PAA

NATIONAL ATOMIC ENERGY AGENCY

ANNUAL REPORT

on the activities of the President of the National Atomic Energy Agency and assessment of nuclear safety and radiological protection in Poland in 2014

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Warsaw 2015

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INTRODUCTION

To the Prime Minister
of the Republic of Poland.

Dear Madam,

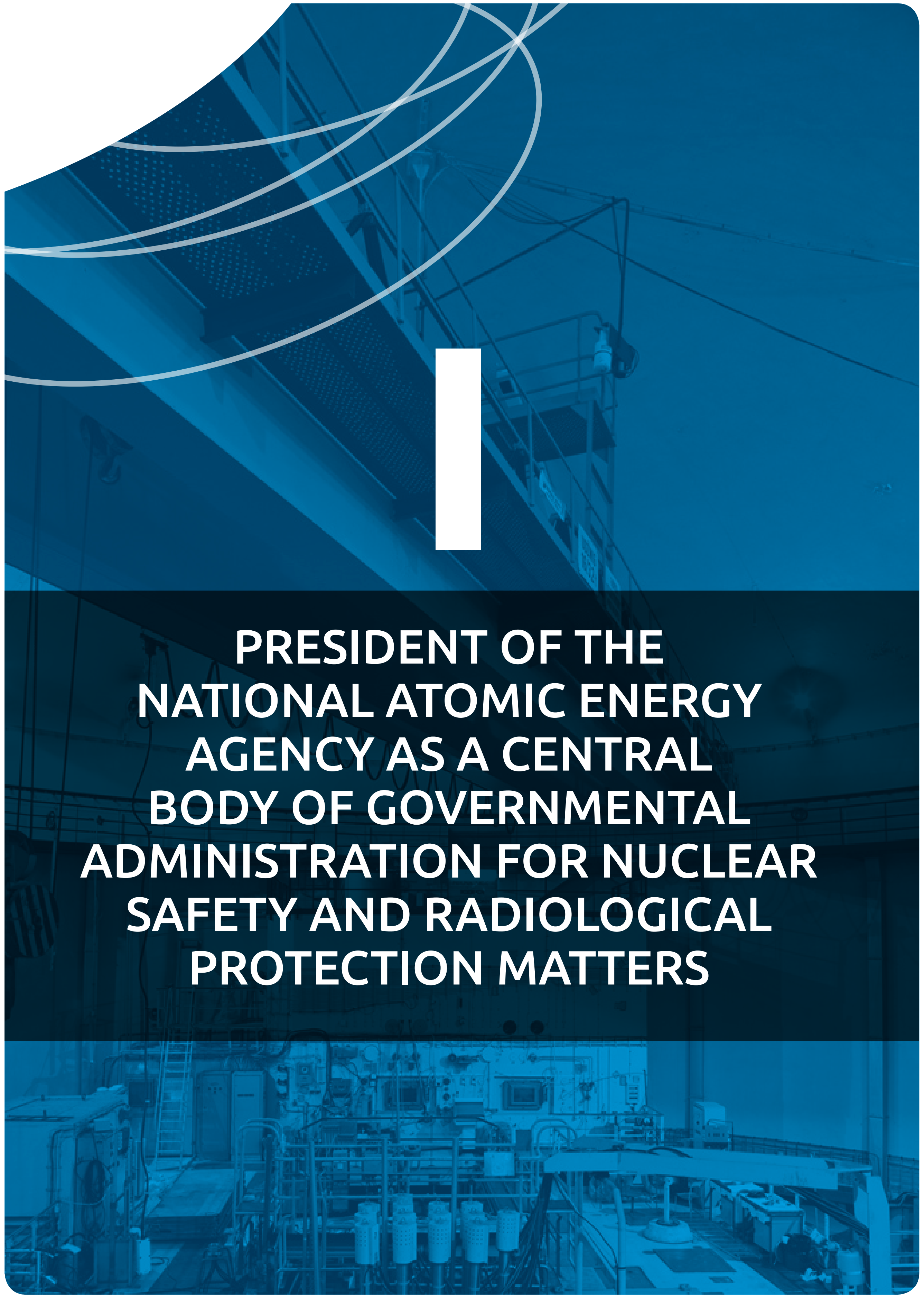
It is my pleasure and privilege to provide you with a report on the activities of the President of the National Atomic Energy Agency in the year 2014. I would like to emphasise that, from the perspective of nuclear safety and radiological protection, the inhabitants of Poland were safe in the previous year and natural environment was appropriately protected against negative effects of ionising radiation.

Preparation of this report is not merely my statutory obligation, but I consider it to be an extraordinary opportunity to introduce the function as well as the efforts of the institution I proudly manage to you, Madam Prime Minister, and to the entire Polish society. The National Atomic Energy Agency supervises a vast majority of activities involving the use of ionising radiation sources conducted in the territory of Poland. It is the safety of workers, the society and the environment that we perceive as the highest priority.

January 2014 saw an event of special importance from the perspective of strategic goals of the National Atomic Energy Agency as the Council of Ministers adopted a multiannual scheme known as the Polish Nuclear Power Programme. For several years now, the Agency over which I preside has been intensely preparing itself to perform the role of a nuclear regulator supervising the future Polish nuclear power plant. By approving the Programme, the Council of Ministers has enabled us to proceed to further action stages aimed at extension of both the organisational system and the authority of the Polish nuclear regulatory framework.

While inviting you to become familiar with the report, I would like to ensure you once again, Madam Prime Minister, that owing to the regulatory activity conducted by PAA, any risk involved in the use of ionising radiation is maintained on the lowest reasonably attainable level.

President
of the National Atomic
Energy Agency



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PRESIDENT OF THE NATIONAL ATOMIC ENERGY AGENCY AS A CENTRAL BODY OF GOVERNMENTAL ADMINISTRATION FOR NUCLEAR SAFETY AND RADIOLOGICAL PROTECTION MATTERS

I. PRESIDENT OF THE NATIONAL ATOMIC ENERGY AGENCY AS A CENTRAL BODY OF GOVERNMENTAL ADMINISTRATION FOR NUCLEAR SAFETY AND RADIOLOGICAL PROTECTION MATTERS

I. 1. LEGAL BASIS OF ACTIVITIES OF THE PAA PRESIDENT

The President of the National Atomic Energy Agency (PAA) constitutes a central body of governmental administration competent for matters of nuclear safety and radiological protection. Their activity is regulated by the Atomic Law of 29 November 2000 (Journal of Laws of 2014, item 1512) and the relevant secondary legislation to the act in question. Since 1 January 2002, the PAA President has been obliged to report to a minister competent for environmental matters. Pursuant to the provisions of the aforementioned act, in the year 2014, the scope of activities of the PAA President included tasks which involved ensuring nuclear safety and radiological protection of Poland, and in particular:

1) preparation of draft documents related to national policies involving nuclear safety and radiological protection, entailing the nuclear power engineering development programme as well as internal and external threats;
2) exercising regulatory control and supervision over activities leading to actual or potential ionising radiation exposure of people and natural environment, including inspections conducted in this scope and issuance of decisions on licenses and authorisations connected with said activity;
3) promulgation of technical and organisational recommendations concerning nuclear safety and radiological protection;
4) performing tasks related to assessment of the national radiation situation in normal conditions and in radiation emergency situations as well as furnishing the relevant information to appropriate authorities and to the general public;
5) performing tasks resulting from the obligations imposed upon the Republic of Poland in terms of recording and control of nuclear materials, physical protection of nuclear materials and facilities, special control measures for foreign trade in nuclear materials and technologies, and from other obligations resulting from international agreements on nuclear safety and radiological protection;
6) activities involving public communication, education and popularisation, as well as scientific, technical and legal information concerning nuclear safety and radiological protection, including providing the general public with the relevant information on ionising radiation and its impact on human health and the environment, and on the available measures to be implemented in the event of radiation emergency, excluding promotion of the use of ionising radiation and promotion of nuclear power engineering in particular;
7) cooperation with central and local administration authorities on matters involving nuclear safety, radiological protection as well as scientific research in the field of nuclear safety and radiological protection;
8) performing tasks involving national and civil defence as well as protection of classified information, as stipulated in separate regulations;
9) preparing opinions on nuclear safety and radiological protection with reference to plans of technical activities involving peaceful use of nuclear energy for purposes of central and local administration authorities;
10) cooperation with competent foreign entities and international organisations on matters provided for in the Act;
11) preparing drafts of legal acts on the matters provided for in the Atomic Law and settling them with other state authorities according to the procedures established in the Rules of Procedure of the Council of Ministers;
12) issuing opinions on draft legal acts developed by authorised bodies;
13) submitting annual reports on the activities of the Agency President and assessments of the status of national nuclear safety and radiological protection to the Prime Minister.

Since 1990, processing of claims submitted by former workers of Industrial Plant R-1 (ZPR-1) in Kowary has been the PAA President's additional duty (resulting from the fact that the PAA President used to perform the function of a founding body of the POLON Nuclear Technology Applications Plant). Until 1972, ZPR-1 had been extracting and preprocessing uranium ores. Pursuant to Ordinance no. 4 of the PAA President of 14 April 1992, the Office for Handling Claims of Former Workers of Uranium Ore Mining and Milling Facilities was established in Jelenia Góra for purposes of legal assistance and processing of claims for damages lodged by former workers of the ZPR-1 in Kowary and their families. The claims settled in 2014 resulted in the following payments:

- compensating benefits payable on a monthly basis to 8 persons in the total amount of PLN 81,682,
- monetary equivalent for coal allowance in kind paid in accordance with provisions of the collective labour agreement to 196 persons in the total amount of PLN 185,415.

Starting from the year 2000, the Office has been fulfilling its statutory obligation to award and pay one-off damages to former soldiers who were compulsorily employed in uranium ore mining plants while performing substitute military service. In 2014, no payments were effected in connection with such claims.

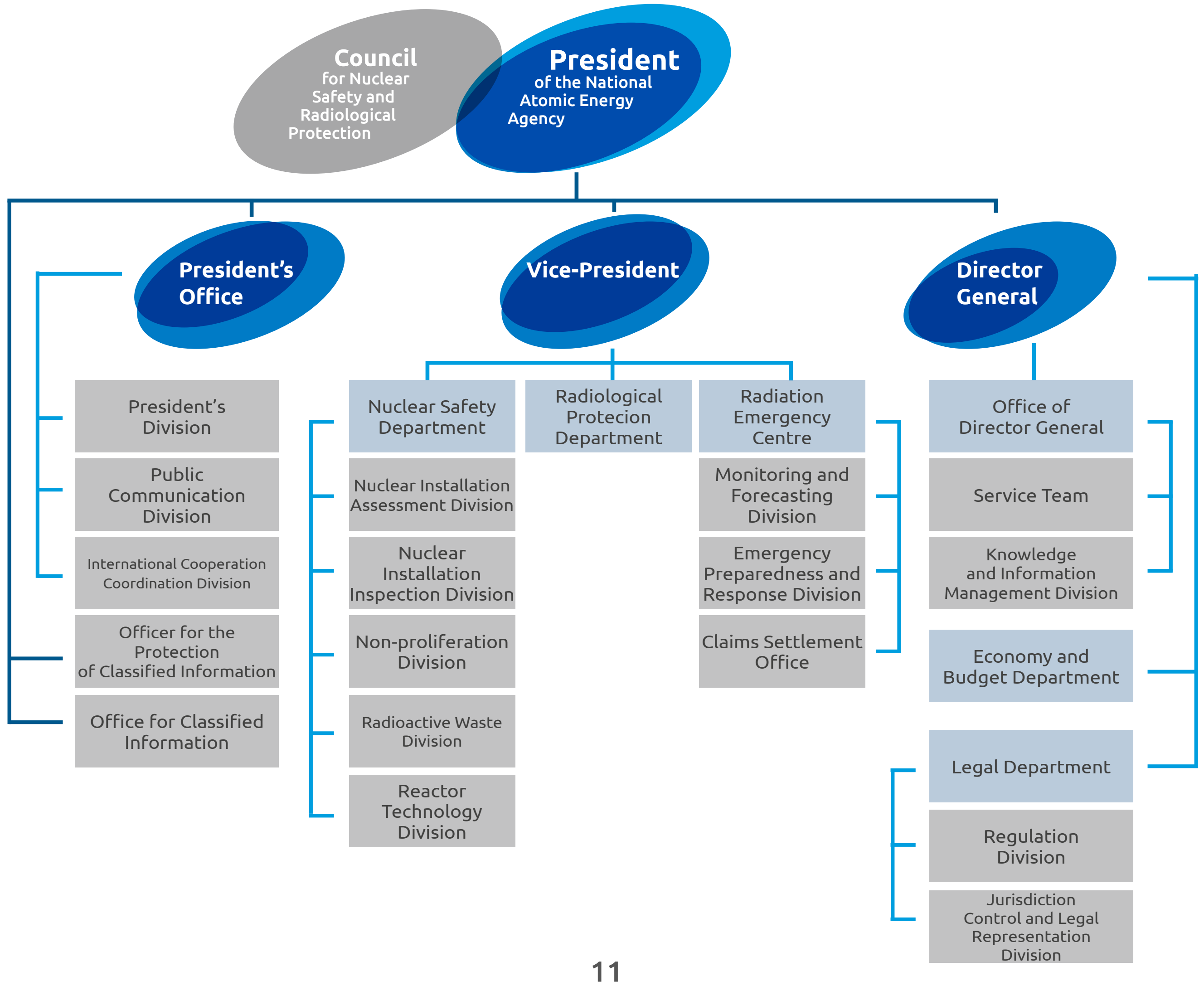
I. 2. NATIONAL ATOMIC ENERGY AGENCY – the organisation

The PAA President fulfils their duties through the National Atomic Energy Agency operating under the former's direct management. The Agency's internal organisation is defined in the charter established by the Minister of the Environment.

2.1. Organisational structure of the National Atomic Energy Agency

The charter of the National Atomic Energy Agency currently in force was enacted by virtue of Ordinance of the Minister of the Environment no. 69 of 3 November 2011. PAA's detailed structure was laid down in Ordinance no. 4 of the PAA President of 4 November 2011 on the Organisational Rules of the National Atomic Energy Agency (Official Journal of PAA no. 2, item 6, as amended). The Agency's organisational structure has been depicted in Fig. 1.

Fig. 1. Organisational diagram of the National Atomic Energy Agency in 2014



2.2. Employment at the National Atomic Energy Agency

PAA's mean annual headcount in 2014 came to 113 persons (115.01 full-time employees), including 28 Nuclear Regulatory Inspectors.

2.3. Budget of the National Atomic Energy Agency

The PAA's budgetary expenses in 2014 amounted to PLN 29.1 million, including:
- financing the activities of the emergency service and the national contact point acting under the international nuclear accident notification system as well as national radiological monitoring – 10.0%,
- performing inspections of and issuing licences for activities conducted under conditions of exposure to ionising radiation – 10.0%,
- membership contributions on account of Poland's membership in the International Atomic Energy Agency – 48.1%,
- operating costs of the National Atomic Energy Agency – 28.8%,
- other activity – 3.1%.

I. 3. COUNCIL FOR NUCLEAR SAFETY AND RADIOLOGICAL PROTECTION

3.1 Council composition

The Council for Nuclear Safety and Radiological Protection is appointed by the PAA President. The Council is composed of the chairman, the deputy chairman, the secretary and not more than 7 members appointed from among outstanding experts in the field of nuclear safety, radiological protection, physical protection, safeguards of nuclear material (henceforth: "safeguards") and other fields of expertise crucial from the perspective of nuclear safety supervision. Members of the Council must hold security clearances authorising them to access classified information marked as "classified".

The Chairman of the Council manages its activities. He/she represents the Council outside as well as prepares plans regarding the Council's activities for each calendar year and presents them at Council meetings.

In 2014, the Council composition was as follows:
Henryk Jacek Jezierski, Chairman of the Council,
Grzegorz Krzysztoszek, Deputy Chairman of the Council,
Andrzej Cholerzyński, Secretary of the Council,
Roman Jóźwik, Member of the Council,
Jerzy Wojnarowicz, Member of the Council,
Janusz Janeczek, Member of the Council,
Andrzej Grzegorz Chmielewski, Member of the Council,

3.2. Tasks of the Council

Main tasks of the Council particularly include issuing opinions upon the PAA President's request with regard to draft versions of licenses for conducting activities involving exposure to ionising radiation and consisting in construction, commissioning, operation and decommissioning of nuclear facilities, and furthermore, draft versions of legal acts as well as organisational and technical recommendations, and undertaking initiatives concerning improvements in the supervision of the aforementioned exposure-interrelated activities.

There were 6 Council meetings held in the year 2014: in January, April, June, July, August and November.

In 2014, the Council adopted seven resolutions under a vote (including four involving amendments to licences previously granted) concerning the following matters:

1. accepting a report on the Council's operations in 2013,
2. issuing a positive opinion on the report entitled "Technical recommendations of the President of the National Atomic Energy Agency concerning the assessment of tectonic stability of substrata and seismic activity of faults with reference to locations of nuclear facilities",
3. issuing a positive opinion on the report entitled "Technical recommendations of the President of the National Atomic Energy Agency concerning the assessment of geological, engineering and hydrogeological conditions for locations of nuclear facilities",
4. issuing a positive opinion on draft ANNEX no. 1/2014/ZUOP to LICENCE no. 1/2002/Ewa of 15 January 2002, as amended, comprising activities connected with disposal of spent nuclear fuel (SNF) in the Russian Federation,
5. issuing a positive opinion on draft ANNEX no. 12/2014/MARIA to LICENCE no. 1/2009/MARIA of 31 March 2009, as amended, comprising the process of preparing the MR type spent fuel to transport from the MARIA reactor,
6. issuing a positive opinion on draft ANNEX no. 13/2014/MARIA to LICENCE no. 1/2009/MARIA of 31 March 2009, as amended, comprising extension of the scope of material tests by granting permission to the use of a thermal-to-fast neutron converter with the power capacity of 14 MeV at the MARIA reactor,
7. issuing a positive opinion on draft ANNEX no. 14/2014/MARIA to LICENCE no. 1/2009/MARIA of 31 March 2009, as amended, comprising replacement of electric converters operating in the MARIA reactor's emergency power supply system with state-of-the-art uninterruptible power supply (UPS) units.

I. 4. ASSESSMENT OF THE NATIONAL ATOMIC ENERGY AGENCY'S OPERATIONS

In 2014, PAA issued 1,570 administrative decisions concerning ionising radiation sources. As regards nuclear facilities, the nuclear regulatory body issued 6 administrative decisions, having received two requests for cases to be reconsidered.

Two appeals against the decisions issued by PAA were submitted to the Administrative Court.

In 2014, PAA was audited by the following official bodies:

- Supreme Audit Office (NIK), with regard to implementation of the state budget in 2013 in section 68 – National Atomic Energy Agency (in the period from 5 February to 28 March),
- Ministry of the Environment, with regard to keeping public records of documents containing information on the environment and its protection (in the period from 17 November to 21 November),
- Social Insurance Institution (ZUS), with regard to premiums transferred to ZUS and social insurance benefits (in the period from 6 June to 27 June).

The Supreme Audit Office positively assessed the state budget implementation in 2013 in section 68 – National Atomic Energy Agency.
Based on the audit proceedings conducted, the Ministry of the Environment positively assessed the National Atomic Energy Agency's operations with certain reservations pertaining to the scope of activities audited.

Also the post-audit assessment of the National Atomic Energy Agency undertaken by the Social Insurance Institution as the auditing body brought positive results.

In accordance with the Public Finance Act, PAA has introduced a management control system which enables execution of a risk analysis and a management system assessment, among other available options.

The year 2014 saw the first ever assessment of efficiency of regulatory activities as well as of the current legal status from the perspective of its adequacy against the needs of nuclear safety and radiological protection assurance. In accordance with statutory requirements, a Report on the assessment results was submitted to the Prime Minister and to the Minister of the Environment. The Agency's regulatory activity was assessed positively in the said Report.
Pursuant to article 113a, section 1, at last every 3 years, the President of the National Atomic Energy Agency is obliged to conduct an assessment of the current legal status from the perspective of its adequacy against the needs of nuclear safety and radiological protection assurance. The relevant analysis, conducted as the Report was being prepared, implied a number of conclusions including that the current legal status provides sufficient legal framework for purposes of activities related to the use of nuclear energy or ionising radiation in a manner which ensures security to the relevant entities, the property and the environment.

It was also stressed in the Report that the nuclear regulatory authority was performing their duties in an appropriate manner by exercising regulatory control and supervision over activities which may lead to ionising radiation exposure of people and natural environment as well as conducting inspections in this respect. It was also recommended that continuation of training for the regulatory service personnel should be considered a priority in order to prepare them for implementation of the Polish Nuclear Power Programme (PEJ) and ensure stability of employment of highly qualified experts in nuclear regulatory institutions, thus providing grounds for competent assessment of the entire project and supervision of construction and operation of a nuclear power plant in Poland.

II. INFRASTRUCTURE FOR NUCLEAR REGULATORY ACTIVITIES IN POLAND

II. 1. DEFINITION, STRUCTURE AND FUNCTIONS OF THE NUCLEAR SAFETY AND RADIOLOGICAL PROTECTION SYSTEM

The nuclear safety and radiological protection system comprises all legal, organisational and technological activities which ensure appropriate state of nuclear and radiological safety of nuclear plants as well as other facilities making use of ionising radiation sources in Poland. A threat to this type of safety may be posed by operation of nuclear facilities, both in Poland and abroad, as well as other activities involving ionising radiation sources. In Poland, all issues connected with radiological protection or the environmental radiation monitoring are, in accordance with the applicable provisions of law, considered jointly with the matter of nuclear safety, physical protection and safeguards. Owing to this solution, there is one common approach to all aspects of radiological protection, nuclear safety, safeguards and radioactive sources, and thus all the nuclear regulatory activities are consolidated into one regulatory system.

The nuclear safety and radiological protection system functions in accordance with the Atomic Law of 29 November 2000 and its secondary legislation, the applicable EU directives and regulations as well as treaties and international conventions to which Poland is a party.

The act of 4 April 2014 amending the Atomic Law (Journal of Laws, item 587), once it became effective on 24 May 2014, abolished one of nuclear regulatory bodies, namely the position of the Chief Nuclear Regulatory Inspector (CNRI), thus initiating a two-stage nuclear regulatory system by transferring the entitlements of the CNRI to the President of the National Atomic Energy Agency.

At present, pursuant to the provisions of the Atomic Law, the nuclear regulatory authorities in Poland are:

- **Nuclear Regulatory Inspectors,**
- **President of the National Atomic Energy Agency.**

The most essential aspects of the nuclear safety and radiological protection system include:

- exercising regulatory supervision over activities involving nuclear material and ionising radiation sources by issuing decisions on granting licenses concerning the performance of these activities or their registration, control over the manner in which activities are performed, control over doses received by workers, supervision of training for radiation protection officers (experts in nuclear safety and radiological protection matters with the entities which conduct activities based on the licenses granted) and workers exposed to ionising radiation, control over the trade in radioactive material, keeping records of radioactive sources and users of radioactive sources and a central register of individual doses, and in cases of activities involving nuclear material, also detailed records and books of accounts for this material, providing approvals for systems of physical protection of nuclear material and control of the technologies applied;
- recognising and assessing the national radiation situation through coordination (including standardisation) of works performed by local stations and units measuring the level of radiation dose rate, content of radionuclides in the chosen elements of natural environment and in drinking water, foodstuffs and feeds;
- maintaining services prepared to recognise and assess the national radiation situation and to respond in cases of radiation emergencies (in cooperation with other competent authorities and services operating under the national emergency response system);
- performing tasks aimed at fulfilment of obligations imposed upon Poland under treaties, conventions and international agreements with regard to nuclear safety and radiological protection, and bilateral agreements on mutual support in cases of nuclear accidents and cooperation with Poland's neighbouring counties in the scope of nuclear safety and radiological protection, as well as for the purpose of assessment of the condition of nuclear facilities, radioactive sources and waste management and nuclear safety and radiological protection systems located outside of Polish borders.

Pursuant to the Atomic Law, the aforementioned tasks are performed by the PAA President.

An exception to the foregoing is that the PAA President's supervision of activities involving ionising radiation sources is not required in cases of using X-ray devices for purposes of medical diagnostics, interventional radiology, surface radiotherapy and radiotherapy of non-cancerous diseases, since the supervision of the said activities is exercised by provincial national sanitary inspectorates (or other competent sanitary inspection bodies reporting to the Minister of National Defence and to the Minister of the Interior).

The PAA President's supervision over any activity conducted under conditions involving exposure to ionising radiation comprises the following:

1. Determining conditions which are required to ensure nuclear safety and radiological protection.
2. Issuing licences for performance of activity which involves the exposure, consisting in:
   - production, processing, storage, transport or use of nuclear material or radioactive sources as well as trade in this material or sources,
   - storage, transport, processing or disposal of radioactive waste,
   - storage, transport or processing of spent nuclear fuel and trade in this fuel,
   - isotopic enrichment,
   - construction, commissioning, operation and decommissioning of nuclear facilities,
   - construction, operation and closure of radioactive waste repositories,
   - production, installation, operation and maintenance of equipment containing radioactive sources and trade in such equipment,
   - commissioning and use of equipment generating ionising radiation,
   - commissioning of laboratories where ionising radiation sources are to be used, including X-ray laboratories,
   - intentional adding of radioactive substances in processes of manufacturing consumer and medical products, medical products for purposes of in vitro diagnostics, equipment for medical products, equipment for medical products for purposes of in vitro diagnostics, active medical products for implantation, in the understanding of provisions of the Act on Medical Products of 20 May 2010 (Journal of Laws no. 107, item 679, as amended), trade in such products, import into and export from the territory of the Republic of Poland of consumer and medical products to which radioactive substances have been added, intentional administration of radioactive substances to people and animals for purposes of medical or veterinary diagnostics, therapy or scientific research.
3. Controlling the aforementioned activities from the perspective of compliance with the criteria specified in the applicable regulations and with requirements of the licenses granted.

In the scope of activities connected with nuclear material and facilities, the PAA President's supervision also involves approvals and inspections of physical protection systems as well as activities envisaged in the obligations of the Republic of Poland relating to safeguards.

II. 2. BASIC PROVISIONS OF LAW ON NUCLEAR SAFETY AND RADIOLOGICAL PROTECTION

2.1. Atomic Law Act

The Atomic Law of 29 November 2000, effective as of 1 January 2002, introduced a consolidated system ensuring nuclear safety and radiological protection of workers and the entire population in Poland.

The most important provisions of the aforementioned act concern issuance of licences for activities connected with exposure to ionising radiation (i.e. licenses for activities specified above in the section "Definition, structure and functions of the nuclear safety and radiological protection system"), obligations of heads of organisational units conducting activities which involve radiation and prerogatives of the President of the National Atomic Energy Agency (PAA) to exercise regulatory control and supervision of these activities. The act also provides for other tasks of the PAA President related to such matters as the assessment of the national radiation situation and response in cases of radiation emergencies.

The principles and procedures set forth in the aforementioned act pertain to the following matters:

1) justification for instituting activities which involve exposure to ionising radiation, their optimisation and establishing dose limits for workers and the entire population,
2) procedure for obtaining the required licenses concerning the performance of such activities as well as the mode and method of controlling the performance of such activities,
3) keeping records and inspection of ionising radiation sources,

4) keeping records and inspection of nuclear material,
5) physical protection of nuclear material and nuclear facilities,
6) management of high-activity radioactive sources,
7) classification of radioactive waste and methods of radioactive waste and spent nuclear fuel management,
8) classification of workers and their workstations based on the degree of exposure involved in the work performed and designation of protection measures suitable to counteract this exposure,
9) training and issuing authorisations to be employed at particular positions considered important for ensuring nuclear safety and radiological protection,
10) assessment of the national radiation situation,
11) procedures applied in cases of radiation emergencies,
12) siting, designing, construction, commissioning, operation and decommissioning of nuclear facilities.

In accordance with the act in question, the head of an entity conducting activities which involve ionising radiation is held responsible for ensuring safety of the use of ionising radiation. In order to support the individuals in the performance of their obligations, a special rule has been introduced stipulating that internal supervision of compliance with safety requirements is exercised at the given entity by a radiation protection officer, i.e. a person provided with special authorisations granted by the PAA President under the provisions of the Atomic Law. The foregoing comprises specific types of activity which require a licence to have been granted. What the Act also stipulates is a possibility to perform activities involving ionising radiation exposure based on a suitable notification only, and also specifies circumstances where neither a license nor any notification is required. For such activities, there is no obligation to provide for internal supervision of their performance via a person holding authorisations of a radiological protection officer.

Some types of positions (particularly those performed at nuclear facilities, but also at organisational entities conducting activities which involve ionising radiation) have been considered to be exceptionally significant for ensuring nuclear safety and radiological protection.

These positions may only be staffed by those candidates who have completed courses offered by special training centres and have successfully passed suitable examinations before an examination board appointed by the PAA President.

Similar rules will apply in the future to individuals who will perform specific activities of special importance for ensuring nuclear safety and radiological protection in nuclear power plants.

Other employees from various entities are also trained – it is an internal course provided by the head of their employer having previously received an approval of the course curriculum from the PAA President.

In order to ensure radiological safety of personnel exposed to ionising radiation, specific dose limits were established which, except for cases determined in the Act, must not be exceeded. Workers are covered by a compulsory dosimetry scheme intended for control of the doses they receive. The head of the given entity is obliged to monitor the personnel's dose measurement results. At the same time, dose measurement results for all workers classified under category A, who are potentially most exposed to ionising radiation, are submitted to the central register of doses maintained by the PAA President.

The Act also addresses the issue of nuclear material and high radioactivity sources as well as their transport, but also cross-border movement of radioactive waste and spent nuclear fuel. The Act introduces mechanisms which allow for safe shipment of the aforementioned material as well as a specific requirement that their receipt by the target recipient must be guaranteed.

What the Act also comprises is a set of special regulations dedicated to radioactive waste. In order to ensure suitable conditions of waste management for purposes of their disposal, a state-owned public utility enterprise was established, namely Zakład Unieszkodliwiania Odpadów Promieniotwórczych (Radioactive Waste Management Plant), subsidised by the state to conduct its statutory activity. It has been secured against liquidation or bankruptcy which allows for its uninterrupted operations.

High-activity sources are under supervision from the moment of production until the time of their disposal: the management procedure at each stage of their use has been defined, and the form of securing costs of delivery and management after completing operations involving their use has been agreed.

Assuming that, even with the most effective safety system, an event may always occur leading to an increase of the radiation level, the Act has obliged the PAA President to perform ongoing assessment of national radiation situation and undertake follow-up measures both in Poland and on an international scale. Moreover, the Act has defined a radiation emergency, systematised individual types of emergencies and determined the ways in which appropriate authorities and services should respond to such emergencies.

In order to ensure efficient enforcement of the nuclear safety and radiological protection regulations, the Act also includes provisions which allow competent authorities to respond immediately to any potential violations thereof. These comprise a possibility of administrative fines being imposed by the PAA President by way of administrative decisions.

Qualified infringement of legal regulations regarding the aforementioned issues is subject to the provisions of the Penal Code.

The use of ionising radiation is managed in accordance with international solutions defining rules and procedures applied to handle the former. The solutions adopted by the Atomic Law fully correspond to the relevant international regulations, since they result from international agreements binding for Poland and from laws of the European Union, particularly EU directives.

The current status of the Atomic Law was achieved by introducing two significant amendments in 2011 and 2014. The amendment of 2011 was enacted in connection with the required implementation into the Polish laws of provisions of Council Directive 2009/71/EURATOM of 25 June 2009 establishing a

Community framework for the nuclear safety of nuclear installations[1], and Poland's ratification of the Protocol to Amend the Vienna Convention of 1963 on civil liability for nuclear damage signed in Vienna on 12 September 1997[2] as well as the commencement of works on the Polish Nuclear Power Programme.

The most important changes introduced under the Act of 13 May 2011 amending the Atomic Law and certain other acts (Journal of Laws no. 132, item 766) included provisions determining detailed requirements for nuclear safety and radiological protection concerning the siting, design, construction, commissioning, operation and decommissioning of nuclear facilities as well as those regarding the siting and construction of radioactive waste and spent nuclear fuel repositories. The Act in question assumed a principle that a nuclear facility was to be sited within a territory ensuring nuclear safety, radiological protection, physical protection during commissioning, operation and decommissioning of this facility as well as effective emergency response procedures in cases of radiation emergency. An investor of a nuclear facility was provided with the possibility to submit a request to the PAA President for issuance of a preliminary opinion concerning the planned siting for a nuclear facility.

What has not been stipulated in the Atomic Law is that a separate license required for designing of nuclear facilities may be issued. However, basic conditions have been determined with regard to nuclear facility design, which must be met from the perspective of nuclear safety and radiological protection as well as safe functioning of technical devices installed and operated at a nuclear facility.

Under the provisions of the amended Atomic Law, the investor has become obliged to conduct, prior to submitting a request for issuing a licence for construction of a nuclear facility to the PAA President, nuclear safety analyses entailing technical and environmental factors. Results of the safety analyses provide grounds for preparing a preliminary safety report submitted to the PAA President along with a request for issuing a license for construction of a nuclear facility. Systems and elements of the nuclear facility structure and equipment of the highest importance from the perspective of nuclear safety and radiological protection, including control and monitoring software, in accordance with the provisions of the Atomic Law, must be identified and classified under safety classes depending on the degree to which these systems and elements affect nuclear safety and radiological protection of the nuclear facility. The documentation containing safety classification for systems and elements of structure and equipment of a nuclear facility should be submitted for approval to the PAA President along with a request for issuing a license for construction of a nuclear facility. In the process of the nuclear facility construction, nuclear regulatory bodies as well as other authorities, within the scope of their respective authorisations, may inspect contractors and suppliers of systems and elements of structure and equipment of the nuclear facility as well as contractors of works performed while constructing the nuclear facility and furnishing it with systems, elements and works important for nuclear safety and radiological protection and safe operation of technical devices. The PAA President has been vested the following regulatory measures of supervision towards an organisational unit conducting activity which consists in construction, operation or decommissioning of a nuclear facility for which audited contractors and suppliers perform their services:

- interdiction to use a particular system or element of structure and equipment of a nuclear facility, if it was established in the course of the inspection that it may negatively affect nuclear safety and radiological protection of the nuclear facility;
- order to suspend particular works at the nuclear facility, if it has been established that they are conducted in a way which may negatively affect nuclear safety and radiological protection of the nuclear facility.

The Atomic Law emphasises the principle that a nuclear facility is commissioned and operated in a manner ensuring nuclear safety and radiological protection of workers and general public in accordance with the integrated management system implemented in the given entity. The commissioning of a nuclear facility should be conducted in accordance with a programme approved by the PAA President and documented in the commissioning documentation of this facility.

The PAA President has been vested special regulatory powers regarding the nuclear facility commissioning stage, such as the authorisation to issue decisions to suspend the commissioning of a nuclear

1 OJ L 172 of 2.7 2009, p. 18, and OJ L 260 of 3.10.2009, p. 40.
2 Journal of Laws of 2011, no. 4, item 9.

facility and to approve a report on the nuclear facility commissioning.

The PAA President has also been authorised to issue an order to reduce the power output or to stop the operation of a nuclear facility if his own assessment or the information forwarded by the President of the Office of Technical Inspection implies that further operation of this facility poses a threat to nuclear safety or radiological protection.

The head of the given organisational unit operating the nuclear facility has been obliged to conduct regular assessments of the nuclear facility safety (referred to as "periodical safety assessments") in accordance with periodical safety assessment plans approved each time by the PAA President.

What the head of the organisational unit has also been obliged is to develop a programme of the nuclear facility decommissioning and to submit it for approval to the PAA President along with a request for

issuing a license for the construction, commissioning and operation of a nuclear facility. In the course of the facility operation, this programme must be updated and approved at least once in every 5 years and immediately after completion of the nuclear facility operation due to extraordinary events. The nuclear facility decommissioning is formally considered completed on the day when the nuclear facility decommissioning report is approved by the PAA President.
The Atomic Law has introduced a system dedicated to financing of the final handling of spent nuclear fuel and radioactive waste as well as decommissioning of a nuclear facility. In order to cover all the costs related thereto, the given entity having received a licence to operate a nuclear power plant is obliged to systematically effect quarterly payments to a special fund referred to as a "decommissioning fund". The funds allocated this way will only be distributed for the coverage of costs of final management of radioactive waste and spent nuclear fuel from the nuclear facility and for the coverage of costs related to decommissioning of this nuclear facility. The payment of decommissioning funds will only take place following a favourable opinion of the PAA President in response to a request submitted by the organisational unit licensed to operate or decommission the nuclear facility.

As a consequence of the amendment of 2011 to the Atomic Law, new provisions not directly connected with the PAA President's duties were introduced, pertaining to the sector of nuclear power engineering. They particularly concern the following:

- obligations of different entities on providing public information with regard to nuclear power facilities;
- activities of the minister competent for economic matters and the Council of Ministers regarding the development of nuclear power engineering, and particularly the adoption of the Polish Nuclear Power Programme.

The year 2014 saw yet another significant amendment enacted, namely the act of 4 April 2014 amending the Atomic Law and certain other acts (Journal of Laws, item 587) which entered into force on 24 May 2014. A draft of the said act had been prepared by the Ministry of Economy with the assistance of the PAA President. The act was aimed at complementing the national legal framework with the provisions of Council Directive 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste (OJ L 199 of 2.8.2011, p. 48).

The said Directive imposes an obligation on the member states to introduce national legislative, regulatory and organisational framework ensuring high level of safety for management of spent nuclear fuel and radioactive waste. The aforementioned amendment to the Act has supplemented the current solutions already deployed in Poland.

The amended Atomic Law has changed definitions of such notions as radioactive waste, radioactive waste management, spent nuclear fuel management, storage of radioactive waste or spent nuclear fuel, processing of radioactive waste, disposal of radioactive waste and closure of radioactive waste repositories, the foregoing being caused by a necessity to ensure that the said definitions match those provided in Council Directive 2011/70/Euratom. The definition of the decommissioning of a radioactive waste repository or a spent nuclear fuel repository has been removed from the Atomic Law, for it stems from the very definition of radioactive waste that, since radioactive waste is disposed at a radioactive waste repository without an intention of its subsequent extraction, the repository decommissioning process should not be taken into account at all.

The amended Atomic Law contains provisions defining entities responsible for management of spent nuclear fuel and radioactive waste. Among the legal instruments they have introduced, one should mention, for instance, that the organisational unit which has generated the radioactive waste or the spent nuclear fuel is held responsible for ensuring that it is possible to manage the radioactive waste and the spent nuclear fuel from the moment of their generation until their disposal at the repository, including for financing of this procedure and coverage of the related disposal costs.

What the Atomic Law has also altered is the principles of classification, storage, disposal and keeping records of radioactive waste and spent nuclear fuel. With regard to the classification of radioactive waste, the notion of activity level or dose rate on the surface of waste material has been replaced by a criterion of radioactive concentration of radioisotopes the former contain. The list of situations in which radioactive waste can be qualified by the PAA President has been complemented by the case of a failure to qualify radioactive waste by the head of the given organisational unit. Principles concerning the manner in which costs of radioactive waste qualification are to be settled have been defined in detail, and consequently they will be charged to entities which, pursuant to article 48, section 1 of the Atomic Law, should perform such qualification as a part of their activity, and specifically to the head of an organisational unit who has conducted incorrect qualification or has failed to complete it at all. Individual principles defined in the Act, like those pertaining to the manner in which records are to be kept as well as conditions of radioactive waste and spent nuclear fuel storage, and criteria according to which a radioactive waste repository is to be recognised as a National Radioactive Waste Repository, rely on the provisions previously provided in the Regulation of the Council of Ministers of 3 December 2002 on radioactive waste and spent nuclear fuel (Journal of Laws no. 230, item 1925). Sections 1a and 1b added to article 62e of the Atomic Law have introduced an explicit prohibition of removing radioactive waste and spent nuclear fuel from the territory of the Republic of Poland for the sake of disposal, but at the same time they stipulate specific exceptions to the said prohibition, one of which being the disposal of radioactive waste at a radioactive waste repository located in another country whose minister competent for economic matters has entered an appropriate agreement under which such a solution is permissible.

