1 decision

Photo by the PAA



IX. NATIONAL RADIATION MONITORING

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

Photo by the PAA

Poland s continuously monitoring the gamma dose rate and conducting measurements of radioactive isotope content in the environment and in food products. The monitoring system operates 24 hours a day, 7 days a week, and allows for an on-going tracking of the country's radiation situation, and early detection of potential 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).

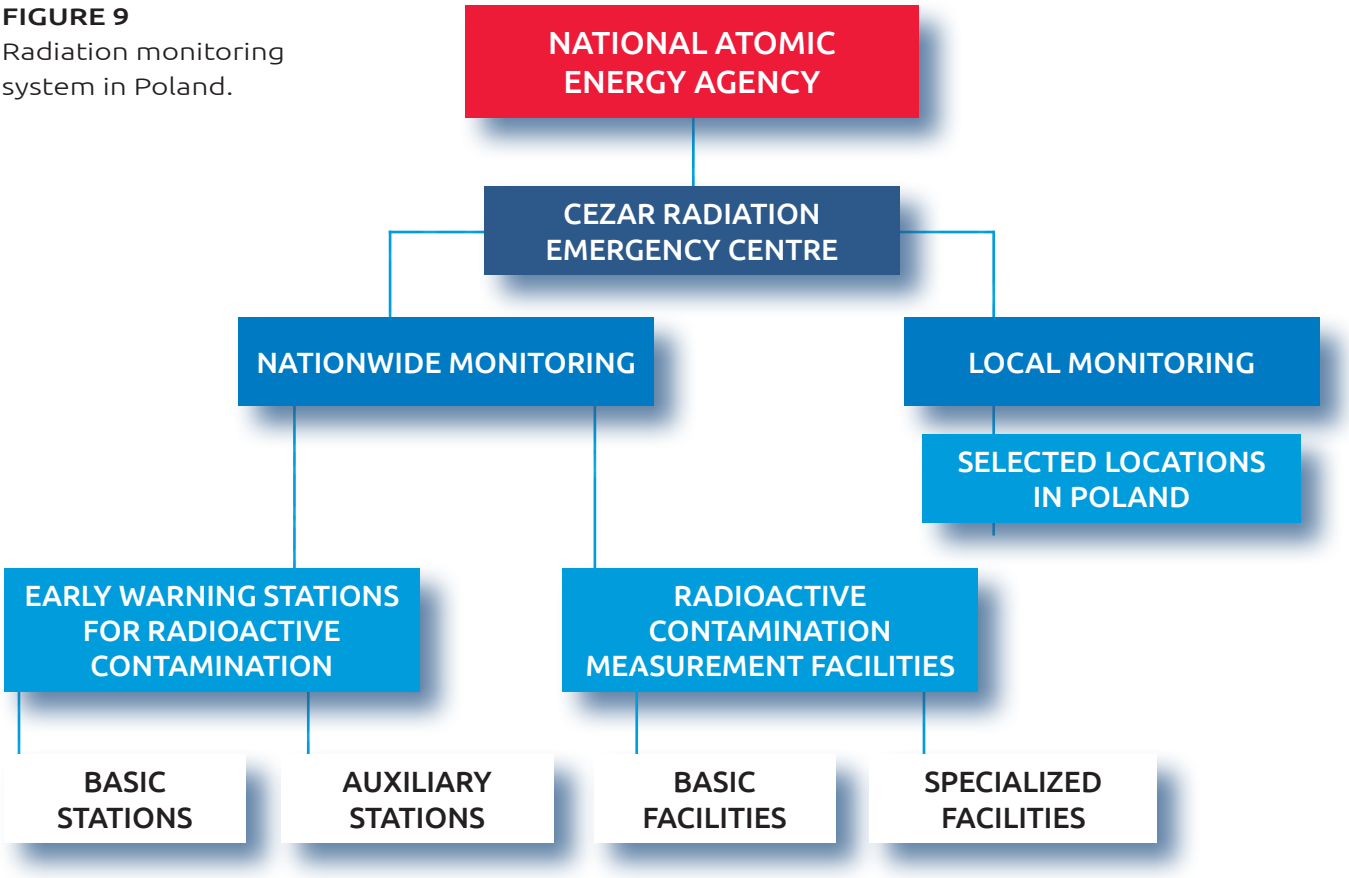
Measurements taken as part of the monitoring are conducted by:

- 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 9 presents a general diagram of this system structure.

FIGURE 9
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:

- On the website of the National Atomic Energy Agency (PAA) – https://monitoring.paa.gov.pl/maps-portal/ gamma radiation dose rate is available,

- 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.

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 71).

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 IMGW 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 (data from 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).

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.

Auxiliary stations:

19 PMS-GM stations (Permanent Monitoring Station – Geiger-Müller) belonging to the National Atomic Energy Agency (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 its network of early warning stations for radioactive contamination. In 2024, four stations – Częstochowa, Katowice, Kielce, and Suwałki – were modernized. In the coming years, further expansion of the entire network is planned, with a total of 145 stations expected to be operational by the time the first nuclear power plant is commissioned.

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 within Sanitary and Epidemiological Stations, which carry out the following[3]:

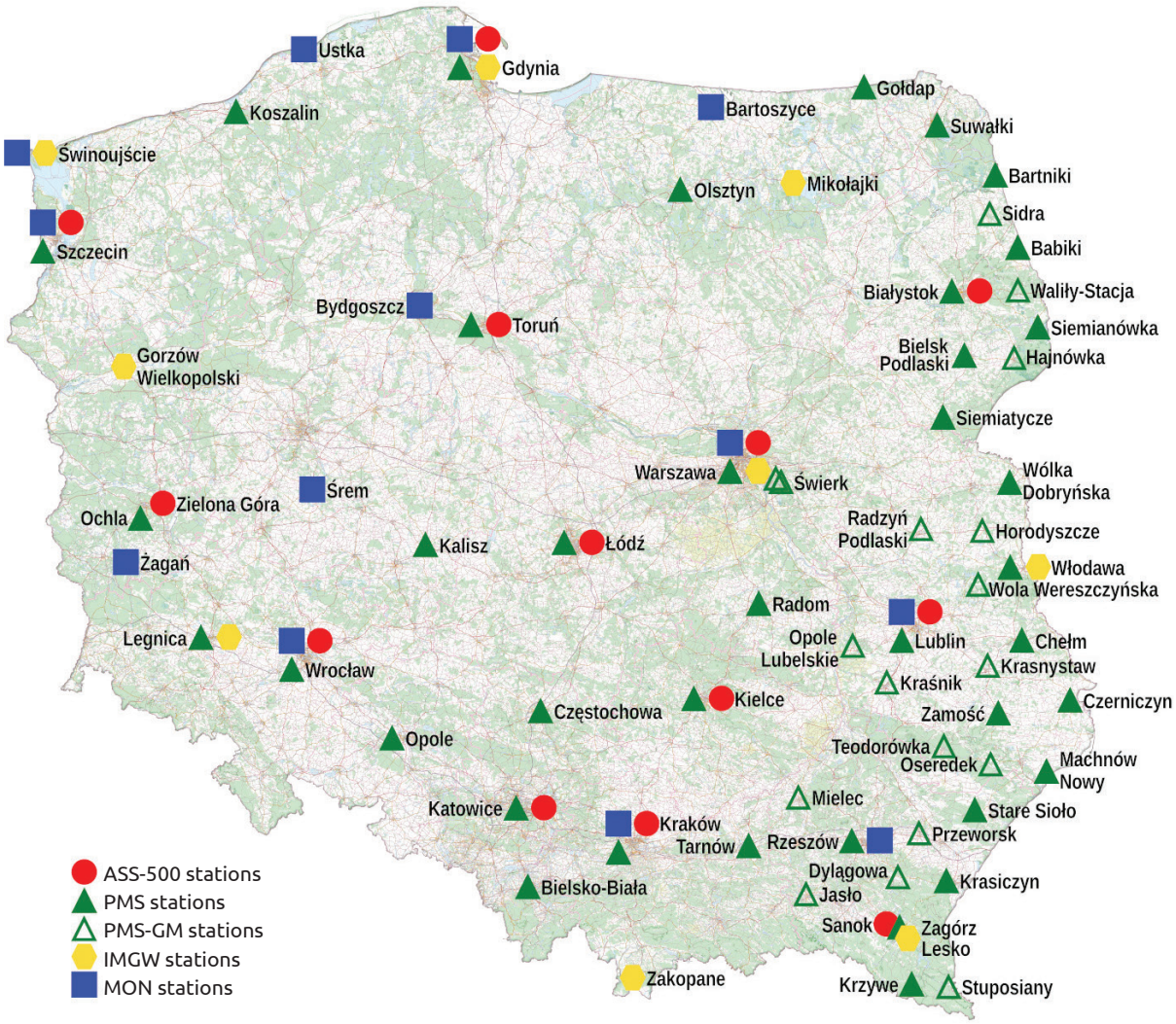
3 The number of laboratories that submitted measurement results in 2024.

- determination of Cs-137 and SR-90 content in samples of milk, drinking water and food products (once a quarter),
- determination of Cs-137 and Sr-90 content in tap water (twice a year),
- determination of Cs-137 in raw feed.

specialized facilities, which carry out more extensive contamination analyses of environmental samples.

The infographics on page 72 presents the locations of the basic measurement facilities.

Nationwide radiation monitoring



PMS/PMS-GM 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 m³/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.

