

NUCLEAR REGULATORY AGENCY

REPUBLIC OF BULGARIA

REPORT
2007



50TH ANNIVERSARY



The objective of this Report of the Nuclear Regulatory Agency is to inform the legislative and executive authorities of the Republic of Bulgaria and the Bulgarian public and international communities on the status of nuclear safety and radiation protection in the country and on the regulatory activity performed by the NRA in 2007.

Bulgaria has in place an ambitious nuclear programme: it has industrial nuclear power reactors in operation; decommissioning of units with WWER-440 type reactors is forthcoming; and the plans for construction of a new nuclear power plant are well advanced. At the same time, efforts are made to construct a dry storage facility for spent nuclear fuel, to strengthen the State Enterprise Radioactive Waste, and to prepare for the establishment of a National Repository for Low and Intermediate Level Waste Disposal. There are over 2000 facilities in industry, medicine, and science in Bulgaria, which use sources of ionizing radiation.

I would like to point out that Bulgaria is a nuclear country and the implementation of its nuclear programme will be possible only under a strict and effective regulatory control.

From 1st January 2007 Bulgaria is a full member of the European Union and further development of Bulgarian nuclear programme will be carried out in compliance with Community Legislation and in close cooperation with the European institutions. The Nuclear Regulatory Agency has completed the process of harmonization of the national legislation with that of the European Union. Starting this year, our managers and experts are already participating in the work of a number of organizations, commissions and working groups involved in safety issues within the Community. We began performing our obligations for informing the European Commission on meeting the requirements of Community law. There is no doubt that the responsibility of the regulator is increased and that it is no longer only a national responsibility.

The year 2007 marks a Jubilee for the Nuclear Regulatory Agency. Half a century after the establishment of our organization, the country has a competent and independent regulatory body with the mission to protect the public, society, future generations and environment from the harmful effects of ionizing radiation. I believe that there is much to be proud of and at the same time we recognize well our responsibility towards the society as well as our future challenges.



NUCLEAR REGULATORY AGENCY CELEBRATING 50 YEARS

It all began in 1957 when Bulgaria ratified the Statute of the IAEA together with 80 other countries. By doing so our country became one of the international organization's founding members.

Bulgaria's membership in the IAEA called for the establishment of a governmental body to coordinate the activities related to the use of nuclear energy in the country. Therefore by a Council of Ministers Decree No. 603 of 4 June 1957 a Committee on the Peaceful Use of Atomic Energy (CPUAE) was established. The Committee was assigned to monitor and coordinate the development of the research and applied activity for the use of nuclear energy in Bulgaria

After the Government Decree became effective, a gradual development began of the institution's structure. In the next year, 1958, five commissions were established within the Committee. They include: the Commission on Physical and Technical Sciences, the Commission on Chemical Sciences, the Commission on Biological and Agrobiological Sciences, the Commission on Medical Sciences, and the Commission on Energy. Through their operation, the CPUAE was advising the government and, on the other hand, coordinating the research work in the country. As a result of this in a short period of time a number of radiochemical laboratories were created in Bulgaria, as well as departments within the Institute of Physics at the Bulgarian Academy of Sciences (BAS), the Faculty of Physics at the Sofia University, and a number of universities and institutes.

In 1961, the initial criticality was reached by the Bulgarian IRT-2000 research nuclear reactor. Later on it became a powerful tool for research and applied activity and also for training of research and management staff. The fate of IRT-2000 during those years was closely related to the fate of the CPUAE. Acad. Georgi Nadzhakov, Director of the Institute of Physics at the BAS with a Nuclear Scientific Experimental Center (NSEC), was the Deputy Chairman of the CPUAE from 1957 to 1969. Mr. Ivan Pandev, one of the Directors of the NSEC, will later become the Chairman of the CUAEPP. In 1962, the research reactor even joined the CPUAE as a constituent unit.

The CPUAE plays a significant role in the training of staff for the needs of nuclear physics, radiochemistry, medicine, energy, etc. Hundreds of Bulgarian experts and scientists have been from the establishment of the organization until today, sent to fellowship training, courses, seminars and schools associated with the IAEA. The cooperation of the CPUAE with the Joint Institute of Nuclear Research in Dubna established in 1956 gives a splendid opportunity for research activity.

In 1960, a Scientific Experimental Center for Radiobiology was established within the Ministry of People's Health, which in 1963 was transformed into a Scientific Institute of Radiology and Radiation Hygiene. Today this is the National Center for Radiobiology and Radiation Protection. When developing rules and standards in the field of radiation protection and when exercising control in this field the importance of this organization is big and its cooperation with the Nuclear Regulatory Agency continues until today.

In the 70s of the last century, different rules and regulations were developed and published governing the work with radioactive substances and other sources of ionizing radiation. All these acts, though created as a result of the CPUAE coordination role, were issued by different administrations and partially settle the issues requiring regulation in the different fields of use of nuclear energy, i.e. health care, industry, science.

The next significant moment of the organization's history came in 1975 after the commissioning of the first two units of Kozloduy NPP. Then with the Council of Ministers Decree No. 31 of 15 March 1975 the Committee's

assignments grew in number as it was vested with control functions. The Committee was established as a state public body responsible for the coordination and control of the performance of tasks with respect to the peaceful use of nuclear energy, observing the rules for safe NPP operation, and internal and external dose control functioning.