The amended Atomic Law also contains provisions which regulate the processes of construction, operation and closure of a radioactive waste repository and defines specific roles of nuclear regulatory bodies with regard to the said activities in a manner corresponding to the IAEA's recommendations referred to in item 16 of the preamble to Council Directive 2011/70/Euratom (IAEA Safety Standards for protecting people and the environment: Predisposal management of radioactive waste, no. GSR part 5; The management system for the disposal of radioactive waste, no. GS-G-3.4; Storage of radioactive waste, Safety guide, no. WS-G-6.1). As a consequence of the amendment, the Atomic Law has defined criteria for siting of radioactive waste repositories, types of tests and analyses required for a siting decision to be made as well as requirements as to the design, the construction process and operation of the repository, partially relying on the previously applicable provisions of Regulation of the Council of Ministers of 3 December 2002 on radioactive waste and spent nuclear fuel. Before requesting the PAA President for issuing a licence for construction of a radioactive waste repository, the investor is obliged to conduct safety analyses the results of which are provided in a report on the safety of the radioactive waste repository drawn up by the latter. Besides the foregoing, the said report should provide a number of other data specified in article 53d, section 4 of the Atomic Law, including information which, pursuant to article 55a of the Act, revoked under the amendment of 2014, was required for purposes of the repository siting report. The safety report is attached to the request for issuance of the radioactive waste repository construction license and, once the relevant updates have been effected, to individual requests for issuing licences for operation and closure of the repository.

The Atomic Law has been supplemented with specific provisions pertaining to safety of a radioactive waste repository. The most fundamental principle applicable in this respect stipulates that, in the course of design, construction, operation and closure of a radioactive waste repository, one must not apply any solutions and technologies which have not been verified in practice at radioactive waste repositories or through tests, examinations and analyses. The Atomic Law also comprises provisions concerning the procedure of a periodical safety assessment for a radioactive waste repository to be conducted by the head of the given organisational unit at a frequency defined in the licence for operation of the repository, and every 15 years at the least. By issuing a decision, the PAA President approves the assessment draft as well as a report on the periodical safety assessment after being furnished with an opinion on the status of physical protection prepared by the Head of the Internal Security Agency (ABW).

Pursuant to article 55j of the Atomic Law, prior to submitting a request for issuing a licence for construction or operation of the repository, the head of the given organisational unit is obliged to develop a repository closure scheme, to be updated at least every 15 years and subject to the PAA President's approval. The amended act has also defined detailed requirements to be taken into account on closure of near-surface and deep repositories. What has also been envisaged in the act is an obligation to ensure physical protection of a closed repository in conformity with the relevant regulations on personal and property protection. Following the completion of the repository closure process, a radioactive waste repository closure report is drawn up. The day of the repository closure completion is considered to be the day when the said report is approved by the PAA President.

As far as the procedure observed by the PAA President in issuing licences for construction, operation and closure of a radioactive waste repository, the

amended Atomic Law contains such provisions as, for instance, regulations defining deadlines for the PAA President's issuance of permits and licences, decisions to be procured prior to submitting a request for issuing a radioactive waste repository construction license, authorisations of the PAA President aimed at better assessment of the request content as well as decisions whose prerequisite is procurement of the relevant licences issued by the PAA President.

The amended Atomic Law has envisaged introduction of an obligation regarding the development of a national programme for spent nuclear fuel and radioactive waste management in Poland. It is prepared by the minister competent for economic matters, enacted by the Council of Ministers, updated every 4 years and subject to international external review at last once in every 10 years. The act also defines requirements as to the content of the national programme for spent nuclear fuel and radioactive waste management comprising such matters as the current and the forecast quantity of spent nuclear fuel and radioactive waste, entities responsible for the programme implementation or the related costs.

The amended Atomic Law contains specific provisions enabling the general public to obtain information on the management of radioactive waste, and its disposal in particular. The act provides for a possibility to obtain the required information concerning the impact of activity comprising operation or closure of a radioactive waste repository on the human health and the environment either directly from the head of the organisational unit conducting such activity, from this unit's website or from a dedicated Public Information Bulletin website of the PAA President.

Furthermore, the amendment in question liquidated one of nuclear regulatory bodies, namely the CNRI. It was caused by an alteration of the scope of the PAA President's activities who, starting from the year 2011, has mainly been focused on nuclear regulatory duties. Consequently, maintaining a separate body supportive to the PAA President, and the CNRI had been one, was considered to be unnecessary, and the latter's duties and authorisations were transferred to the PAA President being the supreme nuclear regulatory authority.

2.2. Other acts

Provisions indirectly connected with the matters of nuclear safety and radiological protection are also included in other acts, and particularly in:

1) the Act of 19 August 2011 on shipment of hazardous goods (Journal of Laws no. 227, item 1367 and 244, item 1454),
2) the Act of 18 August 2011 on marine safety (Journal of Laws no. 228, item 1368, as amended),
3) the Act of 21 December 2000 on technical supervision (Journal of Laws of 2013, item 963 and item 1611, and of 2014, item 822).

2.3. Secondary legislation of the Atomic Law

Secondary legislation of the Atomic Law includes detailed regulations concerning nuclear safety and radiological protection. As for the PAA President's rights and responsibilities, these provisions specify the following in particular:

1. documents to be submitted and attached to the request for issuing a license for specific activity involving exposure to ionising radiation (or attached to a notification concerning such activity),
2. cases in which the activity involving exposure may be conducted without a license or a notification,
3. requirements concerning controlled and supervised areas, as well as dosimetry equipment,
4. values of dose limits for workers and the general public,
5. positions being important from the perspective of nuclear safety and radiological protection and requirements to be fulfilled by a party applying for authorisations needed to be employed at the given position as well as requirements for being granted the authorisations of a radiation protection officer,
6. detailed conditions of work involving ionising radiation sources,
7. methods of physical protection of nuclear material.

In connection with the amended Atomic Law, in 2011 and 2012, the National Atomic Energy Agency developed drafts of 13 implementing regulations. They concerned the following:

- method and working procedure of the Council for Nuclear Safety and Radiological Protection,
- template of an official identification card of a Nuclear Regulatory Inspector,
- standard form of a quarterly report on the amount of fee contributed to a decommissioning fund,
- manner of performing a periodical nuclear safety assessment of a nuclear facility,
- nuclear regulatory inspectors,
- positions considered important for nuclear safety and radiological protection as well as radiation protection officers,

- activities considered important for ensuring nuclear safety and radiological protection in a nuclear power plant,
- detailed scope of assessment with regard to land intended for siting of a nuclear facility, cases precluding the land from being considered eligible for the site of a nuclear facility and requirements concerning a siting report for a nuclear facility,
- scope and manner of conducting safety analyses prior to submission of a request for issuing a licence for construction of a nuclear facility and the scope of a preliminary nuclear facility safety report,
- nuclear safety and radiological protection requirements to be entailed in a nuclear facility design,
- amount of fees contributed to a decommissioning fund,
- requirements for commissioning and operation of nuclear facilities, and
- nuclear safety and radiological protection requirements for the stage of decommissioning of nuclear facilities and the content of a report on decommissioning of a nuclear facility.

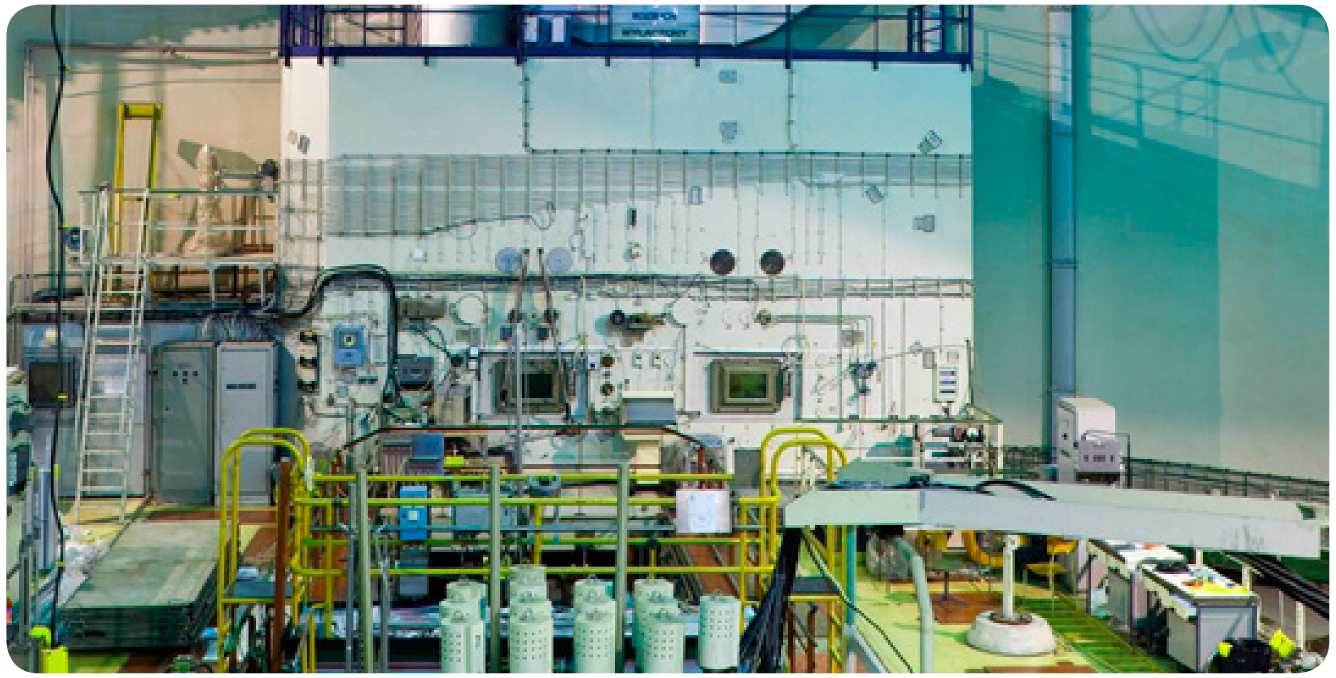
Moreover, in 2012, 3 subsequent implementing regulations to the amended Atomic Law were issued, as prepared at the Ministry of Economy and at the Ministry of Health, and not at PAA. They concerned the following:

- special purpose grant for ensuring nuclear safety and radiological protection of Poland when ionising radiation is used,
- detailed principles of establishment and operation of Local Information Committees as well as cooperation in terms of nuclear power facilities,
- granting authorisations of a radiation protection officer employed at a laboratory using X-ray devices for medical purposes.

In 2014, specific works related to the following four draft regulations of the Council of Ministers were conducted at the PAA:

- concerning documents required while submitting a request for issuing a licence for activity involving exposure to ionising radiation or a notification about such activity – the draft was forwarded to the Council of Ministers for preliminary acceptance on 30 December 2014,
- concerning radioactive waste and spent nuclear fuel – the inter-ministerial arrangements were completed on 24 December 2014,
- concerning periodical safety assessment of a radioactive waste repository – the inter-ministerial arrangements were completed on 24 December 2014,
- amending the regulation on nuclear regulatory inspectors – the inter-ministerial arrangements were completed on 24 December 2014.

A detailed list of all secondary legislation acts to the Atomic Law has been provided in Appendix no. 1 to this report. (See chapter III.1.).



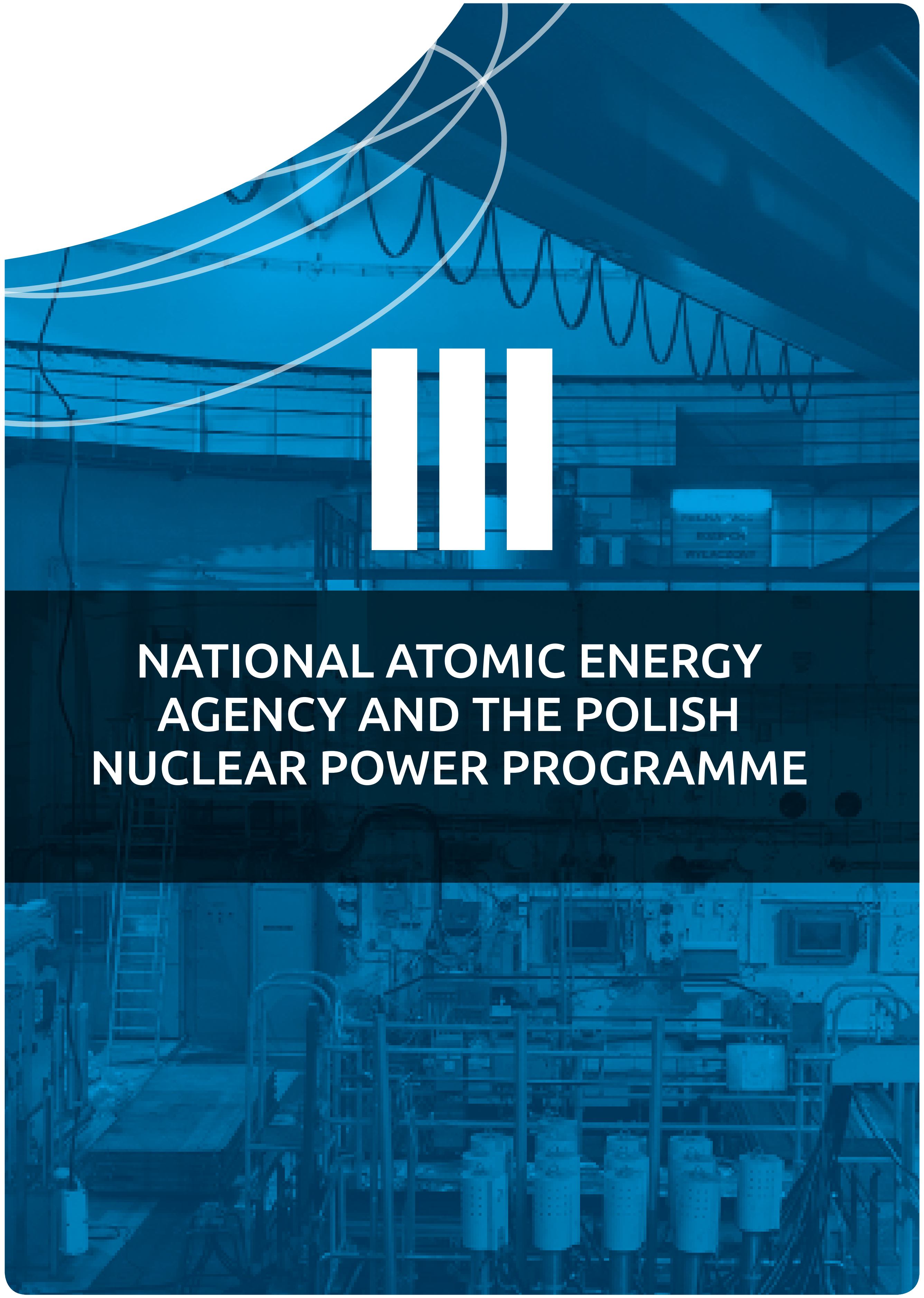
2.4. International regulations

Poland has ratified a number of international agreements relating to nuclear safety and radiological protection which, under the Constitution of the Republic of Poland, constitute the source of legal regulations commonly applicable in Poland. They cover the areas of international cooperation and exchange of information in cases of a nuclear accident or radiological emergency, nuclear safety of nuclear facilities, safety of the spent nuclear fuel and radioactive waste management, physical protection of nuclear material. As regards the matters of civil liability for damage caused by nuclear accidents, the Republic of Poland is a party to the Vienna Convention on Civil Liability for Nuclear Damage concluded in Vienna on 21 May 1963 (Journal of Laws of 1990 no. 63, item 370) and to the Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage concluded in Vienna on 12 September 1997 (Journal of Laws of 2011, no. 4, item 9). The Republic of Poland is also a party to the Treaty on the Non-Proliferation of Nuclear Weapons concluded in Moscow, Washington and London on 1 July 1968 (Journal of Laws of 1970, no. 8, item 60) (INFCIRC/140), and all the resulting agreements and protocols.

Furthermore, Poland is a party to the Treaty establishing the European Atomic Energy Community (Euratom).

Based on the foregoing treaty, a number of directives have been adopted and implemented in the Polish legal system throughout the recent years. They have considered such matters as nuclear safety of nuclear facilities, radiological protection of workers, including external workers and the general public, information provided to the general public about health protection measures to be applied and steps to be taken in the event of radiological emergency, management of high-activity sealed ionising radiation sources, including uncontrolled sources (e.g. abandoned, stolen, illegally possessed ones). Shipment of radioactive waste and spent nuclear fuel across internal and external borders of the European Union also constitutes an important sphere in European regulations.

A list of major acts of international and European Union law has been provided in Appendix no. 2 to this report.



III

NATIONAL ATOMIC ENERGY AGENCY AND THE POLISH NUCLEAR POWER PROGRAMME

III. NATIONAL ATOMIC ENERGY AGENCY AND THE POLISH NUCLEAR POWER PROGRAMME

III.1 NATIONAL ATOMIC ENERGY AGENCY AND THE POLISH NUCLEAR POWER PROGRAMME

The Polish Nuclear Power Programme (PNPP) was adopted by the Council of Ministers on 28 January 2014. It is the first comprehensive document providing a structure for the organisation of activities to be undertaken in order to implement nuclear power in Poland.

The National Atomic Energy Agency is one of the main stakeholders to the Polish Nuclear Power Programme and performs the role of a regulator. The Agency supervises safety of nuclear facilities and of the activity conducted in these units, performs safety inspections and assessments, issues licenses and imposes potential sanctions. Other parties involved in the Programme implementation are the Ministry of Economy as a promoter (handling coordination and promotion of the project and the use of nuclear power for public and economic purposes of the country) and PGE as an investor (providing finance for the construction of a nuclear facility and organising its construction and operation).

PAA started preparations to the implementation of the PNPP in 2009 when a Government Commissioner for Polish Nuclear Power was appointed. In the subsequent years, PAA experts actively participated in works related to the document preparation, and the Agency itself was subject to numerous transformations and organisational changes aimed at its adaptation to the function of a modern nuclear regulator.
Tasks of PAA as a nuclear regulatory body in relation to nuclear facilities, including nuclear power plants, comprise the following in particular:

1. Defining requirements for nuclear safety and radiological protection and issuing technical recommendations indicating detailed methods of ensuring safety,
2. Performing analyses and assessments of technical information provided with appropriate safety analyses by investors or organisations operating a nuclear facility in order to verify whether this nuclear facility conforms with the applicable objectives, rules and criteria of safety for purposes of licensing processes and other decisions of nuclear regulatory bodies,
3. Conducting the licensing process with regard to construction, commissioning, operation and decommissioning of nuclear facilities,
4. Conducting inspections of activities performed by an investor or an organisation operating the nuclear facility in order to ensure safety, including in the scope of compliance with safety requirements set forth in the relevant regulations on nuclear safety and radiological protection as well as compliance with the conditions specified in individual licenses and decisions issued by a nuclear regulator,
5. Imposing sanctions enforcing compliance with the aforementioned requirements.

At present, PAA is fully prepared to perform the function of a nuclear regulatory body proportionally to the stage of advancement of the PNPP implementation process. In the nearest future, the Agency will review the process of site selection for the first Polish nuclear power plant as well as the technology chosen and the construction license issued.

III. 2. NATIONAL ATOMIC ENERGY AGENCY CHANGES ITS IMAGE AND OPENS NEW COMMUNICATION CHANNELS

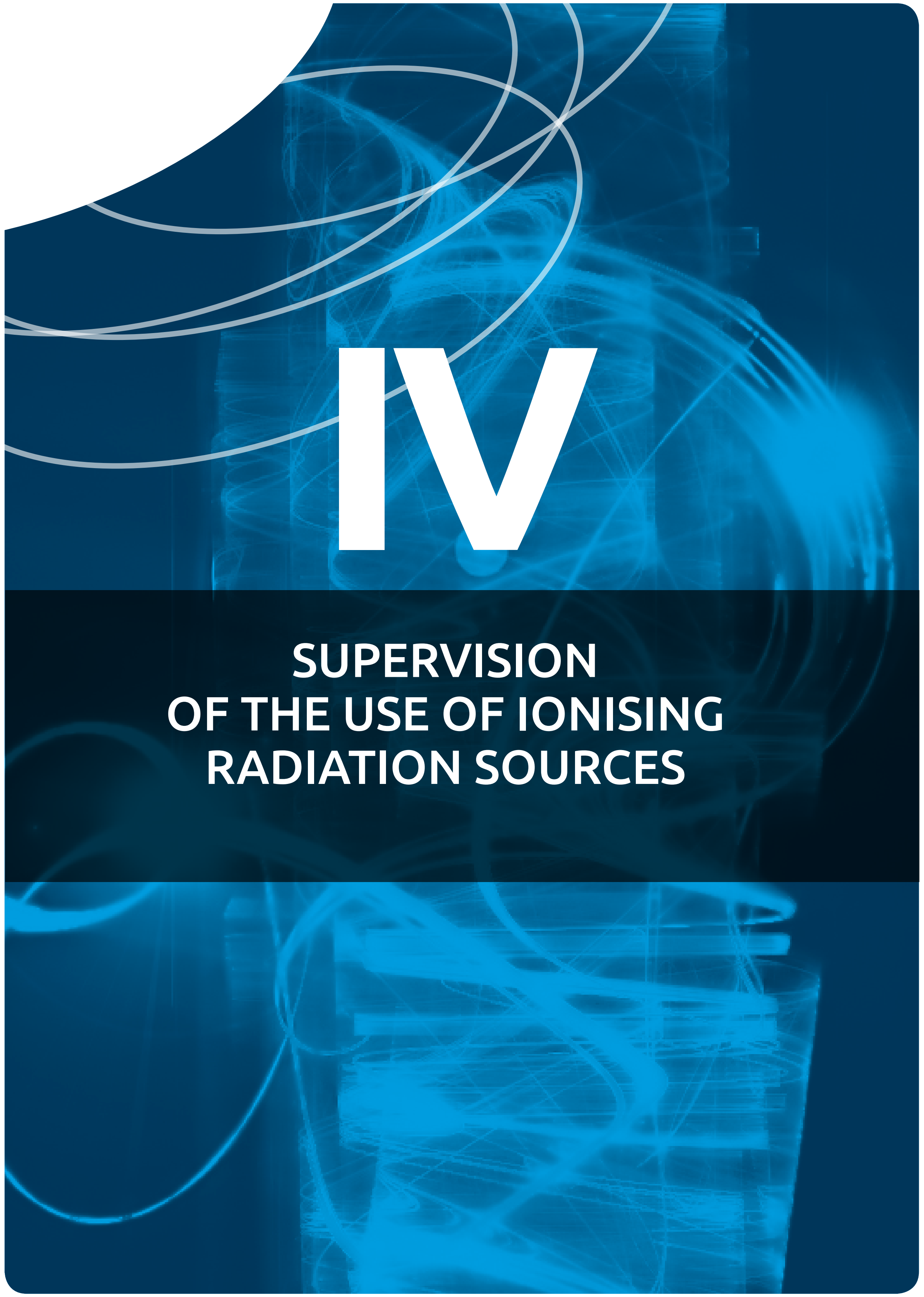
Communication with the general public

As the Polish Nuclear Power Programme (PNPP) is gradually implemented, there are questions arising among the general public about safety of nuclear technologies and of their application. In order to satisfy these expectations and demands, in 2014, PAA prepared a policy addressing communication with the Agency for the years 2014-2018. It is a comprehensive document comprising annual communication action plans for successive years, and among the aspects taken into account there is a process of consistent creation of the Agency's coherent image, development of communication competence among experts, progress of collaboration with the academia as well as promotion of international cooperation. Owing to the gradual deployment of the policy, PAA's communication actions will be conducted in a sequenced and consistent manner.

Pursuant to article 110, section 6 of the Atomic Law, duties of the PAA President include activities related to public information, education and popularisation as well as scientific, technical and legal information in terms of nuclear safety and radiological protection. One of major assumptions of the communication managed by PAA is not being limited to statutory requirements, and – to the contrary – displaying a proactive stance in terms of communication.

In this respect, we rely on state-of-the-art means of communication. In order to be able to explain the complexities of nuclear safety to the general public, in 2014, PAA produced a short film concerning the principles of safety in nuclear power plants. Simultaneously to the film production, a dedicated site was created on PAA's web service to expand and complement the film's content. This production is a response to the PNPP implementation, but also to questions asked by citizens in times when the media report failures occurring in nuclear power plants in Ukraine or Russia. One should stress that such reports, often unconfirmed, appear in the media on a relatively regular basis.

In order to verify how high the sense of security is among the general public in light of the PNPP implementation, in October 2014, PAA ordered a survey of public opinion to be conducted in a representative nationwide sample as well as in a separate sample representative for the municipalities of Choczewo, Krokowa and Gniewino, being the most prospective locations in terms of siting of the first Polish nuclear power plant. Both the nationwide and the local poll implied that ca. 61% of those surveyed assessed their feeling of menace caused by the potential proximity of a nuclear power plant to be lower than 5 (on a 0—10 scale, where 0 designates high sense of security and 10 designates high level of insecurity). The survey also implied a high trust among Poles towards safety standards of the future Polish nuclear power plant. 68.3% of those surveyed under the nationwide poll and 75.9% of respondents in the local poll believed that safety standards of the Polish nuclear power plant would be comparable or even higher than those applied in other countries.



IV

SUPERVISION OF THE USE OF IONISING RADIATION SOURCES

IV. SUPERVISION OF THE USE OF IONISING RADIATION SOURCES

IV. 1. USERS OF IONISING RADIATION SOURCES IN POLAND

Main tasks of the PAA President in terms of regulatory supervision of activities connected with exposure to ionising radiation are as follows:

- issuing licenses and making other decisions concerning nuclear safety and radiological protection following the analysis and assessment of documentation submitted by users of ionising radiation sources,
- preparing and performing audits of organisational units which conduct activities connected with exposure,
- maintaining register of these entities.

The number of registered organisational units conducting activity (one or more) involving exposure to ionising radiation subject to regulatory supervision of the PAA President under the Atomic Law came to 3,645 (as of 31 December 2014).

The number of registered activities involving the exposure was 5,213. The latter is much larger than the overall number of organisational units, since many of them conduct several different activities (some of them even several activities of the same type based on separate licenses). A breakdown of activities involving exposure to ionising radiation according to the type of an ionising radiation source and the purpose of its use has been provided in Table 1.

Table 1. Organisational units conducting activities involving exposure to ionising radiation (as of 31 December 2014)

Organisational units (according to activity types)	Number of units and activity symbol	
Class I laboratory	1	I
Class II laboratory	92	II
Class III laboratory	115	III
Class Z laboratory	100	Z
Smoke detector service	373	UIC
Device service	162	UIA
Isotope devices	552	AKP
Manufacture of isotope sources and devices	27	PRO
Trade in isotope sources and devices	67	DYS
Accelerator	72	AKC
Isotope applicators	35	APL
Telegamma therapy	5	TLG
Radiation device	36	URD
Gamma graphic apparatus	112	DEF
Storage facility of isotope sources	50	MAG
Works with sources outside registered laboratory	47	TER
Transport of sources or waste	475	TRN
Chromatograph	228	CHR
Veterinary X-ray apparatus	868	RTW
X-ray scanner	416	RTS
Defectoscope	207	RTD
Other X-ray apparatus	360	RTG

IV. 2. LICENSES AND NOTIFICATIONS

Drafts of the PAA President's licenses for performance of activities involving exposure to ionising radiation and other decisions in matters considered important for nuclear safety and radiological protection were prepared by the Radiological Protection Department of PAA.

In cases when the activity involving ionising radiation did not require authorisation, decisions were made with regard to the receipt of notification on performance of activity involving exposure to ionising radiation. These cases are specified in the Regulation

Table 2. Number of licenses issued and notifications received in connection with exposure to ionising radiation in 2014

Activity type	Number of activity types in organisational units (as of 31 December 2014)	Number of authorisations issued in 2014		
		licences	annexes	decisions on registration
Class I laboratory	1	0	0	0
Class II laboratory	106	13	18	0
Class III laboratory	232	6	8	4
Class Z laboratory	184	13	9	9
Smoke detector service	373	15	4	0
Device service	172	18	12	0
Isotope devices	682	30	31	5
Manufacture of isotope sources and devices	31	7	8	0
Trade in isotope sources and devices	72	4	8	7
Accelerator	131	30	16	0
Isotope applicators	46	5	0	0
Telegamma therapy	5	0	0	0
Radiation device	37	2	0	0
Gamma graphic apparatus	114	15	27	0
Storage facility of isotope sources	55	23	4	0
Works with sources outside registered laboratory	52	8	7	2
Transport of sources or waste	486	5	7	34
Chromatograph	271	0	0	6
Veterinary X-ray apparatus	895	106	7	0
X-ray scanner	515	39	12	0
X-ray defectoscope	226	18	20	0
Other X-ray apparatus	527	61	22	2
Total:	**5213**	**418**	**220**	**69**

of the Council of Ministers of 6 August 2002 on the cases when activities involving exposure to ionizing radiation do not require authorization or notification and on the cases when such activities may be conducted on the basis of notification (Journal of Laws, No 137, Item 1153.

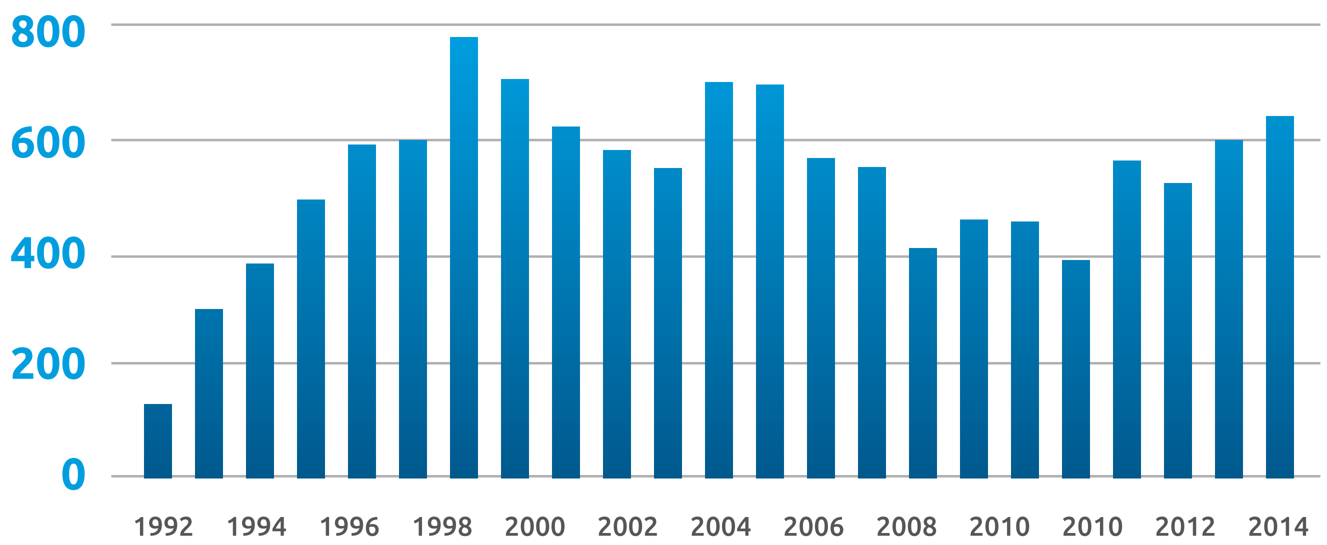
The number of licenses, annexes to licenses issued (in cases of amendments to conditions of licenses already held) and notifications issued in 2014 has been provided in Table 2.

Issuance of a license, an annex to a license or receipt of a notification is always preceded by the analysis and assessment of the documentation submitted by users of ionising radiation sources. Individual documentation types were specified in the Regulation of the Council of Ministers of 3 December 2002 on the documents required when applying for authorization to conduct activities involving exposure to ionizing radiation or when notifying the conduct of such activities (Journal of Laws No 220, Item 1851.
Apart from the said documentation, a detailed analysis is also conducted to cover the following issues: substantiation for the commencement of the activity involving exposure, utility dose limits proposed, quality assurance programme in connection with the activity conducted and an internal emergency plan for cases of radiation emergency.

Figure 2 provides a collation of data concerning the number of licenses and annexes to licences issued in the years 1992–2014.

The above figures do not cover nuclear facilities and radioactive waste processing and storage facilities.

Fig. 2. Number of licenses for performance of activity involving exposure to ionising radiation and annexes to licenses issued by the PAA President in the years 1992–2014



IV. 3. REGULATORY INSPECTIONS

Audits and inspections covering organisational entities, other than those in possession of nuclear facilities or radioactive waste repositories, were performed by Nuclear Regulatory Inspectors with the PAA Radiological Protection Department (RPD) operating in Warsaw, Katowice and Poznań. In 2014, 979 such inspections were performed, including 25 re- inspections (i.e. second inspections performed in the same year), out of which 440 inspections were conducted by RPD inspectors from Warsaw, 385 – by inspectors from the RPD unit in Katowice and 154 – by inspectors from the Poznań unit. Prior to commencement of every inspections, a detailed analysis was performed covering documentation concerning the inspected organisational entity and the activity it conducts from the perspective of initial assessment of potential "critical points" of the activity conducted and the quality system deployed at the given unit (Figure 3).

In order to ensure appropriate frequency of inspections, new cycles of inspections were agreed for particular groups of activities depending on the threat

posed by the given group of activities. At the same time, based on inspections performed in recent years, specific activities were distinguished which, from the perspective of assessment of the hazards involved in such activities and on account of the evolving safety culture of personnel performing such activities, do not require direct supervision in the form of routine inspections or when such inspections are aimless.

Ad-hoc inspections in entities performing the selected activities are only conducted occasionally, as the need be, and supervision of such activities is mainly based on the analysis of reports on the activity, records of individual sources and declarations of shipment submitted. Data regarding audits and inspections performed by Nuclear Regulatory Inspectors from the PAA Radiological Protection Department in 2014 have been provided in Table 3.

IV. 4. REGISTER OF SEALED RADIOACTIVE SOURCES

The obligation of maintaining sealed radioactive sources register stems from article 43c, section 1 of the Atomic Law of 29 November 2000. In accordance with section 3 of the said article, heads of organisational units performing activity which involves use or storage of sealed radioactive sources or equipment featuring such sources under the relevant authorisation granted are obliged to submit copies of records concerning the radioactive sources to the PAA President. Such documents include record sheets containing the following data about sources: radioactive isotope name, activity according to a source certificate, date when the activity was established, certificate number and source type, storage vessel type or device name and place of the source use or storage. Heads of organisational units are obliged to send copies of the record sheets to the PAA President by 31 January each year.

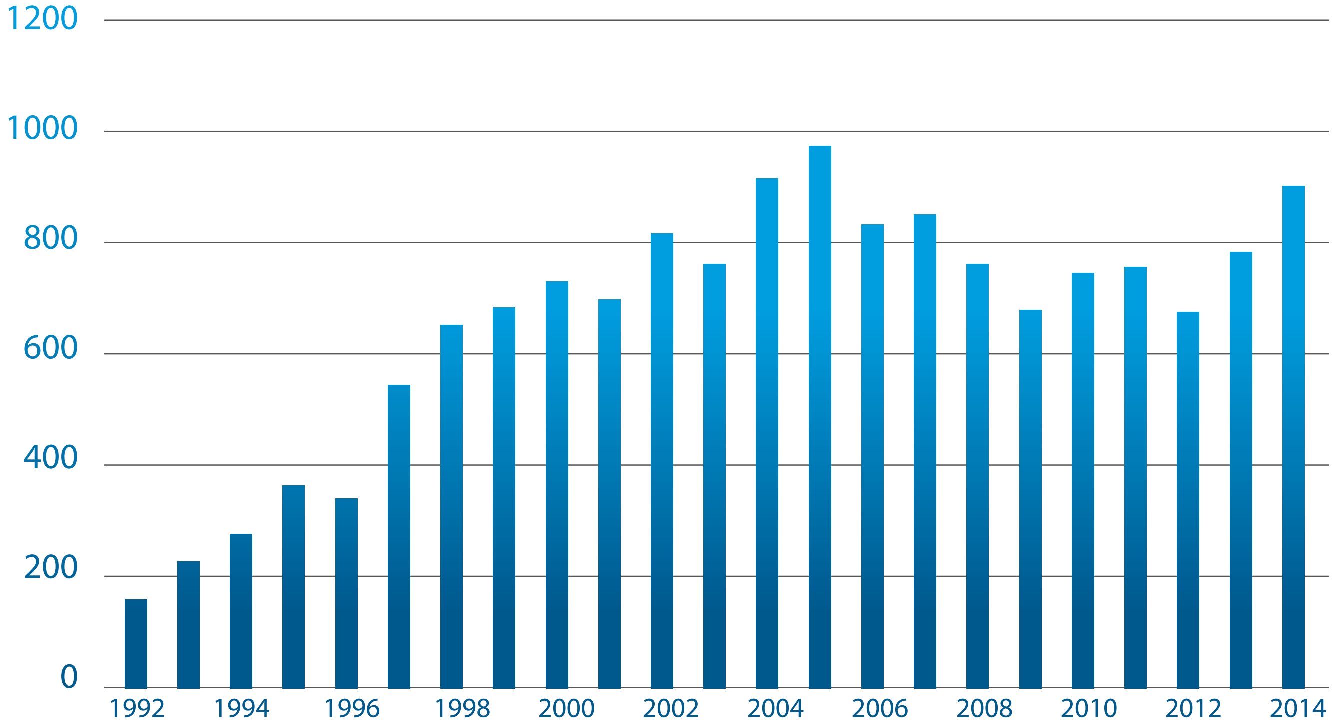
Data extracted from the accountancy cards are entered into the register of sealed radioactive sources, used to verify information about individual sources. The information contained in the said register is used to supervise organisational units conducting activity involving exposure to ionising radiation. The supervision consists in comparing accountancy cards entries with the scope of the given authorisation issued. Data from the register are also used to prepare information and statements for central government and local administration bodies for purposes of mutual cooperation and statistics. A detailed collation of selected isotopes and sources containing them, extracted from the register of sealed radioactive sources, has been provided in Table 4.

Table 3. Number and frequency of audits and inspections conducted in 2014 by the PAA Radiological Protection Department inspectors

Symbols designating activity types	No. of audits/ inspections in 2014	Frequency of audits/ inspections
I	2	annual
II	52	every 2 years
III	65	every 3 years
Z	59	every 4 years
UIC	23	ad hoc
UIA	58	every 3 years
AKP	164	every 3 years
PRO	15	every 3 years
DYS	11	ad hoc
AKC	95	every 2 years
APL	28	every 2 years
TLG	2	every 2 years
URD	19	every 3 years
DEF	65	every 2 years
MAG	16	every 3 years
TER	18	every 3 years
TRN	12	ad hoc
CHR	0	ad hoc
RTW	7	ad hoc
RTS	22	ad hoc
RTD	88	every 2 years
RTG	154	every 3 years

The register contains data of 24,035 sources, including spent radioactive sources (taken out of service and delivered to the Radioactive Waste Management Plant in Otwock-Świerk) as well as information concerning their movement (i.e. date of receipt and shipment of the given source) and associated documents. The register software enables identification of a so-

Fig. 3. Number of inspections conducted by inspectors of the PAA Radiological Protection Department in the years 1992–2014



urce according to the certificate number and determination of its current activity, use or storage place as well as identification of the current and previous users of the source.

Depending on the purpose and the activity of the source, and a type of the radioactive isotope contained in the source, the register software enables the given source to be classified under different categories in accordance with recommendations of the International Atomic Energy Agency:

Category 1 comprises sealed radioactive sources used in such fields as: teleradiotherapy in medicine, industrial radiography, radiation technologies.

The register contains 1,370 sources of this category which are currently in use (status as of 31 December 2014).

Category 2 comprises sealed radioactive sources used in such fields as: medicine (brachytherapy), geology (borehole drilling), industrial radiography (mobile control and measurement instruments and stationary instruments for industrial applications) including level and density meters containing sources of Cs-137 with the activity exceeding 20 GBq and of Co-60 with the activity exceeding 1 GBq, thickness meters containing sources of Kr-85 with the activity exceeding 50 GBq, sources of Am-241 with the activity exceeding 10 GBq, sources of Sr-90 with the activity exceeding 4 GBq and of Tl-204 with the activity exceeding 10 GBq, belt conveyor weighbridges containing sources of Cs-137 with the activity exceeding 10 GBq, sources of Co-60 with the activity exceeding 1 GBq and of Am-241 with the activity exceeding 10 GBq.