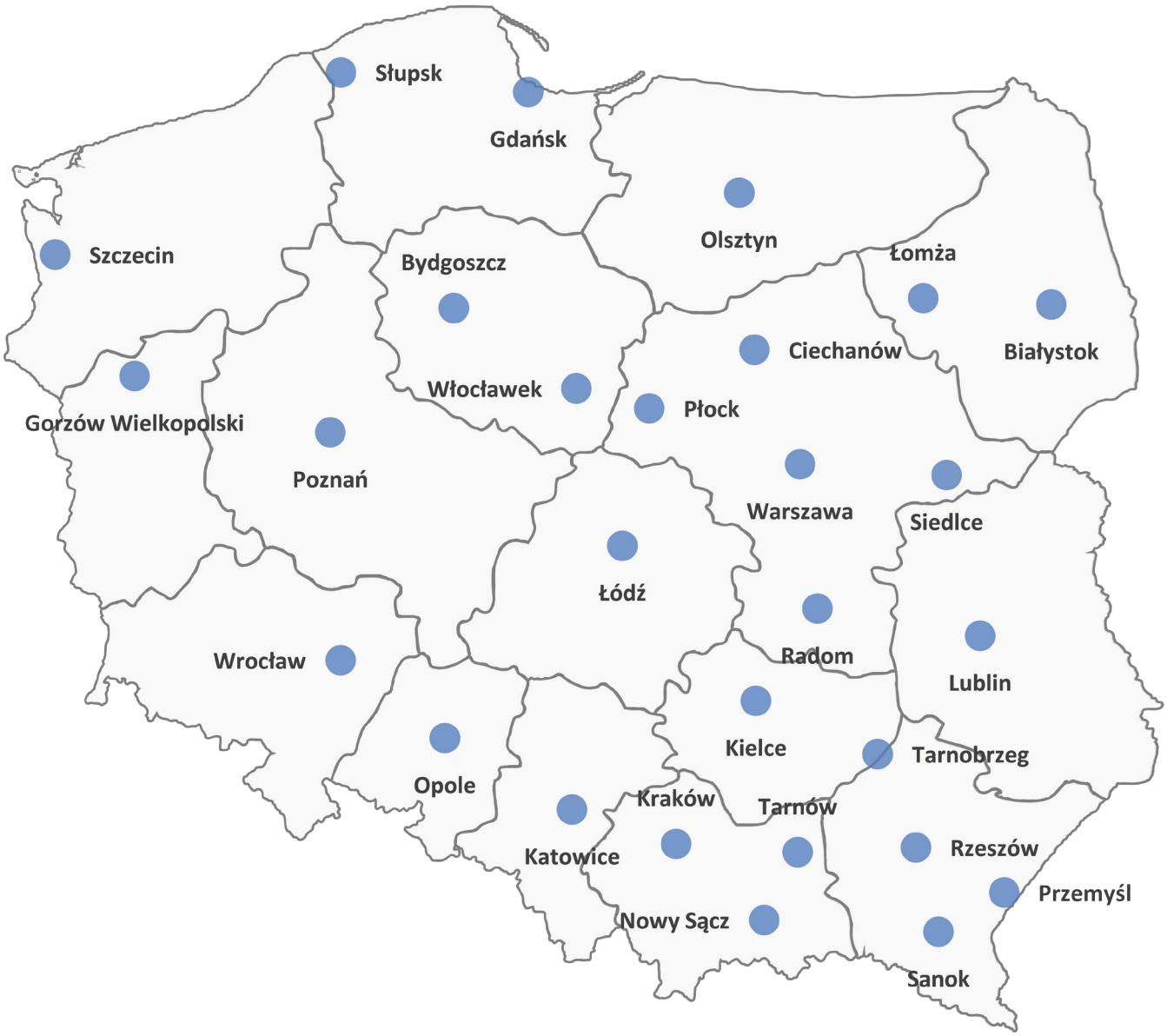
IMGW stations

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 can be found at:
https://monitoring.paa.gov.pl/maps-portal/
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)	gross α gross β Rn-222 γ spectrum	●	●
Drainage waters	gross α gross β γ spectrum Sr-90 HTO	●	
Tap water	gross β	●	
River waters (Swider, Vistula)	gross β γ spectrum		●
Well waters	gross β γ spectrum		●
Total fallout	gross β γ spectrum	●	
Groundwater (subsurface water)	HTO	●	
Process water	gross α,β gross γ γ spectrum Sr-90 HTO	●	
Sanitary wastewater	gross γ gross β γ spectrum Sr-90 gross β	●	●
Wastewater from treatment plants	gross α,β gross γ γ spectrum Sr-90 HTO	●	
Milk	γ spectrum		●
Cereals	γ spectrum		●
Grasses	γ spectrum	●	●
Soils	γ spectrum	●	●
Sludge	γ spectrum Sr-90	●	●

Summary

The data obtained in 2024 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 radioactivity of wastewater, drainage and rainwater discharged from the Świerk Nuclear Centre site was significantly below the applicable limits in 2024.

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 2024, 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),
- measurement of ambient dose equivalent,
- measurements of radioactive substances in soil and grass (spectrometric analysis),
- measurements of photon background using thermoluminescent detectors,
- measurements of radon (Rn-220 and Rn-222) concentrations in the air inside chambers of facilities located within the KSOP area.

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,
- measurement of ambient dose equivalent rate in the surroundings of the KSOP area;
- measurements of radioactive substances in soil and grass.

Furthermore, measurements ordered by the President of the PAA are carried out in the repository's vicinity. The range of the measurements conducted in 2024 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 X "Assessment of the radiation situation in Poland".

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 2024:

- 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 X "Assessment of the radiation situation in Poland".

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 monitoringcarried 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 (https://remap.jrc.ec.europa.eu/Consent/Advanced.aspx).

Poland transmits the following measurement results on an hourly basis:

- gamma dose rate (PMS/PMS-GM and IMGW stations),
- total alpha and beta activity from artificial radionuclides in atmospheric aerosols (PMS/PMS-GM and IMGW stations).

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 emergency 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 Presidentof 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[4], 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), NATO and countries bound by bilateral agreements with Poland, 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).

[4] Jointly with the Central Laboratory for Radiation Protection (based on agreement concluded by the President of PAA and CLOR)

Radiation emergencies in Poland

In 2024, two radiation emergencies were reported in Poland.

The first emergency involved the disappearance of a gamma radiography device (defectoscope) containing a high-activity radioactive source (selenium Se-75) from a construction site in Nowa Huta (a district of Cracow). A search operation was conducted using mobile measurement equipment and handheld dosimetric instruments. Ground-penetrating radar was used to verify the possibility that the defectoscope had been buried at the construction site. Scrap metal yards and city surveillance footage were checked. Construction workers were interviewed, and a public notice was issued to inform the population. The defectoscope was not recovered.

The second incident involved the discovery of several dozen sources of ionizing radiation on a private property in the town of Siedlec (Wielkopolskie Voivodeship). After conducting dosimetric measurements and analyzing the results, a hazard assessment was performed. The sources of ionizing radiation were secured and collected by the Radioactive Waste Management Plant (ZUOP).

On-duty CEZAR officers provided 764 consultations (not related to the elimination of radiation emergencies and their consequences), and most of them (695 cases) were addressed to Border Guard, 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 (363 cases in total), as well as border crossing by persons subject to diagnostics or treatment with the use of radiopharmaceutical products (332 cases). Furthermore, on-duty CEZAR officers provided 69 consultations to other institutions or individuals.

On-duty CEZAR officers also received 8,705 notifications (e.g. reports on the radiometric inspections, messages provided by the official information exchange channels at the international level).

The Dosimetry Team of the President of the National Atomic Energy Agency (PAA) was deployed twice to support local services in situations that did not constitute radiation emergencies under the Atomic Law. The deployments involved assistance in performing radiometric measurements in a public area and at a municipal waste processing facility.

Radiation emergencies outside the country

In 2024, the National Contact Point did not receive any notifications via the Unified System for Information Exchange in Incidents and Emergencies (USIE) about emergencies classified at level 3 or higher on the seven-point INES scale.

However, 27 reports on incidents related to ionizing radiation sources or nuclear facilities, mainly unplanned exposures of staff to ionizing radiation, were received. Additionally, the National Contact Point received several dozen organizational and technical notifications, as well as information related to international exercises, through the USIE and ECURIE systems.

In the context of the situation in Ukraine, it should be emphasized that no event in that country had any impact on the health or lives of the population, or on the environment within the territory of Poland.

No radiation emergency recorded outside the country in 2024 posed any threat to people or the environment in Poland.

Summary

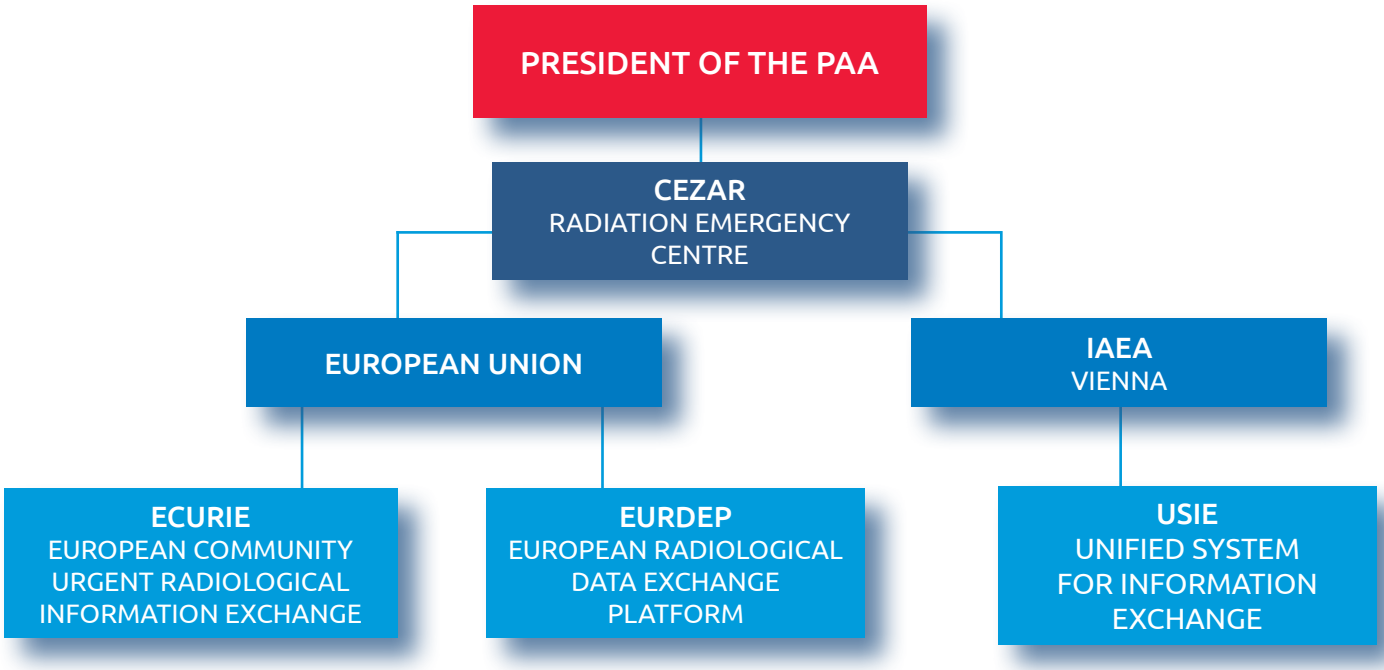
In 2024, two radiation emergencies were recorded within the country. The sources of ionizing radiation discovered in the town of Siedlec were safely transported to the ZUOP. However, the defectoscope lost in Cracow has not been found despite extensive search efforts.