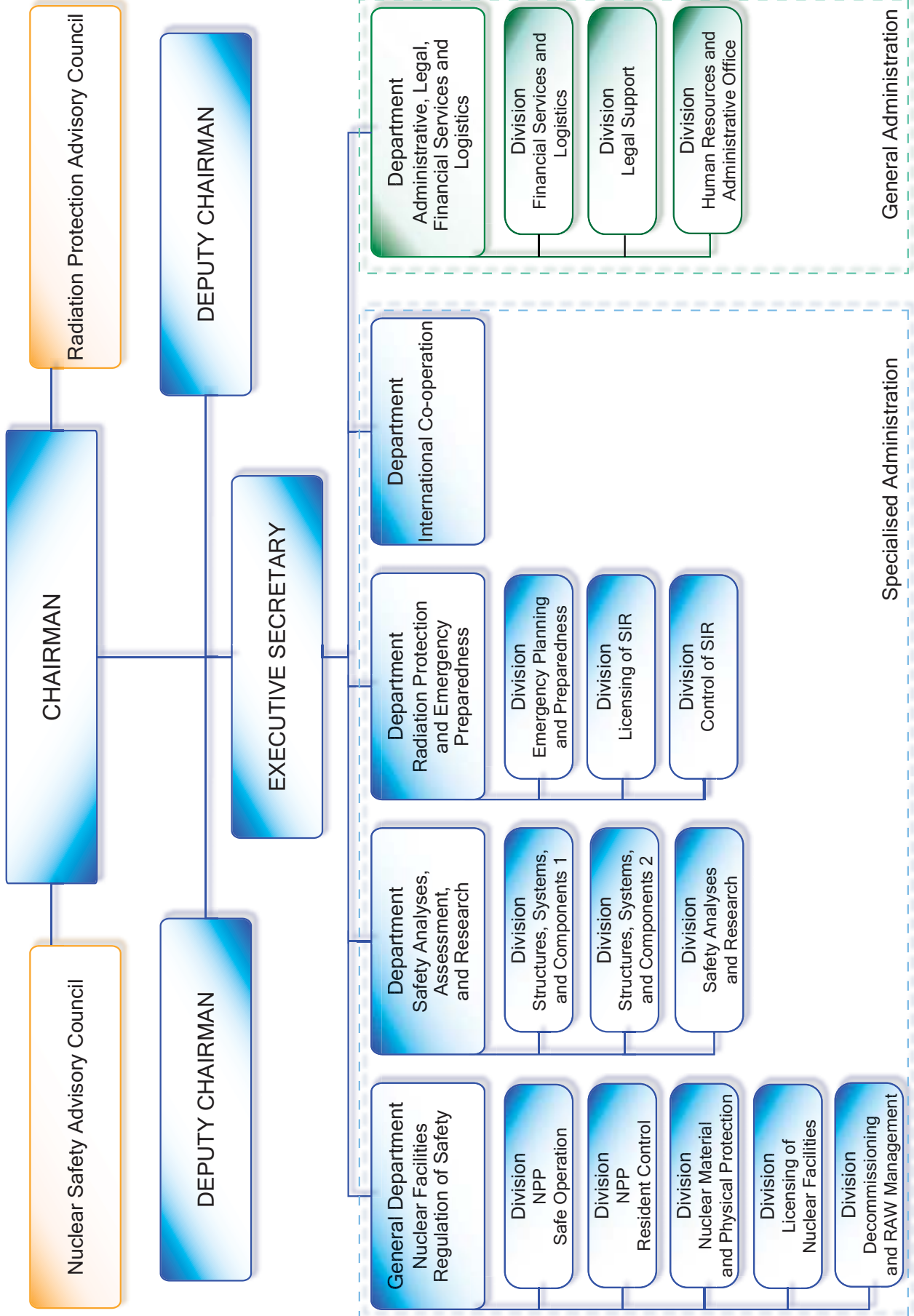
Ten years later, in 1985, the National Assembly adopted the first Law on the Use of Atomic Energy for Peaceful Purposes (LUAEPP). The normative act not only established the Committee on the Use of Atomic Energy for Peaceful Purposes (CUAEPP) but also determined in detail its functions and tasks. The law provided that the CUAEPP was responsible for the implementation of the state policy for safe use of nuclear energy, and also for the performance of tasks involving the adoption and management of nuclear technologies and in the field of safety control. For this purpose an Inspectorate on the Safe Use of Atomic Energy was established within the CUAEPP.

The law was repeatedly amended until 2002 when it was entirely replaced by the new Act on the safe use of nuclear energy (ASUNE). The latter is in line with the modern tendencies in nuclear legislation, including the legislative practice of the EU Member States in this field. The recommendations of IAEA experts who assessed the draft were considered when developing the law. The law transformed the CUAEPP into a Nuclear Regulatory Agency, which is a politically and financially independent regulatory body.

Under the ASUNE, the NRA is an independent specialized body of the executive power responsible for the state regulation of the safe use of nuclear energy and ionizing radiation and of the safe management of radioactive waste and spent nuclear fuel.

The ASUNE determines the following main functions of the NRA: licensing activities, exercising regulatory control, assessment and analysis of safety, elaboration of regulatory requirements, maintaining emergency preparedness, and performing the international cooperation activities of Bulgaria in the field of its competence.

The effective implementation of the law is ensured by 20 regulations issued by the NRA in the period 2002 – 2005. In practice, the regulations cover all fields subject to regulation. They are in full compliance with the European legislation and the internationally recognized IAEA safety standards.



NRA Organizational Structure

ADMINISTRATIVE CAPACITY

The state regulation of the safe use of nuclear energy and ionizing radiation and the safe management of radioactive waste and spent nuclear fuel is carried out by the Chairman of the Nuclear Regulatory Agency (NRA). The Chairman is supported by two deputy chairmen and administration in the performance of his legal duties.

The NRA structure, activity and organization are determined in the Rules of Procedure. The structure is in compliance with the Law on Administration providing uniform requirements with regard to the structure of administrations supporting the executive power. In August 2007 the Rules of Procedure were amended and changed. The main changes included the EU membership of Bulgaria requiring a change in the European integration units' functioning and the execution of the EURATOM Agreement providing a number of post-accession obligations for the Chairman of the NRA in the field of Safeguard Agreement to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and directive implementation reports lying within his competence.

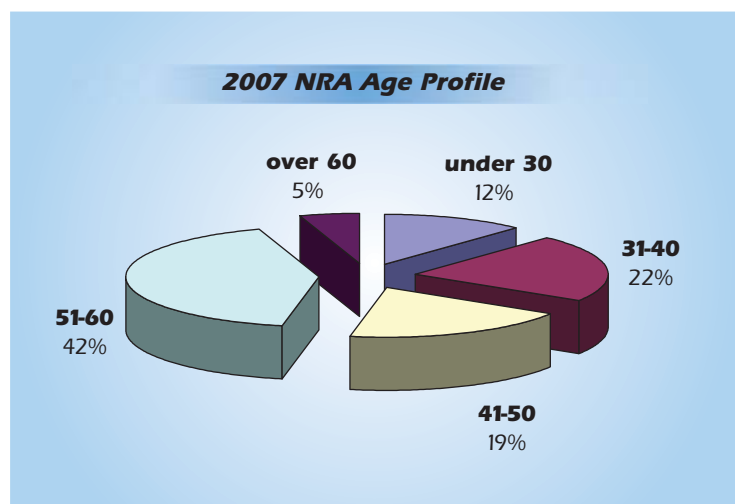
By finalizing the Rules of Procedure, in accordance with the national policy and priorities for maintaining a high-level nuclear safety, the commitment under the EU accession process was achieved, namely to increase the expert potential by six job positions.