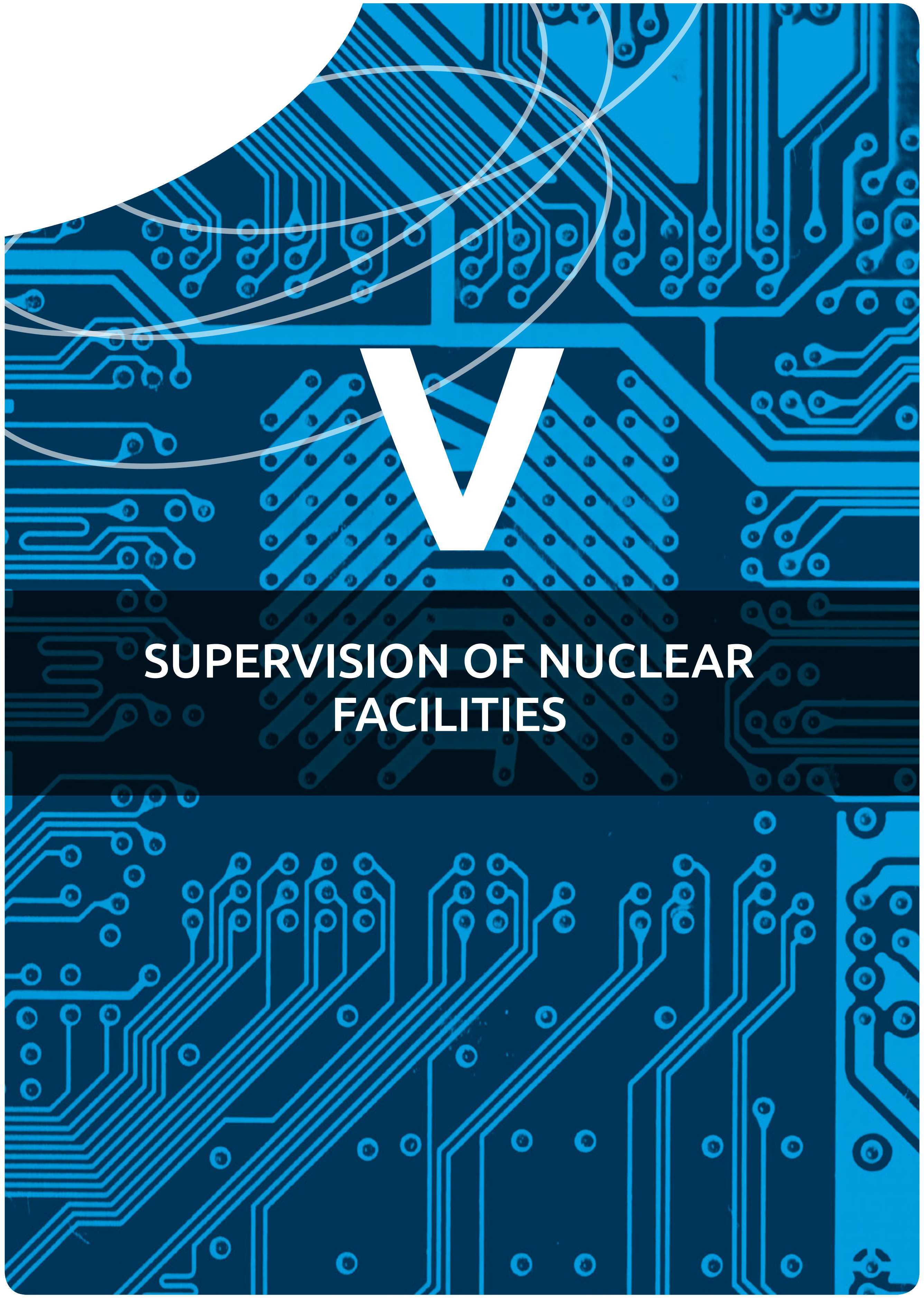
The register contains 2,619 sources of this category (status as of 31 December 2014).

Category 3 comprises other sealed radioactive sources, including those used in stationary control and measurement instruments.

The register contains 8,665 sources of this category (status as of 31 December 2014).

Table 4. Selected radioactive isotopes and sources containing them, classified under individual categories

Isotope	Number of registered sources		
	Category 1	Category 2	Category 3
Co-60	762	1 345	2 609
Ir-192	288	60	1
Cs-137	71	345	2332
Se-75	232	1	3
Am-241	2	413	941
Pu-239	3	120	118
Ra-226	-	80	61
Sr-90	-	19	863
Pu-238	-	78	19
Kr-85	-	23	211
Tl-204	-	-	87
other	12	135	1 420



V. SUPERVISION OF NUCLEAR FACILITIES

V. 1. NUCLEAR FACILITIES IN POLAND

According to the Atomic Law, there are the following nuclear facilities in Poland: the MARIA research reactor along with its technological pool where spent nuclear fuel is stored during the facility operation; the EWA research reactor (the first research reactor in Poland operated in the years 1958–1995, and subsequently subject to decommissioning) as well as spent nuclear fuel storages.

These facilities are administered by two separate organisational entities:

- **the MARIA reactor** — at the National Centre for Nuclear Research (NCNR) based in Świerk near Otwock, established in September 2011 by merging the Institute for Nuclear Problems and the POLATOM Institute of Nuclear Energy,
- **the EWA reactor** as well as spent nuclear fuel storages at the Radioactive Waste Management Plant (RWMP), which also owns and administers the National Radioactive Waste Repository (NRWR) based in Różan.

Pursuant to the Atomic Law, directors of these entities are responsible for ensuring nuclear safety, radiological protection, physical protection and safeguarding of nuclear material..

1.1. MARIA reactor

Historically, the MARIA research reactor is the second research reactor which has been built in Poland (disregarding the critical assemblies of ANNA, AGATA and MARYLA), and currently the only Polish nuclear reactor in service. It is a high-flux pool-type reactor with the nominal thermal power of 30 MWt and the maximum flux density of thermal neutrons in the core of 3.5·1018 n/(m^2·s). September 2014 saw the completion of the reactor core conversion from high enriched fuel (HEU – High Enriched Uranium) of Russian origin, marked with the MR symbol, into French low enriched fuel (LEU – Low Enriched Uranium), marked as MC.

The MARIA reactor was commissioned in 1975, and in the years 1985–1993, the reactor was shut down for the necessary upgrading which included installation of a passive core cooling system using water from the reactor pool. From April 1999 to June 2002, gradual conversion of the reactor core was conducted in 106 consecutive reactor fuel cycles, thus decreasing the fuel enrichment from 80% to 36% of the U-235 isotope content (high enriched fuel).

Under implementation of the Global Threat Reduction Initiative (GTRI) programme, low enriched uranium (LEU) fuel with the content of the U-235 isotope below 20% was introduced into the MARIA reactor. For the sake of application of this fuel type, a dedicated tender was conducted, a supplier was chosen and tests of the new fuel were undertaken. The tender was won by CERCA, a company belonging to the French corporation AREVA. In 2009, CERCA manufactured two fuel elements marked as MC, with the 19.75% enrichment and containing 485 g of the U-235 isotope, installed in the MARIA reactor. The tests of the said elements were completed in 2011, and the results obtained as well as visual inspections of spent fuel elements in the technological pool confirmed their good quality and fitness for the MARIA reactor. Upon obtaining the PAA President's approval in September 2012, the reactor core conversion into low enriched fuel commenced by gradually introducing the MC fuel elements into the core and using them to replace the high enriched fuel previously used. The use of high enriched fuel and the official core conversion into low enriched fuel was completed in September 2014. The core conversion process was handled without issues and in conformity with documentation approved by the PAA President beforehand.

In the course of operation of the MARIA reactor in 2014:

1) after two years of tests, irradiation of two MR fuel elements of Russian origin with the enrichment of 19.7% was completed in the reactor core.
2) NCNR upgraded the reactor's backup power supply system by replacing electric converters with uninterruptible power supply (UPS) units.

The 2014 reactor operation schedule was set in a manner matching the following needs:

1) demand for irradiation of uranium plates required for production of molybdenum-99 for an American company, Mallinckrodt Pharmaceuticals. The task was performed in 7 fuel cycles during which the uranium plates were irradiated in channels adapted to this purpose exclusively;

2) irradiation of target materials for the Radioisotope Centre POLATOM, namely tellurium dioxide, potassium chloride, sulphur, lutetium, cobalt and iron intended for radioisotopes production to be used in nuclear medicine. Figure 4 provides statistics concerning the irradiation of target materials (from 1978 to 2014, inclusive). In 2014, the MARIA reactor remained in service for 4,300 hours, working in 32 fuel cycles, as illustrated in Figure 5.

Fig. 4. Materials irradiated in the MARIA reactor until 2014 (NCNR)

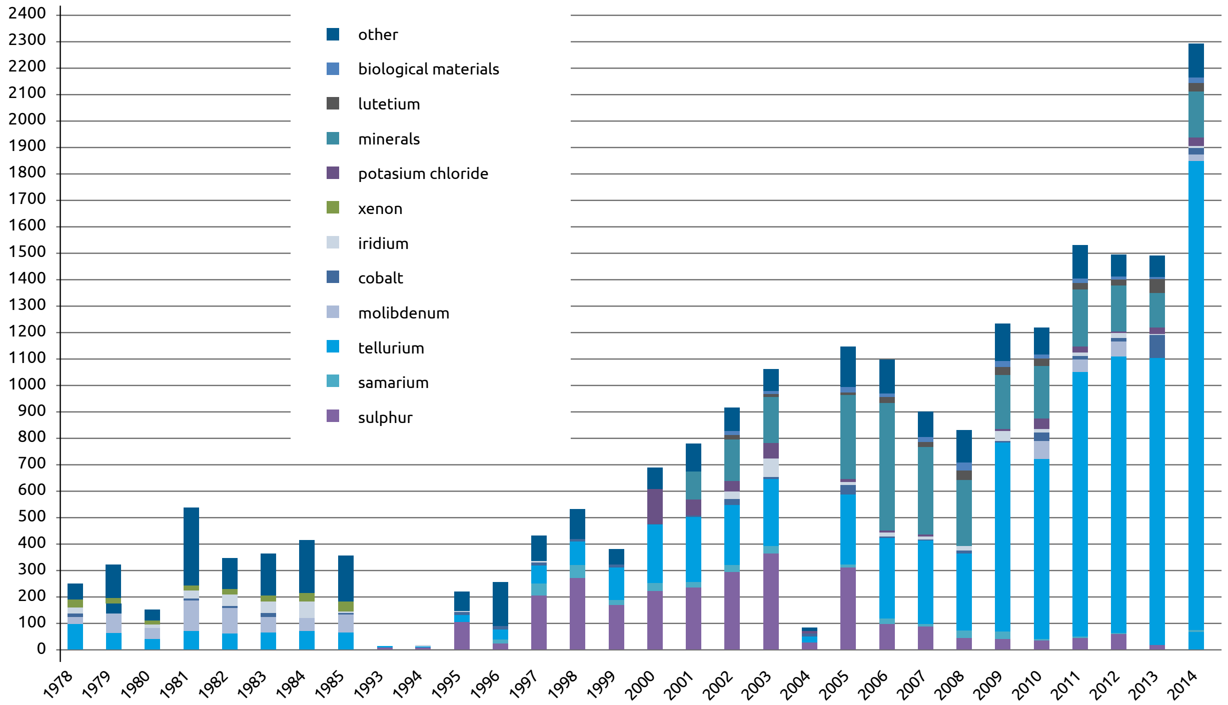


Table 5. General information concerning operation of the MARIA reactor in 2014

Quarter		I	II	III	IV	Total
Number of cycles		8	9	9	6	32
Time of operation at rated power [h]		1190	1178	1104	828	4300
Reactor power [MWt]		0.3-20	0.3-24	0.3-24	0.3-25	0.3-25
Number of fuel elements in the core		25	25	23-25	25	23-25
Unplanned shutdowns		2	1	1	0	4
Causes	Operator's/service personnel's error	0	0	0	0	0
	Leakage	1	0	0	0	1
	Instrumentation error	1	1	1	0	3
Malfunctions/defects and nonconformity found		2	3	3	0	8
Repair and maintenance works conducted		7	4	3	10	24
Tests, inspections and overhauls conducted		20	19	10	34	83

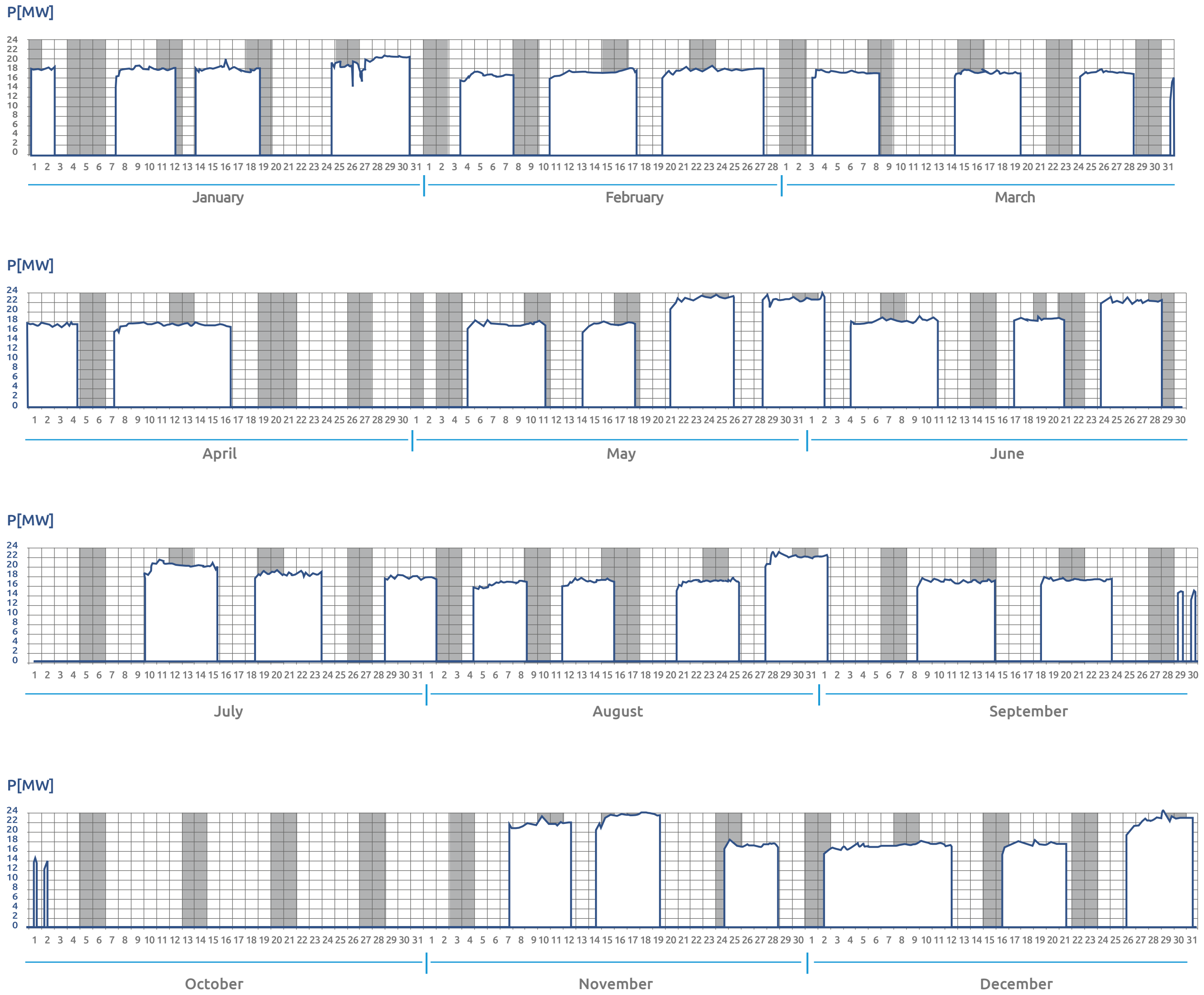
Compared to the preceding year, the overall number of unplanned shut-downs did not change and the number of tests, inspections and overhauls was on the same level as in previous years.

The MARIA research reactor has also been used for physical studies, mainly of condensed matter, using horizontal channels (H-3 to H-8), and in 2014, they were predominantly used for the following purposes:

- atomic ordering in MgxLi2-xSi alloys (in collaboration with the AGH University of Science and Technology in Krakow),
- verification of an assessment of the fraction of neutrons from a 2nd order reflection from a monochromator in studies of superlattice reflections in the Mn-Ni-Cu alloy,
- measurements of inelastic scattering of neutrons in the Mn-Ni-Cu alloy,
- diffraction measurements for the GaFe03 compound with a rhombic and hexagonal structure (in collaboration with the University of Białystok),
- studies of atomic ordering in MgxLi2-xSi alloys,
- studies of spontaneous water migration under the impact of capillary forces in stratified deposits of bentonite and in synthetic F-9 zeolites,
- measurements of elastic neutron scattering in the Mn-Ni-Cu alloy subject to post-soaking re-hardening at 1,200 K,
- supplementary measurements of inelastic neutron scattering in a soaked sample of the Mn0.75Cu0.25 alloy near point (1, 0.5, 0),
- studies of a quasi-unidimensional drying process for samples of granular materials being inhomogeneous due to packing density,
- irradiation of biological samples,
- preliminary study of the structure of pulverised GaFe03 samples followed by tests of the samples in the hexagonal and rhombic phase,
- measurements of elastic neutron scattering in a Mn-Ni-Cu monocrystal after soaking at 12,000 K and slow cooling to the temperature of 1,110 K followed by abrupt cooling to 300 K,
- studies of the directional preference of initial ordering in the reference sample of the Mn-Ni-Cu alloy,
- studies of nanometric structures in model bronze alloys,
- tests of burial urns from the archaeological site of "Czerwony Dwór XXI" (in collaboration with the Institute of Archaeology of the University of Warsaw),
- studies of statistical properties of neutron radiograms obtained without a beam ("dark current") and in a full beam ("light field") (in collaboration with Nesca, RPA),
- studies of the process of water saturation of aged cellular concrete samples,
- studies of the process of drying of coarse-grained corundum samples saturated with water.

The total opening time of 6 horizontal channels in the MARIA reactor in 2014 came to ca. 6,950 hours.

Fig. 5. Summary of the MARIA reactor's operation cycles in 2014 (NCNR)



1.2. EWA reactor (under decommissioning)

The EWA research reactor was operated in the years 1958–1995, initially by the Institute of Nuclear Research, and after the entity's transformation – by the Institute of Atomic Energy. The reactor's original thermal power was 2 MWt, and afterwards increased to 10 MWt.

Started in 1997, the reactor decommissioning process, in the year 2002 reached the status referred to as the end of phase two. It means that nuclear fuel and all irradiated structures and components whose activity level might have been hazardous from the perspective of radiological protection were removed from the reactor. The reactor building was refurbished and office premises were adapted to the needs of the Radioactive Waste Management Plant. Under the Phare PL0113.02.01 project, a hot cell intended for processing of high-activity material was constructed by Babcock Noell Nuclear in the decomissioned EWA reactor hall. Low enriched spent nuclear fuel marked with the EK-10 symbol, which had been used at the initial stage of the EWA reactor's operation in the years 1958–1967, was encapsulated in the hot cell.

1.3. Spent nuclear fuel storages

In accordance with the Atomic Law, in Poland, the category of nuclear facilities also includes wet spent

nuclear fuel storages, i.e. facilities no. 19 and 19A operated since January 2002 by the Radioactive Waste Management Plant which assumed supervisory control over the spent fuel stored in them.

Facility no. 19 was used to store the encapsulated spent low enriched nuclear fuel EK-10 from the EWA reactor, shipped to the country of origin (i.e. the Russian Federation) in September 2012.

This facility is also used for storage of some solid radioactive waste (structural elements) from decommissioning of the EWA reactor and operation of the MARIA reactor, as well as spent high-activity sealed sources.

Facility no. 19A was used for storage of spent high enriched nuclear fuel marked as WWR-SM and WWR-M2 from the operation of the EWA reactor in the years 1967–1995 as well as the spent encapsulated MR nuclear fuel from the MARIA reactor's operation in the years 1974–2005. Since all the spent nuclear fuel from storage no. 19A was shipped back to the Russian Federation in 2010, the Storage is currently used as a backup for storage of spent fuel from the MARIA reactor in case of emergency.

Table 6. Spent nuclear fuel stored in water pools at NCNR (MARIA reactor) in Świerk as of 31 December 2014

Fuel from reactor	Fuel label	Storage facility	Number of elements
MARIA	MC MR-6 MR LEU	technological pool technological pool technological pool	4 51 2

The MARIA reactor's technological pool is mainly used for the storage of spent MR and MC nuclear fuel from the current operation.

After being removed from the reactor core, spent fuel elements require suitable cooling time before they can be shipped to another location, e.g. to the country of origin for recycling or to the permanent spent nuclear fuel repository. In 2014, one shipment of spent fuel from the technological pool to the country of origin was conducted

V. 2. LICENSES ISSUED

In 2014, the MARIA reactor was operated on the basis of license no. 1/2009/MARIA of 31 March 2009 issued by the PAA President. The said license was valid until 31 March 2015 and requires submission of quarterly reports on the reactor operation to the PAA President.

This license was amended in previous years by more than ten annexes, with further three issued in 2014, i.e.:

- annex no. 12/2014/MARIA of 14 August on transport of spent nuclear fuel to the country of origin,
- annex no. 13/2014/MARIA of 9 September on operating conditions of a neutron converter in the reactor core,
- annex no. 14/2014/MARIA of 6 November approving the operation of the MARIA reactor with an upgraded system of backup electric power supply.

The EWA reactor under decommissioning as well as the spent nuclear fuel storages are operated by the Radioactive Waste Management Plant under license no. 1/2002/EWA of 15 January 2002. The license is valid for an indefinite period of time and requires that quarterly reports on the activity in question should be submitted to the PAA President.

The license was amended in previous years by several annexes, with an additional one issued in 2014, i.e.:

- annex no. 1/2014/ZUOP of 14 August authorising the performance of activities involved in transport of spent nuclear fuel to the Russian Federation.

Licenses issued by the PAA President for the performance of activities at nuclear facilities are prepared by PAA's Nuclear Safety Department (NSD).

V. 3. REGULATORY INSPECTIONS

In 2014, Nuclear Regulatory Inspectors with PAA's Nuclear Safety Department performed 21 inspections concerning nuclear safety and radiation protection as well as physical protection of nuclear material and nuclear facilities, including:

- 13 inspections at the National Centre for Nuclear Research,
- 5 inspections at the Radioactive Waste Management Plant, including at the National Radioactive Waste Repository in Różan, and
- 2 inspections related to transport of spent nuclear fuel from Poland, namely from the MARIA research reactor, and 1 inspection related to shipment of fresh nuclear fuel to the MARIA research reactor.

The inspections conducted at NCNR covered the MARIA reactor and included, among other aspects, the verification and assessment of:

- upgrading of the reactor's backup power supply system by replacing electric converters with uninterruptible power supply (UPS) units,
- compliance of the MARIA reactor current operation and documentation with limits and conditions of the license granted,
- compliance with the limits and conditions provided in annex 13/2014/MARIA during reactor start-up 6Li-D converter in the core,
- status of radiation protection of the reactor facility,
- status of physical protection of the reactor facility,
- condition of the reactor protection and monitoring systems,
- ensuring quality of the reactor operation as well as information flow and document management at NCNR,
- fulfilment of recommendations from the inspections conducted in 2013,
- fulfilment of regulatory body enforcement decisions
- performance of the uranium plate irradiation process in the MARIA reactor,
- performance of maintenance and repair works in the reactor.

The inspections conducted at NCNR and RWMP as well as the review of quarterly reports did not reveal any threats to nuclear safety, violations of regulations on radiological protection or violations of limits and conditions of the licences granted and the applicable procedures.

V. 4. FUNCTIONING OF THE COORDINATION SYSTEM FOR INSPECTION AND SUPERVISION OF NUCLEAR FACILITIES

In accordance with the provisions of the Atomic Law, for purposes of supervision and control of nuclear safety and radiological protection of nuclear facilities, nuclear regulatory authority - the PAA cooperates with other public administration bodies entailing competences and responsibilities of these authorities, particularly with the Office of Technical Inspection, the National Fire Service, environmental protection inspection bodies, building inspection bodies, State Sanitary Inspection authorities, the National Labour Inspectorate and the Internal Security Agency. The Atomic Law defines principles of coordination and cooperation of the aforementioned administration bodies by establishing a coordination system for control and supervision of nuclear facilities, referred to as the "coordination system". The management of the coordination system was entrusted to the PAA President who was vested with several necessary entitlements, such as the possibility to convene meetings of representatives of cooperating authorities and inviting to these meetings representatives of other authorities and services as well as laboratories, expert organisations, expert surveyors and specialists who can render advice and support and ultimately contribute to the effectiveness of the system. The latter objective is also attained by establishing teams to handle individual specific tasks connected with the coordination of control and supervision of nuclear facilities.

The cooperation between the bodies covered by the system particularly entails the exchange of information about the controlling activities conducted, organisation of joint training courses and exchange of experience as well as collaboration while developing new legal acts as well as technical and organisational guidance.

In 2014, the activities conducted under the coordination system mostly included cooperation which consisted in:

- participation (as an observer) of a PAA nuclear regulatory inspector in the inspections conducted at NCNR, including those related to the MARIA research reactor and performed by inspectors appointed by the Provincial Inspectorate for Environmental Protection and the Office of Technical Inspection. PAA's officer participated in two such audits in total, the scope of which included external visual inspection of the pressurizer along with its protection equipment, manner of handling waste and hazardous substances at NCNR and verification of technical condition of water intakes as well as the storm water drainage system;
- collaboration between PAA and the Internal Security Agency in assessment of documentation of the physical protection system at the National Centre for Nuclear Research in Świerk;
- commencement of works aimed to develop a draft agreement (the signature of which is scheduled for 2015) between parties to the coordination system, the purpose of which is to define detailed working principles of the system, including: planning of joint inspections, exchange of information on results of the supervisory activities conducted and joint training actions.

V. 5 NUCLEAR POWER PLANTS IN NEIGHBOURING COUNTRIES

5.1. Nuclear power plants in a 300 km distance from the country borders

In a distance not larger than 300 km from Polish borders, there are 8 nuclear power plants operating 23 power reactor units with the total capacity of ca. 15 GWe (Fig. 6), which has not changed since the year 2013. They include:

- 14 type WWER-440 reactors (each of 440 MWe of nominal power):
  - 2 units at the Rivne NPP (Ukraine),
  - 2 units at the Bohunice NPP (Slovakia),
  - 2 units at the Mochovce NPP (Slovakia),
  - 4 units at the Paks NPP (Hungary),
  - 4 units at the Dukovany NPP (Czech Republic);
- 6 type WWER-1000 reactors (each of 1,000 MWe of nominal power):
  - 2 units at the Rivne NPP (Ukraine),
  - 2 units at the Khmelnytskyi NPP (Ukraine),
  - 2 units at the Temelin NPP (Czech Republic);
- 3 type BWR reactors:
  - 3 units at the Oskarshamn NPP (Sweden) with nominal capacities of 487, 623 and 1,197 MWe, respectively.

Within the same distance, there are two nuclear power plants in a permanent shutdown stage, subject to the decommissioning process:

- Ignalina NPP (Lithuania) – 2 type RBMK units with the nominal power of 1,300 MWe, shut down in 2004 and 2009,
- Barsebäck NPP (Sweden) – 2 type BWR units with the nominal power of 600 MWe, shut down in 1999 and 2005, and
- 2 type WWER-440 reactors at the Bohunice NPP (Slovakia) with the nominal power of 440 MWe, shut down in 2006 and 2008,

as well as a nuclear power plant shut down after the Fukushima disaster in 2011:

- Krümmel NPP (Germany) – 1 type BWR unit with the nominal power of 1,315 MWe.

Due to the fact that the operation of these nuclear power plants may theoretically create radiation hazards for the population of Poland, bilateral intergovernmental agreements were signed with respective nuclear regulatory authorities of the neighbouring countries (see chapter XIII 2.)

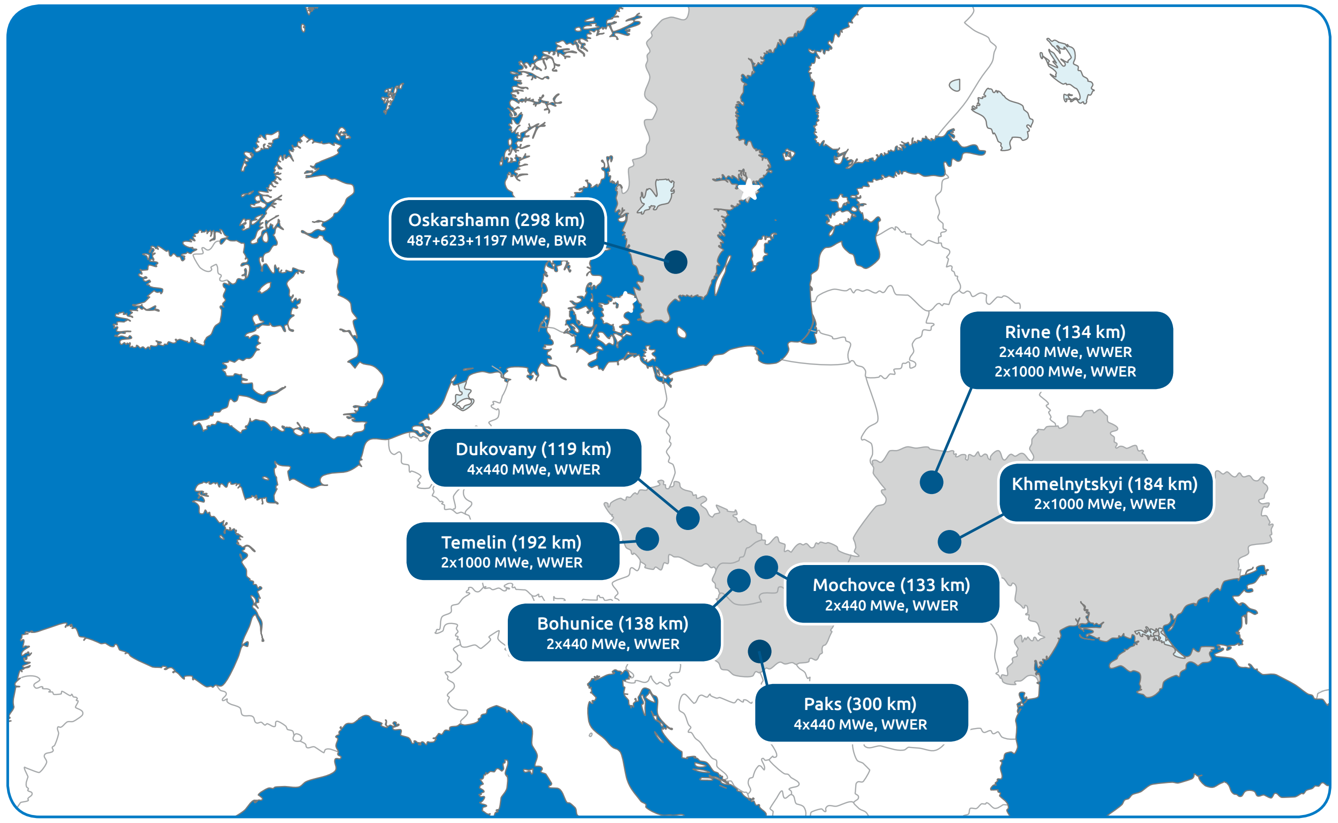
5. 2. Operating data of nuclear power plants in neighbouring countries

Based on the information published by the IAEA, operating data of nuclear power plants located within the distance of 300 km from Polish borders have been collated in Table 7.

The table contains data regarding:

1) share of nuclear power plants in the electric energy output in the given country,
2) current gross electric power after all the upgrades completed,
3) date of the first connection to the grid (and not of commissioning),

Fig. 6. Nuclear power plants located within the distance of 300 km from Polish borders



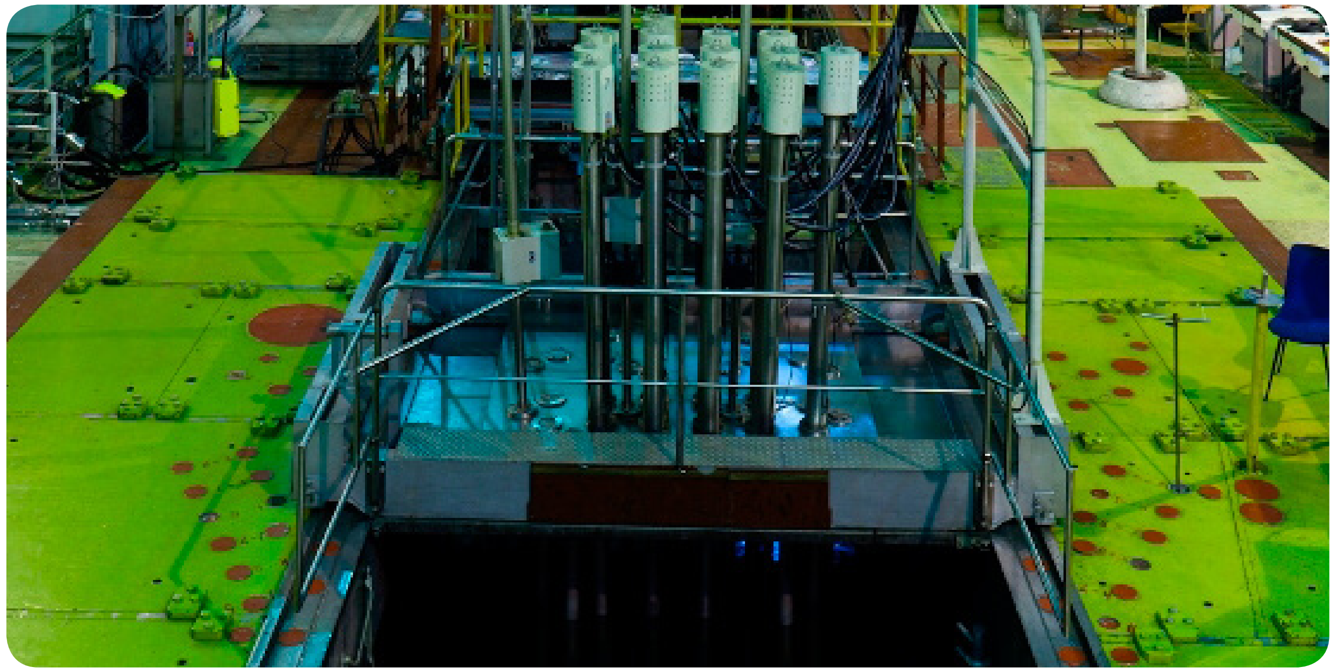
4) annual and multiannual (accumulated) capacity factor in 2014 (first column) since the beginning of the unit operation until 2014 (second column), calculated as a proportion between the electric energy produced and the output theoretically attainable on nominal power in a unit of time.

Comments to the data provided in the table above:
1. most reactors (12) were commissioned in the years 1984-1987, and they are WWER-440 reactors, subject to significant upgrades increasing their nominal power (440 MW) at the unit commissioning time, and 2 reactors of the same type put into ope-

Table 7. Basic information and operating parameters from 2014 for all reactors located in the vicinity of Polish borders (data obtained from the IAEA as of 31.12.2014)

Reactor	Reactor type Share in nuclear power	Gross electric power [MWe]	Start-up year	Electric energy output [TWh]	Capacity factor [%]	
					2014 (annual)	multiannual (accumulated)
Czech Republic	**35,8%**					
Dukovany-1	WWER-440/213	500	1985	3,79	92,3	85,2
Dukovany-2	WWER-440/213	500	1986	3,68	89,0	85,2
Dukovany-3	WWER-440/213	500	1986	3,50	85,4	84,3
Dukovany-4	WWER-440/213	500	1987	3,50	84,7	85,5
Temelin	WWER-1000/320	1056	2000	7,19	81,3	72,8
Temelin	WWER-1000/320	1056	2002	6,99	79,6	78,1
Slovakia	**56,8%**					
Bohunice-3	WWER-440/213	505	1984	3,73	90,4	78,5
Bohunice-4	WWER-440/213	505	1985	3,77	91,3	79,8
Mochovce-1	WWER-440/213	470	1998	3,53	92,4	84,2
Mochovce-2	WWER-440/213	470	1999	3,39	88,8	83,1
Sweden	**41,5%**					
Oskarshamn-1	ABB BWR	492	1971	3,05	73,7	60,4
Oskarshamn-2	ABB BWR	661	1974	0,00	00,0	73,3
Oskarshamn-3	ABB BWR	1450	1985	9,22	75,1	77,4
Ukraine	**49,4%**					
Khmelnytskyi-1	WWER-1000/320	1000	1987	3,55	42,7	73,5
Khmelnytskyi-2	WWER-1000/320	1000	2004	6,77	81,4	76,5
Rivne-1	WWER-440213	420	1980	2,94	88,1	75,4
Rivne-2	WWER-440/213	415	1981	2,19	66,6	77,0
Rivne-3	WWER-1000/320	1000	1986	5,55	66,6	67,6
Rivne-4	WWER-1000/320	1000	2004	6,18	74,2	65,4
Hungary	**53,6%**					
Paks-1	WWER-440/213	500	1982	3,79	92,0	87,2
Paks-2	WWER-440/213	500	1984	3,90	94,2	82,1
Paks-3	WWER-440/213	500	1986	3,60	86,8	87,0
Paks-4	WWER-440/213	500	1987	3,49	84,2	88,9

ration in Slovakia after prolonged interruption in the construction phase,
2. remaining WWER-1000 reactors (6) were commissioned in the years 1986-2004,
3. in 2014, WWER-440 reactors operated with the capacity factor from 66,6 to 94,2%, whereas WWER-1000 reactors – at 42,7 to 81,4%, where the lower factor implies that the given unit operated with reduced capacity, as defined by the grid administrating party,
4. the multiannual capacity factor for the Paks-2 reactor was clearly lower compared to other reactors of the same power plant, but it resulted from a long downtime in the years 2003–2004 as a consequence of a failure which occurred while cleaning fuel elements,
5. the Oskarshamn-1 reactor (Sweden) has been reconnected to the grid after it had remained in a prolonged outage since 2011, and the Oskarshamn-2 reactor has remained out of service for purposes of maintenance and necessary upgrading since June 2013.