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 showing 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.

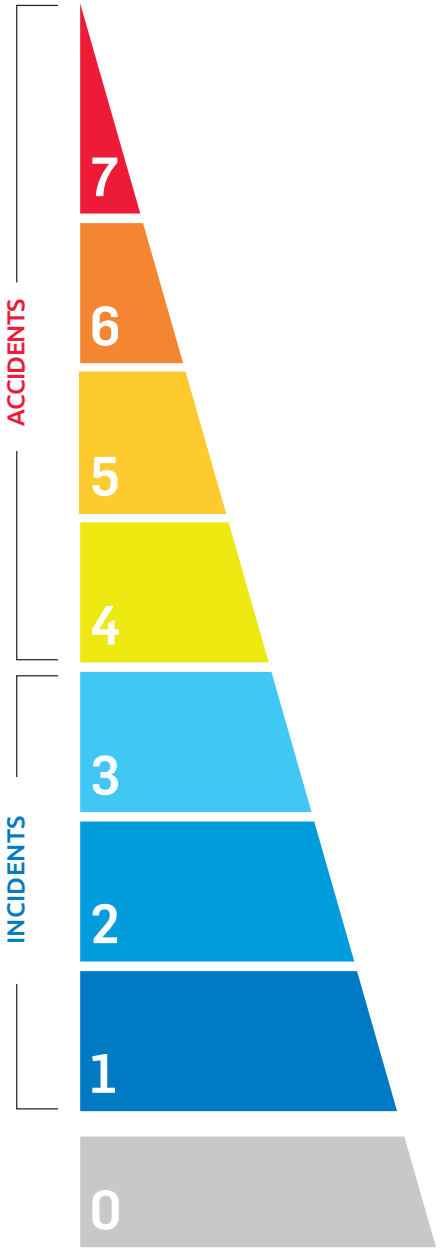
Radiation emergencies recorded worldwide had no impact on the health and lives of the population or on the environment in Poland.

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, USRR 1957
Release of significant amounts of radioactive substances into the environment after the exploslon of a high-level radioactive waste tank

5 ACCIDENT WITH WIDER CONSEQUENSES

Goiânia, Brasil1987
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 CONSEQUENSES

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

X. ASSESSMENT OF THE RADIATION SITUATION IN POLAND

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

Photo by the PAA

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 2024 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 2024 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 10.

The daily average values ranged from 38 to 135 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 88 nSv/h (78 nSv/h on average), and in the area of the KSOP – from 64 to 107 nSv/h (82 nSv/h on average).

The values do not substantially differ from the dose rate measurement results obtained in other regions of the country.

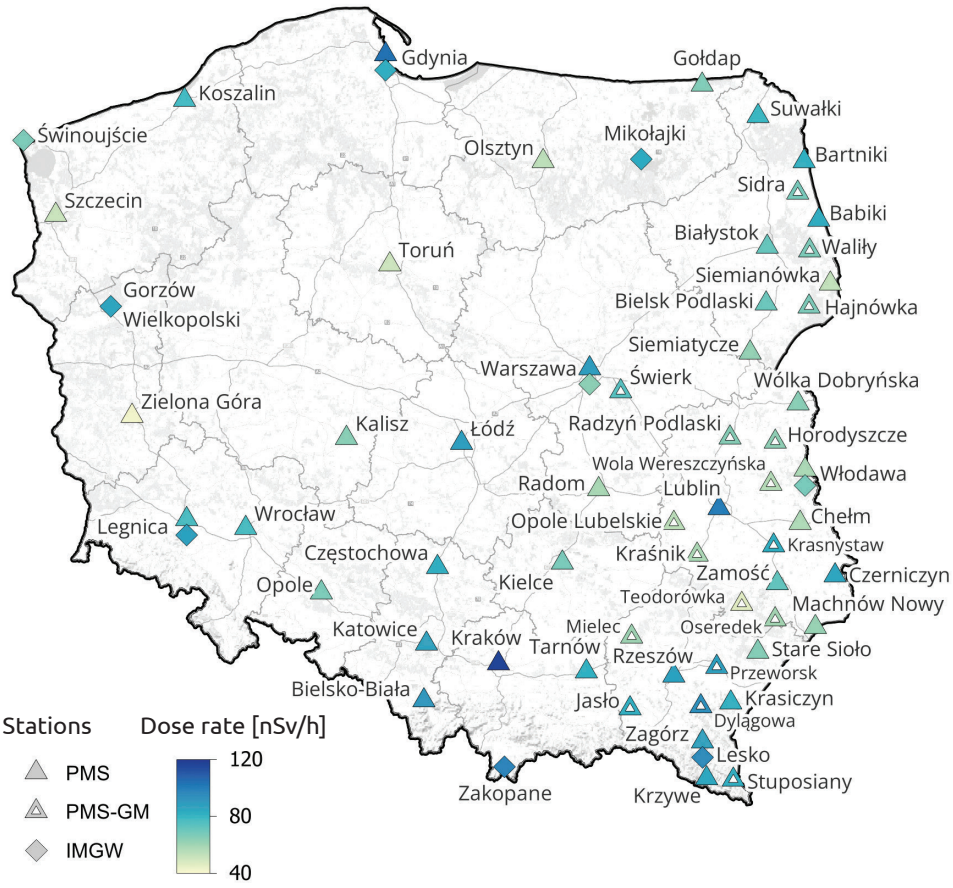
TABLE 8
Dose rates obtained from early warning stations for radioactive contamination in 2024 (PAA).

Stations	Place (location)	Range of average daily dose rate [nSv/h]	Annual average [nSv/h]
PMS	Babiki	79-96	83
	Bartniki	60-92	82
	Białystok	54-82	71
	Bielsk Podlaski	53-84	71
	Bielsko-Biała	80-123	91
	Chełm	50-79	57
	Czerniczyn	71-107	86
	Częstochowa	77-112	82
	Gdynia	99-117	104
	Gołdap	50-81	66
	Kalisz	58-84	65
	Katowice	78-135	87
	Kielce	60-88	68
	Koszalin	69-98	78
	Kraków	112-133	117
	Krasiczyn	67-110	81
	Krzywe	63-120	85
	Legnica	69-107	77
	Łódź	83-97	88
	Lublin	96-112	100
	Machnów Nowy	51-88	62
	Olsztyn	44-69	54
	Opole	57-92	67
	Radom	53-74	59
	Rzeszów	76-112	87
	Sanok	73-108	87
	Siemianówka	42-65	53
	Siemiatycze	53-85	63
	Stare Sioło	53-85	66
	Suwałki	57-93	79
	Szczecin	45-72	52
	Tarnów	68-108	82

Stations	Place (location)	Range of average daily dose rate [nSv/h]	Annual average [nSv/h]
PMS	Toruń	46-64	50
	Warszawa	84-105	89
	Włodawa	50-78	58
	Wólka Dobryńska	53-87	65
	Wrocław	66-107	77
	Zamość	61-97	72
	Zielona Góra	38-54	42
IMGW	Gdynia	77-95	82
	Gorzów	78-97	85
	Legnica	77-106	87
	Lesko	84-111	95
	Mikołajki	64-96	84
	Świnoujście	63-76	67
	Warszawa	52-89	64
	Włodawa	61-87	68
	Zakopane	77-114	98

Stations	Place (location)	Range of average daily dose rate [nSv/h]	Annual average [nSv/h]
PMS-GM	Dylągowa	78-129	94
	Hajnówka	55-78	67
	Horodyszcze	56-83	64
	Jasło	71-94	82
	Kraśnik	52-67	58
	Krasnystaw	73-94	83
	Mielec	55-76	61
	Opole Lubelskie	50-63	55
	Oseredek	52-73	60
	Przeworsk	76-116	88
	Radzyń Podlaski	57-85	65
	Sidra	51-78	68
	Stuposiany	68-114	82
	Świerk	70-87	75
	Teodorówka	41-65	46
	Waliły	53-75	67
	Wola Wereszczyńska	49-75	56

FIGURE 10
Annual average dose rates obtained from individual early warning stations for radioactive contamination in Poland in 2024 (PAA).



Atmospheric aerosols

In 2024, 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 0.08 to 17.04 μBq/m³ (0.53 μBq/m³ on average). Average concentrations of 1-131 radionuclide in this period ranged from less than 0.08 to less than 27.01 μBq/m³ (0.59 μBq/m³ on average), whereas the average concentrations of naturally occurring radionuclide Be-7 amounted to a few thousand μBq/m³.

Figures 11 and 12 present the average annual concentrations of Cs-137 in atmospheric aerosols in the years 2011-2024 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 2024 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 11
Average annual concentration of Cs-137 in aerosols in Poland in 2011-2024 (μBq/m³); (PAA, CLOR data).