The NRA administration is organized in a General and a Specialized Administration divided into a General Department and four other departments. The General Administration technically ensures the activity of the Chairman and provides administrative services to individuals and legal entities. The specialized administration assists the Agency Chairman in performing his regulatory and controlling functions with regard to nuclear facilities, other sources of ionizing radiation, nuclear material and radioactive waste, emergency preparedness, and international cooperation.

Human Resources

At the end of 2007, 100 persons were employed by the NRA on civil service and employment contracts, 82 of them on civil service contracts (civil servants). The status of the civil servants provides the positions of experts and inspectors with a security in terms of their relations with the employer, a clear procedure for career development, and opportunities for increase of qualification.

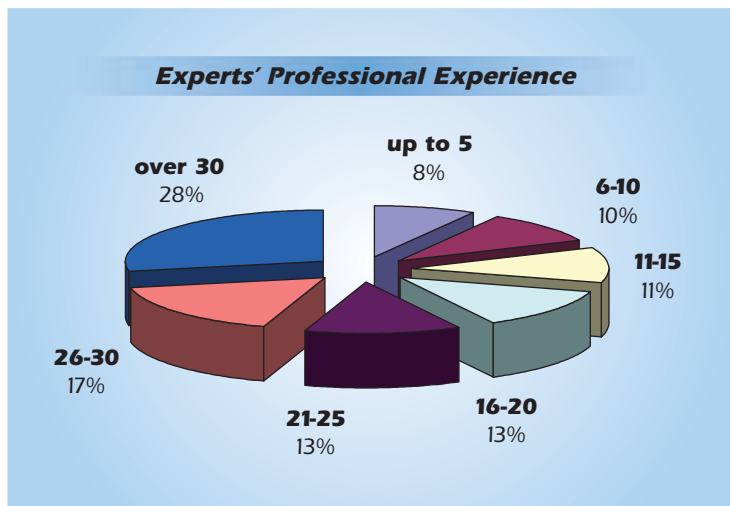
Competitive admission procedures are organized in the process of selection of candidates for the existing vacancies in compliance with the Act on Civil Servants, the Labour Code, and the Regulation on Competitive Admission Procedures for Civil Servants. High requirements are placed for the candidates for civil service, including not only technical competence but also personal qualities, such as teamwork skills, communication skills, willingness to increase one's qualification, knowledge of legislative documents, etc. Fluent foreign language skills and communication skills will be an advantage in case of equal scores under the other criteria. This will result in building a team of skilled employees able to complete their



assignments regardless of the level of difficulty. In 2007, one employee retired and four others terminated their employment relations. Eight new persons were employed on expert positions; four of them were aged under 30.

	Under 30	31-40	41-50	51-60	Over 60	Total
Management	-	3	4	14	1	22
Experts	11	17	11	22	2	63
Support	-	1	4	5	2	12
Executive	1	1	-	1	-	3
Total NRA	12	22	19	42	5	100

The policy of transfer of knowledge and skills by the more experienced (over 56% with more than 20 years of professional experience) to the younger employees followed by the NRA ensures the organization's succession and the preservation of well established professional practices.



Almost all expert positions (over 95%) are taken by university graduates with Master's degrees, and some of them with PhD degrees. The employees with higher education are involved mainly in the field of technical sciences and humanities.

The proportion of management positions taken by women and men is the same as with the expert positions (55:45 in favour of women).

	Management staff		Experts		Total
	Women	Men	Women	Men	
Civil servants	7	12	39	24	82
Employees	-	3	9	6	18
Total NRA	7	15	48	30	100

Administration Skills Improvement

In accordance with the annual plan for mandatory required and specialized training, the total number of employees who successfully completed the training in 2007 is 34. 21 specialized training courses, 3 foreign language courses, and a civil service development course were held. The courses, seminars and annual meetings held by the Institute of Public Administration and European Integration in the field of specialized training of employees are in aspects related to the management and organization of administration and administrative processes, e-management, strategic planning, etc.

The foreign language training is focused on the development and improvement of communication skills of employees. Training in different English language levels was held for the first time under a project of the Ministry of State Administration and Administrative Reform, and the four employees included in the training passed the examination successfully.

The employees appointed in the state administration for the first time, undergo a training course entitled "Introduction in Civil Service" for management staff and experts according to the requirements of the Act on the Civil Servant which is part of the professional development training.

Certification

While implementing the Regulation on the Conditions and Order for Certification of Employees in the State Administration and within the terms set therein, a certification of the NRA employees was performed. The process of certification included three stages: execution and co-ordination of a work plan; intermediate meeting; final meeting and determining the total score of performance on the job. Ninety one employees were certified, of whom eighty one received Grade 3 "Performance meets the requirements, eight received Grade 2 "Performance exceeds the requirements", and only two received Grade 4 "Performance does not meet the requirements, improvement is needed. Compared to the previous year the number of employees evaluated with Grade 2 has increased by six. The work with respect to the employees with Grade 4 has also been positive; in 2007 their number is 4, and in 2006 it was 3 (all three of them increased their results this year). The implementation of the work plans, position duties and the competence of each and every employee have been assessed by the management objectively and with precision.

Compulsory Measures

During this year the NRA's work was also directed towards the proper and accurate implementation of the ASUNE and the regulations governing those public relations which are connected to the safe use of nuclear energy. The employees authorized by the Chairman continued to exercise efficient control over the performance of obligations by the holders of licenses and permits issued by the NRA. The NRA inspectors exercise control under the ASUNE with a special focus on finding the exact facts and circumstances with respect to each specific subject of inspection. During the implementation of the administration policy and before the implementation of enforcement measures, the inspectors make attempts, in compliance with the effective laws, to eliminate the established irregularities with mandatory written recommendations and suggestions on the activity of the persons under control. Three penal provisions were issued.

Financial Resources

The revenue of the NRA represents income from taxes collected under the Act on the safe use of nuclear energy (ASUNE) and the Rate of Charges collected by the NRA under ASUNE (Appendix No. 2 to Article 2 of CMD No. 206 of 17 September 2003, published in the State Gazette No. 85 of 26 September 2003).