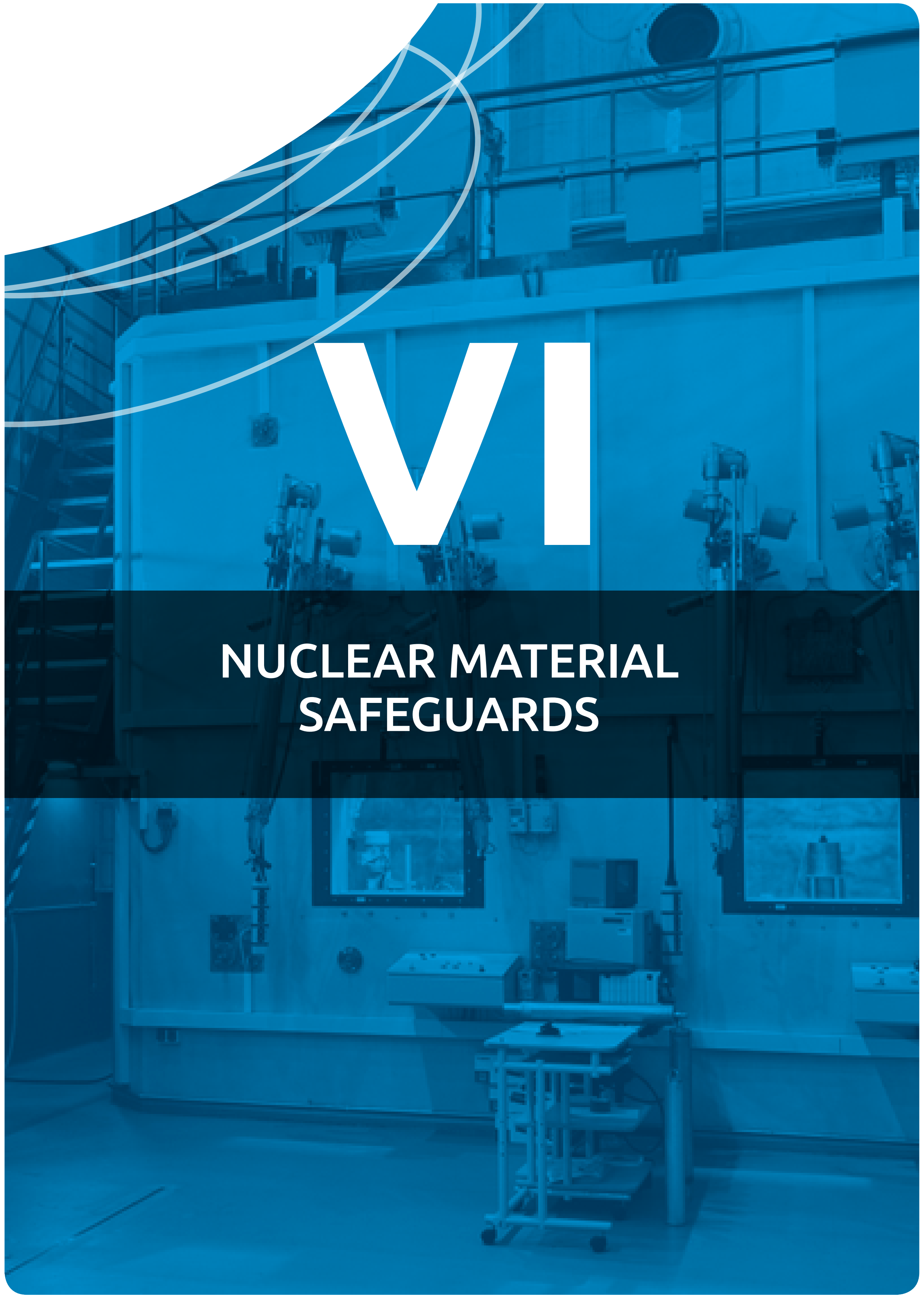
5. 3. Nuclear power plants constructed and planned in the vicinity of the country borders

In 2014, Poland's neighbouring countries were implementing the following construction projects:

1) two type WWER-440 reactors at the Mochovice NPP (Slovakia) which, according to the current plans, are assumed to be commissioned in 2014 and 2015. They are second generation reactors, and their construction started already in the 1980s, subsequently interrupted and then resumed after a series of improvements had been introduced following the latest requirements for safety of reactors operated in the European Union;
2) two type WWER-1200 (AES-2006) reactors at the Ostrovets NPP (Belarus). The construction of the first one was officially commenced (once the concrete was poured) in November 2012, whereas its commissioning is scheduled for 2019. The second reactor started being built in May 2014, and it is scheduled for commissioning in 2020.

Furthermore, as far as countries bordering on Poland are concerned, there were plans to start the construction of a nuclear reactor at the Visaginas NPP in Lithuania in 2014 (in the closest vicinity of a decommissioned power plant in Ignalina). However, discussions concerning implementation of this investment still continue in Lithuania.

Initiated already in 2012, the construction of the first WWER-1200 reactor at the Baltic NPP (Russia) is still under suspension, and it will remain so until a new economic analysis is conducted against the refusal to deliver electric energy to Poland and abandoning plans to install a submarine cable leading to Germany.



VI

NUCLEAR MATERIAL SAFEGUARDS

VI. NUCLEAR MATERIAL SAFEGUARDS

VI. 1. LEGAL BASIS FOR SAFEGUARDS

With regard to safeguards, Poland fulfils its obligations resulting from the following international regulations:

- Treaty establishing the European Atomic Energy Community (Euratom Treaty) of 25 March 1957. The Treaty came into force on 1 January 1958. In Poland, the provisions of the Treaty have been binding since Poland's accession to the European Union;
- Article III of the Treaty of the Non-Proliferation of Nuclear Weapons (NPT). The treaty came into force on 5 March 1970, and it was extended for an indefinite period of time in 1995. Poland ratified the Treaty on 3 May 1969 and it came into force on 5 May 1970;
- Agreement between Poland, the European Atomic Energy Community and the International Atomic Energy Agency in connection with the implementation of Article III of the Treaty of the Non-Proliferation of Nuclear Weapons, also known also as Trilateral Safeguards Agreement INFCIRC/193. It came into force on 1 March 2007;
- Additional Protocol to the Trilateral Safeguards Agreement in connection with the implementation of Article III of the Treaty of the Non-Proliferation of Nuclear Weapons which came into force on 1 March 2007 (INFCIRC/193/Add8);
- Commission Regulation (Euratom) no. 302/2005 of 8 February 2005 on the application of Euratom safeguards (OJ L 54 of 28 February 2005).

The most common form of safeguards agreement, concluded on the grounds provided by the Treaty of the Non-Proliferation of Nuclear Weapons between countries not being in possession of nuclear weapons and the International Atomic Energy Agency (IAEA), is an agreement based on the IAEA's model document, INFCIRC/153.

Pursuant to the latter, Poland and the International Atomic Energy Agency signed and applied the agreement for the application of safeguards, binding since 1972 and laid down in the IAEA's document INFCIRC/179.

Having received all the relevant information concerning the safeguards, the IAEA could establish that nuclear material present in Poland were only used in Poland for peaceful activities. Base on grounds thus laid, an integrated safeguards system was introduced in Poland in March 2006. The deployment of the integrated safeguards system allowed for considerable limitation of the number of inspections undertaken by the IAEA in Poland. The bilateral agreement for the application of safeguards concluded between Poland and the IAEA remained effective until February 2007. Once Poland joined the European Union, the agreement between Poland and the IAEA was suspended and the integrated safeguards system has been binding since 1 March 2007 under a trilateral agreement between Poland, the European Atomic Energy Community and the International Atomic Energy Agency. The PAA President is responsible for the implementation of this agreement.

Pursuant to the trilateral agreement in question, the IAEA and EURATOM have been vested with entitlements to conduct safeguards inspections. Objectives of these inspections include verification of conformity between reports and the operator's documentation, identification and validation of the nuclear material storage facility, verification of quantity and composition of materials placed under safeguards, explanation of reasons for material unaccounted for and discrepancies in the information provided by the nuclear material dispatcher and recipient. Inspections are also conducted before nuclear material are removed from the Polish territory or after they are brought in.

With regard to nuclear material in Poland, the relevant records are kept and inspections are conducted by the Non-Proliferation Division of PAA's Department of Nuclear Safety. In matters regarding inspection of export of strategic goods and dual-use technologies, PAA cooperates with the Ministry of Foreign Affairs, the Ministry of Economy, the National Border Guard and the Customs Service with the Ministry of Finance.

VI. 2. USERS OF NUCLEAR MATERIALS IN POLAND

The state system for accounting for and control of nuclear material, previously required by the bilateral agreement and subsequently by the trilateral agreement between Poland, EURATOM and the IAEA, is based on structures referred to as material balance areas.
Nuclear material are used in Poland by the following entities constituting separate material balance areas:

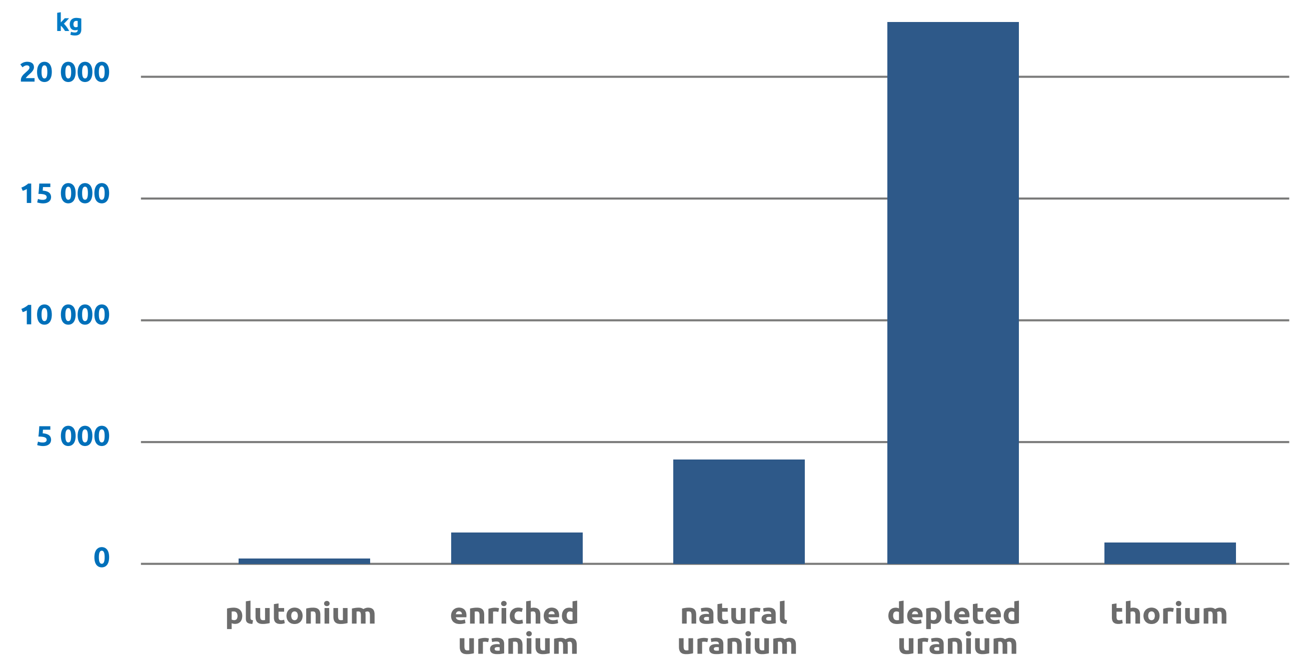
- Radioactive Waste Management Plant, responsible for spent nuclear fuel storages, the shipment warehouse and the National Radioactive Waste Repository in Różan;
- MARIA Reactor Operations Division and the associated research laboratories at the National Centre for Nuclear Research (NCNR) in Świerk;
- POLATOM Radioisotopes Centre / NCNR in Świerk;
- Institute of Chemistry and Nuclear Technology in Warsaw;
- 26 medical and research facilities using small quantities of nuclear material and 98 industrial, diagnostic and service facilities equipped with depleted uranium shields.

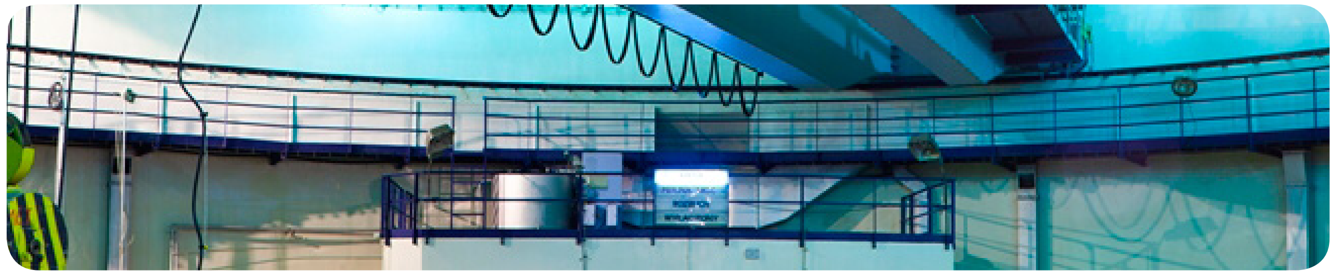
Until October 2013, the research laboratories at NCNR constituted an independent material balance area. On account of the small quantities of nuclear materials in this area, under the agreement with EURATOM, in November 2013, it was included into the material balance area established by the MARIA Reactor Operations Division.

In accordance with the requirements of the Euratom Treaty and Commission Regulation no. 302/2005, any changes to quantities of nuclear material held by individual users must be reported on a monthly basis to the system of nuclear material accountancy and inspection managed by the European Commission's Euratom Safeguards Directorate in Luxembourg. Copies of the foregoing information are also submitted by users to PAA. The reports prepared by users of nuclear materials are sent to the Commission and to PAA by means of the ENMAS Light program. Furthermore, the European Commission's Euratom Safeguards Directorate forwards copies of the reports to the International Atomic Energy Agency based in Vienna.

Under the Global Threat Reduction Initiative (GTRI), export of spent nuclear fuel from the Nuclear Centre in Świerk to the Russian Federation was continued in 2014. The loading and transport of spent nuclear fuel was handled under supervision of inspectors representing PAA, EURATOM and the IAEA.

Fig. 7. Balance of nuclear material in Poland (status as of 31 December 2014)





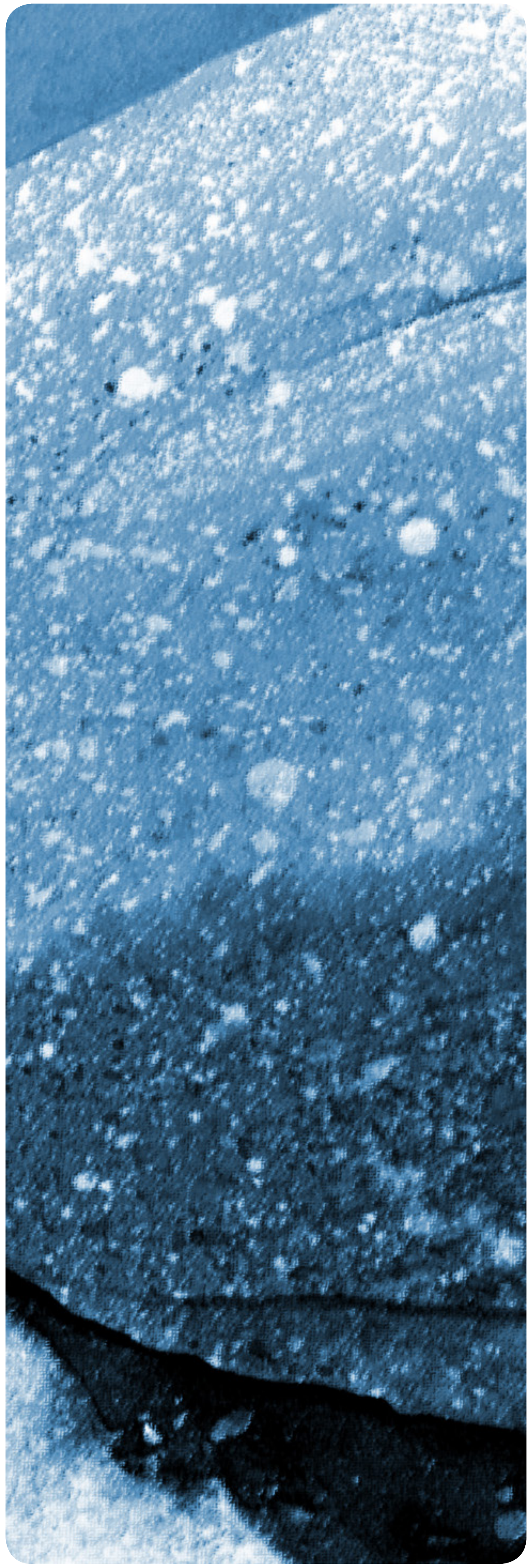
VI. 3. INSPECTIONS OF NUCLEAR MATERIAL SAFEGUARDS

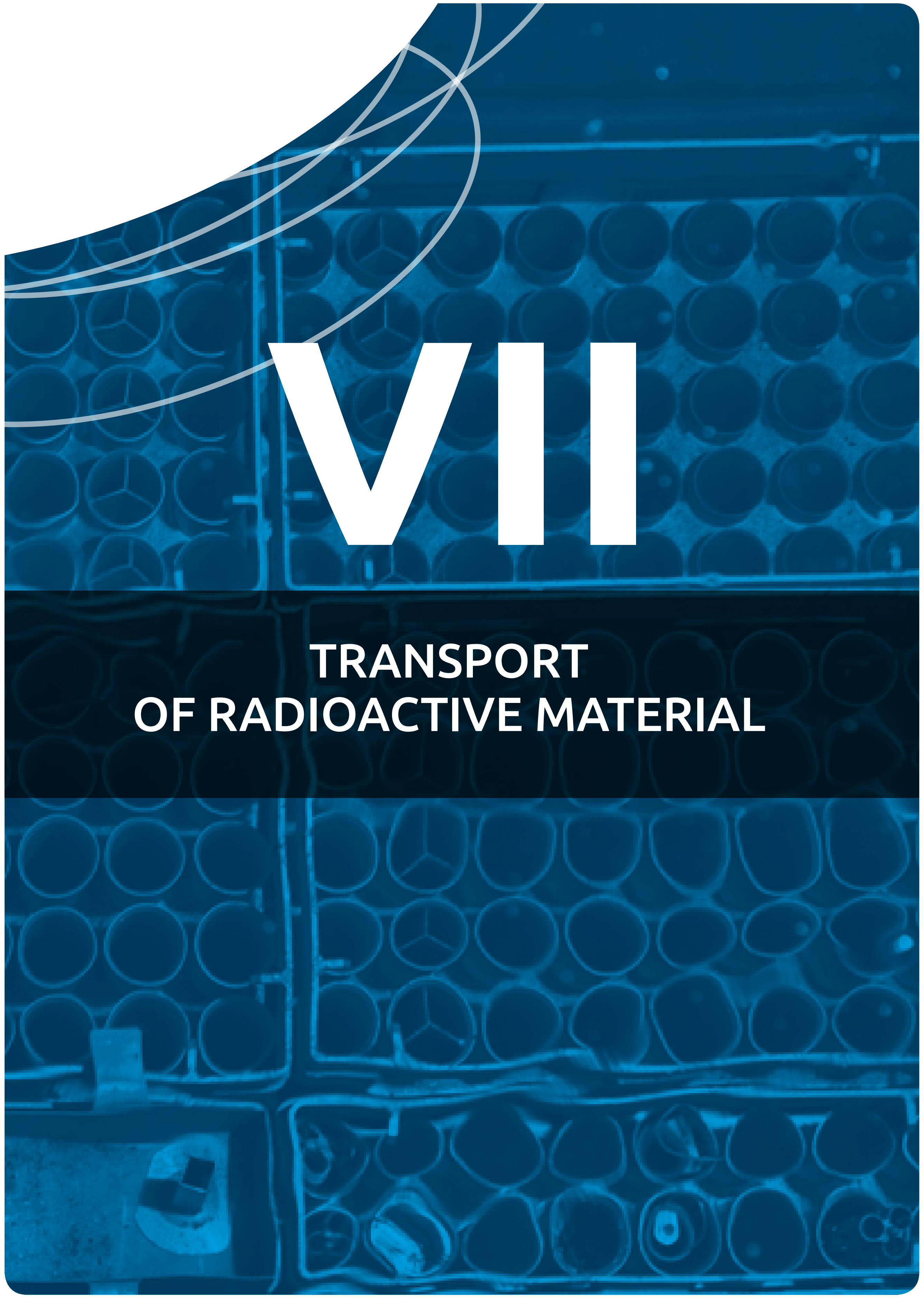
In 2014, nuclear regulatory inspectors with the Non-Proliferation Division of PAA's Nuclear Safety Department, unassisted or acting together with the IAEA and EURATOM inspectors, performed 40 safeguards inspections in all material balance areas in Poland.

Having fulfilled all the relevant obligations under the Additional Protocol to the Trilateral Agreement, PAA submitted a declaration to Euratom updating information about the technical or research activities performed in Poland in relation to a nuclear fuel cycle as well as information about absence of export of goods specified in Annex II to the said Protocol, and also a declaration concerning users of small quantities of nuclear material operating in Poland.

In accordance with article 4.b.(i) of the Additional Protocol to the Safeguards Agreement (INFCIRC/193/Add.8), in March 2014, complementary access was conducted on the premises of the Institute of Nuclear Chemistry and Technology with the participation of inspectors representing the IAEA, EURATOM and PAA. The purpose of the access was to verify legitimacy of the activity conducted at the Institute, and particularly to confirm that there were no undeclared nuclear material and activities performed on the premises. The verification activities undertaken involved such measures as visual inspections, taking photographs, non-destructive testing, environmental sampling, laser measurements of compartments in which works involving radioactive material may be conducted as well as determination of geographic coordinates of the site. As a result of the access, the declarations previously submitted were validated as correct.

The inspections performed revealed no nonconformities connected with safeguards in Poland, and it was specifically confirmed that all nuclear material in Poland were used for peaceful activities.





VII

TRANSPORT OF RADIOACTIVE MATERIAL

VII. TRANSPORT OF RADIOACTIVE MATERIAL

VII. 1. TRANSPORT OF RADIOACTIVE SOURCES AND WASTE

In 2014, transport of radioactive material was conducted in accordance with requirements of the following national regulations:

- Atomic Law Act of 29 November 2000,
- Transport of Dangerous Goods Act of 19 August 2011,
- Maritime Safety Act of 18 August 2011,
- Air Traffic Act of 3 July 2002,
- Transport Law Act of 15 November 1984.

Polish provisions of laws are based on the following international modal regulations:

- **ADR** (L'Accord européen relatif au transport international des marchandises Dangereuses par Route),
- **RID** (Reglement concernant le transport Internationale ferroviaire des marchandises Dangereuses),
- **ADN** (European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways),
- **IMDG Code** (International Maritime Dangerous Goods Code),
- **ICAO** Technical Instructions,
- **IATA DGR** (International Air Transport Association — Dangerous Goods Regulation).

The aforementioned regulations apply to different modes of transport of dangerous goods.

In accordance with the foregoing regulations, radioactive material is categorised under Class 7 on account of the ionising radiation being the predominant threat involved. Radioactive material is transported in accordance with transport regulations SSR-6 developed by the International Atomic Energy Agency. They provide grounds for international organisations preparing the aforementioned international modal regulations or they are directly implemented to the national legal framework and constitute the basic legal form in international transport.

Pursuant to the obligations of Poland towards the IAEA, radioactive sources classified under appropriate categories are transported in accordance with the provisions laid down in the Code of Conduct on the Safety and Security of Radioactive Sources and Guidance on the Import and Export of Radioactive Sources as well as in a supplementary document of Guidance on the Import and Export of Radioactive Sources.

The annual reports of organisational entities holding the applicable transport licenses and performing shipments of radioactive material imply that in 2014, in Poland, 27,217 shipments were made and 70,774 items were transported by roads, railway, inland, sea and air means.

Analysing the matter of transport of radioactive substances as a potential source of radiation hazards, one should also mention attempts of illegal (i.e. without proper authorisation or notification) transport of radioactive substances and nuclear material to Poland. These attempts were prevented by the National Border Guard having 243 fixed radiation portal monitors installed at border crossing points and 1,207 mobile signalling and measurement devices at their disposal. Monitoring of cross-border movement of radioactive and nuclear material is also performed by officers of the National Border Guard who have completed expert training courses in radiometric monitoring and radiological protection.

In 2014, the National Border Guard units performed the following monitoring activities:

- inspections of shipments of radioactive sources:
  - regarding import to Poland – 647 inspections,
  - regarding transit through and transport out of Poland – 2,043 inspections,
- inspections of shipments of materials containing natural radioactive isotopes:
  - regarding import to Poland – 3,579 inspections,
  - regarding transit through and transport out of Poland – 8,544 inspections,
- examinations of persons treated or examined with radioactive isotopes – 893 examinations.

As a result of the inspections performed, in 2014, the National Border Guard detained 18 shipments for further explanation due to the lack of required authorisations for import and transport of radioactive substances and exceedance of the admissible radioactive contamination thresholds.

In accordance with the memorandum of understanding signed in 2009 by and between the U.S. Department of Energy (DoE), the Minister of the Interior and Administration and the Minister of Finance of the Republic of Poland concerning cooperation in preventing the illicit trafficking of nuclear and other radioactive material, the National Border Guard was reinforced by the American partner, as in the years 2012 and 2013, supplying them with equipment. It included state-of-the-art stationary and portable devices, such as spectrometers and radiation portal monitors which supported the activities of the National Border Guard at airports and on the eastern border of Poland, being the external border of the EU at the same time.

VII. 2. TRANSPORT OF NUCLEAR FUEL

Fresh and spent nuclear fuel is transported under an authorisation granted by the PAA President.

In 2014, there were 2 shipments of nuclear fuel, including one of fresh and one of spent nuclear fuel, performed in the territory of Poland.

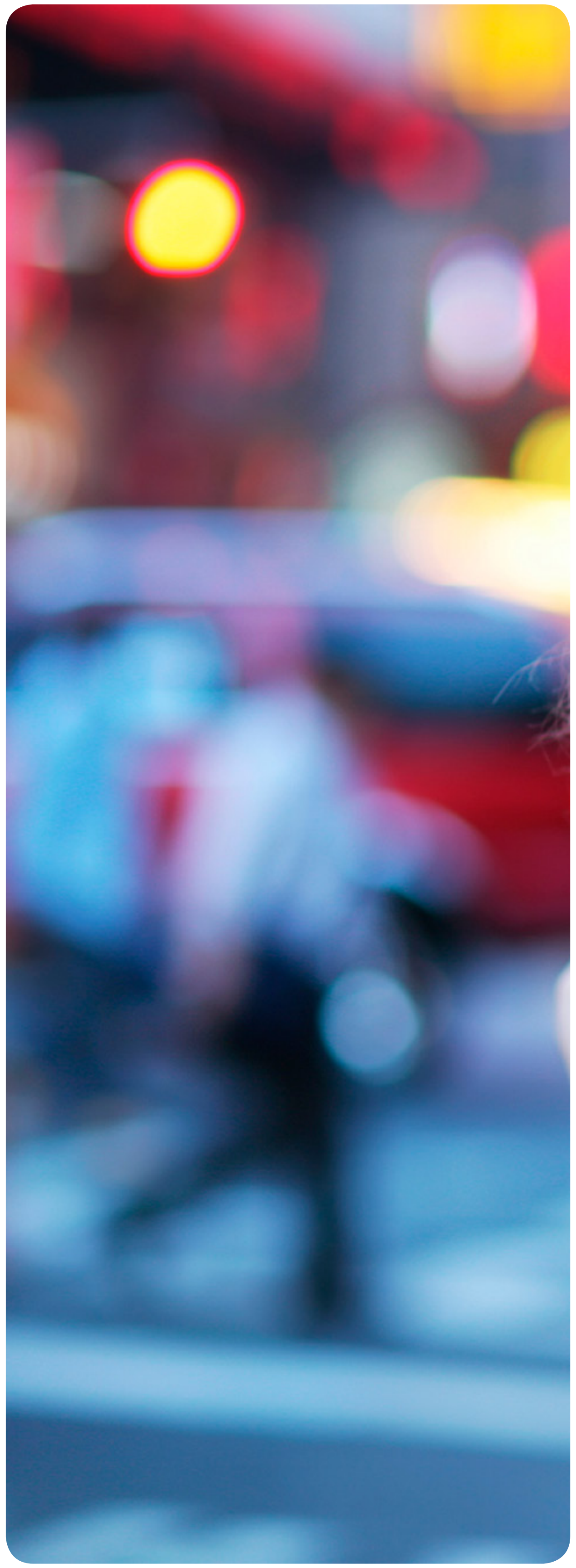
2.1. Fresh nuclear fuel

In 2014, there was 1 shipment of fresh nuclear fuel with the enrichment below 20% made from France to Poland for purposes of operation of the MARIA reactor at the National Centre for Nuclear Research in Świerk.

2.2. Spent nuclear fuel

In relation to the implementation of the Global Threat Reduction Initiative (GTRI) which consisted in a transition of research reactors from using high enriched fuel produced in the former Soviet Union to low enriched fuel, in 2014, there was one shipment of spent high enriched nuclear fuel from the MARIA research reactor to the Russian Federation. Within the last 6 years (2009–2014), there were 7 shipments of spent high enriched nuclear fuel from Polish research reactors of EWA and MARIA to the Russian Federation. Shipments are managed by the Radioactive Waste Management Plant. The PAA President, on the other hand, is responsible for issuing authorisations for the transport and supervises its performance.

Due to the finalised process of conversion of the MARIA reactor to low enriched fuel, it is projected that there will still be one more final shipment of spent high enriched nuclear fuel (with the U-235 enrichment above 20%) to the Russian Federation, thus leaving only low enriched nuclear fuel within the territory of the Republic of Poland.



VIII. RADIOACTIVE WASTE

Radioactive waste is generated as a result of the use of radioisotopes in medicine, industry and scientific research, production of open and sealed radioactive sources and in the course of operation of research reactors. This type of waste may occur in gaseous, solid and liquid form.

The gaseous waste is produced as a consequence of operation of the MARIA research reactor. It mainly comprises radioactive noble gases, iodine, caesium and tritium.

The group of liquid waste mainly constitutes aqueous solutions and suspensions of radioactive substances. The solid waste group includes spent sealed radioactive sources, personal protection items contaminated with radioactive substances (rubber gloves, protective clothing, footwear), laboratory materials and equipment (glass, components of instruments, lignin, cotton wool, foil), used tools and elements of technological equipment (valves, parts of pipelines or pumps) as well as used sorptive and filtering materials utilised in the purification of radioactive solutions or air released from reactors and isotope laboratories (used ionites, precipitation sludge, filter cartridges etc.). What is taken into consideration in qualification of radioactive waste is the radioactive concentration of radioactive isotopes contained in the waste as well as radioactive half-life. One may distinguish between the following categories of radioactive waste: low-, intermediate- and high- level radioactive waste, classified under three sub-categories, namely transitional, short- and long-lived. There are also spent sealed radioactive sources which constitute an additional category of radioactive waste, classified according to the activity level criterion under the following three sub-categories: low-, medium- and high-activity ones. Radioactive waste types containing nuclear material and spent nuclear fuel, the latter becoming high-activity waste when a decision is made to dispose of it, are subject to special regulations on the handling procedures applicable at every stage (including storage and disposal).

Radioactive waste may be stored temporarily, however, it is ultimately to be disposed. It should be pointed out that such terms as "storage" and "disposal" are time-specific in nature, since storage is a process limited in time until waste is deposited at a repository, whereas disposal is final and its time is indefinite.

Processing and disposal of radioactive waste require reduction of its production quantity, its appropriate segregation, decrease of volume, solidification and packaging in a manner ensuring that all the measures undertaken and barriers provided effectively isolate the waste from people and the environment.

Radioactive waste is stored in a way which ensures protection of people and the environment under normal conditions and in cases of radiation emergency, including protection of radioactive waste against leakage, dispersion or release. The means that can used for these purposes are dedicated facilities or compartments (radioactive waste storages) featuring equipment for mechanical or gravitational ventilation as well as purification of air released from such compartments.

Radioactive waste disposal is only allowed at facilities dedicated to this purpose, i.e. at repositories. In accordance with Polish regulations, repositories are divided into near-surface and deep ones, and in the process of their licensing as to the compliance with nuclear safety and radiological protection requirements, this being covered by duties of the PAA President, a detailed specification is prepared regarding types of radioactive waste under particular categories which may be disposed at the given facility.

The organizational entity responsible for collection, transport, processing and disposal of waste generated by radioactive material users in Poland is the Radioactive Waste Management Plant (RWMP). The supervision of safety of waste management, including supervision of safety of waste disposal by RWMP is performed by the PAA President. Before 1 January 2002, not only had the PAA President been responsible for the supervision of waste management safety, but also for the waste management itself, including for the process of investigation into potential sites where a new radioactive waste repository could be constructed. At present, the latter two tasks are excluded from the scope of the PAA President's responsibilities. The PAA President is no longer responsible for exploration and selection of a site for a radioactive waste repository or for the construction or operation of such a repository. These matters are currently managed by the Minister of Economy.

RWMP renders its services against payment, however, the revenue generated from this activity covers only a part of costs incurred by this enterprise. In 2014, the lacking funds were covered from a subsidy granted by the Ministry of Economy. The Radioactive Waste Management Plant operates facilities situated on the premises of the nuclear centre in Świerk, all of them fitted with equipment for radioactive waste conditioning.

The National Radioactive Waste Repository (NRWR) in Różan on the river Narew (ca. 90 km from Warsaw) is the site of radioactive waste disposal in Poland. According to the IAEA classification, NRWR is a near-surface type repository intended for disposal of short-lived, low- and intermediate-level radioactive waste (with the half-life of radionuclides being shorter than 30 years). It is also used to store long-lived, mainly alpha radioactive waste, as well as spent sealed radioactive sources waiting to be placed in a deep repository (also known as geological or underground repository). The Różan repository has been in operation since 1961, and it is the only facility of this type in Poland. Due to the fact that the disposal space is running short, the repository is scheduled to be prepared for closure in the years 2020–2023 and for ultimate closure in 2024-2029 (as stipulated in the National Plan for Radioactive Waste and Spent Nuclear Fuel Management submitted for consultation purposes). In 2014, RWMP received 238 orders covering collection of radioactive waste from 162 institutions. Quantities of radioactive waste collected and processed by RWMP (including the waste generated at RWMP) has been provided in Table 8.

Table 8. Quantities of radioactive waste collected by RWMP in 2014

Sources of waste	Solid waste [m^3]	Liquid waste [m^3]
From outside the Świerk centre (medicine, industry, scientific research)	7,36	0,78
National Centre for Nuclear Research/Radioisotope Centre POLATOM	19,73	0,15
National Centre for Nuclear Research – MARIA Reactor	4,00	20,00
Radioactive Waste Management Plant	8,58	0,00
Total:	**39,67**	**20,93**

The breakdown of solid and liquid waste collected according types and categories was as follows:

- low-level waste (solid) – 39.67 m^3
- intermediate-level waste (solid) – 0.00 m^3
- low-level waste (liquid) – 20.93 m^3
- intermediate-level waste (liquid) – 0.00 m^3
- alpha radioactive waste – 0.67 m^3
- smoke detectors – 21,114 pcs.
- spent sealed radioactive sources – 1,658 pcs.

After being processed, radioactive waste in the solidified form is placed in drums of 200 and 50 dm^3 in capacity, and only then delivered for disposal.

In 2014, the National Radioactive Waste Repository received 91 drums of 200 litres with processed radioactive waste as well as 13 hobbocks of 50-litre containing radioactive sources. Additionally, 1 non-standard container was delivered to the repository. Spent radioactive sources which are not subject to processing (there were 40 such sources delivered in total) are sealed in separate containers. Processed solid waste was delivered to the repository in the quantity of 19.77 m^3 with the total activity of 1,622.4 GBq (as of 31 December 2014).

The repository also receives waste from dismantling of smoke detectors, delivered for the purpose of temporary storage.

RWMP proceeds with the radioactive waste management based on three licenses granted by the PAA President:

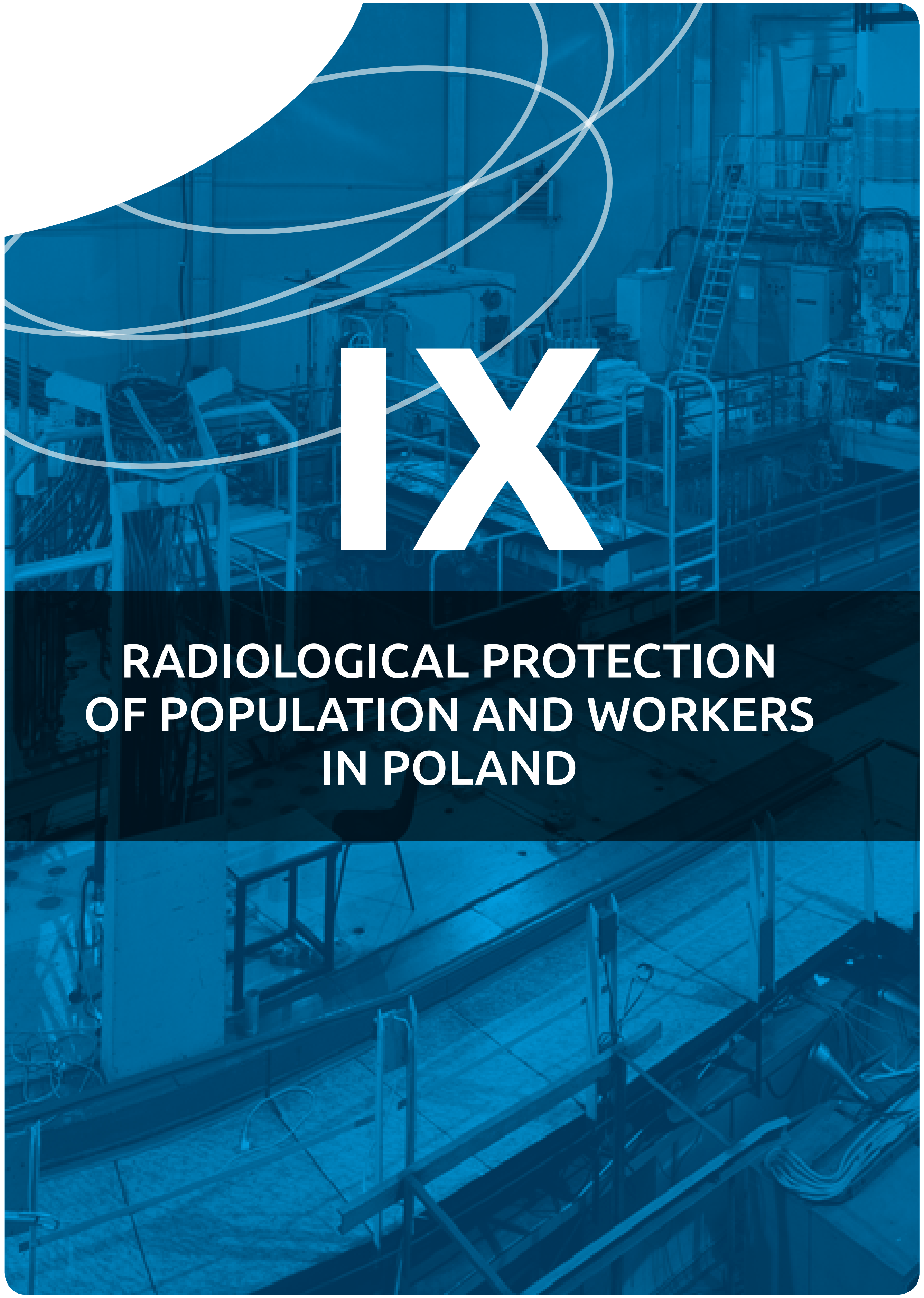
- License no. D-14177 of 17 December 2001 authorising activity related to the use of nuclear energy and consisting in transport, processing and storage of radioactive waste, collected from organizational entities conducting activity involving the use of nuclear energy from the entire territory of the country, on the premises of the Świerk centre,
- License no. 1/2002/KSOP – Różan of 15 January 2002 authorising the operation of the National Radioactive Waste Repository in Różan.
- License no. 1/2002/EWA of 15 January 2002 authorising the decommissioning of the EWA reactor and operation of spent nuclear fuel storages no. 19 and 19A.
- The foregoing licenses are valid for an indefinite period of time, and they require submission of reports on an annual (the first) and quarterly (the second and the third) basis, subsequently to be analysed by Nuclear Regulatory Inspectors from PAA's NSD. The information contained in these reports is then reviewed during regulatory inspections.

In 2014, Nuclear Regulatory Inspectors with PAA's NSD performed 4 inspections on radioactive waste management at RWMP, including:

- 2 inspections at NRWR in Różan, comprising matters of physical protection, adherence to radiological protection regulations among employees of NRWR, on-site and off-site environmental monitoring, co-operation between RWMP and authorities of the Municipality of Różan as well as the status of works related to installation of new piezometers, review of documentation of the waste received for disposal and technical condition of individual facilities of the repository.
- 2 inspections of RWMP facilities within the area of the nuclear centre in Świerk which covered a review of documentation of radioactive waste received and stored, inspection of technological processes of radioactive waste processing, operation of spent nuclear fuel storages, efficiency of the physical protection system for RWMP's nuclear material and facilities (units no. 19 and 19A as well as the hall of the EWA reactor under decommissioning) as well as the status of radiological protection of the facilities managed by RWMP.

Conclusions and remarks from the inspections completed were deployed by the RWMP management on an ongoing basis, whereas all nonconformities and infringements found by Nuclear Regulatory Inspectors were eliminated in accordance with provisions of the applicable inspection reports or follow-up statements.