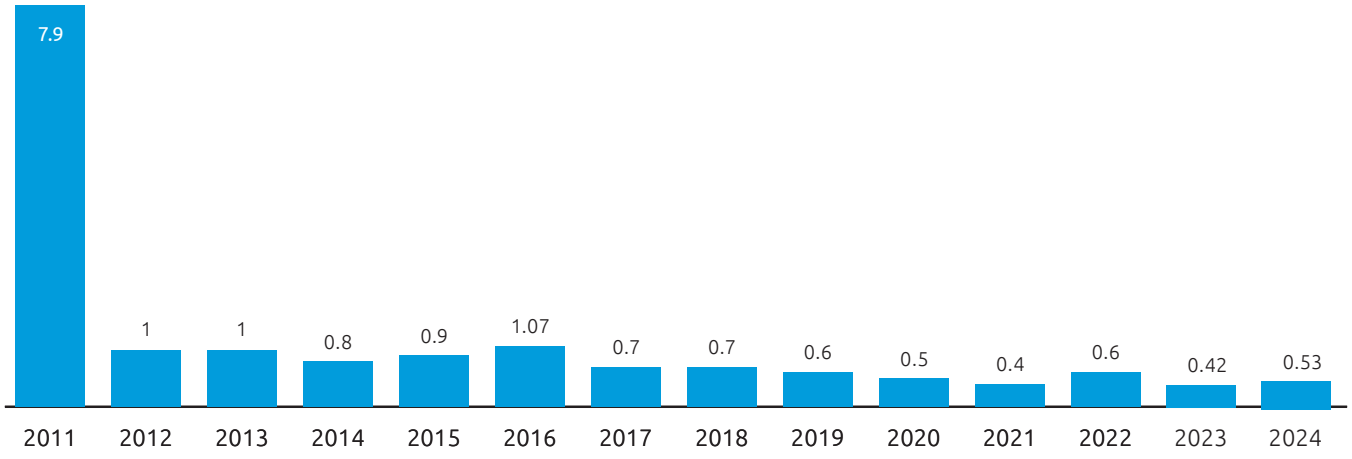


FIGURE 12
Average annual concentration of Cs-137 in aerosols in Warsaw in 2011-2024 (μBq/m³) (PAA, CLOR data).

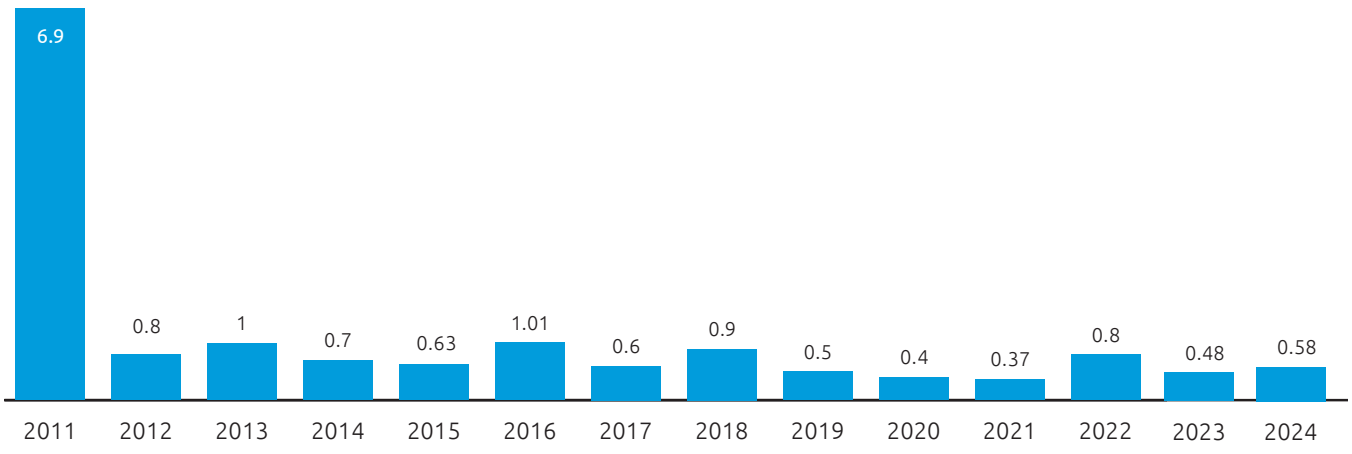


TABLE 9
Summary of weekly measurement results of radionuclide concentrations in atmospheric aerosols at the Centre in Świerk site and its surroundings in 2024 (μBq/m³; PAA, CLOR data).

	ON-SITE		WÓLKA MLĄDZKA	
	I-131	Cs-137	I-131	Cs-137
Average	39.0	6.2	7.1	1.2
Minimum	1.67	0.76	2.9	0.80
Maximum	262	71.8	13.6	1.77

TABLE 10
Average Cs-137 and Sr-90 activity and average beta activity in the total annual fallout in Poland in 2008-2024 (Chief Inspectorate of Environmental Protection (GIOŚ), measurements taken by IMGW).

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
2024	0.3	0.1	0.34

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 2024 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 2024 [mBq/dm³] (GIOŚ, measurements taken by CLOR).

		Vistula, Bug and Narew	Odra and Warta	Lakes
Sr-90	range	2.39-6.24	2.50-5.11	1.52-7.52
	average	3.58	3.69	3.82
Cs-137	range	0.84-10.42	0.65-5.57	0.45-5.23
	average	2.80	2.59	1.81

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 2024, 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, activity concentrations were 14.6 Bq/m³ in surface water and 16.2 Bq/m³ in bottom water; for Ra-226 – 2.68 Bq/m³ in surface water and 3.30 Bq/m³ in bottom water; for T-3 (tritium) – 2.8 kBq/m³ in surface water and 1.7 kBq/m³ in bottom water. The activity concentrations for K-40 averaged several thousand Bq/m³. These values do not differ from those recorded in previous years.

The last radionuclide concentration measurement cycle in river and lake water samples was carried out by GIOŚ in 2024. Table 11 presents the measurement results.

The total Cs-134 and Cs-137 content in open water samples, taken in 2024 from sampling points located near the National Centre for Nuclear Research in Świerk was as follows:

- Świder river 4.34 mBq/dm^3 (upstream from the Centre) and 1.38 mBq/dm^3 (downstream from the Centre),
- waters from the wastewater treatment plant in Otwock discharged to the Vistula River: 4.77 Bq/dm^3.

The average tritium concentration in open water samples taken in 2024 from sampling points located near the National Centre for Nuclear Research in Świerk was as follows:

- Świder river <0,5 mBq/dm^3 (upstream from the Centre) and 0.7 mBq/dm^3 (downstream from the Centre),
- waters from the wastewater treatment plant in Otwock discharged to the Vistula River: 0.8 Bq/dm^3.

Ground waters – local monitoring

The results of radioisotope concentration measurements in waters taken as part of local monitoring in 2024 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 in 2024 amounted to 2.94 mBq/dm^3 for cesium isotopes (Cs-134, Cs-137) and 18.17 mBq/dm^3 for Sr-90. The concentrations of tritium (H-3) were also designated and averaged 1.05 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 were up to 0.62 mBq/dm^3.

In 2024, tritium concentrations were also investigated in ground waters in the vicinity of the KSOP in Różan, and amounted to a maximum of 52.4 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 52 water samples in farmer uranium ore mining sites with the following results:

- public intakes of drinking water:
  - total alpha activity – from 1.9 to 60.4 mBq/dm^3,
  - total beta activity – from 39.4 to 240.7 mBq/dm^3.
- waters flowing from mine workings (mine adits, rivers, ponds, springs, wells):
  - total alpha activity – from 18.1 to 552.4 mBq/dm^3,
  - total beta activity – from 38.5 to 402.6 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 0.3 to 668.7 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 272.6 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, were specified in the Regulation of the Minister of Health of 7 December 2017 on the quality of water intended for human consumption (Journal of Laws, 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

Radionuclide concentrations in samples of dry matter of river and lake bottom sediments in 2024 and of the Baltic Sea in 2024 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 2024 [Bq/kg of dry mass] (GIOŚ,measurements taken by CLOR).

		Vistula, Bug and Narew	Odra and Warta	Lakes
PU-239, 240	range	0.001-0.073	0.001-0.063	0.005-0.780
	average	0.017	0.023	0.135
Cs-137	range	0.13-8.47	0.22-13.5	0.13-113.36
	average	2.67	3.72	19.35

Soil

The monitoring of radioactive isotope concentrations in the soil is conducted in a 2-year measurement cycle.

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) – Fig. 14.

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 2024 (PAA, measurements taken by CLOR).

Isotope		Layer thickness 0-19 cm
Cs-137	kBq/m^2	2.14
Pu-238	Bq/m^2	1.53
Pu-239, 240	Bq/m^2	61.38
K-40	kBq/m^2	37.59
Sr-90	Bq/m^2	173.06

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 2024 was 5.03 Bq/kg and 7.50 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.

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. (GIOS, 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 ± 0.9	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
Poland	**1.96 ± 0.19**	**0.20**	**16.63**

FIGURE 13
Average Cs-137 deposition in Poland for 1988-2022 (PAA, based on data provided by GIOS, measurements taken by CLOR).

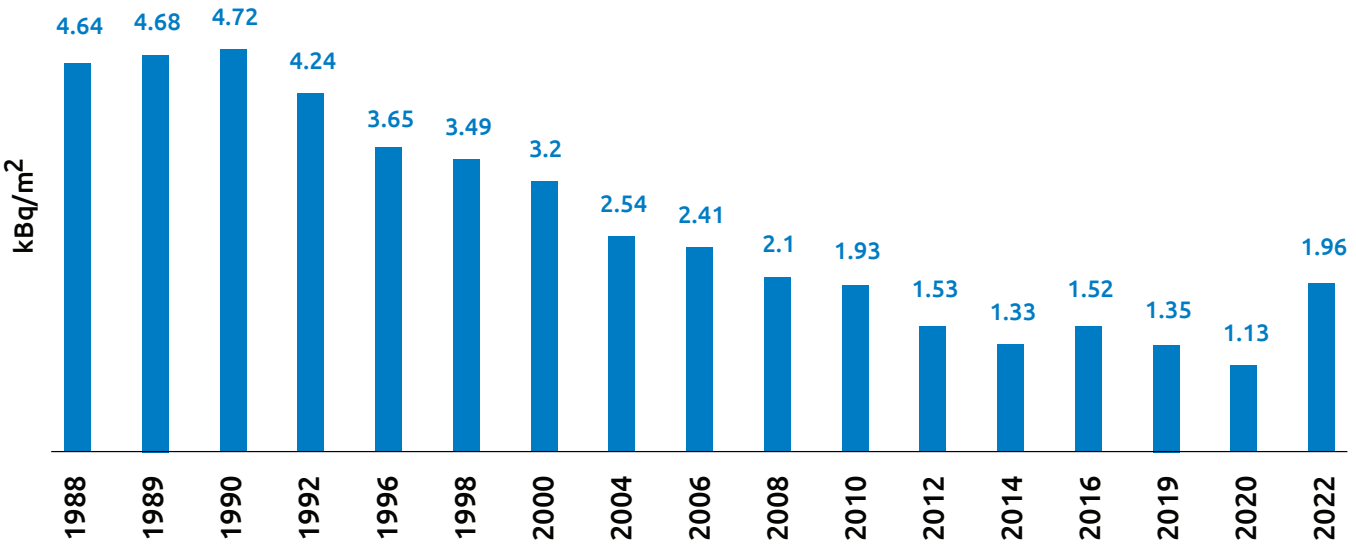


FIGURE 14
Distribution of soil sampling points in Poland (December 2024; PAA's Own Compilation).