The Law on the State Budget of the Republic of Bulgaria for 2006 determined the NRA income from state fees to BGN 6,150,000 and expenses to BGN 4,791,131. For the period from 1 January 2007 to 31 December 2007, the NRA budget income from state fees amounts to BGN 11,749,973, and the income from interests and penalties amounts to BGN 19,996. The over fulfillment of the income from state fees is mainly associated with the amount of BGN 4,000,000 paid by the NEC-PLC for permits issued for the design of a new nuclear power plant.

The total amount of the expenses during this year is BGN 4,762,131. The incurred expenses include costs



of materials, hired services, staff remunerations, social security payments, subscription to memberships in international organizations, short- and long-term business trips abroad, business trips in the country, etc. A significant portion of the expenses during the year accounts for the consulting services. They are conditioned by the nature of the NRA's activity and are related to the surveys, researches and professional reports assigned to hired consultants with regard to the control exercised over the safe use of nuclear energy and sources of ionizing radiation.

POWER UNITS OF THE KOZLODUY NPP

Units with WWER-440 Reactors

Units 1 to 4 are in operational condition E, where the reactors are cooled down and the nuclear fuel is removed from the reactor cores. The irradiated fuel is stored in the Spent Fuel Pools (SFP) as in Unit 1 and Unit 2 it is placed on the lower racks only.



Upon considering the long term operation of the units in condition E and the requirements for efficiency of systems and equipment for ensuring safety in this condition, some changes have been made to the operational documents. They regulate the tests and control over the condition of Structures, systems and components (SSC) that are of essence for the safety. The safety of the units in condition E is ensured by the minimum required staff with the appropriate qualification. All primary and secondary circuit systems are kept on stand-by by maintaining appropriate water chemistry regimes

ensuring equipment passivation. The rate of corrosion processes is minimized and stabilized in time. With the NRA approval, a technical decision for Unit 3 and Unit 4 was implemented providing additional opportunity for emergency water supply to the SFP with service water.

The only operational event in these units occurred on 11 January 2007, when during planned tests of Unit 3 one of the three pumps of the system for emergency flooding of the core did not start. The subsequent inspection discovered the cause for failure – control circuit fault. No operational limits or conditions were violated during the event. The event evaluation on the INES scale is level 0.

Units with WWER-1000 Reactors

Units 5 and 6 of the Kozloduy NPP operate in compliance with the terms of the operating licenses issued and are currently completing the 14th and 13th fuel cycle respectively. The two units operated mainly in their base regime of nominal power. The reliable and safe operation of the units is evident from the safety indicators “Number of unplanned actuations of the reactor scram system for 7000 hours” and “Number of power reductions with more than 20%”, shown on the figures below.

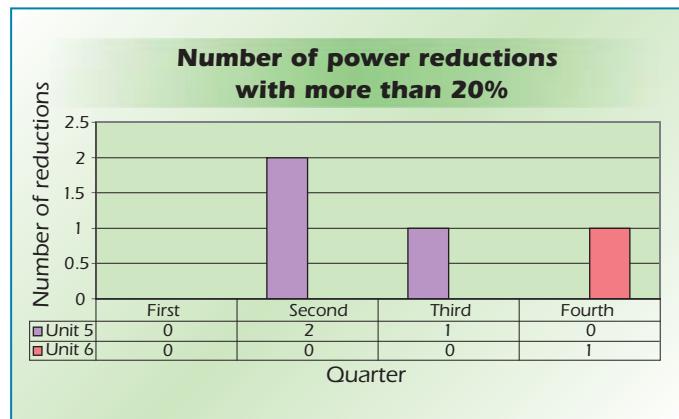
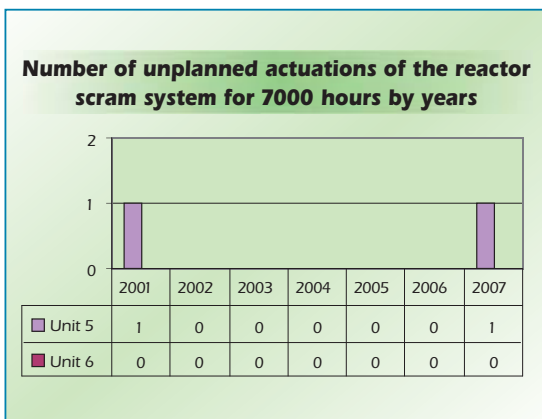
The average indicator of WANO for reactors of the WWER-1000 type is about one scram on every two years. The index values for Unit 5 and Unit 6 are one of the best. The date 22 November 2007 marked 11 years since the last unplanned scram of Unit 6.

The step by step replacement of the fuel assemblies of the units with a new type of fuel assemblies, TBCA, continues. During the planned annual outage in 2008 the cores of both Units will be entirely loaded with the new type of fuel. Besides, a full replacement of the absorbing parts of the CE CPS with new ones was realized in



both units which allows a 10-year stay in the core. The indices “Nuclear Fuel Reliability” for Units 5 and 6 shown on the chart reflect the tightness of fuel elements and demonstrate the good condition of fuels in the past fuel cycles of the units.

The quality of the maintained WCR is evaluated by using a chemical indicator expressing the relation between the actual pH values, electrical conductivity and contained impurities with the values determined by the respective limits of normal operation. For Units 5