The said inspections of radioactive waste disposed and stored at NRWR and RWMP in Świerk near Otwock did not reveal any threats to people and the environment.



IX. RADIOLOGICAL PROTECTION OF POPULATION AND WORKERS IN POLAND

IX. 1. EXPOSURE OF POPULATION TO IONISING RADIATION

Exposure of a statistical inhabitant to ionising radiation, expressed as an effective dose, is a sum of doses from natural radiation sources as well as from artificial sources, namely those created by men. Sources of ionising radiation emitted by radionuclides, being natural components of all elements of the environment, as well as cosmic radiation constitute the first exposure group. The second group comprises all artificial radiation sources used in different areas of economic and scientific activity as well as for medical purposes, and they include artificial isotopes of radioactive elements and devices generating radiation, for example X-ray devices, accelerators, nuclear reactors and other radiation devices.

Human radiation exposure may not be eliminated completely but only limited, since one cannot affect cosmic radiation or contents of natural radionuclides in the lithosphere which have existed for billions of years. Therefore, the said limitation of radiation applies to exposure caused by artificial ionising radiation sources, and it is determined through threshold doses (limits), as they are referred to, which – to the best of scientific knowledge – do not cause negative health effects when conformed with. In this respect, one should note that the said limits do not include natural radiation. In particular, they do not cover exposure to radon in residential buildings, to natural radioactive radionuclides occurring in a human body, to cosmic radiation on the ground level as well as exposure above the surface of the ground to nuclides contained in intact lithosphere. Neither do they include doses received by patients as a consequence of irradiation for medical purposes and doses received by people in cases of radiation emergency, i.e. under circumstances where the radiation source remains out of control.

Exposure limits for the entire population include external radiation and internal radiation caused by radionuclides which enter human body with the food ingested or the air breathed, and they are expressed, similarly to occupational exposure, as:

- effective dose illustrating the exposure of the whole body, and
- equivalent dose corresponding to the exposure of particular organs and body tissues.

The basic national normative act which specifies the aforementioned limits is the Regulation of the Council of Ministers of 18 January 2005 on ionising radiation dose limits (Journal of Laws of 2005, no. 20, item 168). This document also stipulates that a dose limit for the entire population (caused by artificial ionising radiation sources) expressed in terms of an effective dose amounts to 1 mSv in a calendar year. This dose may be exceeded in the given calendar year on a condition that, within the period of the next five years, its total value does not exceed 5 mSv.

It is estimated that an annual effective ionising radiation dose received by a statistical inhabitant of Poland from natural and artificial ionising radiation sources (including radiation sources used in medical diagnostics) amounted to 3.31 mSv on average in 2014, i.e. it remained on the same level as in previous years. The percentage share of different radiation sources in the exposure has been shown in Figure 8. This value has been estimated with reference to data received from the Central Laboratory for Radiological Protection in Warsaw, the Institute of Occupational Medicine in Łódź and the Central Mining Institute in Katowice.

The exposure to radiation from natural sources, as shown in the Figure above, results from:
- radon and products of its decay,
- cosmic radiation,
- earth radiation, i.e. radiation emitted by natural radionuclides to be found in intact lithosphere,
- natural radionuclides present in the human body.

Figure 8 implies that in Poland – similarly to many European countries – exposure to natural sources constitutes 73.6% of the total radiation exposure, and when expressed in terms of the effective dose, as it is referred to – it amounts to ca. 2.438 mSv per annum. Radon and radon decay products, from which a statistical Polish inhabitant receives a dose of ca. 1.201 mSv per annum, account for the largest share in the said exposure. It should also be noted that the exposure of a statistical Polish inhabitant to natural sour-

Fig. 8. Share of different ionising radiation sources in mean annual effective dose

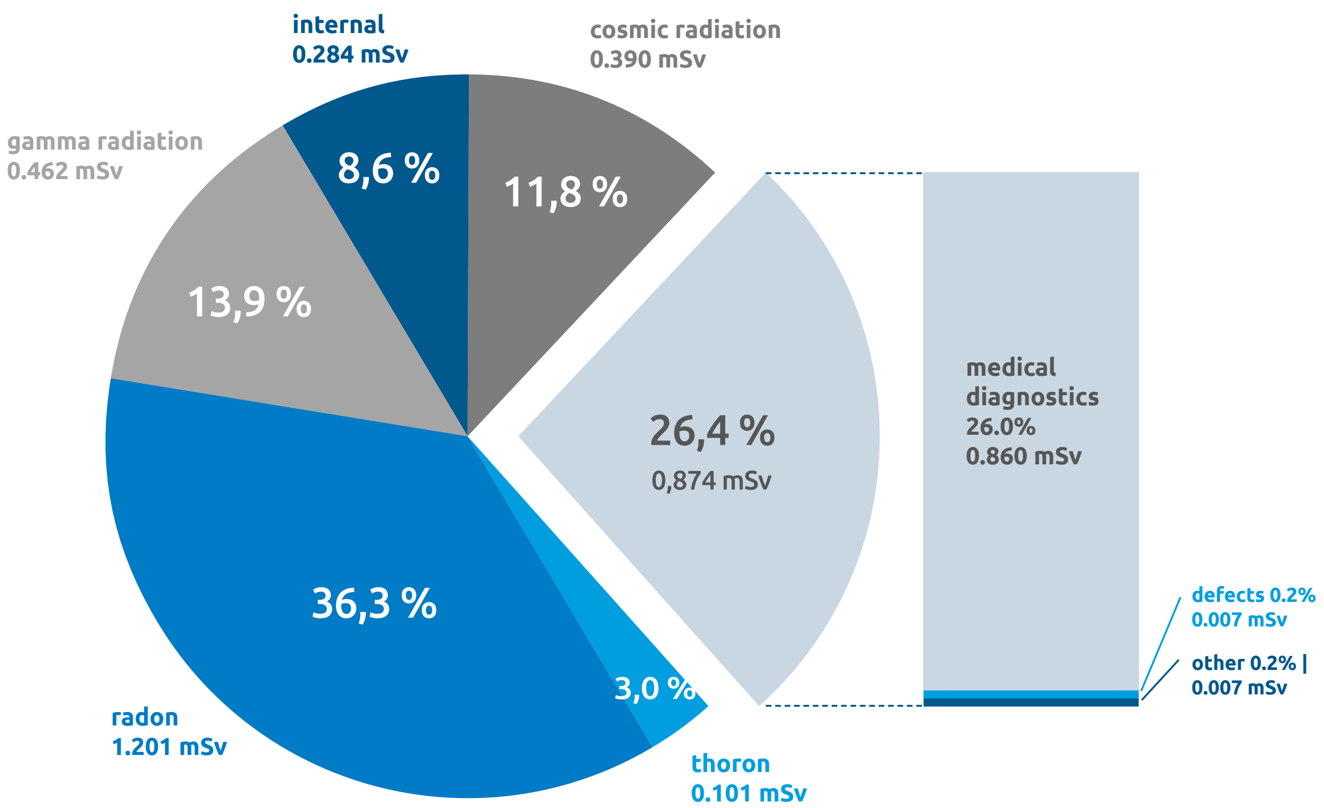
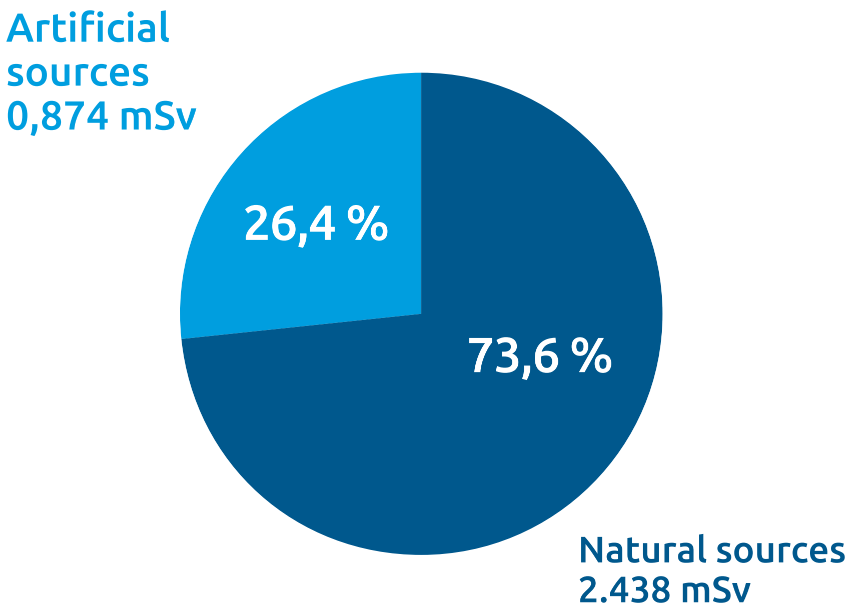


Fig. 9. Annual effective dose of ionising radiation received by Polish population in 2014 (3.31 mSv)



ces is ca. 1.5-2 times lower than that of inhabitants of Finland, Sweden, Romania or Italy.

The exposure of a statistical inhabitant of Poland in 2014 to radioactive sources used for medical purposes, and mainly in medical diagnostics including X-ray examinations and in vivo tests (i.e. administering radioactive preparations to patients) is estimated at 0.860 mSv.

This overall dose predominantly includes doses received during computer tomography examination (0.33 mSv) as well as conventional radiography and fluoroscopy (0.38 mSv). These doses are far lower in other diagnostic examinations. In mammography tests, the annual effective dose received by a statistical inhabitant of our country amounts to 0.02 mSv; in cases of cardiac surgery procedures – it is 0.08 mSv and in nuclear medicine – 0.05 mSv.

An average effective dose received in a single X-ray examination comes to 1.2 mSv, and with the most popular tests, these amounts are as follows:

- chest X-ray – ca. 0.11 mSv,
- spine and lungs X-ray from 3 mSv to 4.3 mSv respectively;

The range of variability for the aforementioned amounts as regards individual examinations may even reach two orders of magnitude, and may result from the quality of instruments and examination conditions which may depart significantly from standard examination conditions.

Moreover, the foregoing data may change in the future due to the fact that the X-ray equipment which does not meet requirements provided for in Council Directive 97/43/Euratom of 30 June 1997 on health protection of individuals against the dangers of ionising radiation in relation to medical exposures is subject to successive replacement.

However, it should also be noted that exposure limits for population do not include exposure resulting from the use of ionising radiation for therapeutic purposes.

The radiation exposure caused by:

- presence of artificial radionuclides in foodstuffs and the environment resulting from nuclear explosions
- and radiation emergencies,
- use of household articles which emit radiation or contain radioactive substances,
- professional activity connected with the use of ionising radiation sources, is subject to monitoring and restrictions resulting from international standards establishing exposure limits for the population.

As aforementioned, national regulations define the annual effective dose limit, which equals 1 mSv for the population. The value of effective dose for a statistical Pole, subject to the said limit, consists of the three aforementioned elements.

The exposure of a statistical inhabitant of Poland to artificial radionuclides – mainly isotopes of caesium and strontium – in foodstuffs and in the environment has been estimated at ca. 0.011 mSv (which corresponds to 1.1% of a dose limit for the population), whereas the exposure to radionuclides in foodstuffs has been estimated at ca. 0.007 mSv (which corresponds to 0.7% of a dose limit for the population).

The foregoing values have been calculated based on measurements of the content of radionuclides in foodstuffs which constitute basic ingredients of an average diet, entailing the current data on the consumption of main ingredients. Similarly to previous years, the largest share in the exposure in question is attributed to dairy products, meat products, vegetables (mainly potatoes) and cereals, whereas mushrooms, forest fruit and meat of wild animals, despite increased levels of caesium and strontium isotopes, do not contribute significantly – owing to relatively low consumption of these products – to the said exposure. It should also be mentioned that exposure to the natural K-40 isotope, which commonly occurs in foodstuffs, amounts to ca. 0.17 mSv per annum, which is 20 times higher than the exposure caused by artificial radionuclides.

Values illustrating the exposure caused by radiation emitted by artificial radionuclides present in such environmental components as: soil, air, open waters, have been established based on measurements of the content of individual radionuclides in samples of environmental materials collected in different parts of Poland (the measurement results have been discussed in Chapter XI "Assessment of the national radiation situation"). Bearing in mind local discrepancies in the content level of the Cs-137 isotope, still present in soil and food, it can be estimated that the maximum dose value may be about 4-5 times higher than an average value, which means that the exposure caused by artificial radionuclides does not exceed 5% of the dose limit.

The exposure to household goods came to ca. 0.001 mSv in 2014, which corresponded to 0.1% of the dose limit for the population. The said amount was mainly established based on measurements of radiation emitted by TV picture tubes and isotope smoke detectors as well as gamma radiation emitted by artificial radionuclides used to stain ceramic tiles or porcelain. The value calculated also entailed the dose from cosmic radiation received by passengers during air travels. In relation to the increasing popularity of LCD screens and monitors replacing picture tube lamps, the dose received by a statistical Pole from these devices is continuously decreasing.

The exposure of statistical Poles in their professional activities involving ionising radiation sources (read more about this problem in chapter IX.2 "Control of exposure to ionising radiation at work") came to ca. 0.002 mSv in 2014, which corresponded to 0.2% of the dose limit.

In 2014, the total exposure of a statistical Polish inhabitant to artificial ionising radiation sources, exclusive of medical exposure (with the predominant share in the exposure attributed to Cs-137 present in the environment as a consequence of nuclear explosions and the Chernobyl disaster), came to ca. 0.016 mSv, i.e. 1.6% of a dose limit for artificial radioactive isotopes for the entire population, which is 1 mSv per annum, and only 0.48% of a dose received by a statistical inhabitant of Poland from all ionising radiation sources.

In light of the radiological protection regulations adopted all around the world and applied in Poland, the radiation exposure of a statistical inhabitant of Poland in 2014, being a consequence of the use of artificial ionising radiation sources, should be considered as low.

IX. 2. CONTROL OF EXPOSURE TO IONISING RADIATION AT WORK

2.1. Occupational exposure to artificial ionising radiation sources

Performing occupational duties related to working in nuclear facilities, entities managing radioactive waste and other entities using ionising radiation sources is a cause of radiation exposure of workers.

Specific principles for monitoring of people working under conditions of occupational exposure have been applied in Poland since 2002. They result from the implementation of Council Directive 96/29/EURATOM of 13 May 1996 laying down basic safety standards for the protection of health of workers and the general public against the dangers resulting from ionising radiation (OJ L 159 of 29 June 1996, p. 1; OJ Of the EU, special Polish edition, chapter 5, vol. 2, p. 291).

The principles applicable to exposure control (transposed from the directive to the Polish legal framework) are included in Chapter 3 of the Atomic Law, dedicated to nuclear safety, radiological protection and protection of workers' health.

In accordance with these provisions, the responsibility for compliance with the relevant requirements applicable in this scope rests firstly with a head of the organisational entity who is responsible for the assessment of doses received by workers. This assessment (article 21 of the Atomic Law) must be performed with reference to results of environmental measurements or individual dosimetry conducted by a specialised and authorised radiometric laboratory. Both measurements and the assessment of individual doses were performed in 2014 by the following authorised laboratories, commissioned by the organisational entities involved, i.e.:

- Laboratory of Individual and Environmental Dosimetry of the H. Niewodniczanski Institute of Nuclear Physics in Krakow,
- Radiological Protection Unit, of the J. Nofer Institute of Occupational Medicine in Łódź,
- Department of Dose Control and Calibration of the Central Laboratory for Radiological Protection in Warsaw,
- Military Institute of Hygiene and Epidemiology in Warsaw,
- Laboratory of Dosimetry of the National Centre for Nuclear Research in Świerk,
- in terms of monitoring of doses from natural radioactive isotopes received by miners working underground – Laboratory of Radiometry of the Central Mining Institute in Katowice.

Provisions of the Atomic Law introduced an obligation to maintain a register of doses and to only apply personal dosimetry to workers classified under category A of ionising radiation exposure, i.e. those who, according to the head's opinion, may be, under normal occupational conditions, exposed to an effective

dose exceeding 6 mSv per annum or to an equivalent dose exceeding the level of 0.3 of the relevant dose limits for skin, limbs and eye lenses within the period of 12 months.

The assessment of doses of category B workers, who are exposed to annual doses from 1 to 6 mSv from artificial radiation sources, is based on measurements conducted in the working environment. When the head of the given organisational entity considers it necessary, workers of this category may (but are not obliged to) be covered by exposure monitoring by means of personal dosimeters.

It is acceptable for people working under the conditions of exposure to ionising radiation that the limit of 20 mSv (but not more than 50 mSv) is exceeded within a year's time, provided that the dose of 100 mSv is not exceeded in a five-year period. Due to the foregoing, it is necessary to check a sum of doses received in the present year and in previous 4 calendar years while supervising the exposure of workers handling ionising radiation sources. The foregoing means that heads of organisational entity must maintain a register of doses received by the exposed workers. Detailed information concerning records, reporting and registration of individual doses is provided in the Regulation of the Council of Ministers of 23 March 2007 on requirements concerning registration of individual doses (Journal of Laws of 2007 no. 131, item 913). Pursuant to this regulation, heads of organisational entity are obliged to send data concerning exposure of subordinate category A workers to the central register of individual doses maintain by the PAA President.

There are a few dozen thousand people working in contact with ionising radiation sources in Poland However, only a small part of them perform routine work under conditions of actual exposure to ionising radiation. The control of individual doses in Poland (according to data provided by the aforementioned authorised laboratories) in 2014 covered 50,000 persons. For 95% of the group analysed, the dose control is performed in order to confirm that the use of ionising radiation sources is not hazardous and should not cause any health detriment. Workers of this group are classified under category B of exposure to ionising radiation. Medical personnel working at diagnostic X-ray laboratories (ca. 30,000 people working in ca. 4,000 diagnostic centres featuring X-ray laboratories) constitutes the largest group of persons classified under in category B.

Ca. 2,500 potentially endangered persons who must be covered by the personal dosimetry scheme for external exposure or/and assessment of internal doses (committed doses from radioactive substances which, under working conditions, could penetrate the body as a result of an intake) are classified annually under category A of exposure to ionising radiation. Data concerning doses received by employees classified under category A are collected by heads of individual entities in the PAA President's central register of doses. Workers under this category of exposure to ionising radiation are obliged to undergo measurements of effective doses receive by the whole body and/or by individual most exposed body parts (for example hands). Exceptionally, in cases of exposure to contamination caused by diffusible radioactive substances referred to as open sources, an assessment of committed dose from internal contaminations is performed.

Since the beginning of the central register of doses, i.e. since 2002, until the end of April 2015, the total number of 5,079 persons were reported, and data of 2,233 from among those reported were updated within the past 4 years. In the year 2015, data of 1,606 persons have been updated.

Owing to appropriate radiological protection, 1,565 persons classified under category A received effective annual doses not exceeding 6 mSv (being the lower exposure limit assumed for category A workers), and doses exceeding 6 mSv were received by 41 persons, among whom only 3 cases were found to have exceeded the annual dose of 20 mSv, i.e. a dose limit which may be received during a calendar year as a result of routine work with ionising radiation. In cases of the dose limit exceedance, working conditions and reasons for the exposure to radiation were analysed in detail.

The data summary for 2014 concerning exposure to ionising radiation of workers classified under category A, who were entered into the central register of doses by individual organisational entities, has been provided in Table 9[3].

3 By 2002, annual collations of data concerning individual exposure (according to occupational groups, industries and facility types) had relied on data obtained directly from laboratories conducting readouts of dosimeters and dose assessments. They concerned workers subject to the exposure control scheme but disregarded the division into categories A and B. This division of worker had not been introduced until the beginning of the year 2002. Data on the doses received by people working under conditions of ionising radiation exposure are currently stored in the central register of doses of the PAA President which has been functioning since 2003. They only concern workers classified by the given person in charge under category A, and are obtained directly from organisational units whose heads are obliged to submit datasheets containing information for the previous year until 15 April of the present year. The datasheets submitted provide an assessment of the effective doses received by the given worker, as prepared by authorised laboratories.

Table 9. 2014 statistics on individual annual effective doses of workers classified under category A of exposure to ionising radiation

Annual effective dose received [mSv]	Number of workers*
< 6	1 565
6 ÷ 15	28
15 ÷ 20	10
20 ÷ 50	2
> 50,0	1

* According to notifications to the central register of doses submitted until 30 April 2015.

The foregoing data imply that, in the group of category A workers, the percentage of individuals who did not exceed the lower limit specified for this exposure category, i.e. 6 mSv per annum, in 2014, came to 97%, and the percentage of individuals who did not exceed the limit of 20 mSv per annum – 99.8%. Consequently, only ca. 3% of persons exposed at work, who had been classified under category A, received doses established for workers of this ionising radiation exposure category.

In 2014, the central register of doses received no reports on cases of exposure to radiation under circumstances referred to in article 12, section 1 (incidental exposure), in article 19, section 1 (special cases of exposure) or in article 20, section 1 (extraordinary exposure) of the Atomic Law.

All cases of annual dose limit exceedance are subject to detailed explanatory investigation conducted by Nuclear Regulatory Inspectors.

2.2. Control of exposure to natural ionising radiation sources in mining

Unlike with radiation hazards resulting from artificial radioactive isotopes and devices emitting radiation, radiation hazards in mining (coal mining and extraction of other natural raw materials) are mainly caused by the increased level of ionising radiation in mines, being the effect of natural radioactivity. Sources of these hazards include:

- radon and products of its decay in the mine air (basic source of hazard),
- gamma radiation emitted by natural radioactive isotopes (mainly radium) contained in the rock mass,
- mine water (and the related sediments) with increased content of radium isotopes.

The former two factors practically apply to all miners working underground, whereas radiation hazards resulting from mine waters and sediments occur under special circumstances and apply to a limited number of workers.

As reported by the State Mining Authority (WUG), the headcount of persons employed in coal mines as of 31 December 2014 was: 102,917 miners.

As for radiation hazards, apart from secondary legislation to the Atomic Law, also the following implementing regulations to the Geological and Mining Law applied in 2014:

1. Regulation of Minister of Economy of 28 June 2002 on occupational safety and hygiene, movement and special fire safeguards in underground mining facilities (Journal of Laws, No 139 of 2002, Item 1169 with later amendments) regulating principles of supervision over protection against radiation hazards of natural radioactive substances and the method of the performance of measurements and assessment of radiation hazards in the underground mining plant,
2. Regulation of Minister of Interior and Administration of 14 June 2002 on natural hazards in mining facilities (Journal of Laws No 94 of 2003, Item 841 with later amendments) distinguishing the following excavations:

- **class A** excavations, situated in controlled area within the meaning of provisions of the Atomic Law, where the occupational environment creates potential exposure of a worker to an annual effective dose exceeding 6 mSv,
- **class B** excavations, situated in supervised area within the meaning of the provisions of Atomic Law, where the occupational environment creates potential exposure to an annual effective dose which is more than 1 mSv, but does not exceed 6 mSv.

The foregoing dose levels are values entailing the effect of the natural surface background (i.e. from outside the working environment). It means that while performing calculations necessary to classify excavations under individual classes of radiation hazard, the dose value calculated based on measurements must be reduced by the dose resulting from natural surface background for the working time assumed. Table 10 contains values of working limits of hazard rates for both classes of headings which create radiation hazards. The values proposed result from the model prepared and implemented for calculation of committed doses caused by specific working conditions in underground mining facilities. In examinations, one must consider the following aspects of radiation hazard:

- potential alpha energy concentration of short-lived products of radon decay in mine heading air,
- gamma radiation dose rate at a workplace in a mine heading,
- radium concentration in mine water,
- radium concentration in mine water sediments.

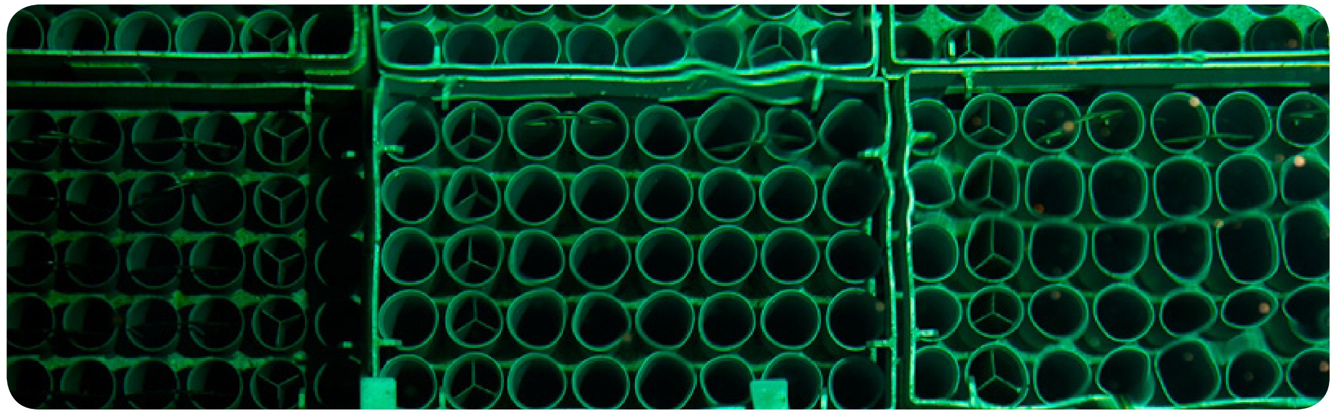


Table 10. Values of working limits of hazard rates for individual classes of headings creating radiation hazards (Central Mining Institute)

Hazard rate	Class A*	Class B*
Potential alpha energy concentration of short-lived products of radon decay (Ca), μJ/m³	Ca > 2,5	0,5 < Ca ≤ 2,5
Radiation kerma rate γ (K), μGy/h	K > 2,5	0,5 < K ≤ 2,5
Specific activity of radium isotopes present in sediments (C_{RaO}), kBq/kg	C_{RaO} > 120	20** < C_{RaO} ≤ 120

* The foregoing values correspond to doses of 1 mSv and 6 mSv, provided that the effects from particular hazard sources are not accumulated and the annual working time is 1,800 hours.

** If the specific activity exceeds the value of 20 kBq/kg, it is absolutely necessary to estimate effective committed dose for people working at the given place.

Miners' exposure to natural radiation sources is assessed (based on measurements conducted in the working environment) by the Central Mining Institute (GIG) in Katowice.

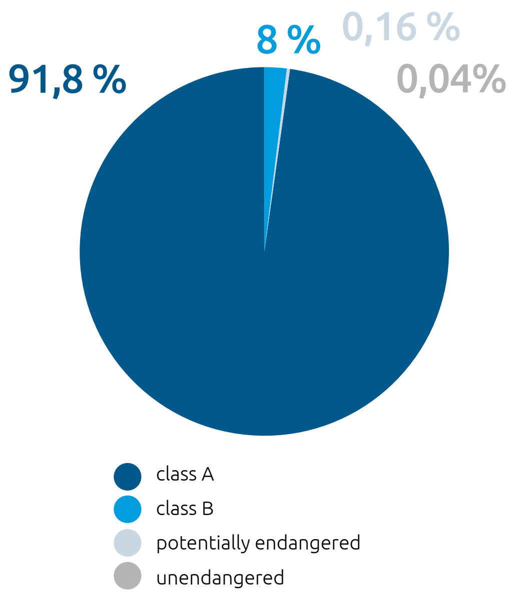
Work organisation methods which prevent the exceedance of the 20 mSv dose limit were introduced in underground mining facilities, in headings exposed to radiological hazard (where workers are likely to receive an annual effective dose exceeding 1 mSv). Table 11 contains a collation of the mines where (based on confirmed cases of exceedance of individual radiation hazard rates) headings classified under classes A and B of radiation hazard may occur. It should be stressed that headings exposed to radiological hazard are classified by managers of individual mining facilities based on a sum of effective doses for all radiation hazard factors in the course of the actual work. Therefore, the number of headings classified under individual categories of radiation hazard is in fact smaller.

Furthermore, a percentage share has been estimated with regard to persons working in headings belonging to individual hazard classes. Results of this assessment have been provided in Figure 10.

Table 11. Number of hard coal mines featuring headings with radiological hazard (Central Mining Institute)

Hazard class	Number of mines	Hazard due to short-lived products of radon decay	Hazard due to radiation γ	Hazard due to radioactive deposits	External radiation γ (individual dosimetry)
A	2	-	2	2	1
B	15	12	4	3	2

Fig. 10. Percentage share of hard coal miners working in headings classified under individual radiation hazard classes. Total employment in hard coal mines as of 31.12.2013 according to the State Mining Authority: 102,917 persons



The analysis entailed the number of mines with radiologically hazardous headings, the heading type, the hazard source and the headcount of the mining crew. Based on the information acquired by the State Mining Authority, it was possible to determine the share of miners working in headings potentially exposed to radiation hazard. The foregoing particularly applies to sites possibly containing water and sediments with increased concentration of radium isotopes, increased concentrations of potential alpha energy and dose rates of gamma radiation higher than average.

In 2014, the Central Mining Institute conducted 3,242 measurements of potential alpha energy of short-lived radon decay products, 776 measurements of exposure to external gamma radiation in underground mining facilities, 773 analyses of radioactivity of mine water sampled in underground headings of hard coal mines as well as 127 analyses of concentration of radionuclides found in samples of mine water sediments.

In 2014, measurements of individual doses of gamma radiation were conducted in 9 hard coal mines. In other mining facilities, no such measurements were undertaken. The employees subject to the examinations, namely 95 persons, were mainly involved in removal of radioactive mine sediments or worked at locations where such sediments may accumulate. In two hard coal mines, the annual dose estimated based on results of individual dose measurements exceeded 1 mSv, but it was lower than 6 mSv (category B), and it exceeded 6 mSv (category A) in one mine.

Based on the radiation hazard monitoring conducted, it was found that – under disadvantageous circumstances – it may occur in nearly every single mine heading. The hazard assessment performed by the Central Mining Institute has implied that there are 2 mines with active class A headings (the hazard being applicable to 0.04% of all working miners) and 15 mines with class B headings (the hazard being applicable to 0.16% of all working miners). In mine headings with slightly increased natural radiation background (yet below the level corresponding to class B), 8% of the total number of miners employed work, whereas more than 91.8% of miners work in headings where the radiation level remains on the level of natural surface background. In 2014, the maximum dose came to 6.7 mSv for the total annual working time of 1,800 hours. For the working time of 750 hours, the dose would come to ca. 2.8 mSv. The Silesian Centre for Environmental Radioactivity of the Central Mining Institute is in disposal of accurate information regarding working time in individual headings for calculation of committed effective doses only. For other radiation hazard factors, the analysis of the extent of hazard was performed according to specific assumptions: nominal working time of 1,800 hours and – as frequently reported – working time in water galleries of 750 hours. The estimates developed on the basis of these values may depart significantly from the actual situation.

In 2014, the maximum additional annual effective dose connected with individual hazard sources amounted to:

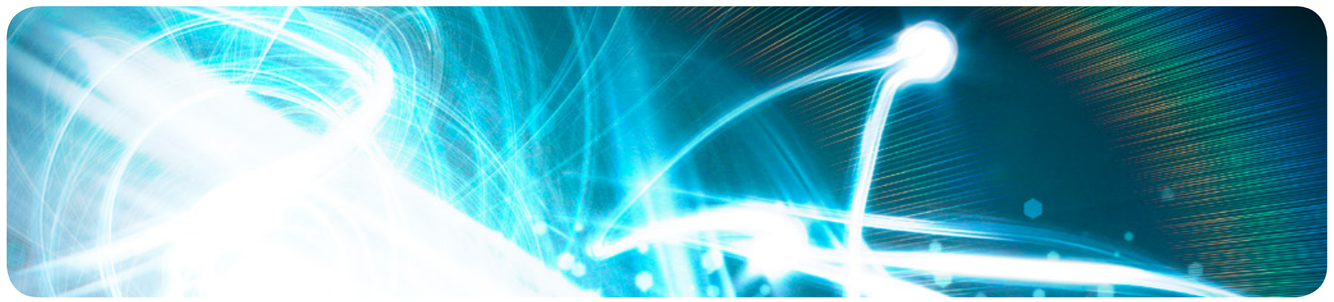
- for short-lived radon decay products – E_α = 5.2 mSv (assuming the annual working time of 1800 hours);
- for environmental gamma radiation measurements – $E\gamma$ = 6.3 mSv (assuming the annual working time in water galleries of 750 hours);
- and expressed as an effective committed dose – E_{Ra} = 3.21 mSv for absorption of radium isotopes into human organism (with regard to actual working time).

In accordance with the requirements of the Atomic Law concerning controlled and supervised areas, underground headings classified under category B (supervised area) should be reclassified under category A (controlled area) in cases when there is the possibility of contamination spread, e.g. during the performance of works connected with removal of sediments or effluents.

The analysis of measurement results against the data collected in recent years has showed that, in underground mining facilities (with working times assumed for individual hazard factors), there are always headings classified under radiation hazard category B, including stations where the dose exceeds 1 mSv. The headings which should belong to radiation hazard category A are those where the dose received by miners could exceed 6 mSv and they are very infrequent, and after the hazard is confirmed they could be abandoned.

In 2014, the main reasons for the occurrence of increased effective doses for miners was the exposure to external gamma radiation and short-lived products of radon decay.

In no mine was the dose of 20 mSv found to be exceeded throughout the entire year. The said value is a dose limit for persons whose professional activity is connected with exposure to radiation.



IX. 3. GRANTING PERSONAL AUTHORISATIONS ON NUCLEAR SAFETY AND RADIOLOGICAL PROTECTION

In nuclear facilities and in other entities where exposure to ionising radiation occurs, on individual positions, persons holding authorisations granted by the PAA President are employed (in accordance with article 7, section 3 and 10, and article 12, section 1 of the Atomic Law of 29 November 2000 and the Regulation of the Council of Ministers of 10 August 2012 on positions important for ensuring nuclear safety and radiological protection and on radiation protection officers (Journal of Laws, item 1022). This Regulation entered into force on 29 September 2012 and superseded Regulation of the Council of Ministers of 18 January 2005 with the same title (Journal of Laws no. 21, item 173).

In light of article 7, section 6 and article 12, section 2 of the Act, the authorisations in question may only be obtained upon completion of training on radiological protection and nuclear safety in the scope required for the specific type of authorisations, and upon passing an examination before the PAA President's examination board. The information about entities which offered such training in 2014 has been provided in Table 12.

Table 12. Entities which conducted nuclear safety and radiological protection safety training in 2014

Type of authorisations	Entity name	Number of training courses held	Number of training participants	Number of authorisations received*
Radiation Protection Officer	Central Laboratory for Radiological Protection in Warsaw	2	48	232
	Chief Technical Organisation (NOT) in Katowice	2	28	
	Association of Radiation Protection Officers in Poznań	2	21	
	National Defence University in Warsaw	1	18	
	Faculty of Physics of the University of Warsaw	2	53	
Accelerator Operator	Central Laboratory for Radiological Protection in Warsaw	5	83	394
	Association of Radiation Protection Officers in Poznań	9	193	
	National Centre for Nuclear Research	3	52	
	Oncology Centre, Division in Krakow	2	60	
	Oncology Centre, Division in Gliwice	1	30	

* Including persons who attended training before 2014 or were authorised to take examination without an obligation to attend training.

The training courses required were conducted by organisational entities authorised to conduct such activity by the PAA President. They employed sufficient staff of instructors and used the necessary technical equipment enabling practical classes to be conducted in accordance with the course syllabus developed for each such entity, in line with the type of training approved by the PAA President.

In 2014, there were two examination boards functioning, appointed by the PAA President pursuant to article 7, section 1 and article 12a, section 6 of the Atomic Law:

- an examination board entitled to grant authorisations of a radiological protection officer,
- an examination board entitled to grant authorisations which allowed for being employed at positions considered particularly important for ensuring nuclear safety and radiological protection.

The training courses organised in 2014 were attended by 586 persons in total.

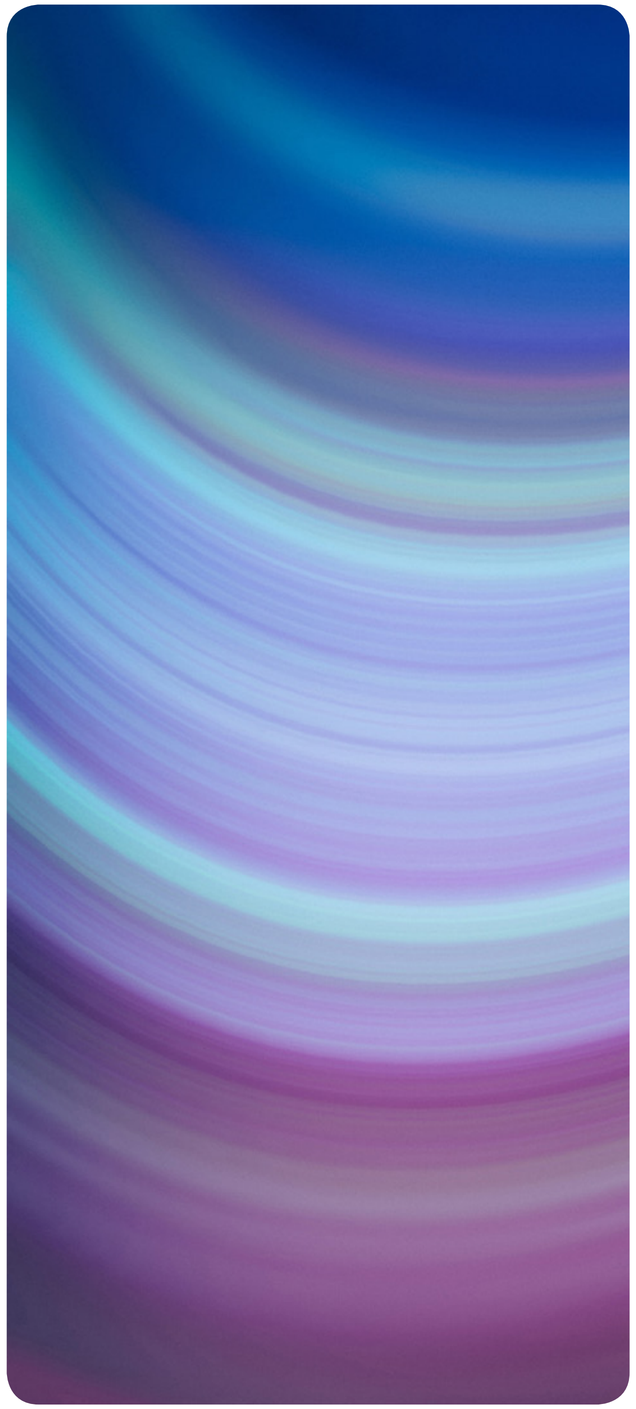
Having passed the examination and fulfilled all the remaining conditions required to obtain the relevant authorisations, 232 persons were granted authorisations of a radiation protection officer and 394 persons received authorisations enabling them to be employed at positions of special importance for ensuring nuclear safety and radiological protection, including:

- for **285 persons** – authorisations of an operator of accelerators for medical applications and of teleradiotherapy devices and/or devices used in brachytherapy involving radioactive sources,
- for **109 persons** – authorisations of an accelerator operator applied in applications other than medical.

Moreover, having passed the examination before the PAA President's Examination Board, 10 persons not having attended previous training were granted extensions of authorisations to be employed at positions of special importance for ensuring nuclear safety and radiological protection, including:

- 1 person – research reactor operator,
- 2 persons – research reactor health physicist,
- 1 person – senior research reactor health physicist,
- 3 persons – research reactor shift manager
- 1 person – deputy director for nuclear safety and radiological protection at an organisational unit operating a research reactor,
- 1 person – spent nuclear fuel storage operator,
- 1 person – radioactive waste management plant manager.

In 2014, the total number of 636 persons received authorisations of a radiation protection officer and authorisations to be employed at positions of special importance for nuclear safety and radiological protection (including 10 persons connected with the operation of the MARIA reactor).