Photo 1. An employee of the PAA during an inspection of an early warning station for radioactive contamination (photo: PAA)

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 must comply with the requirements of the Commission Implementing Regulation (EU) 2024/256 of 17 January 2024. In 2023, the European Commission repealed a similar implementing regulation concerning foodstuffs and food products originating from Japan following the Fukushima accident.

TABLE 15
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 (not applicable)	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 2024, Cs-137 concentrations in liquid (fresh) milk ranged from 0.1 to below 3.34 Bq/dm^3 and averaged approx. 1.07 Bq/dm^3, see infographics on pages 92-93.

Meat, poultry, fish, and eggs

In 2024, 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 14.10, on average 1.25 Bq/kg,
- poultry – from below 0.18 to below 3.00 Bq/kg, on average 1.04 Bq/kg,
- fish – from below 0.11 to below 3.00 Bq/kg, on average 0.94 Bq/kg,
- eggs – from below 0.1 to below 3.19 Bq/kg, on average 1.00 Bq/kg.

For comparison, the concentrations measured in fish meat as part of Baltic Sea monitoring ranged from 1.65 to 2.63 Bq/kg, with an average of 2.05 Bq/kg (PAA, measurements performed by CLOR).

The temporal distribution of Cs-137 activity between 2011 and 2024 in different types of livestock meat (beef, pork), as well as in poultry meat, eggs and fish is presented in the infographics on pages 92-93.

Vegetables, fruit, cereals, feed, and mushrooms

The results of artificial radioactivity measurements in vegetables and fruit carried out in 2024 indicate that the concentration of Cs-137 in vegetables ranged from below 0.10 to below 5.54 Bq/kg, with an average of 1.15 Bq/kg, and in fruit from below 0.10 to 3.66 Bq/kg, with an average of 1.04 Bq/kg (see infographics on p. 93).

In 2024, Cs-137 activity levels in cereals ranged from below 0.10 to below 4.26 Bq/kg (1.25 Bq/kg on average) and were similar to the values observed in 1985.

In 2024, Cs-137 activity levels in animal feed ranged from 0.19 to below 6.31 Bq/kg, with an average of 2.05 Bq/kg.

In 2024, Cs-137 activity levels in grass (based on dry mass) in the vicinity of the Świerk nuclear centre ranged from below 0.25 to 2.34 Bq/kg, with an average of 1.21 Bq/kg, and in the vicinity of the National Radioactive Waste Repository (KSOP) from below 0.06 to 0.90 Bq/kg, with an average of 0.251 Bq/kg.

The measured cesium activities in major species of fresh mushrooms in 2024 ranged from below 1.00 to 429.3 Bq/kg, with an average of 78.26 Bq/kg, similar to values from previous years. It is important to emphasize that in 1985, i.e., before the Chernobyl accident, Cs-137 activities in mushrooms were also significantly higher than in other food products. At that time, this radionuclide originated from nuclear weapons testing (as confirmed by the analysis of Cs-134 to Cs-137 isotope ratios in 1986).

Summary

The results of monitoring programmes taking place in Poland in 2024 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 2024.

INFOGRAPHICS

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 concentration dose of Cs-137 and Cs-134 isotopes in milk, milk products, and infant products.

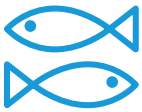
Cs-137 AVERAGE CONCENTRATIONS	MILK	MEAT	POULTRY
2024	**1.07 Bq/dm³**	**1.25 Bq/kg**	**1.04 Bq/kg**
2023	0.79	0.79	0.73
2022	0.81	0.74	0.47
2021	0.63	1.10	0.80
2020	0.63	0.87	0.50
2019	0.41	1.11	0.52
2018	0.52	1.09	0.47
2017	0.46	0.89	0.50
2016	0.40	0.63	0.54
2015	0,.50	0.77	0.60
2014	0.50	0.83	0.73
2013	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
2009	0.60	0.85	0.52
2008	0.60	0.70	0.52
2007	0.70	0.64	0.67

1,250 Bq/kg

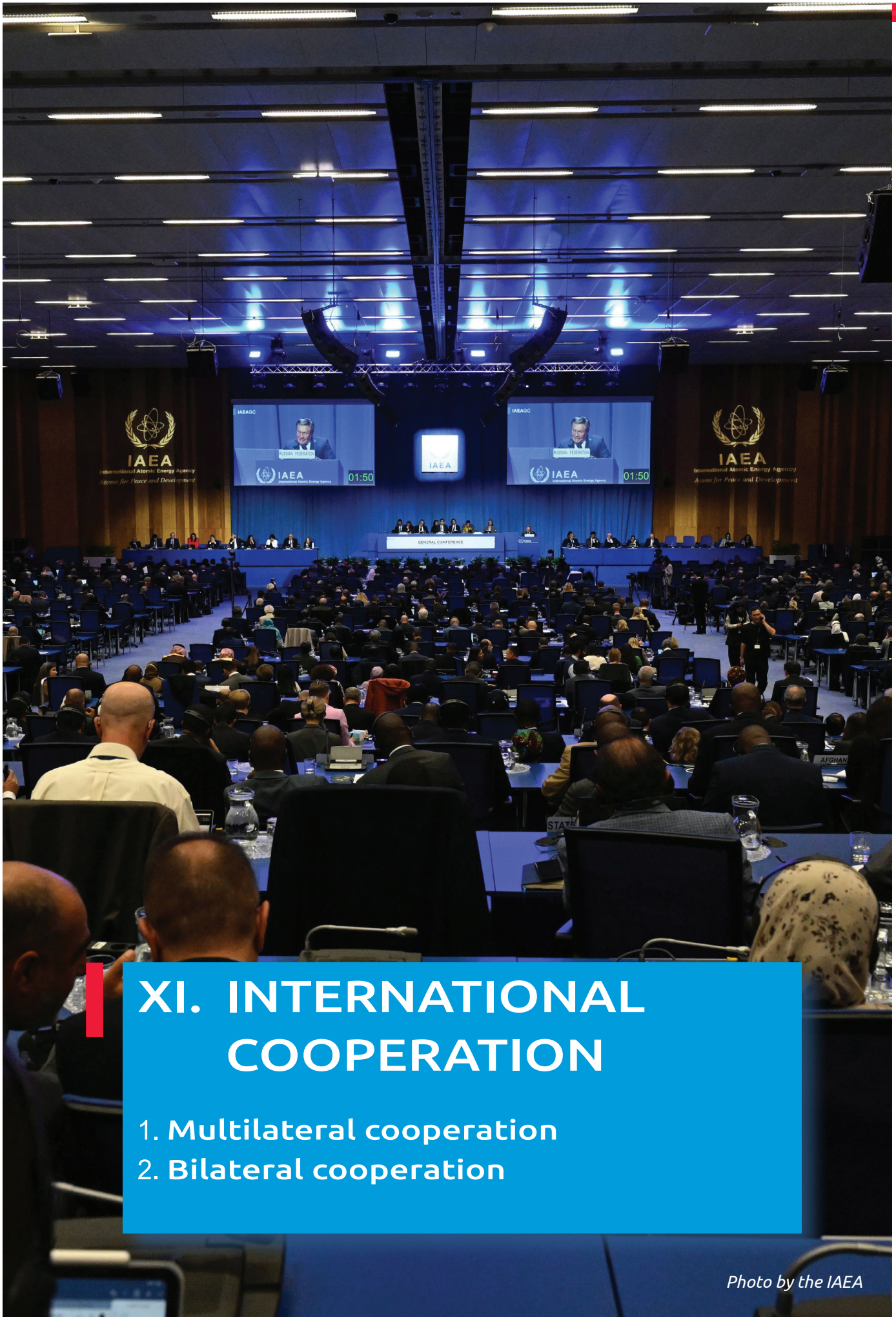
maximum total permissible concentration dose of Cs-137 and Cs-134 isotopes in all other foodstuffs and food products.

Cs-137

the reported measurement results consider only the concentrations of the Cs-137 isotope, as the concentration of Cs-134 amounts to less than 1‰ of their total activity.



EGGS	FISH	VEGETABLES	FRUIT
1.00 Bq/kg	**0.94 Bq/kg**	**1.15 Bq/kg**	**1.04 Bq/kg**
0.75	0.81	1.01	0.85
0.54	0.64	0.39	0.67
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
0.50	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



XI. INTERNATIONAL COOPERATION

1. **Multilateral cooperation**
2. **Bilateral cooperation**

Photo by the IAEA

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, the Minister of Industry and other ministers and 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 2024, 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),
- Heads of the European Radiological 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 2024, 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 20 March and 28 November 2024. 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-Tofll. During the meetings, among other topics, issues related to nuclear safety in the context of the situation in Ukraine and the challenges to nuclear safety arising from armed conflicts were discussed. At the EU forum, discussions were also held regarding progress on the initiative for the development of small modular reactor technologies (the European Industrial Alliance on SMRs), the cooperation mechanism between ENSREG and WENRA, as well as ongoing and planned analyses by the European Commission, in particular the analysis of the Implementation of the Nuclear Safety Directive in Member States.