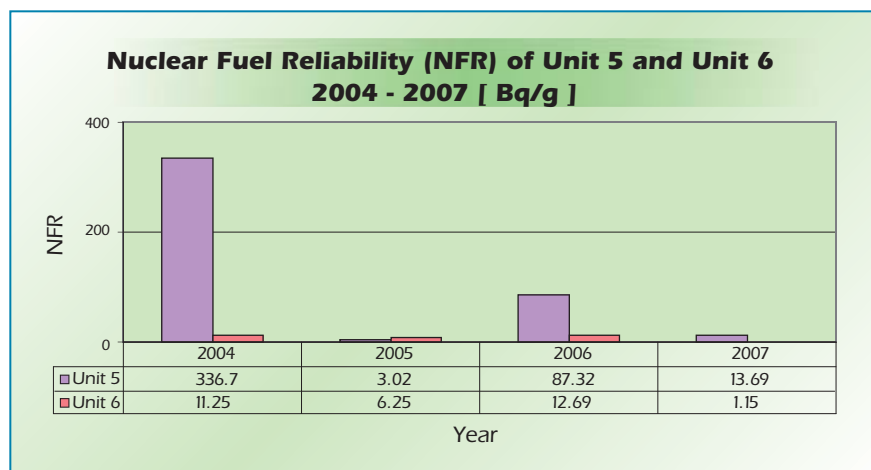


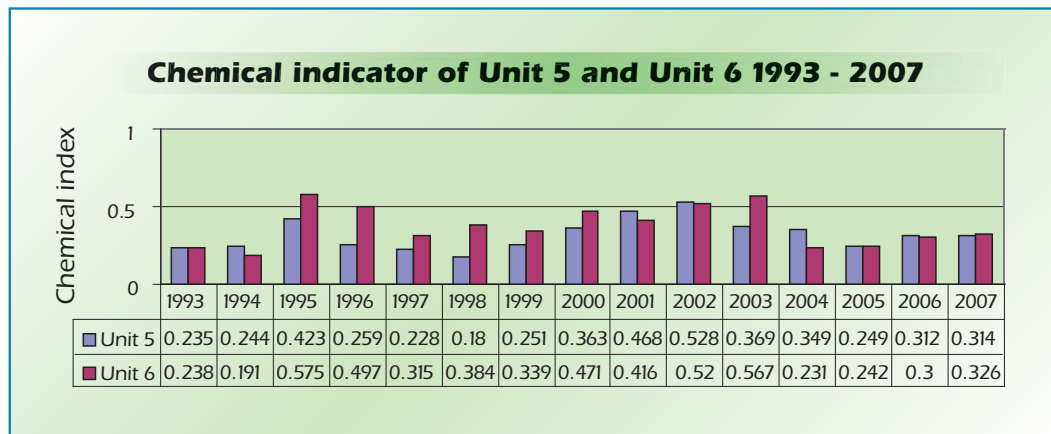
and 6, this indicator demonstrates maintaining of an optimal water chemistry regime and achieved low level of corrosion of construction materials of the secondary circuit technological equipment. The stable tendency of the indicator is shown on the chart below for the period 1993-2007.

The system preparedness for safety of work is shown on the following figures.

Maintaining a high level of preparedness and reliability of these systems ensures the third level of the defense in depth and reduces the probability of core damage in all internal initiating events.

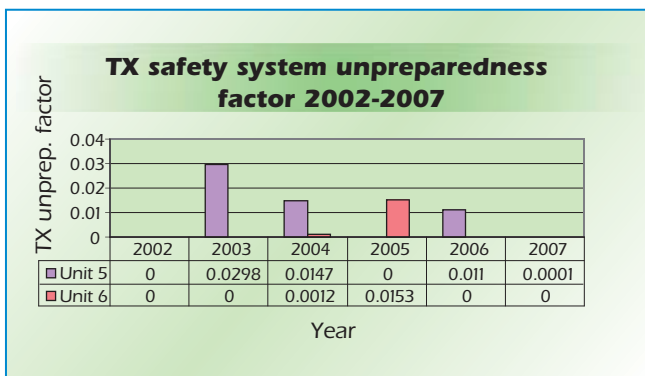
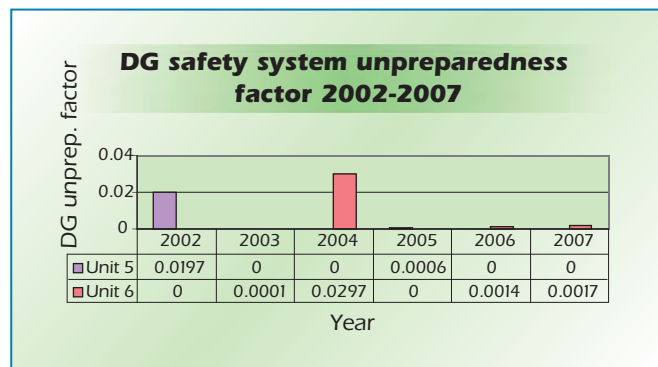
The final phase of the Units 5 and 6 Modernization Programme was completed in 2007. From the initially defined 212 measures, 210 were applied, and the other two are in a process of application:



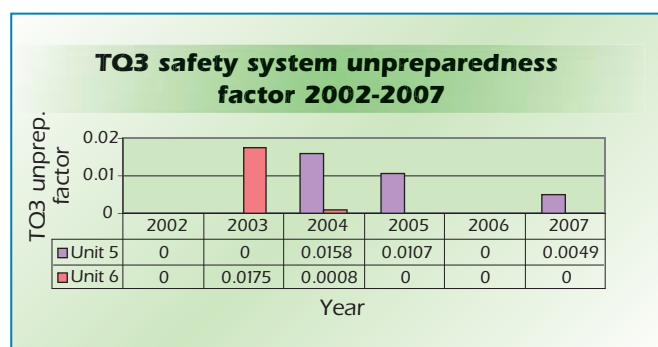


- Implementation of the system for visual indication of safety parameters
- Implementation of the system for constant control and support of the major primary circuit WCR indicators.

The implementation of the Modernization Programme is made within the estimated budget and in compliance with the terms of the Units' operating licenses.



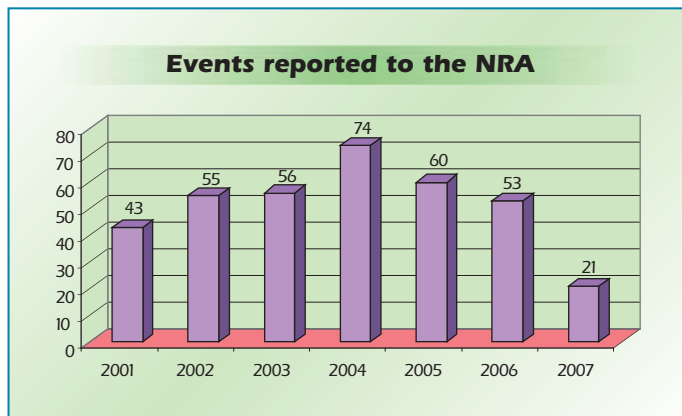
In 2007 sixteen operational events were registered on Units 5 and 6 that should be reported to the NRA in compliance with the Regulation on the Conditions and Order for Notifying the Nuclear Regulatory Agency on Events in Nuclear Facilities and Sites with Sources of Ionizing Radiation.