PAA NATIONAL ATOMIC ENERGY AGENCY

X

NATIONAL RADIOLOGICAL MONITORING

X. NATIONAL RADIOLOGICAL MONITORING

National radiological monitoring consists in systematic measurements of the gamma radiation dose rate at specific points within the territory of Poland as well as measurements of content of radioactive isotopes in main components of the environment (foodstuffs). Depending on the scope of tasks performed, one may distinguish between two types of monitoring:

- **nationwide monitoring** making it possible to obtain data necessary to assess the radiological situation of the entire country under normal conditions and in cases of radiation emergency, and to examine long-term changes in the environment and foodstuff radioactivity,
- **local monitoring** making it possible to obtain data from areas where activities are (or were) conducted potentially causing local increase of radiation exposure of local population (it applies to the Świerk nuclear centre, the radioactive waste repository in Różan and areas of former uranium ore plants in Kowary).

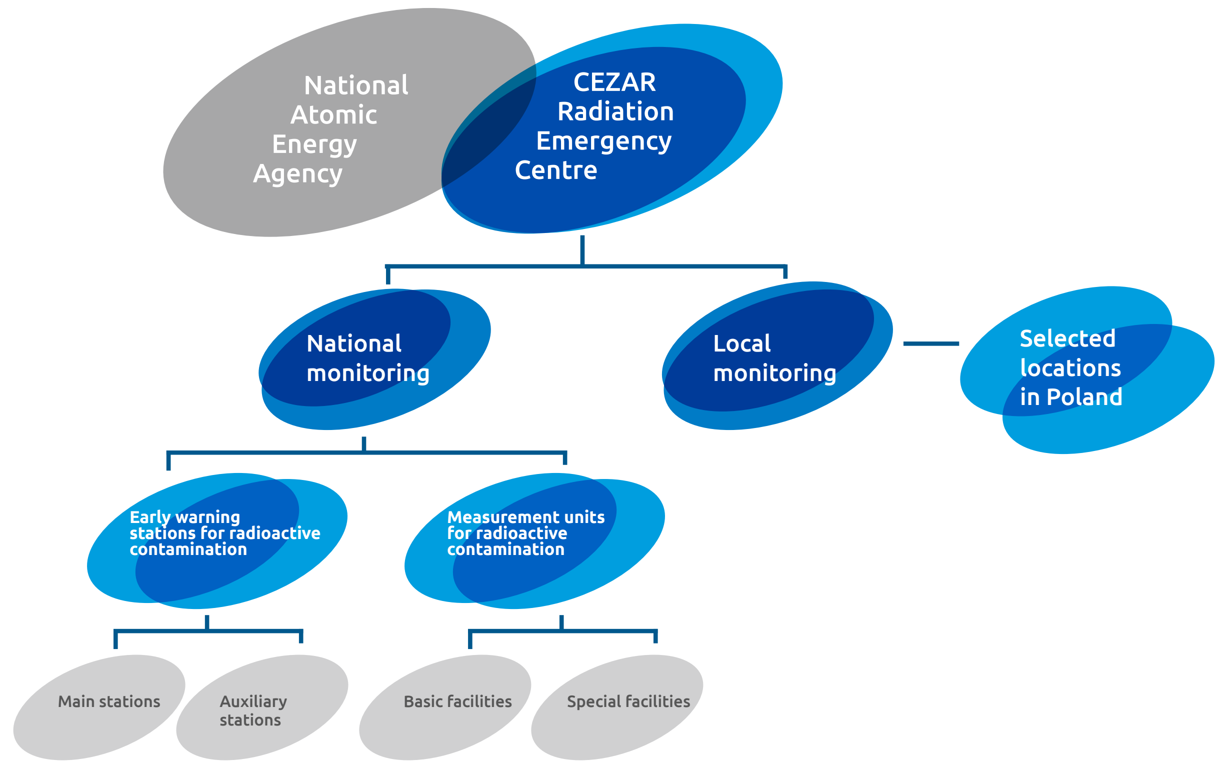
Nationwide and local monitoring measurements are conducted by:

- **measurement stations** forming the early warning network for radioactive contamination,
- **measurement units** which conduct measurements of radioactive contamination related to environmental materials and foodstuffs,
- **services of entities operating nuclear facilities and nuclear regulatory bodies** responsible for local monitoring.

In 2014, as in previous years, the PAA Radiation Emergency Centre (CEZAR) was responsible for coordination of a network of measurement stations and units on behalf of the President of the National Atomic Energy Agency.

A general schematic overview of this system has been depicted in Figure 11.

Fig. 11. Radiological monitoring system in Poland



Results of the national radiological monitoring provide grounds for the national radiological status assessment made by the PAA President, which is announced every day at 11:00 a.m. on the PAA website (gamma radiation dose rate) and cumulatively in quarterly releases published in the Official Gazette of the Republic of Poland entitled Monitor Polski (gamma radiation dose rate and content of Cs-137 in air and milk) as well as in annual reports (comprehensive utilisation of the measurement results). This procedure is followed under normal circumstances, when there is no potential radiation hazard, and in the event of emergency, the frequency of communication releases is agreed individually. The information thus provided constitutes the basis for the assessment of radiation hazards for people and for undertaking suitable intervention measures, if the situation so requires.

X. 1. NATIONWIDE MONITORING

1.1. Early warning stations for radioactive contamination

The purpose of measurement stations functioning under the early warning network for radioactive contamination is to provide information necessary for ongoing assessment of the radiological status of Poland and to enable early detection of radioactive contamination in the event of radiation emergency. The system consists of main and auxiliary stations, as they are referred to (Figure 12).

Main stations:

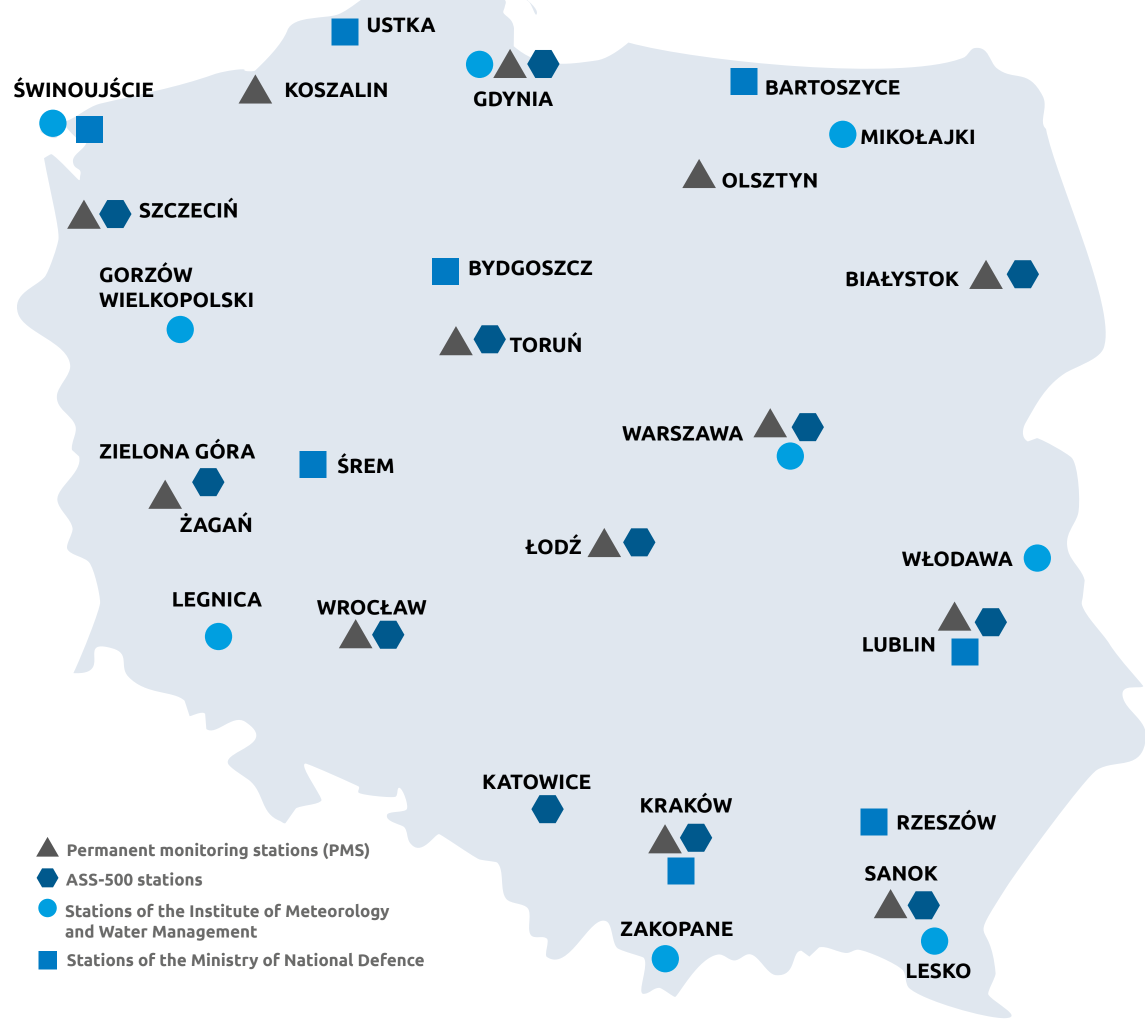
- **13 automatic Permanent Monitoring Stations (PMS)** managed by PAA as well as operating under the international systems of the EU and of the Baltic States (Council of the Baltic Sea States), conducting ongoing measurements of:
  - gamma radiation dose rate and spectrum caused by emergence of radioactive elements in air and on the land surface,
  - intensity of precipitation and ambient temperature.
- **12 type ASS-500 stations,** 11 of which are owned by the Central Laboratory for Radiological Protection and 1 belonging to PAA, which continuously sample atmospheric aerosols on a filter and perform spectrometric determination of content of individual radioisotopes on a weekly basis. The stations also conduct ongoing measurements of activity of atmospheric aerosols collected on the filter, which enables immediate detection of a significant increase in the concentration of the Cs-137 and I-131 isotopes in air.
- **9 stations of the Institute of Meteorology and Water Management (IMWM)** which conduct:
  - continuous measurement of ambient gamma dose rate,
  - continuous measurement of total and artificial alpha and beta activity of atmospheric aerosols (7 stations),
  - measurement of total beta activity in 24-hour and monthly samples of total fallout.

Additionally, once a month the content of Cs-137 (by a spectrometric method) and Sr-90 (by a radiochemical method) is determined in cumulative monthly samples of total fallout from all 9 stations.

Auxiliary stations:

- 8 monitoring stations of the Ministry of National Defence which perform ongoing measurements of ambient gamma dose rate, registered automatically at the Centre for Analysis of Contamination (status provided as of the end of 2014). In 2014, the network of stations managed by the Ministry of National Defence was being revamped. As of the beginning of the year 2015, there have been 10 automatic stations operating under the Ministry's system. There are further 3 stations scheduled for commissioning by the end of 2015.

Fig. 12. Locations of early warning stations for radioactive contamination



1.2. Facilities conducting measurements of radioactive contamination of the environment and foodstuff

It is a network of facilities applying laboratory methods to monitor the content of radioactive contamination in samples of environmental materials as well as in foodstuffs and animal feed. The network consists of:

- basic units operating at Sanitary and Epidemiological Stations, conducting measurements of total beta activity in milk samples (on a monthly basis) and foodstuffs (on a quarterly basis) as well as the content of individual radionuclides (Cs-137, Sr-90) in selected foodstuffs (twice a year on average),
- special facilities conducting more extensive analyses concerning radioactivity of environmental samples.

Locations of basic monitoring units have been shown in Figure 13.

Until the end of 2002, there were 48 basic units established in accordance with Appendix no. 2 to the Regulation of the Council of Ministers of 17 December 2002 on stations for early detection of radioactive contamination and on units conducting measurements of radioactive contamination (Journal of Laws of 2002, no. 239, item 2030). As a result of the reorganisation of the National Sanitary Inspection system undertaken in 2003 and further changes introduced in the following years, the number of units decreased to 30 (status as of the end of 2014).

Fig. 13. Locations of basic units monitoring radioactive contamination in Poland

In 2014, the measurement results obtained (see Chapter "National radiological assessment" – "Radioactivity of basic food processing products and other foodstuffs") were submitted to the PAA Radiation Emergency Centre by 31 units. Some facilities did not submit measurement results, but they took part in comparative measurements organised by the PAA President. The above map shows 33 units in total, namely those which either submitted measurement results or participated in comparative measurements.

X. 2. LOCAL MONITORING

2.1. Nuclear Centre in Świerk

Radiological monitoring on the premises and in the vicinity of the Świerk nuclear centre was conducted in 2014 by the Laboratory of Dosimetry of the National Centre for Nuclear Research (former POLATOM Institute of Atomic Energy), and additionally, in the close vicinity of the Centre – by the Central Laboratory for Radiological Protection in Warsaw, commissioned by the PAA President. The monitoring was performed in the manner described below.

On the premises and in the vicinity of the centre, concentrations of the following isotopes were measured:

- alpha, beta and gamma isotopes in atmospheric aerosols,
- beta and gamma isotopes in atmospheric fallout,
- beta and gamma isotopes in well water,
- beta isotopes in water from the water-supply system,

- beta and gamma isotopes in water from the river Świder,
- gamma as well as alpha and beta isotopes (including the content of H-3 and Sr-90) and alpha isotopes in drainage and storm water,
- H-3 in underground water,
- Sr-90 and gamma isotopes in sludge from an in-house sewage pumping station,
- gamma as well as alpha and beta isotopes (including the content of Sr-90 and H-3) in sanitary sewage,
- gamma isotopes in soil, grass and crops as well as in milk from a nearby farm.

Measurements of gamma radiation were also conducted for selected locations on the premises and in the vicinity of the centre using thermoluminescent dosimeters (TLD) and GM counters in order to establish annual dose levels.

Additionally, as commissioned by the PAA President, measurements of the content of natural and artificial radioactive isotopes were conducted in the vicinity of the centre, addressing the following components of the environment:

- water from the nearby Świder river,
- water from a sewage treatment plant in the closest (to the centre) municipality of Otwock,
- well water,
- soil,
- grass.

Also the gamma radiation dose rate was measured at five locations chosen.

2.2. National Radioactive Waste Repository in Różan

Radiological monitoring on the premises and in the vicinity of the National Radioactive Waste Repository (NRWR) in Różan was conducted in 2014 by the Radioactive Waste Management Plant, and additionally in the vicinity of the repository – by the Central Laboratory for Radiological Protection commissioned by the PAA President. The monitoring was performed in the manner described below.

On the premises and in the vicinity of NRWR, measurements of the content of radioactive isotopes were conducted:

- gamma isotopes in atmospheric aerosols,
- beta isotopes (including H-3) in water from the water-supply system as well as in groundwater (piezometers), well water, spring water and water from the river Narew,
- gamma isotopes in soil and grass.

Gamma radiation was also measured by means of thermoluminescent dosimeters (TLD) and the RUST device in order to determine annual gamma radiation dose values for fixed check points.

Additionally, as commissioned by the PAA President, measurements were conducted for the following environment components:

- Cs-137, Cs-134, H-3 and Sr-90 in spring water,
- radioactive beta isotopes, including H-3, in groundwater (piezometers),
- artificial (mainly Cs-137) and natural radioactive gamma isotopes in soil and grass.

The gamma radiation dose rate was also measured at five fixed check points. The most important measurement results and data illustrating the radiological situation on the premises and in the vicinity of the nuclear centre in Świerk and NRWR in Różan have been discussed in Chapter XI "Assessment of the national radiation situation".

Having compared the data from 2014 and from the preceding years, one may draw a conclusion that the operation of the nuclear centre in Świerk and of the National Radioactive Waste Repository in Różan does not affect natural environment, whereas the radioactivity of sewage as well as drainage and storm water removed from the premises of the nuclear centre in Świerk in 2014 was much lower than the applicable limits.

2.3. Areas of former uranium ore extraction and processing plants

Since 1998, the PAA division in Jelenia Góra (Office for Handling Claims of Former Workers of Uranium Ore Plants) has been implementing the "Programme of radiological monitoring of areas degraded due to uranium ore extraction and processing". The following measures were undertaken in 2014 under the programme in question:

- measurements of the content of radioactive alpha and beta isotopes in drinking water (from public water intakes) within the territory managed by the Association of Municipalities of the Karkonosze Region (Związek Gmin Karkonoskich), in the town of

Jelenia Góra as well as in surface and underground water (outflows from underground headings),
- determination of radon concentration in water from public intakes, in water supplied to residential premises and in surface and underground water (outflows from underground headings).

Results of the measurements have been provided in Chapter XI 3. "Assessment of the national radiation situation – Environmental radioactivity of natural radionuclides increased due to human activity".

X. 3. PARTICIPATION IN THE INTERNATIONAL EXCHANGE OF RADIOLOGICAL MONITORING DATA

3.1. The European Union measurement data exchange system based on routine radiological monitoring of the environment, deployed in the EU Member States

The system encompasses data concerning dose rate, air contamination, contamination of drinking water, surface water, milk and food (diet). The data are submitted by the PAA Radiation Emergency Centre to the Joint Research Centre based in the city of Ispra in Italy on an annual basis (by 30 June each year, data for the previous year must be submitted).

3.2. Exchange of data from early warning stations operating under the European Union's EURDEP system

In 2014, the European Radiological Data Exchange Platform (EURDEP) covered the exchange of the following data from early warning stations for radioactive contaminations:

- gamma radiation dose rate (Permanent Monitoring Stations and stations of the Institute of Meteorology and Water Management),
- total alpha and beta activity from artificial radionuclides in atmospheric aerosols (stations of the Institute of Meteorology and Water Management).

The EURDEP system operates on a continuous basis, however:

- under normal conditions, data are updated at least once every 24 hours,
- under emergency conditions, data update should be provided at least once every 2 hours,
- submitting data to the EURDEP central database should be conducted automatically ensuring that the normal and the emergency modes can be switched over (based on appropriate instructions).

Poland provides its measurement results once every hour, regardless of the mode of operation.

3.3. Exchange of data from early warning stations operating under the system of the Council of the Baltic Sea States

The scope and the format of data submitted by Poland under the data exchange system of the Council of the Baltic Sea States (CBSS), i.e. under the framework of regional exchange, is identical to the EURDEP system operating in the European Union.

The frequency of data updates under normal circumstances may be different in different countries, and it depends on the frequency of data collection in individual countries. In cases of emergency, it is recommended that data should be provided on a 2-hour basis.

X. 4.RADIATION EMERGENCIES

4.1. Emergency procedures

In accordance with the definition laid down in the Atomic Law, radiation emergency is a hazardous situation which requires urgent actions to be undertaken for the sake of protection of workers or the population. In cases of radiation emergency, intervention measures are taken as scheduled separately for incidents occurring within the area of the given organisational unit (on-site emergency incidents) and for those whose results reach beyond the organisational unit ("regional" and "national" emergency incidents, including those of cross-border effects). A head of

the given entity, a provincial governor or a minister competent for the interior are in charge of elimination of the hazard and of consequences of the incident, depending on the scale of emergency.

The Radiation Emergency Centre (CEZAR) provides information and consultancy for assessing the doses and contamination as well as other expert opinions and measures which are required on the incident site. Furthermore, they submit information on radiation emergencies to communities which have become exposed as an outcome of the emergency incident and to international organisations and neighbouring countries. The same procedure also applies in cases when illegal trade in radioactive substances is revealed (including attempts of illegal shipment across the national border). The PAA CEZAR centre employs a dosimetry team which may perform on-site measurements of radiation dose rate and radioactive contamination, identify the contamination type and the abandoned radioactive substances as well as remove the contamination and transport the radioactive waste from the incident site to the Radioactive Waste Management Plant.

CEZAR performs a number of functions: emergency service of the PAA President[4], the function of a National Contact Point (NCP) for the International Atomic Energy Agency (the USIE system – Unified System for Information Exchange in Incidents and Emergencies), for the European Commission (the ECURIE system – European Community Urgent Radiological Information Exchange), for the Council of the Baltic Sea States, NATO and states bound with Poland by virtue of bilateral agreements on early notification in cases of radiation emergency, being on duty for 7 days a week and 24 hours a day. The Centre conducts regular national radiological assessment, and in the event of radiation emergency, it makes use of computer-aided decision support systems (RODOS and ARGOS).

4.2. Radiation emergencies outside the country borders

In 2014, the National Contact Point did not receive any reports about accidents in nuclear facilities classified above level 3 in the seven-degree international scale of INES.

However, about 75 notifications were submitted with regard to minor incidents (level 0 to 3) which mainly concerned unplanned exposure of workers to ionising radiation during the use of radiation sources, incidents on premises of nuclear power plants or related to radioactive sources.

Moreover, the National Contact Point, via the USIE and the ECURIE system, received several dozen organisational and technical reports or notifications related to international exercises.

Table 13. Notifications on radiation emergency in 2014

The notifications concerned the following issues:	
presence of radioactive substances in scrap	12
radioactive sources go missing	3
activation of a radiation portal at a border crossing point	9
detecting a device displaying increased radioactivity	1
devastation of an ionization smoke detector	1
failure of a device generating ionising radiation	1
discovering a radioactive source in a generally accessible location	1
a worker exceeding the dose limit	2
IN TOTAL	**30**

4 Along with RWMP (under an agreement concluded by the PAA President and RWMP).

Table 14. Emergency interventions of the PAA President's dosimetry team in 2014

The interventions of the dosimetry team were related to the following incidents:	
activation of a radiation portal at a border crossing point	7
discovering a radioactive source in a generally accessible location	1
presence of radioactive substances in scrap	3
detecting a device displaying increased radioactivity	1
IN TOTAL	**12**

It must be emphasised that no incidents which had taken place outside national borders, as reported in 2014, posed any hazard to the population and the environment of Poland.

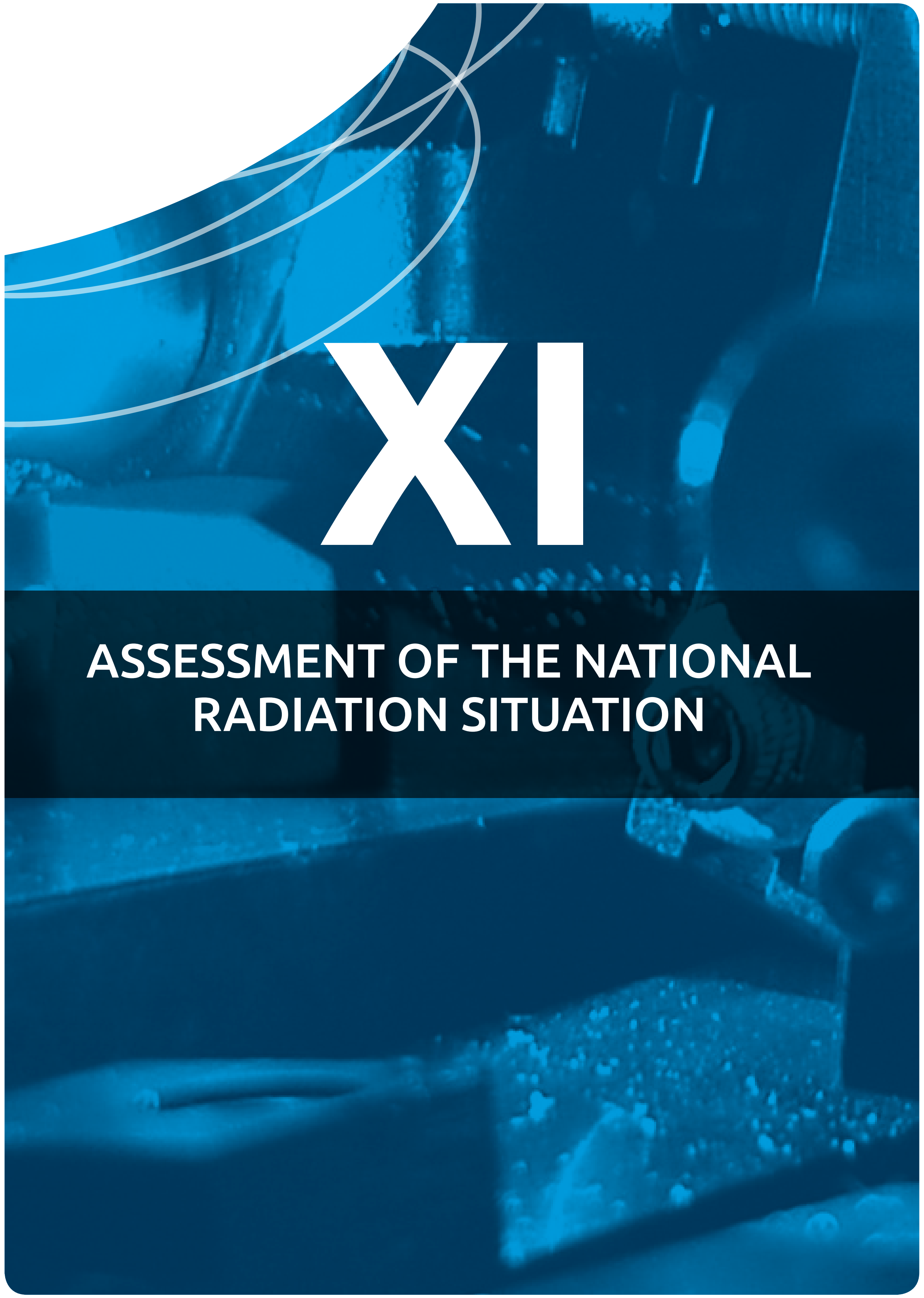
4.3. Radiation emergencies in the country

In 2014, the Radiation Emergency Centre's officers on duty received 30 notifications of radiation emergency within the territory of Poland (see Table 13).

In fulfilment of their respective tasks, the dosimetry team of the PAA President was deployed in 12 cases to the incident site in order to perform radiometric measurements and/or to collect materials which had been classified as radioactive waste (see Table 14).

It should be stressed that no radiation emergency reported within the territory of Poland in 2014 posed any hazard to people and the environment.

Moreover, within the reporting period in question, the PAA CEZAR officers on duty rendered consulting services in 7,586 cases (which were not connected with elimination of the hazard and of consequences of radiation emergency incidents), and in the majority of cases (7,454), the consultancy was provided to National Border Guard units in relation to detection of an increased radioactivity level. The consultations concerned such matters as, for instance, transit carriage or import to Poland, for domestic recipients, of minerals, charcoal, refractory brick, propane-butane, electronic and mechanical components, chemicals, radioactive sources (6,573 cases in total), as well as crossing the border by nuclear medicine patients (881 cases). Furthermore, officers on duty with the PAA President's emergency service provided consulting and advisory services in 132 cases to other state authorities and individuals.



XI

ASSESSMENT OF THE NATIONAL RADIATION SITUATION

XI. ASSESSMENT OF THE NATIONAL RADIATION SITUATION

Pursuant to article 72 of the Atomic Law, the President of the National Atomic Energy Agency conducts systematic assessment of the national radiation situation. The grounds for such an assessment are primarily provided by measurement results from early warning stations for radioactive contamination and units monitoring radioactive contamination of foodstuffs, drinking water, surface water and raw feeds (see Chapter X "National radiological monitoring"). The said assessments are published in:

- quarterly notifications of the PAA President published in the Monitor Polski Official Gazette of the Republic of Poland concerning national radiation situation and containing data on the gamma radiation level, radioactive contamination of air and content of the Cs-137 radionuclide in milk,
- annual "Reports on the activities of the President of the National Atomic Energy Agency and assessment of nuclear safety and radiological protection in Poland".

Moreover, based on the data obtained from early warning stations for radioactive contamination conducting ongoing measurements, the PAA website displays a map illustrating the 24-hour distribution of gamma radiation dose rate within the territory of the whole country, updated on a daily basis.

The assessments contained in this publication also include results of measurements (with regard to soil, surface water and bottom sediments) conducted by the Central Laboratory for Radiological Protection, as commissioned by the Chief Inspectorate of Environmental Protection under nationwide monitoring, and by the PAA President with regard to vicinities of the nuclear centre in Świerk and the National Radioactive Waste Repository in Różan. The assessments pertaining to the Świerk nuclear centre and NRWR in Różan also entail results of measurements conducted by the relevant services of organisational units operating these facilities.

XI. 1. RADIOACTIVITY IN THE ENVIRONMENT

1.1. Gamma radiation dose rate

Values of the ambient dose rate equivalent, including cosmic radiation and radiation generated by radionuclides present in the soil, as provided in Table 15, imply that, in Poland, the average 24-hour values varied in 2014 between 67 and 133 nSv/h, with the annual average of 95 nSv/h.

In the vicinity of the Świerk nuclear centre, gamma radiation exposure dose rates, entailing the earth component only, were between 48.9 and 64.7 nGy/h (the average value being 59.3 nGy/h), whereas in the vicinity of the National Radioactive Waste Repository in Różan – from 69.9 to 85.2 nGy/h (with the average of 76.3 nGy/h), however, a single measurement result of 265.4 nGy/h was obtained once. The foregoing values do not depart significantly from dose rate measurement results obtained in other regions of the country.

Table 15. Dose rate values obtained from early warning stations for radioactive contamination in 2014 (PAA, based on data received from early warning stations for radioactive contamination)

Stations*	Municipality (location)	Range of average daily dose rate [nSv/h]	Annual average value [nSv/h]
Permanent Monitoring Stations (PMS)	Białystok	90-105	95
	Gdynia	101-113	106
	Koszalin	85-96	90
	Kraków	110-128	114
	Łódź	84-95	88
	Lublin	94-109	100
	Olsztyn	86-104	95
	Sanok	105-127	114
	Szczecin	94-103	98
	Toruń	84-95	88
	Warsaw	86-97	89
	Wrocław	84-98	88
	Zielona Góra	87-100	90
Institute of Meteorology and Water Management	Gdynia	80-96	86
	Gorzów	79-96	85
	Legnica	91-118	97
	Lesko	91-121	104
	Mikołajki	91-122	102
	Świnoujście	73-87	76
	Warsaw	69-90	79
	Włodawa	67-92	80
	Zakopane	106-133	120

* Stations designated as defined in Chapter X "National radiological monitoring"

The measurement results imply that the level of gamma radiation in Poland and in the vicinity of the nuclear centre in Świerk and the National Radioactive Waste Repository in Rózan did not depart in 2014 from the level established in the previous year. The differences in the dose rate values (even for the same municipality) result from the local geological conditions affecting the level of earth radiation.

1.2. Atmospheric aerosols

In 2014, the artificial radioactivity of aerosols in the near-surface atmosphere, determined based on measurements performed by early warning stations for radioactive contaminations (ASS-500), primarily implied, similarly to the several preceding years, presence of detectable amounts of the Cs-137 radionuclide.

Its average concentrations in the period analysed varied from below 0.1 to 9.4 μBq/m³ (the average being 0.8 μBq/m³). Average values of the I-131 radionuclide concentration in the same period varied between less than 0.04 to 2.4 μBq/m³ (the average being 0.6 μBq/m³), whereas average values of the natural Be-7 radionuclide concentration came to a few millibecquerels per m³.

Figures 15 and 16 show the annual average concentration of Cs-137 in atmospheric aerosols in the years 1998-2014, across the entire territory of Poland and in Warsaw, respectively. The increased concentrations of Cs-137 reported in 2002 were caused by fires of forests in Ukraine, contaminated as a result of the Chernobyl disaster, whereas the increased concentrations of Cs-137 in 2011 were due to air masses containing increased amounts of this radionuclide released during the Fukushima nuclear power plant accident moving over Poland. Detailed information on this subject was provided in the "Report on the activities of the President of the National Atomic Energy Agency and assessment of nuclear safety and radiological protection in Poland in 2011".

Weekly concentrations of the Cs-137 isotope in air on the premises of w NRWR in Różan equalled from 0.29 to 28 μBq/m³ with the annual average value being 4.8 μBq/m³.

Measurements of concentration of radioactive isotopes in air were conducted in 2014 within the territory and in the vicinity (Wólka Mlądzka) of the National Centre for Nuclear Research in Świerk on a weekly basis. Measurement results obtained in the first half of the year 2014 on the premises of the centre have been provided in the table below.

In stations which perform continuous measurements of total alpha and beta activity of atmospheric aerosols, enabling detection of the presence of artificial radionuclides, daily concentrations of beta isotopes did not exceed 1.9 Bq/m³, whereas those of alpha isotopes – 0.6 Bq/m³.

Fig. 14. Annual average concentration of Cs-137 in aerosols in Poland in the years 1998–2014 (number of stations measuring the content of this radionuclide given in brackets) (PAA, based on data provided by the Central Laboratory for Radiological Protection, as submitted by the ASS-500 early warning stations for radioactive contamination)

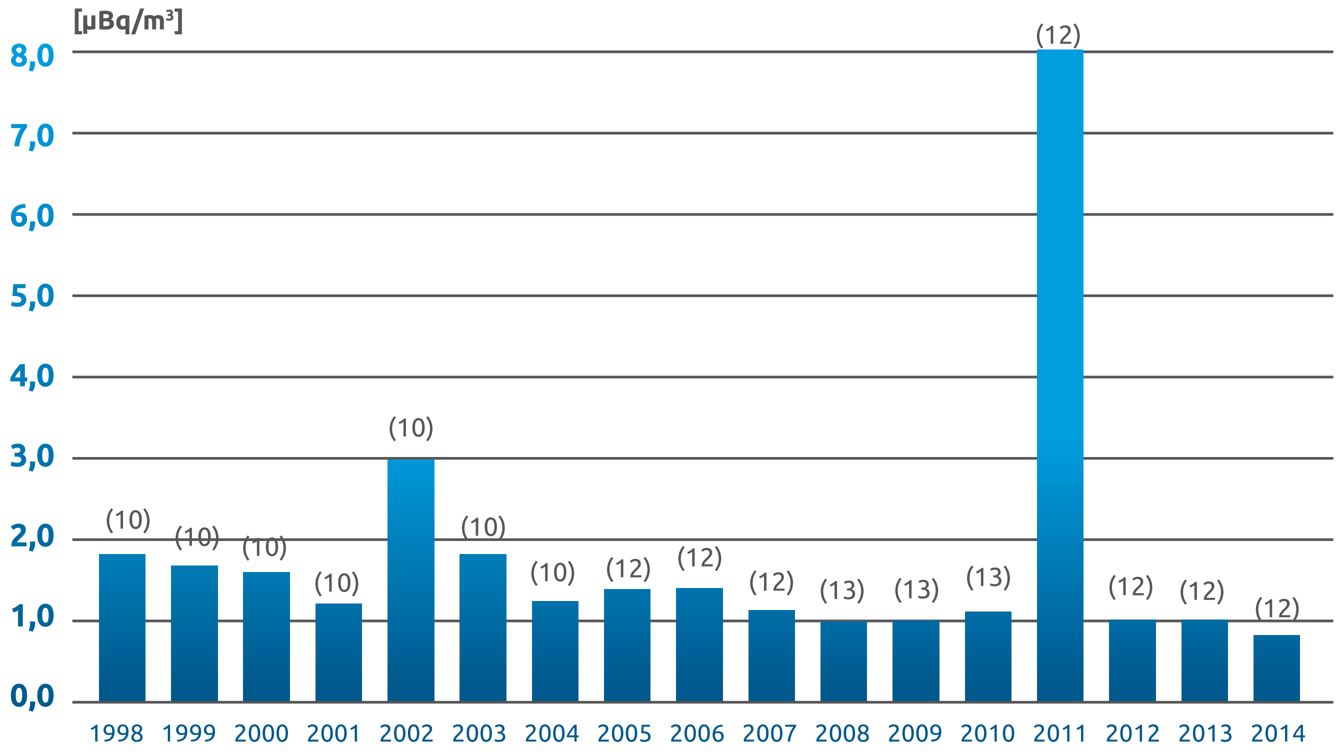


Fig. 15. Annual average concentration of Cs-137 in aerosols in Warsaw in the years 1998-2014 (PAA, based on data provided by the Central Laboratory for Radiological Protection, as submitted by the ASS-500 early warning stations for radioactive contamination)

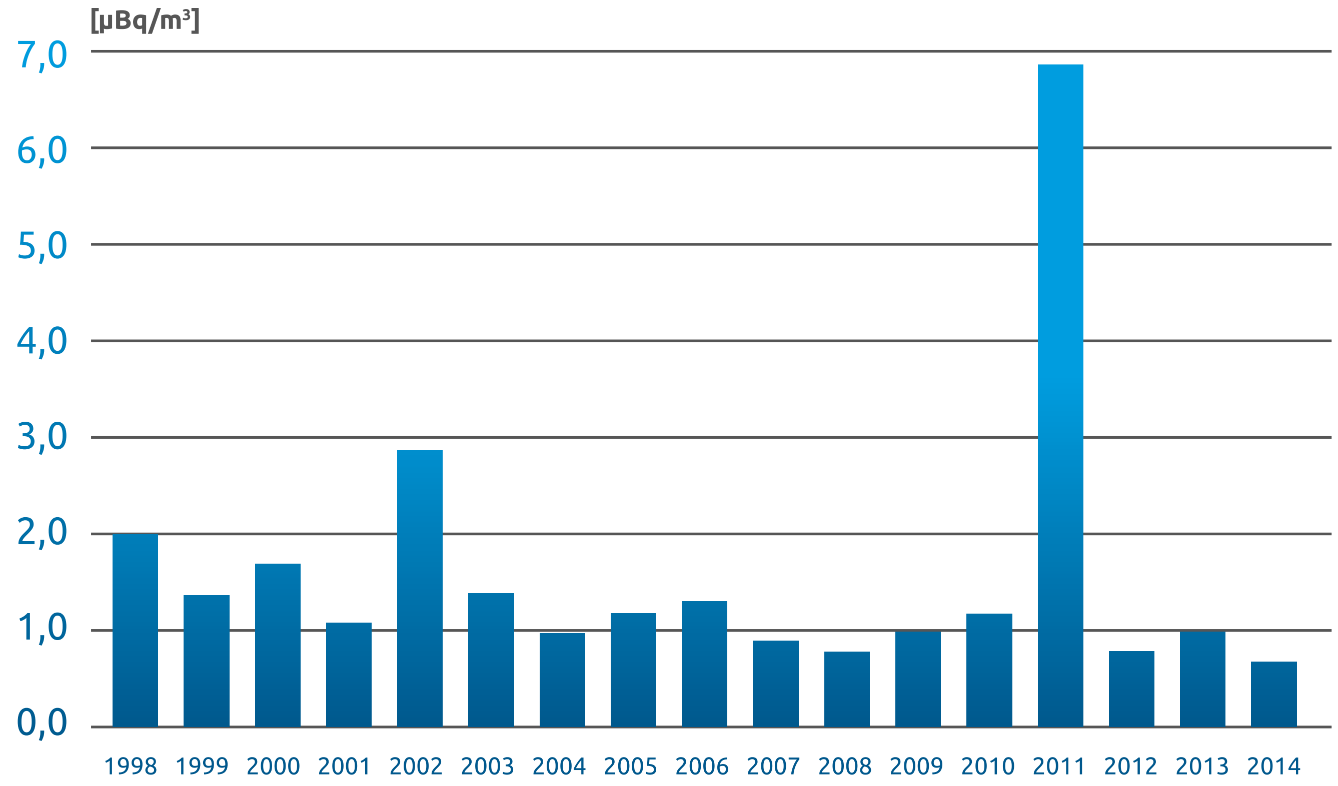


Table 16. Collation of results of weekly measurements of radionuclide concentrations in atmospheric aerosols on the premises of the Świerk nuclear centre in the 1st half of 2014

	Be-7 [mBq/m³]	K-40 [μBq/m³]	I-131 [μBq/m³]	Cs-137 [μBq/m³]
average value	2,5	13	6,3	1,3
minimum value	0,54	8,8	<0,25	0,24
maximum value	4,2	21	45	5,3

1.3. Total fallout

The notion of total fallout refers to dusts contaminated with isotopes of radioactive elements which, due to the field of gravity and atmospheric precipitation, settle on the surface of the earth.

The measurement results provided in table 17 imply that the content of artificial Sr-90 and Cs-137 radionuclides in the total annual fallout in 2014 remained on the level observed in previous years. The increased level of activity of Cs-137 in the total fallout in 2011 was caused by the arrival of the air masses from over the Fukushima nuclear power plant to the territory of Poland in March, April and May 2011. In 2014, no occurrence of the Cs-134 radionuclide was detected.