Within ENSREG, European topical peer reviews of nuclear facilities (TPR) are also conducted, aimed at improving nuclear safety and radiation protection in Europe. European Union Member States are obligated to carry out TPR reviews every six years. As part of the second edition of the TPR, dedicated to fire protection, in May 2024 EU experts conducted a technical visit to the MARIA research reactor, where they inspected the reactor's safety systems with regard to fire protection.

Technical visits are part of the evaluation of national reports. After the completion of visits

in individual countries and the assessment of the national reports, recommendations and corrective action plans will be formulated, which will ultimately contribute to enhancing the level of nuclear safety and radiation protection.

On June 24-25, 2024, the 7th edition of the European Nuclear Safety Regulators Group (ENSREG) conference was also held. Representatives of nuclear regulatory authorities discussed regulatory challenges related to new nuclear technologies, climate change, and the licensing approach for small modular reactors (SMRs). The President of the National Atomic Energy Agency (PAA) participated as a panelist in the session entitled "Competencies and Skills", during which he discussed the progress of the Polish Nuclear Energy Programme and the current challenges faced by the National Atomic Energy Agency, including preparations for the oversight of not only large scale nuclear power plants but also SMRs.

From October 28 to 31, 2024, in accordance with Article 35 of the Euratom Treaty, a verification visit by the European Commission took place in Poland. During the visit, the nationwide environmental radiation monitoring network was reviewed, including early warning stations for radioactive contamination, facilities conducting measurements of radioactive contamination, environmental measurements around nuclear facilities and radioactive waste repositories, as well as the implementation of recommendations from the previous visit, which took place in 2016. In addition to the National Atomic Energy Agency (PAA), European Commission representatives also visited other Polish institutions involved in the country's radiation monitoring (NCBJ, ZUOP, CLOR, PIW-PIB, IMGW-PIB).

The conclusions of the European Commission's verification visit will be included in a technical report, which Poland will receive through the Permanent Representation of the Republic of Poland to the European Commission.

Since 2024, the Director of the Policy and International Cooperation Bureau (BSM) at the National Atomic Energy Agency (PAA) has served as the chairperson of the Nuclear Safety and International Cooperation Working Group (WG1 ENSREG). The group is working on tasks arising from the ENSREG work plan for 2024-2026, including the development of guidelines for conducting subsequent Topical Peer Reviews (TPR) and a position on technical criteria for assessing compliance with the delegated act concerning taxonomy.

International Atomic Energy Agency (IAEA)

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

The 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 sixcommittees:

- Nuclear Safety Standards Committees (NUSSC);
- Radiation Safety Standards Committee (RASSC);
- Waste Safety Standards Committee (WASSC);
- Transport Safety Standards Committee (TRANSSC);
- Nuclear Security Guidance Committee (NSGC);
- Emergency Preparedness and Response Standards Committee (EPRESC).

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 from 180 Member States (as of November 15, 2024). The General Conference is held annually to review and approve the Agency's programme and budget, as well as to make decisions and adopt resolutions on matters submitted to it by the Board of Governors, the Director General, or Member States.

The 68th General Conference of the International Atomic Energy Agency took place from September 16 to 20, 2024.

Photo 2. President of the PAA, Andrzej Głowacki, with the IAEA Director General Rafael Mariano Grossi (photo: PAA)

The Vice-Chairperson of the Polish delegation was the President of the PAA.

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:

Photo 3. President of the PAA, Andrzej Głowacki, with the Executive Director for Operations of the NRC Commission, Mirela Gavrilas (photo: PAA)

- the delegation of the U.S. Nuclear Regulatory Commission (US NRC), led by Mirela Gavrilas, Executive Director for Operations of the NRC;
- the delegation from the Canadian Nuclear Safety Commission (CNSC), led by Pierre Tremblay, Chairperson of the CNSC Commission;
- the delegation from the Slovak Nucelar Regulatory Authority (ÚJD SR), led by Marta Žiakova, the President of the ÚJD SR;
- the delegation of the Czech State Office for Nuclear Safety (SUJB), led by Dana Drabova, Chairperson of SUJB;
- the delegation of the Slovenian Nuclear Safety Administration (SNSA), led by Igor Sire, Director of SNSA;
- the delegatlon from the Ukrainian Nuclear Regulatory Authority (SNRIU) led by Oleh Korikov, Chairman of the SNRIU;
- the delegation of the UK Office for Nuclear Regulation (ONR), led by Mark Foy, Chief Executive of ONR;
- the delegation of the German nuclear regulatory authority (BMUV), led by Gerrit Niehaus, Director General of Department S;
- the delegation of the French Nuclear Safety Authority (ASN), led by Bernard Doroszczuk, President of ASN;
- the delegation of the Dutch Authority for Nuclear Safety and Radiation Protection (ANVS), led by Annemiek van Bolhuis, President of ANVS;
- the delegation of the Egyptian Nuclear and Radiological Regulatory Authority (ENRRA), led by Dr. Samy Shaaban Ataallah Soliman, Chairman of ENRRA;
- the delegation of the Singapore Nuclear Energy Agency (NEA), led by Wong Kang Jet, Chairman of NEA;
- the delegation of the Pakistan Nuclear Regulatory Authority (PNRA), led by Muhammad Rahman, Board Member of PNRA;
- the delegation of the Federal Authority for Nuclear Regulation (FANR) of the UAE, led by Christer Viktorsson, Director of FANR;
- the delegation of the Swedish Radiation Safety Authority (SSM), led by Michael Knochenhauer, Director of SSM.

The PAA's delegation also participated in meetings accompanying the General Conference:

- the meeting of heads of nuclear regulatory authorities;
- the meeting of Central and Eastern European regulators, known as the Quadrilateral;
- Regulatory Cooperation Forum (RCF).

Photo 4. Meeting of the PAA's delegation led by the President of PAA, Andrzej Głowacki, with representatives of the Nuclear Regulatory Authority of the United Arab Emirates (photo: FANR)

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 in June 2022. Its aim is to support the harmonization and standardization of regulatory and industry approaches to facilitate the effective deployment of small modular reactors (SMRs) worldwide, while maintaining the highest nuclear safety standards. The National Atomic Energy Agency (PAA) has been engaged in the NHSI activities since the inception of the initiative.

In October 2024, the President of the PAA participated in the NHSI plenary meeting, where the activities completed during the first phase of the initiative, already finished, were summarized and plans for the second phase of NHSI were presented. The second phase will focus primarily on implementing the processes developed in the first phase. Among the planned tasks for this phase are the development of guidelines to facilitate the use of regulatory assessments conducted by other nuclear regulators, with particular attention to regulatory differences between countries; the creation of a database containing conducted regulatory assessments and related experiences, including similarities and differences in regulations across countries; and the execution of a pilot joint international prelicensing review of a selected nuclear reactor.

Representatives of the PAA are members of four working groups established as part of the second phase of NHSI.

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.

On November 27, 2024, a programme document defining the framework for cooperation between Poland and the IAEA, titled the Country Programme Framework for 2024-2029, was signed.

In 2024, the PAA coordinated the participation of Polish institutions in IAEA technical meetings, training sessions, internships, and conferences – resulting in 470 participants from Poland being registered for 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 years 2024-2025, the National Centre for Radiation Protection in Health Care coordinated projects in the area of radiation protection in healthcare; the Ministry of Climate and Environment and the Ministry of Industry focused on developing infrastructure necessary for nuclear energy meanwhile, the PAA concentrated on further expanding competencies essential for the effective performance of nuclear regulatory oversight.

Additionally, the PAA's specialists participated as international experts in international review missions: the International Physical Protection Advisory Service (IPPAS) in the USA, from February 26 to March 8, 2024, and the Integrated Regulatory Review Service (IRRS) in South Korea, from November 11 to 22, 2024.

INIR-2 review

From April 15 to 25, 2024, at the invitation of the Minister of Climate and Environment, an Integrated Nuclear Infrastructure Review for phase 2 (INIR-2) mission was conducted by the International Atomic Energy Agency.

The PAA participated as a mission member. INIR missions aim to assist in the comprehensive assessment of a country's infrastructure readiness for the deployment of nuclear energy at various stages of nuclear programme Implementation. This assessment was carried out based on the analysis of a self-assessment report prepared by the Polish side, in accordance with the IAEA's Milestones Approach methodology. The report was developed using substantive contributions from various stakeholders involved in the Polish Nuclear Power Programme.

According to the overall assessment of the international expert team, Poland has established legal and regulatory frameworks covering safety, physical protection of nuclear materials and facilities, as well as radiation protection, and is working on contractual arrangements related to the construction of the first nuclear power plant. Poland has implemented a comprehensive stakeholder engagement programme, which forms the basis for strong public support at both the national and local levels.

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.

From June 25 to 28, 2024, the President of the National Atomic Energy Agency (PAA) participated in the meeting of the international Regulatory Cooperation Forum (RCF). The RCF meeting served to discuss the preparedness of individual nuclear regulators for nuclear licensing and potential forms of cooperation. PAA presented its training needs related to strengthening the workforce required for supervisory tasks within the Polish Nuclear Power Programme and received commitments for cooperation from

foreign partners, including the U.S. Nuclear Regulatory Commission, the Canadian Nuclear Safety Commission, and the Finnish Radiation and Nuclear Safety Authority. PAA's representatives took part in developing proposals for new performance indicators for RCF activities as part of the RCF task group's work.

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 Industry. The PAA is involved in the work of NEA committees and working groups on nuclear safety, nuclear regulation, nuclear legislation, new reactors and SMRs.

The President of the PAA represents Poland in the Committee on Nuclear Regulatory Activities (CNRA). The CNRA plenary sessions were held on June 5–7 and December 10–11, 2024. These meetings addressed current topics related to nuclear safety, including proposals for pre-licensing engagement activities, optimization and improvement of regulatory effectiveness and efficiency, the application of a graded approach to licensing, the use of artificial intelligence in regulatory work, as well as supply chain issues. Discussions also covered the work of various working groups and committees, as well as strategies for the development and maintenance of competencies within nuclear regulatory bodies. Poland presented up-to-date information on the nuclear power plant licensing process in the country, as well as an analysis of the license application for the MARIA research reactor.