OPERATIONAL EXPERIENCE FEEDBACK

In 2007, the Kozloduy NPP has reported a total of twenty one events to the NRA. Twenty events were reported under the Regulation on the Conditions and Order for Notifying the NRA on Events in Nuclear Facilities and Sites with Sources of Ionizing Radiation, all of which belong to the “deviations from normal operation” category. One event was reported by the decision of the license holder. The distribution of events by units and their evaluation on the international INES scale are provided in the table below.

Events reported to the NRA		Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Other	Total
Under the Regulation	Level 2 – Incident	0	0	0	0	0	0	0	0
	Level 1 – Abnormality	0	0	0	0	0	0	0	0
	Level 0 – Deviation	0	0	1	0	8	7	3	19
	Beyond the scale	0	0	0	0	0	1	0	1
Beyond the Regulation criteria		0	0	0	0	0	1	0	1
Total		0	0	1	0	8	9	3	21



As it is evident from the data above, in 2007 no incidents or failures (events of level 1 or higher on the INES scale) have occurred at Kozloduy NPP. Keeping the positive tendency for reducing the number of reported operational events is also observed. This reduction is significant for the last year and can be explained with the improved condition of the plant’s safety as a result not only of the major Units 5 and 6 Modernization Programme completion, but also the regular implementation of the policy for thorough analysis of causes for operational events and undertaking effective corrective measures for preventing reoccurrence. The training of the

operating staff and management team in error prevention techniques has also contributed to the reduction of the number of events.

Regardless of the good results achieved in the prevention of events, the Kozloduy NPP continues to optimize its activities for the use of operational experience. For this purpose, in September 2007 a new Control and Analysis Departments was created in PP-2, which will be involved in the analysis of the plant’s and international operational experience. The newly created department is directly subordinated to the chief engineer of PP-2, which provides the experts of the department with a greater independence and is expected to lead to increasing their objectivity.

Events of Public Interest

On 5 April 2009, 9.00 am, transportation was initiated of radioactive waste (RAW) from a RAW processing facility On 5 April 2009, 9.00 am, transportation was initiated of radioactive waste (RAW) from a RAW processing facility (RAWPF) to a location for long term storage of two reinforced-concrete containers with

packages of super-compacted solid RAW. While driving around a curve, one of the containers fell off the vehicle platform on the wayside of the road and some of the packages contained in the basket were scattered. The accident area was fenced and access to it was blocked. By 1:40 pm the scattered packages of RAW were loaded in the container and then transported to the location for long term storage. After gathering the packages and cleaning the area, a scan was performed: the results showed that there were no signs of radioactive contamination in the area.

The events of a reinforced-concrete container falling off a 1.5 meters height were foreseen when designing the containers, which were calculated and tested for such kind of falls. The falling of the container did not violate the limits of safe operation. It was established that the integrity of the fallen packages of RAW was not affected and the area was not radioactively contaminated as a result of the event. The staff involved in the process of elimination of consequences did not receive exposure dose over the daily limit.

The event evaluation on the INES scale was level 0.

The reason for the container falling off was the truck driving around a curve at a speed of 25 km/h which is over the permitted speed of 20 km/h. The driver had the required qualification for transporting radioactive material but the accumulated routine driving along the same routes lead to ignoring the risks which can be caused by additional factors, such as inadequate fixing of containers to the platform, bumps on the road bed, etc.

For the purposes of preventing similar events, instructions were provided for strict adhering to the speed limits to all drivers qualified to drive RAW transportation vehicles. The persons in charge were instructed to fix the containers on the vehicle platforms in a reliable manner and then to inspect and record their preparedness for transportation. An order was issued for all RAW transportation vehicles to be equipped with tachographs.

Analysis of Operational Experience at the Kozloduy NPP

The Kozloduy NPP maintains an extensive database of the recorded failures and defects. After the initial review, the events with respect to safety are thoroughly analyzed in accordance with the established methodology. The methodology combines the methods of assessment of significant events (ASSET) with one of the most common method of human factor analysis in the world, HPES.

Most of the direct causes for occurrence of the events reported to the NRA are equipment failures most of which are detected during the regular tests of safety systems. From the summary analysis of the key causes for the occurrence of events, focus should be placed on obtaining updated documents from the equipment manufacturers with respect to its use and repair, and on observing the requirements of procedures by the staff.

Solutions were found to two problems known from previous years and related to failures of 6 kV breakers type ZAK-1 and of spring lock washers securing M52 nuts against self-unwinding, respectively. In the first case the instructions for use of the breaker was modified and technical means were provided for the implementation of compensation measures. Following the implementation of those, the occurrence of such events was prevented. In the second case, due to failure of the spring lock washer, M52 nut is coming loose which causes inoperability of pumps of the emergency core cooling system. Following the implementation of corrective measures, including changes to repair procedures, no such event has occurred.

There is still a tendency to study a larger number of events in other plants, as the basic sources of information used are the WANO databases and the IRS of IAEA. In 2007, the NRA continued to provide assistance in ensuring access to the IRS system to experts in the field of nuclear energy.

Main Conclusions

The generated and used methods of event analysis containing elements of the HPES methodology which makes a comprehensive review of the human factor is a precondition for a thorough analysis of events. Supporting the analysis with consideration of the human factor impact contributes to a correct clarification of the key causes and a proper identification of the corrective measures. The significant reduction in the number of events reported to the NRA is a clear evidence of this fact.

Adequate corrective measures for prevention of reoccurrence are being applied to the discovered root causes.

A common world tendency is when analyzing events to pay special attention to the quality of instructions and procedures and whether they are followed. A greater attention should be paid to the operational records quality assessment – maintaining and adhering to them helps to detect low-level events and “near events” before occurring as real ones.

NRA Independent Analysis of Events

In order to enhance objectivity while making the independent assessment of events by the regulator at the end of 2007 a group was formed at the NRA on operational experience analysis comprising of six experts from different professional fields. The main tasks of the analysis group include:

- Making an independent analysis of root causes for significant events and identifying the relevant corrective measures to enable the NRA to assess whether the measures suggested by the operating organization are adequate to prevent reoccurrence of events;
- Transferring the accumulated operational experience to international organizations, and screening foreign operational experience and its dissemination within the country;
- Carrying out special inspections with respect to events in nuclear plants.

Safety Indicators

The safety indicators are an integral part of the operational experience feedback system. According to a requirement of the operating licenses of the Kozloduy NPP Units, both power productions (PP-1 and PP-2) should submit quarterly results of certain safety indicators which are also a kind of self-assessment of the effectiveness and safety of the Units. The indicators reported to the NRA are subject to regular reviews and discussions between the license holder and the regulatory authority.