Table 17. Average activity of Cs-137 and Sr-90 and average beta activity in total annual fallout in Poland in the years 1997-2014 (Chief Inspectorate of Environmental Protection, measurements conducted by the Institute of Meteorology and Water Management)

Year	Activity [Bq/m²]		Beta activity [kBq/m²]
	Cs-137	Sr-90	
1997	1,5	<1,0	0,35
1998	1,0	<1,0	0,32
1999	0,7	<1,0	0,34
2000	0,7	<1,0	0,33
2001	0,6	<1,0	0,34
2002	0,8	<1,0	0,34
2003	0,8	<0,1	0,32
2004	0,7	0,1	0,34
2005	0,5	0,1	0,32
2006	0,6	0,1	0,31
2007	0,5	0,1	0,31
2008	0,5	0,1	0,30
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

1.4. Waters and bottom sediments

Radioactivity of waters and bottom sediments was established based on determination of the chosen artificial and natural radionuclides in samples collected at fixed sampling points.

Open waters
Results of measurements of the content of Cs-137 and Sr-90 conducted in 2014 have been collated in Table 18. They imply that the concentrations in question remained on the same level as in the previous year and were similar to those observed in other European countries.

Concentrations of Cs-134 and Cs-137 in open water samples collected in 2014 at check points located in the vicinity of the nuclear centre in Świerk came to:

- the river Świder: 2.24 mBq/dm³ (upstream of the centre) and 2.43 mBq/dm³ (downstream of the centre),
- water from a sewage treatment plant in Otwock discharged to the Vistula: 8.11 mBq/dm³.

The concentration of tritium in open water samples collected in 2013 at check points located in the vicinity of the nuclear centre in Świerk came to:

- the river Świder: 3.0 Bq/dm³ (upstream of the centre) and 0.7 Bq/dm³ (downstream of the centre),
- water from a sewage treatment plant in Otwock discharged to the Vistula: below 0.5 mBq/dm³.

Radioactivity of surface waters of the southern Baltic Sea was measured in 2014 for the following isotopes: Cs-137, Ra-226 and K-40 (measurements conducted by the Central Laboratory for Radiological Protection). Average concentrations of the aforementioned three isotopes remained on the level of 27.73 mBq/dm³ for Cs-137, 3.13 mBq/dm³ for Ra-226 and 2,724.5 mBq/dm³ for K-40, and did not depart from the results obtained in previous years.

Well, spring and ground water in the vicinity of the National Radioactive Waste Repository and the nuclear centre in Świerk.

Nuclear Centre in Świerk:
The average concentration of radioactive isotopes of caesium and strontium in well water from farms located in the vicinity of the nuclear centre in Świerk in 2014 was, respectively: 5.04 mBq/dm³ for Cs-137 and 17.23 mBq/dm³ for Sr-90. The concentration of tritium (H-3) was also determined, and it came to 0.5 Bq/ dm³ on average.

Table 18. Concentrations of Cs-137 and Sr-90 in river and lake water in Poland in 2014 [mBq/dm³] (Chief Inspectorate of Environmental Protection; measurements conducted by the Central Laboratory for Radiological Protection)

	Cs-137		Sr-90*	
	Range	Average value	Range	Average value
Vistula, Bug and Narew	1,34-4,50	2,74	2,81-16,15	5,70
Oder and Warta	1,37-7,67	3,76	2,52-5,02	4,02
Lakes	1,53-6,69	3,35	1,51-8,89	4,06

* The activity of Sr-90 in the radioactive contamination emitted during the Chernobyl disaster was considerably lower than the activity of Cs-137. The increased activity of Sr-90 currently observed in sediments is caused by the isotope washing out from soil proceeding more easily.

Table 19. Concentrations of the caesium and plutonium radionuclides in bottom sediments of Polish rivers and lakes in 2014 [Bq/kg of dry mass] (Chief Inspectorate of Environmental Protection; measurements conducted by the Central Laboratory for Radiological Protection)

	Cs-137		Pu-239,240	
	Range	Average value	Range	Average value
Vistula, Bug and Narew	0,78-11,25	4,43	0,010-0,094	0,033
Oder and Warta	0,35-13,75	5,42	<0,002-0,104	0,036
Lakes	1,61-23,02	7,35	<0,002-0,054	0,015

National Radioactive Waste Repository in Różan:
Concentrations of radioactive isotopes of Cs-137 and Cs-134 in spring water near the National Radioactive Waste Repository in Różan came to 2.84 Bq/dm³ on average.

The concentration of tritium was also examined in 2014 in the vicinity of the National Radioactive Waste Repository in Różan, and it equalled 2.50 Bq/dm³ on average.

Results of the concentration measurements conducted in 2014 did not depart from the results obtained in previous years.

Bottom sediments
In 2014, as in the previous year, the concentration of selected artificial and natural radionuclides were determined in samples of dry mass of bottom sediments from rivers, lakes and the Baltic Sea. The results thus obtained have been provided Tables 19 and 20.

The above results imply that, in 2014, the concentration of artificial radionuclides in bottom sediments

Table 20. Concentrations of artificial radionuclides of Cs-137, Pu-238, Pu-239, Pu-240 and Sr-90, and of the natural radionuclide of K-40 in bottom sediments from the southern Baltic Sea in 2014 [Bq/kg of dry mass] (PAA, based on data provided by the Central Laboratory for Radiological Protection)

Layer thickness	Cs-137	Pu-238	Pu-239,240	K-40	Sr-90
0-5 cm	125,10	0,06	1,62	840,97	2,60
5-19 cm	38,27	0,08	2,48	873,90	

Table 21. Average deposition and concentrations of Cs-137 in soil in individual provinces of Poland in 2012 (Chief Inspectorate of Environmental Protection; measurements conducted by the Central Laboratory for Radiological Protection in 2013[5])

Item	Province	Cs-137	
		Average deposition (Deposition range) [kBq/m²]	Average concentration (Concentration range) [Bq/kg]
1	dolnośląskie	2,55 (0,44-17,97)	25,8 (3,9-188,1)
2	kujawsko-pomorskie	0,75 (0,51-1,18)	6,3 (3,3-10,6)
3	lubelskie	1,19 (0,22-4,81)	12,0 (1,7-57,2)
4	lubuskie	0,73 (0,26-1,29)	6,5 (2,5-10,0)
5	łódzkie	0,65 (0,28-1,80)	6,5 (2,3-17,7)
6	małopolskie	1,89 (0,51-7,65)	25,4 (5,4-109,1)
7	mazowieckie	1,76 (0,46-6,15)	15,5 (4,1-50,0)
8	opolskie	4,02 (0,97-7,80)	32,7 (9,4-61,6)
9	podkarpackie	0,83 (0,33-1,53)	7,7 (2,6-14,4)
10	podlaskie	1,05 (0,71-1,66)	17,8 (6,3-63,8)
11	pomorskie	0,86 (0,42-1,60)	9,3 (3,2-22,2)
12	śląskie	2,50 (0,61-7,84)	26,4 (5,1-77,4)
13	świętokrzyskie	1,28 (0,31-3,55)	12,8 (3,7-26,6)
14	warmińsko-mazurskie	1,02 (0,23-1,82)	10,0 (2,8-18,8)
15	wielkopolskie	0,68 (0,32-1,29)	6,5 (3,2-12,4)
16	zachodniopomorskie	0,50 (0,22-1,19)	5,1 (1,4-9,7)

5 Based on samples collected in 2012.

and waters of the Baltic Sea remained on the same levels as observed in previous years.

1.5. Soil

Concentrations of both natural and artificial radionuclides in soil are determined based on cyclic spectrometric measurements conducted every few years on samples of non-cultivated soil collected from 10 and 25 cm thick layers of soil. Monitoring of radioactive isotopes present in soil is performed by the Central Laboratory for Radiological Protection, as commissioned by the Chief Inspectorate of Environmental Protection.
The last measurement cycle was conducted in the years 2012-2013. In 2012, 264 samples of soil were taken at 254 fixed check points spread across the country. **In 2013, spectrometric measurements of these samples were conducted and the concentration of artificial (Cs-137, Cs-134) and natural radioisotopes was determined.**

Based on the examinations conducted, it can be claimed that average deposition of Cs-137 in the surface layer of soil (10 cm) in Poland remains on the level exceeding 1 kBq/m² and equals 1.54 kBq/m² on average (data from measurements of samples collected in the autumn of 2012.)

The average deposition of Cs-137 in Poland in the period of radioactive contamination monitoring of soil decreased from 4.64 kBq/m² in 1988 to 1.54 kBq/m² in 2012. The Cs-134 deposition in soil samples was changing throughout the monitoring period according to the half-life, and so this isotope does not appear in detectable amounts in Polish soils at the present.

Results of spectrometric measurements indicate that deposition of Cs-137 in individual samples collected from a 10 cm thick soil layer in 2012 ranged from 0.22 to 17.97 kBq/m², and more than 70% of results did not exceed the value of 1.5 kBq/m² (the average being 1.54 kBq/m²). However, the concentration of this isotope in soil ranges from 1.4 to 188.1 Bq/kg, with the average concentration coming to 16.3 Bq/kg. The highest levels observed in the south of Poland were consequences of intense local rainfalls occurring in these regions in the aftermath of the Chernobyl disaster.

Average concentrations of natural radionuclides observed in 2012 in Poland equalled: 24.8 Bq/kg for Ra-226 (natural uranium series), 23.8 Bq/kg for Ac-228 (natural thorium series) and 415 Bq/kg for K-40 (naturally occurring potassium isotope).

The average deposition of Cs-137 in individual regions of Poland has been shown in Table 20, whereas average provincial concentrations of natural radioactive isotopes in soil determined in 2012 have been provided in Table 21.

Average values of deposition of the Cs-137 radioisotope in soil in individual provinces have been shown in Figure 16, whereas the average deposition of this radionuclide in soil within the entire territory of Poland measured chronologically in the years 1988-2012 has been illustrated in Figure 17.

Average values of surface contamination of soil with Cs-137 in 2012 in the vicinity of the nuclear centre in Świerk and of the National Radioactive Waste Repository in Różan equalled 6.8 Bq/kg and 70.5 Bq/kg respectively. For the sake of comparison, the average concentration of Cs-137 in soil all over Poland in 2012 ranged between 1.4 and 188.1 Bq/kg.

Having analysed the data acquired, one can draw the following conclusions:

- the Cs-137 radioisotope occurring in soil mainly comes from the time of the Chernobyl disaster and its concentration is slowly decreasing, predominantly due to radioactive decay,
- the average concentration of Cs-137 in soil is 20 times lower than the average concentration of the natural K-40 radionuclide,
- average concentrations of the Cs-137 radioisotope in soil in the vicinity of the nuclear centre in Świerk and of the National Radioactive Waste Repository in Różan remain within the range of values observed in other parts of Poland.

In October 2014, further soil samples were collected for purposes of the studies scheduled for the years 2014-2015. In accordance with the assumptions made, the samples were taken at 254 points spread all across Poland. 264 samples were collected in total: 254 from a 10 cm thick soil layer and 10 more from a 25 cm thick soil layer. Similarly to the previous series of examinations, spectrometric measurements of these samples are to be conducted and the concentration of artificial (Cs-137, Cs-134) and natural radioisotopes will be determined.

Table 22. Average concentrations of natural isotopes in soil in individual provinces of Poland in 2012 (Chief Inspectorate of Environmental Protection; measurements conducted in 2013[6])

Item	Province	Average concentration (Concentration range) [Bq/kg]		
		Ra-226	Ac-228	K-40
1	dolnośląskie	41,1 (5,5-128,3)	36,0 (6,0-101,7)	551 (178-924)
2	kujawsko-pomorskie	16,4 (10,0-22,7)	16,4 (8,5-23,6)	409 (243-536)
3	lubelskie	17,6 (10,3-32,6)	17,8 (10,0-33,9)	330 (196-552)
4	lubuskie	13,5 (8,6-19,2)	12,7 (8,0-20,3)	312 (224-429)
5	łódzkie	13,1 (7,4-18,2)	13,3 (6,8-22,1)	297 (164-430)
6	małopolskie	33,7 (10,3-57,6)	33,9 (11,6-49,6)	507 (218-816)
7	mazowieckie	13,5 (7,6-21,0)	13,8 (6,8-25,8)	322 (166-525)
8	opolskie	26,9 (7,6-43,5)	25,8 (7,7-43,9)	445 (190-694)
9	podkarpackie	33,7 (4,6-57,6)	32,2 (4,3-47,2)	473 (115-834)
10	podlaskie	17,7 (7,8-26,6)	18,9 (4,4-24,9)	458 (63-588)
11	pomorskie	17,9 (6,0-39,9)	15,9 (4,7-32,8)	350 (175-564)
12	śląskie	28,6 (10,1-51,4)	27,7 (7,7-48,3)	393 (147-627)
13	świętokrzyskie	20,4 (12,6-33,7)	19,8 (6,3-36,1)	318 (112-585)
14	warmińsko-mazurskie	17,9 (9,6-24,2)	16,8 (8,9-28,8)	425 (218-676)
15	wielkopolskie	14,4 (7,6-24,5)	14,0 (6,6-21,0)	335 (212-461)
16	zachodniopomorskie	15,8 (4,3-29,7)	15,3 (4,1-30,3)	335 (181-574)

6 Based on samples collected in 2012.

Fig. 16. Average deposition of Cs-137 (10 cm thick soil layer) in 2012 in individual provinces of Poland (PAA, based on data provided by the Chief Inspectorate of Environmental Protection; measurements conducted by the Central Laboratory for Radiological Protection in 2013[7])

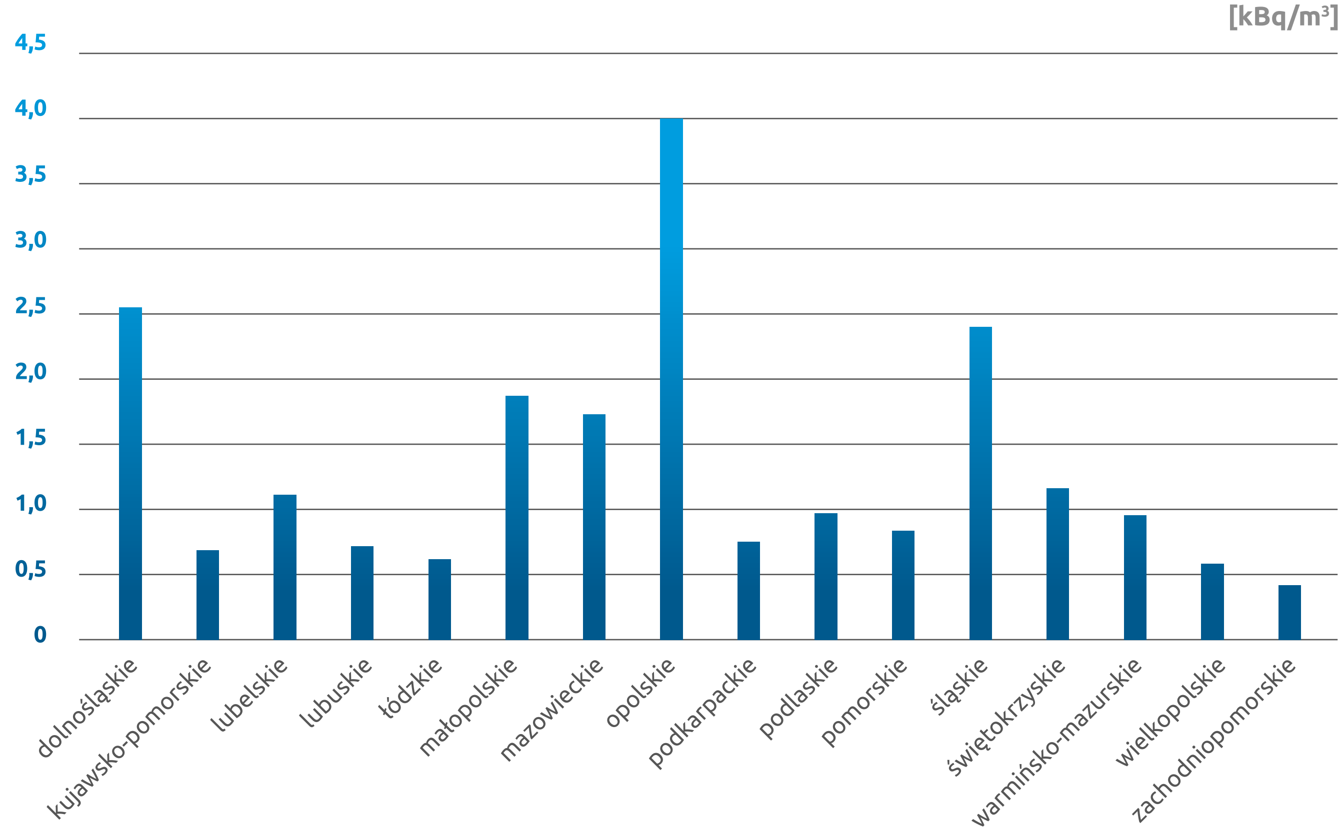
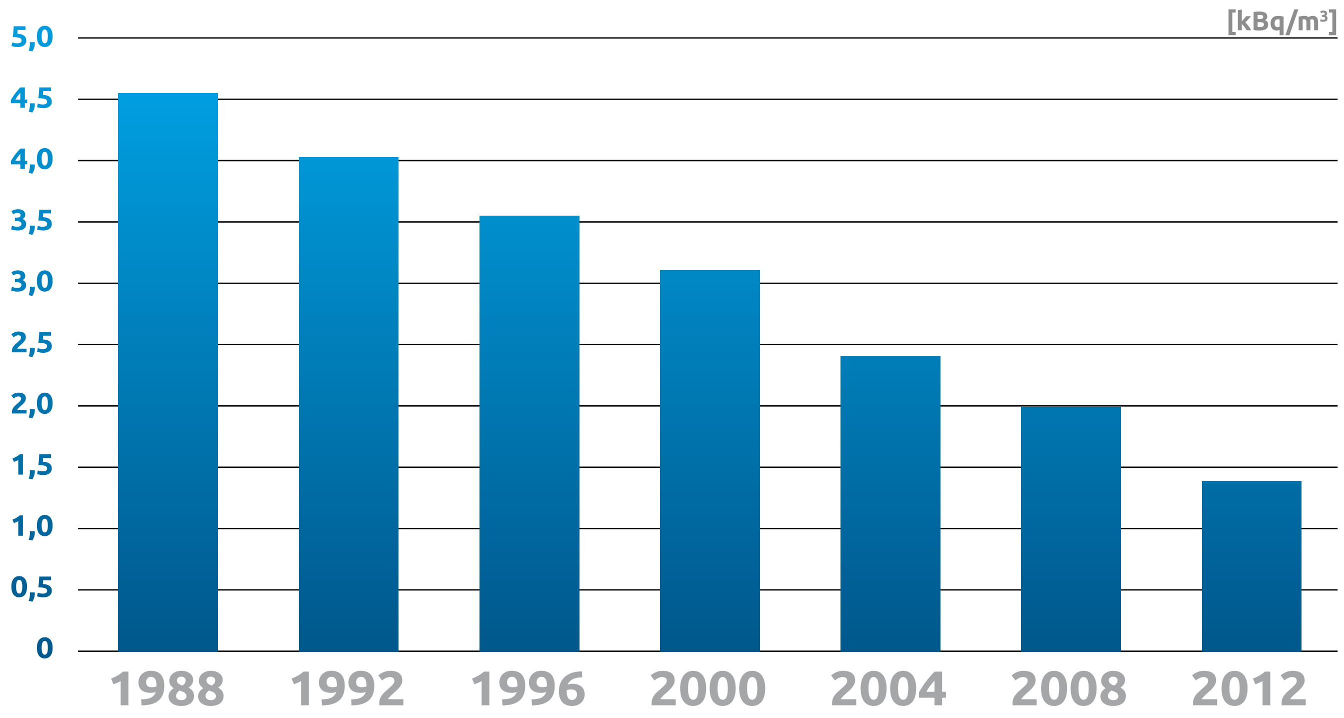


Fig. 17. Average deposition of Cs-137 (10 cm thick soil layer) in Poland in the years 1988–2012 (PAA, based on data provided by the Chief Inspectorate of Environmental Protection; measurements conducted by the Central Laboratory for Radiological Protection in 2013[8])



7 Based on samples collected in 2012.

8 Based on samples collected in 2012.

XI. 2. RADIOACTIVITY OF BASIC FOOD PROCESSING PRODUCTS AND OTHER FOODSTUFFS

Values of activity of radioactive isotopes in food processing products and other foodstuffs discussed in this section should be referred to values specified in Council Regulation no. 737/90. This document stipulates that concentration of the Cs-137 and Cs-134 isotopes may not jointly exceed 370 Bq/kg in milk and dairy products and 600 Bq/kg in all food processing products and other foodstuffs. At present, the concentration of Cs-134 in food processing products and other foodstuffs is below the level of 1‰ of the Cs-137 activity. Therefore, Cs-134 has been disregarded further on in this section. Lower activities of Cs-137 (compared to previous and following years) measured in 2006 in some foodstuffs were probably caused by meteorological conditions which occurred at that time on the territory of Poland (drought periods).

The data provided in this section are based on measurement results submitted to the PAA by facilities conducting measurements of radioactive contamination (sanitary and epidemiological stations).

2.1. Milk

Concentration of radioactive isotopes in milk constitutes an important factor for the assessment of radiation exposure through the alimentary tract. It may be assumed that, in an average Polish food ration, milk accounts for 20-30% of total nutritious supply.

In 2014, concentrations of Cs-137 in liquid (fresh) milk ranged from 0.10 to 1.75 Bq/dm^3 and amounted to ca. 0.5 Bq/dm^3 on average (Figure 18), which corresponds to ca. 25% of the total nutritious supply of Cs-137. Consequently, they were only ca. 20% higher than in 1985 and more than 10 times lower than in 1986 (the Chernobyl disaster). For the sake of comparison, it should be noted that the average concentration of the natural radioactive potassium isotope (K-40) in milk amounts to ca. 0.43 Bq/dm^3.

2.2. Meat, poultry, fish and eggs

Results of the Cs-137 activity measurements conducted on different kinds of meat from animal farms (beef, veal, pork) as well as poultry, fish and eggs in 2014 were as follows (annual average concentration of Cs-137):

- meat from animal farms – ca. 0.83 Bq/kg,
- poultry – ca. 0.73 Bq/kg,
- fish – ca. 0.86 Bq/kg,
- eggs – ca. 0.45 Bq/kg.

The time distribution of the Cs-137 activity in the years 2004-2014 in different types of meat from animal farms (beef, veal, pork) as well as in poultry, eggs and fish has been shown in Figures 19-21. The data obtained imply that, in 2014, the average activity of the caesium isotope in meat, poultry, fish and eggs remained on the same level as in the previous year. Compared to the year 1986 (the Chernobyl disaster), the said activities were more than a dozen times lower in 2014.

2.3. Vegetables, fruits, cereals and mushrooms

Results of measurements of artificial radioactivity in vegetables and fruits conducted in 2014 imply that the concentration of the Cs-137 isotope in vegetables ranged from 0.10 to 3.17 Bq/kg, with the average value being 0.9 Bq/kg (Fig. 22), and in fruits in came to 0.12-2.25 Bq/kg on the average value of 0.5 Bq/kg (Fig. 23). In long-term comparisons, the results from 2014 remained on the level from the year 1985, and in relation to the year 1986 – they were more than a dozen times lower.

The values of activity of Cs-137 in cereals observed in 2014 ranged from 0.13 to -1.61 Bq/kg (the average value being 0.5 Bq/kg) and were similar to amounts measured in 1985.

In 2013, measurements of the content of Cs-137 in cereals were conducted in the vicinity of the National Radioactive Waste Repository in Różan. The values of activity of Cs-137 in cereals in the vicinity of NRWR in Różan in 2013 remained on a very low level, below the limit of detection. No cereal samples were collected in the year 2014.

Average values of activity of the caesium isotope in grass in the vicinity of the Świerk nuclear centre and of NRWR (with reference to dry mass) in 2014 ranged from <0.14 to 2.58 Bq/kg (the average value being 1.5 Bq/kg) for the nuclear centre in Świerk and from 0.62 to 352 Bq/kg (the average value being 46.5 Bq/kg) for NRWR.

Compared to basic foodstuffs, fresh forest mushrooms displayed a slightly higher level of the Cs-137 activity. Results of the measurements conducted in 2014 implied that the average activity of caesium in

Fig. 18. Annual average concentration of Cs-137 in milk in Poland in the years 2004-2014 (PAA, based on measurements conducted by sanitary and epidemiological stations)

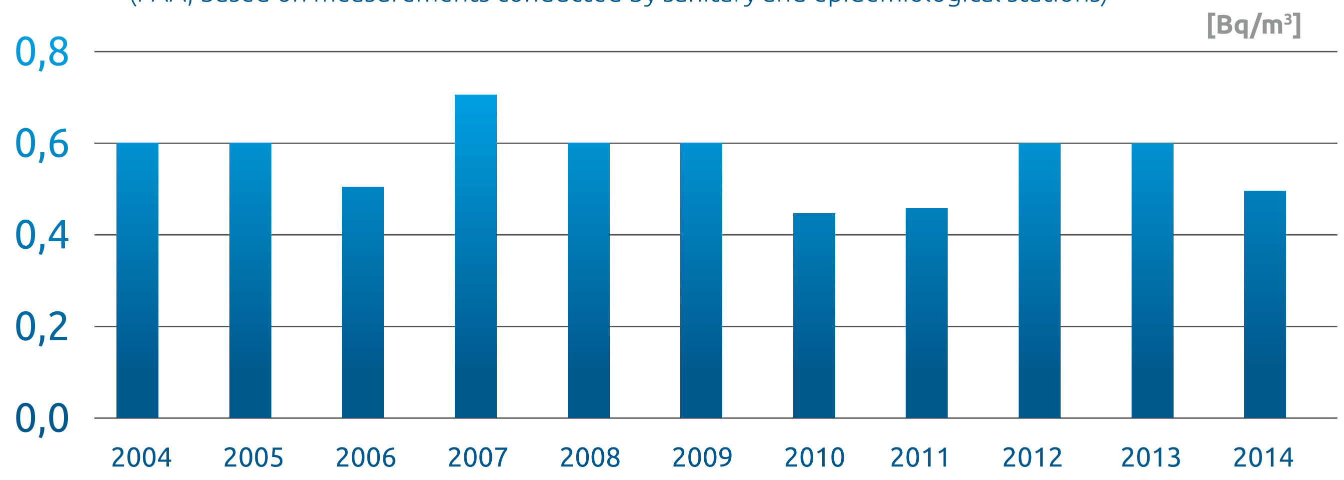


Fig. 19. Annual average concentration of Cs-137 in meat from Polish animal farms in the years 2004-2014 (PAA, based on measurements conducted by sanitary and epidemiological stations)

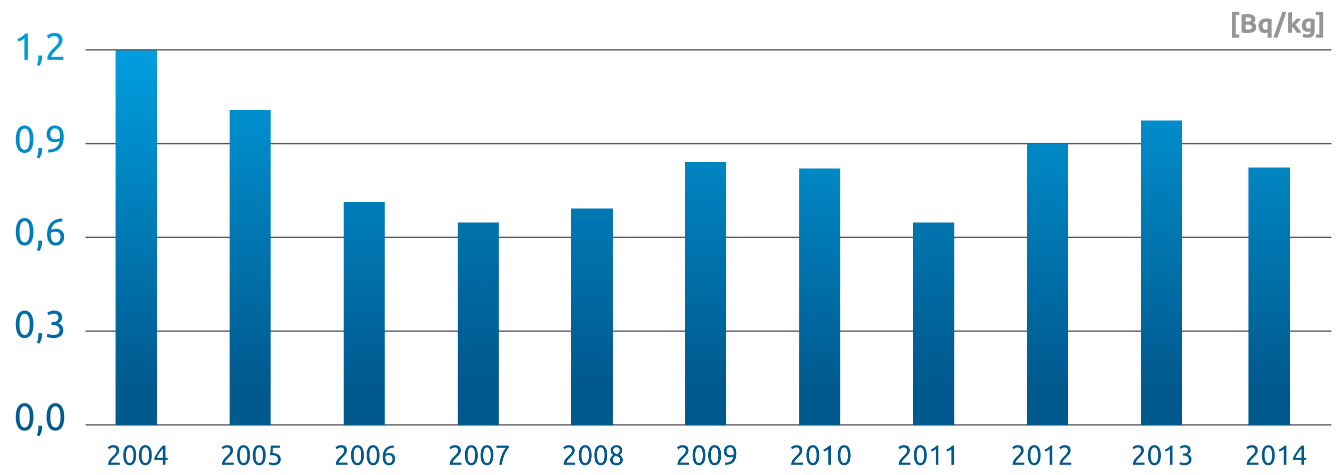
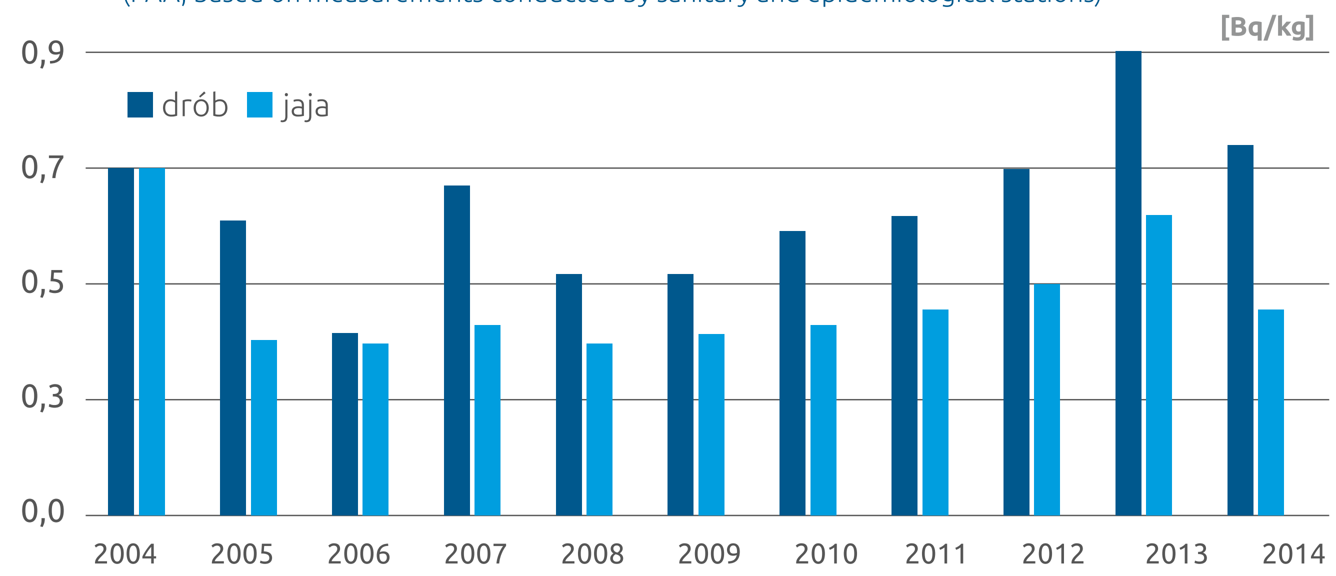


Fig. 20. Annual average concentration of Cs-137 in poultry and eggs in Poland in the years 2004-2014 (PAA, based on measurements conducted by sanitary and epidemiological stations)



basic specimens of fresh mushrooms came to ca. 22 Bq/kg. It should be stressed that in 1985, i.e. before the Chernobyl disaster, the activity of Cs-137 in mushroom was also much higher than in other foodstuffs. At that time, this radionuclide was produced in the course of tests of nuclear weapons (which is confirmed by an analysis of the proportion of the Cs-134 and Cs-137 isotopes in 1986).

XI. 3. ENVIRONMENTAL RADIOACTIVITY OF NATURAL RADIONUCLIDES INCREASED DUE TO HUMAN ACTIVITY

A part of radiological monitoring of the environment is the observation of the status of radiation in areas with an increased level of ionising radiation from natural sources caused by human activity. These areas include (as indicated in Chapter X "Monitoring of the national radiation situation") territories of former uranium ore plants near Jelenia Góra.

For the purpose of interpretation of the relevant measurement results, recommendations developed by the World Health Organisation ("Guidelines for drinking-water quality", Vol. 1 – Recommendations. Geneva, 1993, item 4.1.3, p. 115) were applied, introducing what is referred to reference levels for drinking water. In accordance with the aforementioned guidelines, the total alpha activity of drinking water should not, as a rule, exceed 100 mBq/dm^3, whereas the beta activity should not exceed 1,000 mBq/dm^3. However, it should also be noted that the said levels function as indicators only, and in cases of their exceedance, identification of radionuclides is recommended.

In line with the monitoring scheme, in 2014, measurements of the alpha and beta activity were conducted for 74 water samples in areas where uranium ore plants used to operate, and the following results were obtained:

- public intakes of drinking water:
  - total alpha activity – from 3.6 to 55.7 mBq/dm^3,
  - total beta activity – from 31.0 to 284.9 mBq/dm^3;
- water flowing out of mine headings (adits, rivers, ponds, springs, wells):
  - total alpha activity – from 2.8 to 620.2 mBq/dm^3,
  - total beta activity – from 43.6 to 3,611.7 mBq/dm^3;

however, the upper activity levels were observed in the water flowing out of adit no. 19a of the former "Podgórze" mine in Kowary.

Despite the fact that surface and underground water as well as water flowing out of mine headings is not intended to be used as drinking water and does not pose a direct health hazard, it should be systematically inspected due to increased radioactivity.

The measurements conducted also covered the concentration of radon in water from public intakes within the area managed by the Association of Municipalities of the Karkonosze Region.

Commission Recommendations 2001/928 EURATOM on radon present in water stipulates that, for public intakes with radon concentration exceeding 100 Bq/dm^3, the Member States should individually establish what is referred to as reference levels of radon concentration, and for concentrations exceeding 1,000 Bq/dm^3, it is necessary that specific countermeasures be undertaken for the sake of radiological protection. In 2014, none of the results obtained in radon concentration measurements in water exceeded the threshold of 1,000 Bq/dm^3.

The concentration of radon in water from public intakes and household wells in municipalities managed by the Association of Municipalities of the Karkonosze Region ranged from 0.0 to 729.8 Bq/dm^3. The concentration of radon in water flowing out of mining facilities, which displayed the highest total alpha and beta radioactivity, showed the highest value of 408.2 Bq/dm^3 in water flowing out of adit no. 17 of the "Podgórze" mine. Therefore, one may claim that even in this part of Poland, where there is potentially the highest radiation hazard due to radon present in water and natural radioactive elements in soil, the threat to local population is negligibly small.

Based on the data provided in this chapter, one may conclude that the concentration of natural radionuclides in the environment has remained on a similar level for several years. Nevertheless, the concentration of artificial isotopes (mainly of Cs-137) which originated from the Chernobyl disaster and previous nuclear weapon tests is systematically decreasing owing to the natural process of radioactive decay. The radionuclide contents reported do not pose any radiation threat for the population and the environment of Poland.

Fig. 21. Annual average concentration of Cs-137 in fish in Poland in the years 2004-2014 (PAA, based on measurements conducted by sanitary and epidemiological stations)

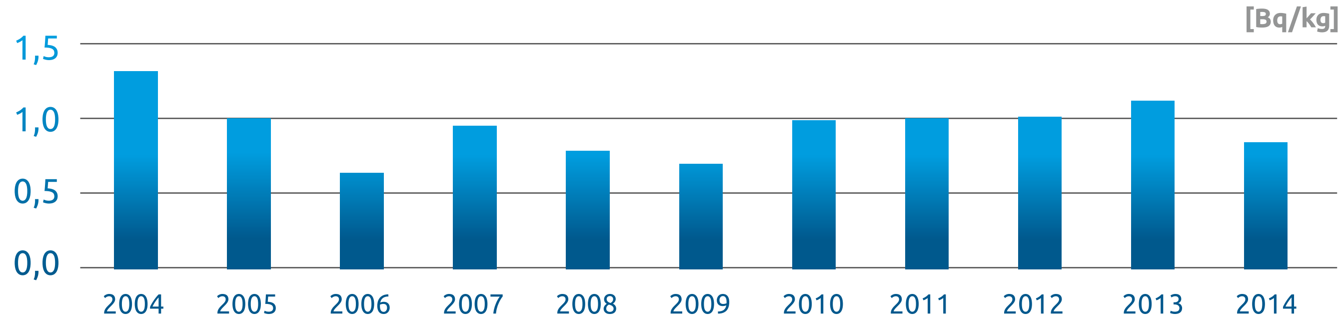


Fig. 22. Annual average concentration of Cs-137 in vegetables in Poland in the years 2004–2014 (PAA, based on measurements conducted by sanitary and epidemiological stations)

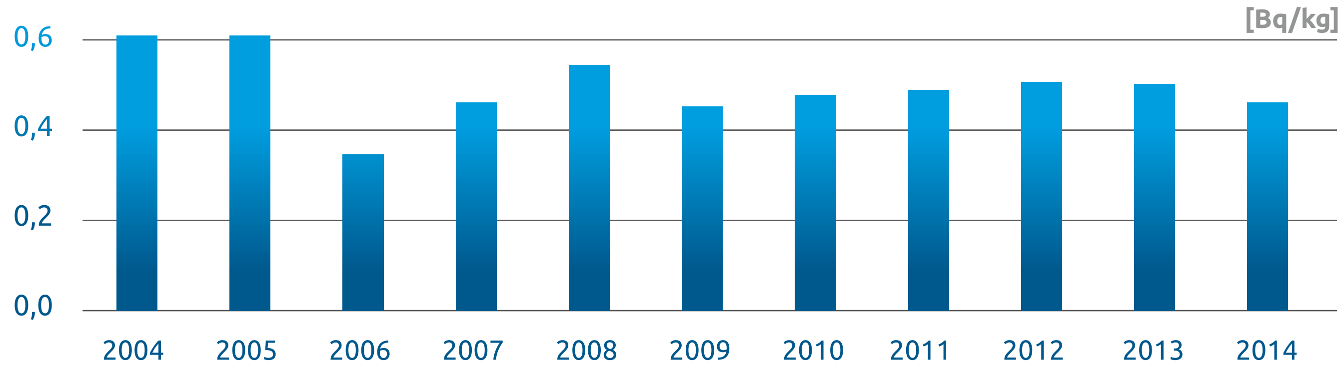
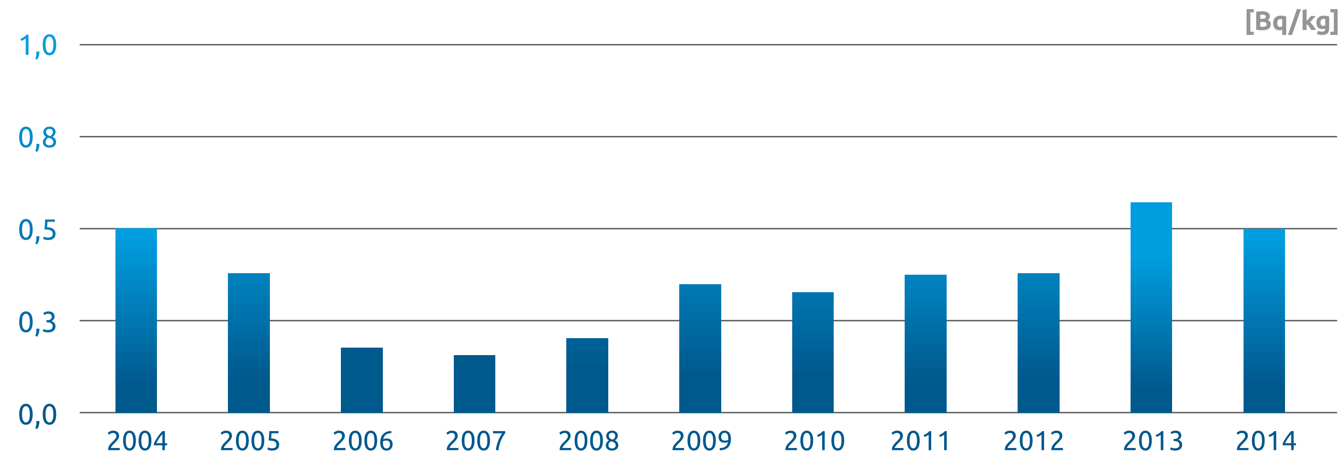


Fig. 23. Annual average concentration of Cs-137 in fruits in Poland in the years 2004–2014 (PAA, based on measurements conducted by sanitary and epidemiological stations)



XII

INTERNATIONAL COOPERATION

XII. INTERNATIONAL COOPERATION

Coordination of Poland's international cooperation in the field of nuclear safety and radiological protection is a statutory duty of the President of the National Atomic Energy Agency. This duty is performed by the President in close collaboration with the Minister of Foreign Affairs, the Minister of Economy and with other competent ministers (heads of central offices) in line with their respective responsibilities.