Cooperation within associations and other forms of multilateral cooperation

Western European Nuclear Regulators' Association (WENRA)

Since November 2023, Poland has been a full member of the Western European Nuclear Regulators' Association (WENRA), which operates in both plenary sessions and working groups.

In 2024, the PAA was involved in the work of four working groups, including three focused on harmonizing Safety Reference Levels (SRLs) for: power reactors, research reactors, and the processing and disposal of radioactive waste. The PAA also has a representative in the working group addressing selected aspects of human resource management and competencies.

Photo 5. Meeting of the WENRA Reactor Harmonization Working Group (RHWG) at the headquarters of the National Atomic Energy Agency (PAA) (photo: PAA)

From January 30 to February 2, 2024, a meeting of the Reactor Harmonization Working Group (RHWG) for power reactors took place in Warsaw, hosted by the PAA. Representatives of nuclear regulatory bodies discussed, among other topics, the status of implementation of Safety Reference Levels by WENRA members, the concept of revising safety objectives for small modular reactors (SMRs), as well as planned changes to the Safety Reference Levels concerning safety policy, the functioning of organizations operating nuclear power plants, leadership and management for safety.

From April 23 to 25, 2024, the President of the PAA headed the Polish delegation at the spring plenary session of WENRA held in Larnaca, Cyprus. Representatives of nuclear regulatory bodies discussed the priorities of working groups for the upcoming months, opportunities to strengthen cooperation between WENRA and the European Union, and exchanged experiences related to the lifetime extension of nuclear power plants.

Photo 6. Anniversary plenary meeting of WENRA at the PAA's headquarters (photo: PAA)

From November 7 to 8, 2024, the autumn anniversary plenary session of WENRA was held in Warsaw, hosted by the PAA.

In 2024, WENRA celebrated its 25th anniversary. The session was attended by heads of nuclear regulatory bodies from Europe, Japan, Canada, and the USA. The Polish delegation, led by the President of the PAA, presented the status of the implementation of safety reference levels in Poland and participated in discussions on current challenges in the field of nuclear safety.

Photo 7. Participants of the WENRA anniversary plenary session at the PAA's headquarters (photo: PAA)

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.

Photo 8. Heads of radiation protection authorities at the HERCA meeting (photo: HERCA)

From May 22 to 23 and from December 3 to 4, 2024, the President of the PAA participated in the board meetings of the Heads of European Radiological Protection Competent Authorities (HERCA). During the meetings, heads of radiation protection authorities from 32 European countries discussed current and planned activities of the organization. The agenda included the work of individual working groups as well as issues related to harmonizing the actions of Member States in the areas of radiation protection and response to radiation emergencies.

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.

2. Bilateral cooperation

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

In 2024, the PAA continued cooperation with foreign partners experienced in the oversight of large nuclear facilities. The PAA implemented a bilateral cooperation programme:

- on January 18, 2024, a meeting was held with representatives of the Korean nuclear power plant operator KHNP;
- on March 26, 2024, a meeting was held with representatives of the Korean training centre KINGS;
- on April 5, 2024, a meeting was held with representatives of the United States Department of Energy;
- on April 10, 2024, an online working meeting was held with representatives of the Slovenian nuclear regulatory authority (SNSA);
- on December 5, 2024, a workshop on nuclear safety culture was held.

As part of its cooperation with the U.S. Department of Energy (DoE), the PAA received, on a long-term loan basis, equipment for the detection of radioactive materials – RSX-1 detectors, which enable large-area measurements from the ground, air, or water.

- on May 7-8, 2024, a meeting was held in Berlin with representatives of the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection;
- on May 16-17, 2024, a bilateral meeting was held with representatives of the Swedish nuclear regulatory authority (SSM);
- on May 28-29, 2024, a working meeting was held with representatives of Gesellschaft für Anlagen und Reaktorsicherheit (GRS) GmbH, a German research and expert organization;
- on June 10, 2024, a meeting was held in Warsaw with the Chairman of the United States Nuclear Regulatory Commission (US NRC);
- on June 20, 2024, a meeting was held in Warsaw with representatives of the Embassy of the United Kingdom of Great Britain;
- on July 18, 2024, a bilateral meeting was held with representatives of the Canadian Nuclear Safety Commission (CNSC);
- on July 29-31, 2024, a meeting was held in Sofia with representatives of the Bulgarian Nuclear Regulatory Agency (BNRA);
- on September 10, 2024, a meeting was held with Andrea Veil, a representative of the United States Nuclear Regulatory Commission (USNRC);
- from October 7 to 11, 2024, workshops were held in Warsaw with representatives of the Pakistan Nuclear Regulatory Authority (PNRA);
- on October 10-11, 2024, a meeting was held in Warsaw with representatives of the Austrian government;
- on October 24, 2024, a meeting was held in Warsaw with representatives of the National Nuclear Security Administration (NNSA);
- on November 4, 2024, a meeting was held in Warsaw with a representative of the United States Nuclear Regulatory Commission (USNRC);
- on November 7, 2024, a meeting was held in Warsaw with the Chairwoman of the Dutch nuclear regulatory authority (ANVS).

The bilateral cooperation with the U.S. NRC also allowed to organise the following in 2024:

- the next edition of On-the-Job Trainings (OJT) from March 15 to April 12 and from August 1 to September 30, 2024. The trainings were held at the US NRC headquarters in Rockville, the Training Center in Chattanooga, and the Vogtle nuclear power plant;
- workshops on the licensing of nuclear power plants from 13 to 29 February, 2024;
- workshops on safety culture in nuclear regulatory work from June 10 to 14, 2024;
- specialized training sessions on the construction of the AP-1000 reactor from June 17 to July 5, 2024;
- a study visit of the PAA representatives in the United States focusing on public communication from November 18 to 22, 2024.

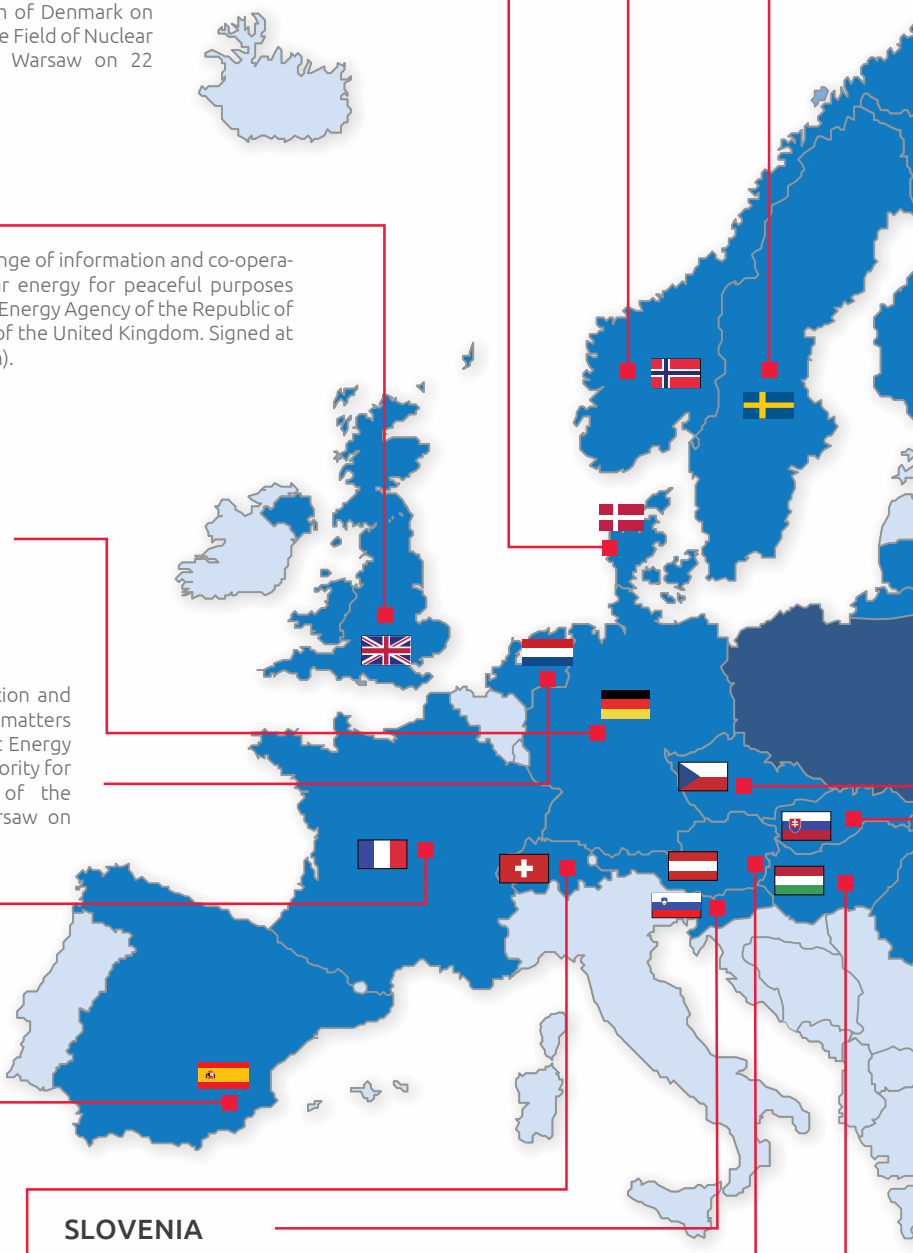
Bilateral agreements signed by Poland within the areas of National Atomic Energy Agency's activities

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 cooperation 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 radiation protection. Signed at Warsaw on 30 July 2009.

THE NETHERLANDS

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 Authority for Nuclear Safety and Radiation Protection of the Kingdom of the Netherlands, signed at Warsaw on 7 November 2024 (only in English).

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 Center for Energy, Environment and Technology in Spain. Signed at Warsaw on 21 December 2017 and at Madrid on 15 January 2018 (only in English).

SWITZERLAND

Memorandum of Understanding for cooperation and exchange of information for 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).

SLOVENIA

Memorandum of Understanding for cooperation and exchange of information for 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).