In 2007, an improved specificity was introduced to the reported indicators by clarifying together with the NPP representatives 14 safety indicators for the operating Units 5 and 6, and 10 indicators for Units 1-4 maintained in condition E. In the selection of these indicators the national legal framework, the IAEA recommendations, and the world regulatory practices were considered.

The safety indicators of the Kozloduy NPP show that the plant is reliably operated, the major safety systems are maintained on stand-by and in a good condition. The nuclear fuel is in a good condition and the maintained water chemistry regime ensures the lifetime of secondary circuit equipment.

In the execution of the 2008 NRA Annual Inspection Plan the analyzed safety indicators of the Kozloduy

NPP were also considered by including inspections focused on the operation of units, operational experience feedback, and the plant's system of self-assessment indicators. One of the objectives of the forthcoming inspections is to study in detail the low-level events analysis. During one of the inspections in 2007, some weaknesses were discovered in the procedures for functional testing of safety systems. The 2008 inspections should establish completeness and correctness of test result recordings.

REGULATORY INSPECTIONS

In 2007, all nuclear facilities in the country were subject to regulatory control. 44 regulatory inspections were carried out for which 2,666 man-hours were spent and 115 findings, comments and recommendations were made. The detailed data on the subjects and topics of inspection are provided in Appendix 1 hereto.

Results of Major Inspections Carried out at Kozloduy NPP

A regulatory inspection of safety management was carried out at the Safety and Quality Department of Kozloduy NPP. The purpose of the inspection was to assess the progress with respect to the 2005 findings. The following key areas were inspected: safety policy and management duties to maintain a high level of safety; safety management system – criteria, major and auxiliary processes, procedures; self assessment by indicators; task execution monitoring and quality assurance audits. The new revisions were discussed of major documents, such as “Kozloduy NPP Safety Policy”, “Kozloduy NPP Management Declaration”, and the company’s business plan. The NRA Commission established that progress was made compared to the condition in 2005 but an insufficient order and specificity of documents was reported. A positive assessment was made to the development of the system of self-assessment indicators on a corporate level, but no effect of its implementation was observed. The S&Q Department did not sufficiently consistently exercise its powers to identify corrective measures with respect to established weaknesses. The final conclusion of the Commission is that new elements of safety management were applied but greater efforts are required to complete the development of a formalized and effective system.

At the end of May a NRA Commission assessed the compliance with the recommendations by the Engineering Support Department of PP-2 made two years ago. The inspected areas include: changes in the organizational structure; joint engineering management: analysis of the control test results; management of the measurements, operational instructions and emergency procedures, and the operational experience feedback system. The Commission concluded that the Engineering Support Department of PP-2 is an effectively operating organizational unit employing staff with high technical potential and possibilities to ensure the research and technical support of the safe operation of the Units.

The operation of Kozloduy NPP Units 5 and 6 in the 14th and 13th fuel cycle, respectively, was initiated following the positive conclusion of the inspections made by the NRA on their preparedness. The completion of the total amount of planned repairs, the planned modernization activities, the quality of repairs, the results of post-repair tests and control tests of SSC important to safety were also inspected. Special emphasis was given to the safety system preparedness, which was proven with specific tests performed by established methods. An inspection was made of the results of the nondestructive metal monitoring. The data on fuel reliability and its physical properties were analyzed. A review was made of all data on the maintained primary and secondary circuit water chemistry regime. The quality of operational records, the modifications made, and the staff availability and training were assessed. Information was provided relating to the radiation protection of staff and external organizations. The actual condition of systems and premises was inspected. Weaknesses were reported in the operational order and the condition of equipment and premises. Most weaknesses were eliminated which was confirmed by the NPP reports. The Commission recommended making further efforts and investing additional funds to achieve significant improvements with a view to the forthcoming international missions. Special consideration was given to the necessity of making reasonable steps towards improving the condition and operation of Auxiliary Building 3. As a result of the recommendations made, the Kozloduy NPP developed a programme for improving the operational condition of AB-3, including short- and long-term steps. At the beginning of December the NRA performed a special inspection to assess the current condition, and the

result of the steps made so far and the planned long-term steps. The Commission found out that a significant progress was made with respect to the operational condition improvement. No weaknesses were observed of the technical support, the radiation protection and the maintained water chemistry regimes. However, there was still a weakness in integrating the operational records in a unified system. These documents did not clearly provide the operational relations, there were weaknesses in keeping the operative journals, and there were omissions in the system tests and control. Recommendations were made as to improving the equipment and cable labels, removing the unnecessary objects, and painting the premises and constructions.

With respect to the decommissioning (DE) of the Kozloduy NPP Units 1-4, in December 2007 an inspection was made to assess the Kozloduy NPP preparedness to decommission the WWER-440 Units. It was found out that the weaknesses of the organizational structure optimization and of the preparation for decommissioning of the Decommissioning Department were still not completely eliminated. Improvements were also required in the development of lower-level documents, such as programmes for dismantling of individual systems and equipment, technical project for complete radiological investigation of the Units, clear definition of all necessary activities for ensuring safe management of the operational RAW. It was also required to impose strict control by the license holder over the contractors of the delayed DE projects, to develop the plan for decommissioning in a satisfactory level of completeness, as well as other documents relating to issuing a permit for decommissioning of Units 1 and 2.

In November an inspection was performed on the RAW management at the PP-1. The collection, characterization and sorting out of liquid and solid RAW, their internal and external report, processing and storage, the existing RAW management facilities at AB-1 and AB-2, their technical condition and service were inspected, as well as projects for the development of new facilities. An improvement was observed in the organization, planning, performance and analysis of the RAW management activities, and good knowledge of the staff on the issues in this field. Some weaknesses were established in the field of organizational structure effectiveness, waste minimization, planning and analysis of future activities, and in the distribution of duties for RAW classification



and management between the Kozloduy NPP and RAW SE, the vacation of premises and warehouses with flammable RAW, and the delays of new RAW management projects and their licensing.