The goal of international cooperation in which PAA has become involved is to pursue the mission of a nuclear regulatory body, i.e. ensuring nuclear safety and radiological protection of the country. PAA strives to accomplish this goal by entering international legal acts and implementing international standards as well as increasing their own competence in action by sharing experience and know-how with foreign partners. The international cooperation in question comprises participation of PAA's representatives in the efforts undertaken by international organisations and associations as well as their involvement in bilateral cooperation.

XII. 1. MULTILATERAL COOPERATION

In 2014, the PAA President was involved in fulfilment of tasks resulting from Poland's multilateral cooperation under the framework of:

1. the European Atomic Energy Community (EURATOM) – Poland has been its member since 2004;
2. the International Atomic Energy Agency (IAEA) – Poland has been its founding member since 1957;
3. the Nuclear Energy Agency of the Organisation for Economic Cooperation and Development (NEA OECD) – Poland joined NEA OECD in 2010;
4. the Western European Nuclear Regulators' Association (WENRA) – PAA has collaborated with WENRA since 2004, and has been holding the status of an observer since 2008;
5. Meetings of Heads of the European Radiological Protection Competent Authorities (HERCA) – the cooperation started in 2008;
6. the Council of the Baltic Sea States (CBSS) – Poland has been its founding member since 1992;
7. the European Nuclear Security Regulators Association (ENSRA) – PAA has been a member of ENSRA since 2013,
8. the European Safeguards Research and Development Association (ESARDA) – PAA joined ESARDA in 2009.

1.1. Cooperation with international organizations

1.1.1. European Atomic Energy Community (EURATOM)

The European Atomic Energy Community is an intergovernmental organisation established by virtue of the Rome Treaty signed on 25 March 1957 by France, the Federal Republic of Germany, Italy, Belgium, the Netherlands and Luxembourg. After the amendments effected under the Lisbon Treaty signed on 13 December 2007, the modified EURATOM Treaty entered into force on 1 December 2009.

Among other provisions contained in the preamble, the treaty stipulates that nuclear energy is a necessary means for development and revival of the industry, and that it contributes to preservation of peace in Europe. What the EURATOM Treaty also defines is the duties of the Community, including contribution to raising the living standards in the Member States and development of relationships with other countries by fostering conditions necessary to create and rapidly develop the nuclear industry.

PAA's involvement resulting from the membership of Poland in the Euratom Community in 2014 focused mainly on activities conducted in two groups:

- the European Nuclear Safety Regulators' Group (ENSREG) composed of representatives of the senior management of European nuclear regulators from the Member States, providing advisory support to the European Commission;
- the Working Party on Atomic Questions – B.07 WPAQ, in which PAA holds leading competence. The group was mainly focused on continuation of the most vital subject discussed in the period of the Lithuanian presidency (second half of 2013), namely draft amendments to the Council Directive establishing a community framework for nuclear safety of nuclear facilities (Nuclear Safety Directive – NSD).

In 2011 and 2012, nuclear power plants operating across the European Union were subject to inspection procedures regarding natural dangers such as earthquakes and floods, this being a direct consequence of the Fukushima accident. These procedures included comprehensive safety and risk analyses (stress tests) of nuclear power plants based in the European Union and their objective was to identify safety areas for improvement.

The amendments proposed to the previous NSD were preceded by the Group's in-depth discussions and constituted a response to results of analyses conducted in the European Union in accordance with the conclusions contained in the document entitled "Communication from the Commission to the Council and the European Parliament on the comprehensive risk and safety assessments (stress tests) of nuclear power plants in the European Union and related activities".

The most important changes proposed comprise strengthening the role and actual independence of national nuclear regulatory bodies operating in the Member States, enhancing transparency in terms of access to information on nuclear safety and, besides the currently applicable obligation for international audits of nuclear regulators, introducing compulsory and independent safety reviews of nuclear facilities and promoting what is referred to as "nuclear safety culture" in its broadest meaning.

The discourse on individual amendments to the NSD was completed by the Group at the end of the Greek presidency (first half of 2014), thus ensuring full support of all Member States and the European Commission for the final wording of the act.

Ultimately, Council Directive 2014/87/Euratom amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear facilities was enacted by the Council of the European Union on 8 July 2014.

The other crucial subject which the Group had not elaborated upon before the Italian presidency (second half of 2014) was a common standpoint to be assumed by the Euratom Community for a Diplomatic Conference on the potential amendments to the Convention on Nuclear Safety (CNS) planned to be held by the International Atomic Energy Agency (IAEA) at the beginning of 2015. It was ultimately decided that the option of amendments to the CNS preferred by the Community would assume their conformity with the amendments introduced to the Nuclear Safety Directive. At the same time, the Community declared their far reaching flexibility and openness to other proposals which may substantially contribute to strengthening of the global nuclear safety regime.

As a result of Poland's membership in the European Atomic Energy Community, PAA's representatives also participated in proceedings of other working groups and consulting bodies of the Council of the European Union and the European Commission related to the PAA President's duties and responsibilities. PAA's representatives participated in the works of:

- Working Group for radioactive waste management established under article 37 of the EURATOM Treaty;
- Groups for monitoring of levels of radioactivity in air, water and soil and for control of compliance with basic safety standards as well as for the European Commission's control of radiation situation in the Member States, all of which were established in accordance with article 35, and for furnishing the European Commission with measurement results from national radiological monitoring under normal conditions and during radiation emergency incidents (as per article 36 of the EURATOM Treaty);
- Advisory Committee established under article 21 of Council Directive 2006/117/EURATOM of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent nuclear fuel;
- Standing Working Group of the European Commission for Safe Shipment of Radioactive Material.

In 2014, the PAA Nuclear Regulatory Inspectors participated in audits and inspections of nuclear facilities conducted in Poland by the Euratom Community inspectors. Moreover, it should be emphasised that Poland, represented by PAA, is a link in measurement data exchange systems deployed across the European Union. These include: an exchange system for data from routine radiation monitoring of the environment and the European Radiological Data Exchange Platform ERDEP, i.e. an exchange system for data from early warning stations for radioactive contamination (dose rate). More information about this topic may be found in Chapter. XI. "Assessment of the national radiation situation".

1.1.2. International Atomic Energy Agency (IAEA)

The International Atomic Energy Agency is a specialised agenda of the United Nations Organisation, established in 1957, functioning as a centre of cooperation in the fields relating to the safe use of nuclear energy for peacetime purposes. Poland is a founding member of the IAEA and ratified the Statute of the International Atomic Energy Agency on 23 May 1957 (Journal of Laws of 1958, no. 41, item 187).

The IAEA's goal, as provided for in its Statute, is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world" and to "ensure so far as it is able, that assistance provided by it or at its request or under its supervision or control is not used in such a way as to further any military purpose". The IAEA's supreme policy making body is the General Conference whose sessions are held every year. The 58th session of the General Conference was held in September 2014 in Vienna. The PAA delegation led by the PAA President attended the Conference.

Poland's membership fee payable to the IAEA (settled under PAA's budget) in 2014 amounted to:

- EUR 2,409,953 and USD 339,528 for the Regular Budget, and
- EUR 613,997 for the Technical Cooperation Fund.

Both amounts are calculated based on the UN membership fee rates for the given state in the given year.

Between 24 March and 4 April 2014, the Vienna headquarters of the IAEA hosted an international review meeting of the Convention on Nuclear Safety. The Polish delegation, led by the PAA Vice-President, was composed of representatives of the National Atomic Energy Agency and of the Permanent Mission of the Republic of Poland to the United Nations Office in Vienna. It was the sixth consecutive review meeting organised cyclically since 1999 on a 3-year basis. With regard to Poland, what delegates of the Group 2 member states considered as a good practice was ongoing tracking of processes of implementing changes to the IAEA safety standards and defining WENRA safety goals based on the lessons learnt in Fukushima as well as their immediate transfer into the provisions of the Atomic Law which was being amended exactly at that time. Owing to the foregoing, despite the fact that Poland has not built a nuclear power plant yet, the relevant Polish regulations already include all the latest (global level) safety requirements which may pertain to the future nuclear power plant project.

Cooperation in establishing the IAEA Safety Standards

A vital part of the IAEA's activities is dedicated to establishing safety standards for peacetime use of nuclear energy. Works devoted to these standards are performed by five committees and one commission:

- Nuclear Safety Standards Committee (NUSSC),
- Radiation Safety Standards Committee (RASSC),
- Waste Safety Standards Committee (WASSC),
- Transport Safety Standards Committee (TRANSSC),
- Security Guidance Committee (NSGC).

PAA's experts actively participate in works of all the aforementioned committees.

Regulatory Cooperation Forum

The Regulatory Cooperation Forum (RCF) is a relatively new initiative of the International Atomic Energy Agency whose aim is to coordinate the cooperation between nuclear regulatory authorities operating in countries developing their nuclear power engineering industry and those which already have a well-developed nuclear power engineering sector.
The strategy of the Forum's agenda concentrates on developing a plan of activities adjusting the nuclear safety infrastructure to the objective of supervision of nuclear power plants as well as implementation of this plan in cooperation with experienced international partners. The cooperation involves consultations, peer reviews, training courses and employee exchange schemes.

In 2014, a dedicated PAA-RCF Action Plan was adopted for the years 2014-2015 covering a schedule of on-site training courses to be delivered for a period of several months to PAA's employees at the aforementioned nuclear regulatory bodies operating in countries which have successfully deployed nuclear programmes (France, Canada, South Korea, the United States and the United Kingdom). The training courses are envisaged to enable PAA's personnel to acquire practical experience in supervision of nuclear facilities, including in the process of granting licences for operation of new power units.

Scientific and technical cooperation and the IAEA's technical assistance for Poland

In the years 2014-2015, Polish institutions will be involved in 3 national projects to be implemented under the Technical Cooperation Fund (TCF). A collation of the said national projects has been provided in Table 22.

Besides national projects, in 2014, Poland participated in more than 20 IAEA projects of regional cooperation (Central-Eastern Europe) and inter-regional cooperation, half of which were of strictly nuclear re-

Table 23. The IAEA's national technical assistance projects implemented in Poland in 2014

IAEA project no.	Project title	Beneficiary
POL/2/017	Support for the development of nuclear infrastructure	Ministry of Economy
POL/6/010	Strengthening of the cooperation between parties to the national network of oncology centres in the sphere of application of positron technologies in emission tomography	Institute of Oncology in Bydgoszcz
POL/9/022	Preparation of the nuclear regulatory framework to the performance of individual tasks under the nuclear energy programme	National Atomic Energy Agency

gulatory nature and were coordinated by PAA's representatives.

Other fields and forms of cooperation with the IAEA

The cooperation with the IAEA was also related to such areas as:

- participation in the Emergency Notification and Assistance Convention (ENAC), being an international system coordinated by the IAEA. The National Contact Point of this system operates 24 hours a day at the PAA Radiation Emergency Centre;
- participation in the classification system of the International Nuclear and Radiological Event Scale (INES) which ensures, among other benefits, access to updated information available at the IAEA, concerning incidents which, due to their local impact, are not included in the early warning procedures;
- performance of obligations in the scope of state control over the trade and flow across the territory of Poland of nuclear material and devices subject to special supervision in order to counteract the proliferation of nuclear weapons (including supervision of the fulfilment of Poland's obligations connected with the safeguards system). This task is pursued by a contact point with the Non-Proliferation Division at PAA's Nuclear Safety Department in cooperation with the Ministry of Economy and the Ministry of Foreign Affairs;
- current cooperation in the scope of nuclear safety and radiological protection, comprising such matters as the participation of Polish experts in developing and amending the IAEA's requirements and recommendations.

1.1.3. Nuclear Energy Agency of the Organisation for Economic Cooperation and Development (NEA OECD)

The Nuclear Energy Agency is an international, independent and specialised agency of the OECD based in Paris. Its main goal is to support the Member States in fostering peacetime use of nuclear energy in a safe, environmentally friendly and economically sound manner. All these objectives are pursued through international cooperation, organisation of joint research programmes, preparation of legal acts and implementation of new technological solutions for products and services. The NEA incorporates 30 out of 34 OECD countries and supports the Member States in their use of nuclear energy for peacetime purposes.

The NEA's activity is based on the cooperation of national experts in 7 standing technical committees and several subordinate working groups (there are only 65 employees working at the NEA). Poland became the NEA member in 2010.

The membership in the NEA enables more intensive participation in the exchange of experience with other Member States, this being particularly important on account of the fact that the NEA has incorporated nearly all countries with a developed nuclear power engineering sector.

Three out of the NEA committees are directly involved in PAA's scope of activity i.e. the Committee on Nuclear Regulatory Activities (CNRA), the Committee on the Safety of Nuclear Installations (CSNI) and the Nuclear Law Committee (NLC). PAA joined the works of the aforementioned committees just before Poland's accession to the NEA. From the perspective of PAA's preparations for the implementation of the Polish Nuclear Power Programme, under the framework of the CNRA, the participation in the Working Group on Regulation of New Reactors (WGRNR) is particularly important. PAA is also a member of the Working Party on Nuclear Emergency Matters (WPNEM) being an entity which seeks to improve national systems for detecting and mitigating radiation emergencies.

Since Poland's accession to the NEA, PAA has additionally participated in the following efforts: Working Groups on Public Communication of Nuclear Regulatory Organizations (WGPC) and Working Groups on Inspection Practices (WGIP) as well as the Working Group on Risk Assessment (WGRISK).

1.2. Other forms of multilateral cooperation

1.2.1. Western European Nuclear Regulators' Association (WENRA)

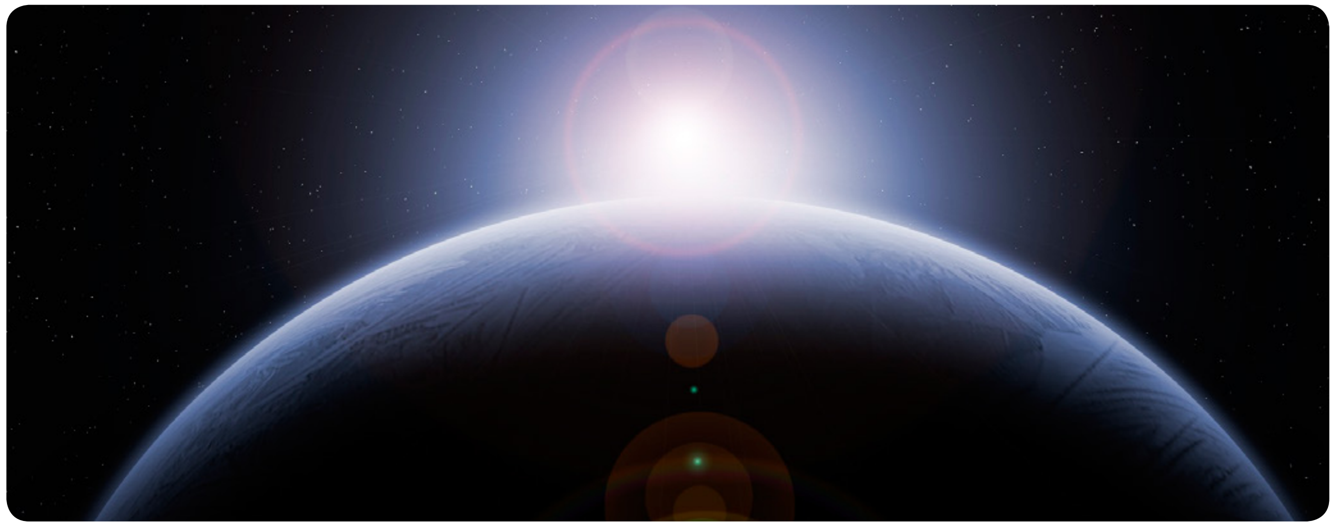
The Western European Nuclear Regulators' Association (WENRA) voluntarily incorporates persons in charge of the nuclear regulatory bodies of the European Union Member States and of Switzerland operating nuclear power plants (i.e. seventeen states in total). The purpose of this organisation is harmonisation of requirements and practices pertaining to siting, design, construction, operation and decommissioning of nuclear power plants, storage and disposal of radioactive waste as well as systematic improvement of safety.

WENRA operates through permanent or ad hoc working groups, defines what is referred to as Safety Reference Levels (SRLs) accepted by all members in terms of safety and decommissioning of nuclear power plants, acting via a standing group referred to as RHWG[9] as well as storage and disposal of waste, this being handled by a standing group abbreviated as WGWD[10]. WENRA's Safety Reference Levels were used in the course of the legislative works aimed at preparation of the amendment to the Atomic Law in Poland.

PAA has been participating in plenary meetings of the Association since 2004, and since 2008, it has been holding the observer status. In 2014, PAA's representatives took part in the WENRA assembly held in Lucerne on 17-19 March as well as in a joint meeting of WENRA and HERCA and in a plenary meeting of both these groups held in Stockholm on 21-24 October.

9 Reactor Harmonisation Working Group.

10 Working Group on Waste and Decommissioning.



1.2.2. Meetings of Heads of European Radiation Control Authorities (HERCA)

A group known as HERCA (Heads of European Radiation Control Authorities) is a relatively new platform for cooperation of European nuclear regulators. PAA's representatives have participated in its plenary meetings and working groups since 2009. In 2014, PAA's representatives took part in the HERCA plenary meeting held in Vilnius on 11-12 June as well as in a joint meeting of the aforementioned groups held in Stockholm on 21-24 October.

1.2.3. Council of the Baltic Sea States (CBSS)

The Council of the Baltic Sea States was established in March 1992 at the Conference of Ministers of Foreign Affairs. It is composed of representatives of Denmark, Estonia, Finland, Iceland (since 1993), Germany, Lithuania, Latvia, Norway, Poland, Sweden and the Russian Federation. PAA represents Poland in the Expert Group on Nuclear and Radiation Safety (EGNRS).

Information concerning the exchange of data from early warning stations for contamination operating under the system managed by the Council of the Baltic Sea States (CBSS) has been provided in Chapter X.3 "National radiological monitoring – Participation in the international exchange of radiological monitoring data".

1.2.4. European Nuclear Security Regulators Association (ENSRA)

The history of the European Nuclear Security Regulators Association (ENSRA) dates back to 1990 when an informal group was composed of representatives of nuclear regulators from Belgium, Germany, France, Sweden, Spain and the United Kingdom. The group transformed into the Association abbreviated as ENSRA in 2004. At present, the Association incorporates 14 Member States of the European Union. Main goals of the Association include exchange of information concerning physical protection of nuclear material and facilities as well as promotion of a uniform approach towards physical protection in the European Union countries.

On 8 and 9 October 2014, Belgium hosted the plenary meeting of ENSRA. It was attended by 23 representatives from 15 ENSRA Member States. The meeting was organised by the Belgian regulatory body, i.e. the Federal Agency for Nuclear Control (FANC), which had been presiding over ENSRA since the previous meeting held in Spain in 2013.

Working Groups

With regard to the recommendations provided in the report prepared by the Ad Hoc Group on Nuclear Security of May 2012, ENSRA undertook to review its terms of reference and to admit further countries with nuclear reactors to the Association as well as to tighten the cooperation through exchange of good practices between ENSRA countries. The new version of terms of reference along with a confirmation of their approval was distributed among all the ENSRA members.

At the Nuclear Security Summit held in the Netherlands in 2014, 36 states signed a document referred to as the Joint Statement. By that means, all these

countries assumed a number of obligations aimed to strengthen their actual physical protection.

1.2.5. European Safeguards Research and Development Association (ESARDA)

PAA has been a member of the European Safeguards Research and Development Association (ESARDA) since 2009. It is an organisation of the EU countries constituting a forum for exchange of information and experience concerning safeguards, and it incorporates scientific institutes, universities, industrial companies, specialists and administration bodies of the EU countries. There are several thematic working groups operating in the Association. These groups are involved in such matters as: implementation of rules for safeguards, inspection of interlocks and access to nuclear material, destructive and non-destructive tests and measurements, verification techniques and methodology, knowledge and training management, application of the Novell network technology, inspection of export of goods as well as strategic and dual use technologies.

XII. 2. BILATERAL COOPERATION

In order to ensure nuclear and radiological safety, the Republic of Poland has signed a number of international bilateral agreements, the performance of which was entrusted to the PAA President. The agreements concerning early notification of nuclear accidents and exchange of information and experience were concluded with the neighbouring countries, i.e. with the Russian Federation (the relaxant agreement concerned a zone of 300 km from the Polish border, namely the area of the Kaliningrad Oblast), Lithuania, Belarus, Ukraine, Slovakia, the Czech Republic, Austria, Denmark, Norway and Germany. Grounds for the foregoing were laid down in the international Convention on Early Notification of a Nuclear Accident concluded under the auspices of the IAEA.

Due to the fact that there is a number of operating nuclear power plants near the Polish borders, collaboration with nuclear regulators of the neighbouring countries, conducted in accordance with the aforementioned intergovernmental agreements, is an essential element of our radiological safety.

In the framework of PAA's preparation for the tasks related to the Polish Nuclear Power Programme, in 2010 PAA president has signed an agreement with United States Nuclear Regulatory Commission (US NRC) on technical information exchange and cooperation in the field of nuclear safety and, in 2012, a similar agreement with French nuclear regulator (ASN). PAA success to CAMP (2011) and CSARP (2012) programmes, which include international cooperation on the development of advanced computer codes used for safety analysis for nuclear power plants.

Additionally, in 2014, PAA signed an agreement on cooperation with the British, Canadian and Romanian nuclear regulatory authorities..

Under bilateral cooperation with the United States of America, PAA continued intensive work on computer codes. In 2014 meetings with delegates from the United Kingdom and the Czech Republic were held in Poland, whereas PAA's representatives paid visits to Belarus and Slovakia. Furthermore, two study visits were organised for PAA's representatives, one at the British regulatory body (ONR) and the other at the French equivalent (ASN), enabling them to become familiar with the manner in which the said institutions function and learn about the experiences of regulatory bodies operating in countries with a well-developed nuclear power engineering sector.

XIII

APPENDICES

APPENDIX NO. 1

LIST OF SECONDARY LEGISLATION ACTS TO THE ATOMIC LAW OF 29 NOVEMBER 2000

Regulations:

1. Regulation of the Council of Ministers of 6 August 2002 on the cases when activities involving exposure to ionising radiation are exempted from mandatory licensing or notification, and on the cases when such activities may be conducted on the basis of notification (Journal of Laws no. 137, item 1153 and Journal of Laws of 2004, no. 98, Item 980),
2. Regulation of the Council of Ministers of 6 August 2002 on Nuclear Regulatory Inspectors (Journal of Laws no. 137, item 1154),
3. Regulation of the Council of Ministers of 3 December 2002 on the documents required when applying for authorisation to conduct activity involving exposure to ionising radiation or when notifying such activity (Journal of Laws no. 220, item 1851, Journal of Laws of 2004, no. 98, item 981, Journal of Laws of 2006, no. 127, item 883 and Journal of Laws of 2009, no. 71, item 610),
4. Regulation of the Council of Ministers of 3 December 2002 on radioactive waste and spent nuclear fuel (Journal of Laws no. 230, item 1925),
5. Regulation of the Council of Ministers of 17 December 2002 on the stations for early detection of radioactive contamination and on the units conducting measurements of radioactive contamination (Journal of Laws no. 239, item 2030),
6. Regulation of the Council of Ministers of 23 December 2002 on the requirements for dosimetry equipment (Journal of Laws no. 239, item 2032),
7. Regulation of the Council of Ministers of 27 April 2004 on values of intervention levels for individual types of intervention measures and criteria for revoking these measures (Journal of Laws no. 98, item 987),
8. Regulation of the Council of Ministers of 27 April 2004 on the determination of entities competent to inspect maximum permitted levels of radioactive contamination of foodstuffs and feeding stuffs following a radiation event (Journal of Laws no. 98, item 988),
9. Regulation of the Council of Ministers of 27 April 2004 on the protection against ionising radiation of outside workers exposed during their work in a controlled area (Journal of Laws no. 102, item 1064),
10. Regulation of the Council of Ministers of 27 April 2004 on prior information for the general public in the event of radiation emergency (Journal of Laws no. 102, item 1065),
11. Regulation of the Council of Ministers of 18 January 2005 on ionising radiation dose limits (Journal of Laws no. 20, item 168),
12. Regulation of the Council of Ministers of 18 January 2005 on emergency response plans in cases of radiation emergency (Journal of Laws no. 20, item 169, and Journal of Laws of 2007, no. 131, item 912),
13. Regulation of the Minister of Health of 7 April 2006 on the minimum requirements for healthcare centres applying for the consent to conduct activity involving exposure to ionising radiation for medical purposes, which consists in rendering services related to oncological radiotherapy (Journal of Laws no. 75, item 528, Journal of Laws of 2011, no. 48, item 252, and Journal of Laws of 2012, item 471),
14. Regulation of the Council of Ministers of 12 July 2006 on the detailed safety requirements for work involving ionising radiation sources (Journal of Laws no. 140, item 994),
15. Regulation of the Minister of Health of 21 August 2006 on the special conditions for safe work with radiological devices (Journal of Laws no. 180, item 1325),
16. Regulation of the Minister of Health of 22 December 2006 on supervision and control of the compliance with radiological protection conditions in organisational units using X-ray devices for purposes of medical diagnostics, interventional radiology, surface radiotherapy and radiotherapy of non-cancerous diseases (Journal of Laws of 2007, no. 1, item 11),
17. Regulation of the Council of Ministers of 2 January 2007 on the requirements concerning the content of natural radioactive isotopes: Potassium-40, Radium-226 and Thorium-228 in raw material and material used in buildings designed to accommodate people and livestock, as well as in industrial waste used in the construction industry and on the inspection of the content of these isotopes (Journal of Laws No. 4, item 29),
18. Regulation of the Minister of Health of 2 February 2007 on the detailed requirements concerning the form and content of standard and wor-

king medical radiological procedures (Journal of Laws no. 24, item 161),
19. Regulation of the Council of Ministers of 20 February 2007 on the basic requirements for controlled and supervised areas (Journal of Laws no. 131, item 910),
20. Regulation of the Council of Ministers of 20 February 2007 on the conditions for import into the territory of the Republic of Poland, export out of the territory of the Republic of Poland and transit through this territory of nuclear material, radioactive sources and devices containing such sources (Journal of Laws no. 131, item 911),
21. Regulation of the Council of Ministers of 23 March 2007 on the requirements concerning registration of individual doses (Journal of Laws no. 131, item 913),
22. Regulation of the Council of Ministers of 4 October 2007 on the allocated and special purpose subsidy, fees and financial management of the state-owned public utility enterprise – "Radioactive Waste Management Plant" (Journal of Laws no. 185, item 1311),
23. Regulation of the Minister of Health of 27 March 2008 on the minimum requirements for health care units providing health care services in the scope of X-ray diagnostics, interventional radiology, diagnostics and radioisotope therapy of non-cancerous diseases (Journal of Laws no. 59, item 365),
24. Regulation of the Minister of Health of 27 March 2008 on the database of radiological devices (Journal of Laws no. 59, item 366),
25. Regulation of the Council of Ministers of 21 October 2008 on granting authorisation and consent for import into the territory of the Republic of Poland, export from the Republic of Poland and transit through this territory of radioactive waste and spent nuclear fuel (Journal of Laws no. 219, item 1402),
26. Regulation of the Council of Ministers of 4 November 2008 on physical protection of nuclear material and nuclear facilities (Journal of Laws no. 207, item 1295),
27. Regulation of the Prime Minister of 8 January 2010 on the manner of exercising supervision and control at the Internal Security Agency, the Foreign Intelligence Agency and the Central Anticorruption Bureau by nuclear regulatory authorities (Journal of Laws No. 8, item 55),
28. Regulation of the Minister of Health of 18 February 2011 on the conditions of safe use of ionising radiation for all types of medical exposure (Journal of Laws of 2013, item 1015 and item 1023),
29. Regulation of the Minister of the Interior and Administration of 13 April 2011 on the list of border crossings across which nuclear material, radioactive sources, devices containing such sources, radioactive waste and spent nuclear fuel may be imported into and exported from the territory of the Republic of Poland (Journal of Laws no. 89, item 513),
30. Regulation of the Minister of Finance of 14 September 2011 on the guaranteed minimum amount of the compulsory civil liability insurance of the nuclear facility operator (Journal of Laws no. 206, item 1217),
31. Regulation of the Minister of Health of 29 September 2011 on psychiatric and psychological tests of employees performing activities important for nuclear safety and radiological protection at the organisational unit conducting activity involving exposure which consists in commissioning, operation or decommissioning of a nuclear power plant (Journal of Laws no. 220, item 1310),
32. Regulation of the Minister of the Environment of 9 November 2011 on the standard form of an identity document of a Nuclear Regulatory Inspector (Journal of Laws no. 257, item 1544),
33. Regulation of the Minister of the Environment of 18 November 2011 on the Council for Nuclear Safety and Radiological Protection (Journal of Laws no. 279, item 1643),
34. Regulation of the Council of Ministers of 27 December 2011 on the standard form of a quarterly report on the amount of fee contributed to a decommissioning fund (Journal of Laws of 2012, item 43),
35. Regulation of the Council of Minister of 26 March 2012 on the special purpose subsidy granted for ensuring nuclear safety and radiological protection of Poland in cases of using ionising radiation (Journal of Laws of 2012, item 394),
36. Regulation of the Council of Ministers of 27 December 2011 on periodical safety assessment of a nuclear facility (Journal of Laws of 2012, item 556),
37. Regulation of the Minister of Economy of 23 July 2012 on detailed rules for the establishment and operation of Local Information Committees and cooperation in terms of nuclear power facilities (Journal of Laws of 2012, item 861),
38. Regulation of the Council of Ministers of 24 August 2012 on Nuclear Regulatory Inspectors (Journal of Laws of 2012, item 1014),
39. Regulation of the Council of Ministers of 10 August 2012 on positions important for nuclear safety and radiological protection and Radiation Protection Officers (Journal of Laws of 2012, item 1022),
40. Regulation of the Council of Ministers of 10 August 2012 on activities important for nuclear safety and radiological protection in an organisational unit conducting activity which consists in commissioning, operation or decommissioning of a nuclear power plant (Journal of Laws of 2012, item 1024),
41. Regulation of the Council of Ministers of 10 August 2012 on the detailed scope of assessment of land intended for siting of a nuclear facility, cases excluding the land from being considered eligible for siting of a nuclear facility and on requirements concerning the siting report for a nuclear facility (Journal of Laws of 2012, item 1025),
42. Regulation of the Council of Ministers of 31 August 2012 on the scope and method for the performance of safety analyses prior to the submission of an application for issuing a license for the construction of a nuclear facility and the scope of the preliminary safety report for a nuclear facility (Journal of Laws of 2012, item 1043),
43. Regulation of the Council of Ministers of 31 August 2012 on the nuclear safety and radiological protection requirements which must be fulfilled by a nuclear facility design (Journal of Laws of 2012, item 1048),
44. Regulation of the Council of Ministers of 10 October 2012 on the amount of payment to cover the costs of spent nuclear fuel and radioactive waste management and the costs of nuclear power plant decommissioning performed by an organisational unit which received license for the operation of a nuclear power plant (Journal of Laws of 2012, item 1213),
45. Regulation of the Minister of Health of 21 December 2012 on granting authorisations of a radiation protection officer in laboratories using X-ray devices for medical purposes (Journal 1534), effective as of 1 January 2013,
46. Regulation of the Council of Ministers of 11 February 2013 on nuclear safety and radiological protection requirements for the stage of decommissioning of nuclear facilities and the contents of a report on the decommissioning of a nuclear facility (Journal of Laws of 2013, item 270), effective as of 14 March 2013,
47. Regulation of the Council of Ministers of 11 February 2013 on requirements for decommissioning and operation of nuclear facilities (Journal of Laws of 2013, item 281), effective as of 15 March 2013.

Major acts of domestic law:

1. Ordinance no. 1 of the Minister of Economy of 16 January 2002 on granting the statute of a public utility enterprise to "The Radioactive Waste Management Plant" with its registered seat in Otwock-Świerk,
2. Ordinance no. 4 of the Minister of the Interior and Administration of 26 March 2002 on the enforcement of provisions of the Atomic Law in the Police, State Fire Service, Border Guard and organisational units reporting to the minister competent for matters of the interior (Official Journal of the Ministry of the Interior and Administration no. 3, item 7),
3. Ordinance no. 51/MON of the Minister of National Defence of 17 September 2003 on the enforcement of provisions of the Atomic Law at organisational units reporting to the Minister of National Defence (Official Journal of the Ministry of National Defence no. 15, item 161)
4. Ordinance no. 69 of the Minister of the Environment of 3 November 2011 on establishing the charter of the National Atomic Energy Agency (Official Journal of the Minister of the Environment and the Chief Environmental Protection Inspector no. 4, item 66).

New acts pertaining to nuclear safety and radiological protection have been listed in section II.2.2.

APPENDIX NO. 2

LIST OF MAJOR ACTS OF INTERNATIONAL AND EUROPEAN LAW

International agreements:

1. Treaty Establishing the European Atomic Energy Community (EURATOM),
2. Treaty on the Non-Proliferation of Nuclear Weapons signed in Moscow, Washington and London on 1 July 1968 (Journal of Laws of 1970, no. 8, item 60) (INFCIRC/140), and consequential acts:
    - Agreement between the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of Netherlands, the European Atomic Energy Community and the International Atomic Energy Agency on implementation of Article III, items 1 and 4 of the Treaty on the Non-Proliferation of Nuclear Weapons, signed in Brussels on 5 April 1973 (Journal of Laws of 2007 no. 218, item 1617),
    - Additional Protocol to the Agreement between the Republic of Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Republic of Finland, the Federal Republic of Germany, the Hellenic Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of Netherlands, the Portuguese Republic, the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the International Atomic Energy Agency on implementation of Article III, items 1 and 4 of the Treaty on the Non-Proliferation of Nuclear Weapons, signed in Vienna on 22 September 1998 (Journal of Laws of 2007 no. 156, item 1096).
3. Convention on Early Notification of a Nuclear Accident signed in Vienna on 26 September 1986 (Journal of Laws of 1988, no. 31, item 216),
4. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency signed in Vienna on 26 September 1986 (Journal of Laws of 1988, no. 31, item 218),
5. Convention on Nuclear Safety signed in Vienna on 20 September 1994 (Journal of Laws of 1997, no. 42, item 262),
6. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management signed in Vienna on 5 September 1997 (Journal of Laws of 2002, no. 202, item 1704),
7. Convention on the Physical Protection of Nuclear Material, including Annexes I and II, open for singing in Vienna and New York on 3 March 1980 (Journal of Laws of 1989, no. 17, item 93),
8. Vienna Convention on Civil Liability for Nuclear Damage signed in Vienna on 21 May 1963 (Journal of Laws of 1990 no. 63, item 370),
9. Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (on liability for nuclear damage) signed in Vienna on 21 September 1988 (Journal of Laws of 1994, no. 129, item 633),
10. Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage signed in Vienna on 12 September 1997 (Journal of Laws of 2011, no. 4, item 9).

Selected acts of the European Community law:

1. Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers resulting from ionising radiation (OJ L 159 of 29.61996, p. 1; OJ – Polish special edition , ch. 5, vol. 2, p. 291)[11],
2. Council Directive 89/618/Euratom of 27 November 1989 on informing the general public about health protection measures to be applied and steps to be taken in the event of radiological emergency (OJ L 357 of 7.12.1989, p. 31; OJ – Polish special edition , ch. 15, vol. 1, p. 366)[12],
3. Council Directive 90/641/Euratom of 4 December 1990 on the operational protection of outside workers exposed to the risk of ionising radiation during their activities in controlled areas (OJ L 349 of 13.12.1990, p. 21, as amended; OJ – Polish special edition , ch. 5, vol. 1, p. 405, as amended)[13],
4. Council Directive 97/43/Euratom of 30 June 1997 on health protection of individuals against the dangers of ionising radiation in relation to medical exposure and repealing Directive 84/466/Euratom (OJ L 180 of 9.7.1997, p. 22, as amended; OJ – Polish special edition , ch. 15, vol. 3, p. 332, as amended)[14],
5. Council Directive 2003/122/Euratom of 22 December 2003 on the control of high-activity sealed radioactive sources and radioactive waste (OJ L 346 of 31.12.2003, p. 57, as amended; OJ – Polish special edition , ch. 15, vol. 7, p. 694)[15],
6. Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel (OJ L 337 of 5.12.2006, p. 21),
7. Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations (OJ L 172 of 2.7.2009, p. 18, and OJ L 260 of 3.10.2009, p. 40),
8. Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste (OJ L 199 of 2.8.2011, p. 48),
9. Council Regulation (Euratom) no. 3954/87 of 22 December 1987 laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other case of radiological emergency (OJ L 371 of 30.12.1987, p. 11, as amended; OJ – Polish special edition , ch. 15, vol. 1, p. 333, as amended),
10. Commission Regulation (Euratom) no. 944/89 of 12 April 1989 laying down maximum permitted levels of radioactive contamination in minor foodstuffs following a nuclear accident or any other case of radiological emergency (OJ L 101 of 13.4.1989, p. 17; OJ – Polish special edition , ch. 15, vol. 1, p. 347),
11. Council Regulation (EEC) no. 2219/89 of 18 July 1989 on the special conditions for exporting foodstuffs and feedingstuffs following a nuclear accident or any other case of radiological emergency (OJ L 211 of 22.7.1989, p. 4; OJ – Polish special edition , ch. 11, v. 16, p. 342),
12. Commission Regulation (Euratom) no. 770/90 of 29 March 1990 laying down maximum permitted levels of radioactive contamination of feedingstuffs following a nuclear accident or any other case of radiological emergency (OJ L 83 of 30.3.1990, p. 78; OJ – Polish special edition, ch. 15, vol. 1, p. 379),
13. Council Regulation (Euratom) no. 1493/93 of 8 June 1993 on shipments of radioactive substances between Member States (OJ L 148 of 19.6.1993, p. 1; OJ – Polish special edition , ch. 12, vol. 1, p. 155),
14. Commission Regulation (Euratom) no. 302/2005 of 8 February 2005 on the application of Euratom safeguards (OJ L 54 of 28.2.2005, p. 1),
15. Commission Regulation (EC) no. 1635/2006 of 6 November 2006 laying down detailed rules for the application of Council Regulation (EEC) no. 737/90 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station (OJ L 306 of 7.11.2006, p. 3),
16. Council Regulation (EC) no. 733/2008 of 15 July 2008 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station (OJ L 201 of 30.7.2007, p. 1),
17. Commission Implementing Regulation (EU) no. 284/2012 of 29 March 2012 imposing special conditions governing the import of feed and food originating in or consigned from Japan following the accident at the Fukushima nuclear power station and repealing Implementing Regulation (EU) no. 961/2011 (OJ L 92 of 30.3.2011, p. 16),
18. Council Decision of 14 December 1987 on Community arrangements for the early exchange of information in the event of a radiological emergency (87/600/Euratom) (OJ L 211 of 22.7.1989, p. 4; OJ – Polish special edition, ch. 11, v. 16, p. 342),
19. Commission Decision of 5 March 2008 establishing the standard document for the supervision and control of shipments of radioactive waste and spent fuel referred to in Council Directive 2006/117/Euratom (2008/312/Euratom) (OJ L 107 of 17.4.2008, p. 32).

11 In accordance with Article 107 of Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation and repealing directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom (OJ L 13 of 17 January 2014, p. 1), this directive is repealed as of 6 February 2018.

12 In accordance with Article 107 of Council Directive 2013/59/EURATOM, this directive is repealed as of 6 February 2018.

13 In accordance with Article 107 of Council Directive 2013/59/EURATOM, this directive is repealed as of 6 February 2018.

14 In accordance with Article 107 of Council Directive 2013/59/EURATOM, this directive is repealed as of 6 February 2018.

15 In accordance with Article 107 of Council Directive 2013/59/EURATOM, this directive is repealed as of 6 February 2018.