AUSTRIA

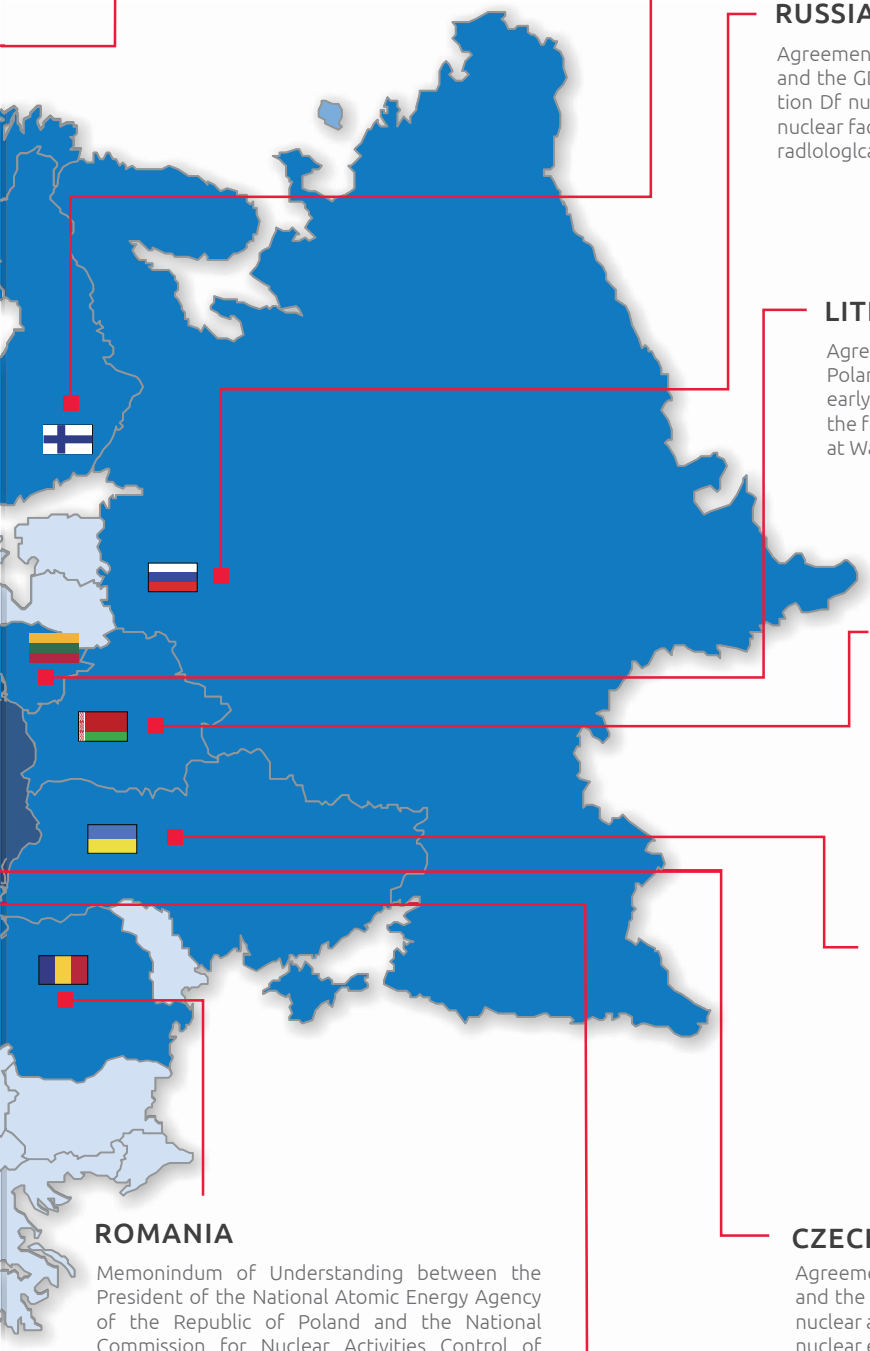
Agreement between the Government of the Polish People's Republic and the Government of the Republic of Austria on exchange of information and cooperation in the field of nuclear safety and radiation protection. Signed at Vienna on 15 December 1989.

SWEDEN

Memorandum of Understanding between the President of the National Atomic Energy Agency of the Republic of Poland and the Swedish Radiation Safety Authority on co-operation and exchange of information in the area of regulatory oversight of the use of nuclear energy for peaceful purposes, signed at Warsaw on 17 May 2024 (only in English).

FINLAND

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



RUSSIA

Agreement between the Gavernment of the Republic cf Poland and the GDVemment of the Russian Federation oo early notifica-tion Df nuclear accidents, on exchanse of Information related to nuclear facllltles and cooperation In the field of nuclear safety and radlologlcal pratection. Signed at Warsaw on 18 February 1995.

LITHUANIA

Agreement between the Government of the Republic of Poland and the Gavernment 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 June1995.

BELARUS

Agreement between the Government of the Republic of Poland and the Government of the Republic of Belarus on earty 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 Gavemment of Ukraine on early notification cf 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

Memonindum 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.

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-opera-tion in the field of nuclear safety and radiological protection. Signed at Bratislava on 17 September 1996.

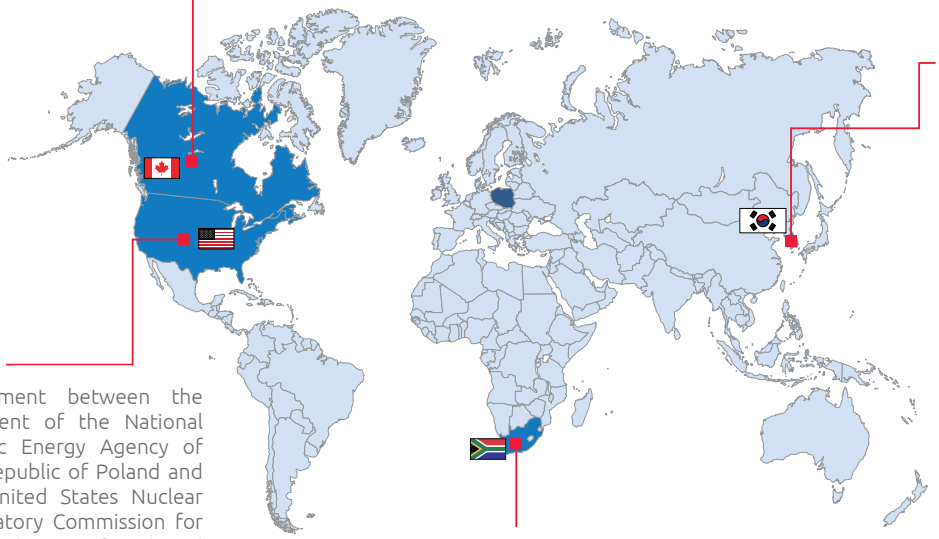
HUNGARY

Memorandum of Understanding for cooperation and exchange of information for 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).

Bilateral agreements concluded by Poland in the areas of activity of the National Atomic Energy Agency outside Europe

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).

Conclusions

In 2024, the PAA strengthened its international position, as evidenced by its acceptance as a full member of the Western European Nuclear Regulators Association (WENRA), allowing active participation in the development of a common nuclear safety system in the Western world.

The PAA participated in the majority of meetings organized within associations and other forms of multilateral cooperation. The PAA's representatives actively took part in the work of working groups and expert teams focusing on the development of nuclear safety standards, as well as on building nuclear regulatory competencies, nuclear law, and the development of new reactor types. The knowledge gained during these meetings enables the further development of the Agency's competencies.

The intensive exchange of experiences and best practices with the US NRC regarding the licensing process, continued in 2024, enabled the PAA to more effectively prepare for activities arising from the implementation of tasks assigned to the Agency under the Polish Nuclear Energy Programme.

In 2024, the implementation of recommendations and suggestions from the IAEA's integrated regulatory review service mission (IRRS) conducted in September 2023 also began. This will allow for further strengthening and adaptation of the Polish legal framework in the field of nuclear safety and radiation protection to international standards and recommendations in this area.

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 – Dutch nuclear regulatory authority
- **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** – 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
- **EA** – Environment Agency
- **ECURIE** – European Community Urgent Radiological Information Exchange
- **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
- **GIG** – Central Mining Institute
- **GIOŚ** – Chief Inspectorate of Environmental Protection
- **GTRI** – Global Threat Reduction Initiative
- **HERCA** – Heads of the European Radiological Protection Competent Authorities
- **HEU** – Highly Enriched Uranium
- **IAEA** – International Atomic Energy Agenc)
- **IAEA Safety Standards**
- **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
- **IMGW** – Institute of Meteorology and Water Management
- **INES** – International Nuclear and Radiological Event Scale
- **IOR** – radiation protection officer
- **JRC** – European Comission's Joint Research Centre
- **ISN – change of name to IRSN** – L'Institut de Radioprotection et de Sûreté Nucléaire – French Institute of Radiation Protection and Nuclear Safety
- **KINS** – Korea Institute of Nuclear Safety
- **KPK** – National Contact Point
- **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 Organisation for Economic Co-operation and Development
- **NIK** – Supreme Audit Office
- **NPP** – nuclear power plant
- **NPT** – Treaty on the Non-Proliferation of Nuclear Weapons
- **NRW** – Natural Resources Wales

- **NUSSC** – Nuclear Safety Standards Committee
- **ONR** – Office for Nuclear Regulation
- **PAA** – National Atomic Energy Agency
- **PIP** – National Labour Inspectorate
- **PIS** – State Sanitary Inspection
- **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
- **RPMB** – Council of the Baltic Sea States
- **TLD** – thermoluminescent dosimeters
- **TRANSSC** – Transport Safety Standards Committee
- **UDT** – Office of Technical Inspection
- **ÚJD SR** – Nuclear Regulatory Authority of the Slovak Republic
- **USIE** – Unified System for Information Exchange in Incidents and Emergencies
- **US NRC** – U.S. Nuclear Regulatory Commission
- **WASSC** – Waste Safety Standards Committee
- **WENRA** – Western European Nuclear Regulators Association
- **WHO** – World Health Organization
- **ZUOP** – Radioactive Waste Management Plant

PAA

NATIONAL
ATOMIC ENERGY
AGENCY

ul. Nowy Świat 6/12
00-400 Warszawa
www.gov.pl/web/paa