The NRA Commission performed a topical site inspection on radiation monitoring in normal operation of the Kozloduy NPP. The inspection programme included the organization of radiation monitoring, and the condition of work documentation and radiometric and dosimetric instruments. The compliance with the major effective documents, and the development and implementation of new procedures and methods were inspected. During the workplace inspection it was established that the recording of the

monitoring results was made by following strict programmes and instructions. A reliable radiation monitoring was ensured on the site by using the available measuring devices and methods. Good interaction among the different units was observed. The organization of control, the staff training and the performance of activities were in compliance with the regulatory and license documents and the good international practices.

A NRA Commission inspected whether the recommendations of the European Commission on the radioactive discharges to the environment were followed. The purpose was to establish the level of applying the EC Recommendation 2004/2/EURATOM on providing standard information on radioactive discharges to the



environment. The Commission performed an inspection of the following: implementation of the developed documents under the recommendation (programmes, instructions, methods); recording, reporting and archiving the measurement results; technical characteristics of equipment, condition of the systems for control of radioactive discharges to the environment. The Commission found out that the activities initiated in 2006 for implementing the programmes for following the recommendation were performed within the projected terms by the end of 2008. In addition to the programmes, a single assessment was made of the emission of ^{14}C and ^3H from ventilation stack 1 of Unit 6 and installation of a new water station WS-6 to the automated information system for radiation control of technological discharge and wastewaters.

NUCLEAR FACILITIES LICENSING REGIME

Permits for Modification

Under the ASUNE any modification leading to: changes in the structures, systems and components (SSC) related to the nuclear safety and radiation protection in a nuclear facility; conditions and limits on safe operation of nuclear facility based on which the operating license was issued; internal rules for performing the activity, including instructions, programmes, technical specifications and others enclosed to the nuclear facility operating license, should be made by the license holder after issuing a permit by the NRA. Complying with the provisions of the ASUNE and based on a detailed assessment of modifications impact on safety, a total of 53 permits for modifications in nuclear facilities were issued last year. The permits are distributed as follows:

Kozloduy NPP

- Units 1 and 2 – 2
- Units 3 and 4 – 8
- Units 5 and 6 – 38
- General plant installations – 3

SE Radioactive Waste

- SD RAW Kozloduy – 2

More important modifications made as a result of the permits issued

- Modernizing the prime cause signaling devices under the RSS/AWP system of Units 5 and 6
- Modernizing the autonomous radiation control system for each safety system of Units 5 and 6
- Replacing the secondary circuit UCTM of Unit 5
- Replacing the power supply of CE CPS drives of Unit 6
- Activities for enhancing safety upon rupture of main feed-water pipeline in the containment of Power Unit 6
- Installation works for implementation of the system for visual indication of safety parameters of Units 5 and 6
- Introducing a system for control of critical parameters in emergency and post-emergency situations to Units 5 and 6
- Changing the structure of SRCC for RAW storage
- Ensuring a further possibility for SFP emergency water supply with service water of Units 3 and 4.

Permits for Import, Export and Transport of Nuclear Material

According to the licensing regime, the NRA may issue permits to import, export and transport of nuclear material. Eight permits were issued to the Kozloduy NPP as follows:

- Import of nuclear material – 2
- Export of nuclear material – 2
- Transport of nuclear material – 4.

Current Licensing Activities by Nuclear Facilities

Belene NPP – Permits for Design

In May 2007, the Chairman of the NRA issued to the NEC-PLC a permit to design Unit 1 of the Belene NPP, and in June 2007 of Unit 2. This became possible after the NRA experts made a thorough assessment of the entire documentation submitted by the NEC with regard to the issuing of permits. The assessment confirmed that the documents submitted were in compliance with the provisions of the ASUNE and the regulations for its implementation, and that the conditions of the Order on the Belene Site Approval issued by the NRA Chairman were met.

IRT 2000 Research Reactor

The review and assessment of the nuclear facility design, submitted by the INRNE BAS, continues as part of the design approval process.



SD RAW

In April 2007 an application was submitted to the NRA for renewing the SD RAW Kozloduy operating license, which expires in April 2008. The application is accompanied by the documents required under the ASUNE, including the Updated Safety Analysis Report (USAR) of the nuclear facility. Following the preliminary review of documentation made by the NRA, SD RAW was required to submit additional documentation on issues important to justification of the facility safety. Some of the required documents were submitted at the end of the year, and the regulatory review for the operating license renewal continues.

Dry Spent Fuel Storage Facility

The licensing procedure is at technical project approval stage. In August 2007 the Kozloduy NPP submitted to the NRA a new version of the Interim Safety Analysis Report revised following the comments sent by the NRA for correcting and completing the report. For the assessment of the new ISAR version the NRA requested the assistance of Atomenergoprojekt and the Sofia University St. Kliment Ohridski for independent expert analysis of parts of the report.

Licensing Regime for Specialized Training

Issued Licenses

Under the ASUNE, licenses can be issued to individuals and to legal entities for carrying out:

- Specialized training in activities performed in nuclear facilities
- Specialized training and issuing certificates for qualification for activities performed with sources of ionizing radiation.

Last year, after reviewing the applications and the enclosed documents, the Chairman of the NRA issued

licenses for specialized training and issuing certificates for qualification for activities performed with sources of ionizing radiation to the National Center for Radiobiology and Radiation Protection and to the Military Medical Academy.

Certificates for Qualification for Use of Nuclear Energy

Under the ASUNE, following an examination successfully passed in the opinion of the Qualification Examination Commission, the Chairman of the NRA issues certificates for qualification to persons performing activities related to ensuring nuclear safety and radiation protection in nuclear facilities. In 2007, ten sessions of the Qualification Examination Commission were held and 19 persons were granted certificates for qualification for the respective operational positions at the Kozloduy NPP as follows:



- 1 for the position of chief shift supervisor of nuclear power plant, Units 1-4;
- 1 for the position of shift supervisor of nuclear power unit, Units 3 and 4;
- 3 for the position of shift supervisor of nuclear power unit, Units 5 and 6;
- 4 for the position of senior reactor operator, Units 3 and 4;
- 6 for the position of senior reactor operator, Units 5 and 6;
- 4 for the position of controlling physicist, Units 5 and 6.

STATUS OF THE RADIATION PROTECTION IN KOZLODUY NPP

The control over the condition of radiation protection which is being carried out by the NRA includes analysis and assessment of the information provided by the Kozloduy NPP to the NRA relating to the gaseous and liquid discharges, doses of the staff, status of the radiation control systems, compliance with the regulatory requirements for radiation protection of the documents submitted for issuing permits for modifications and operating licenses.

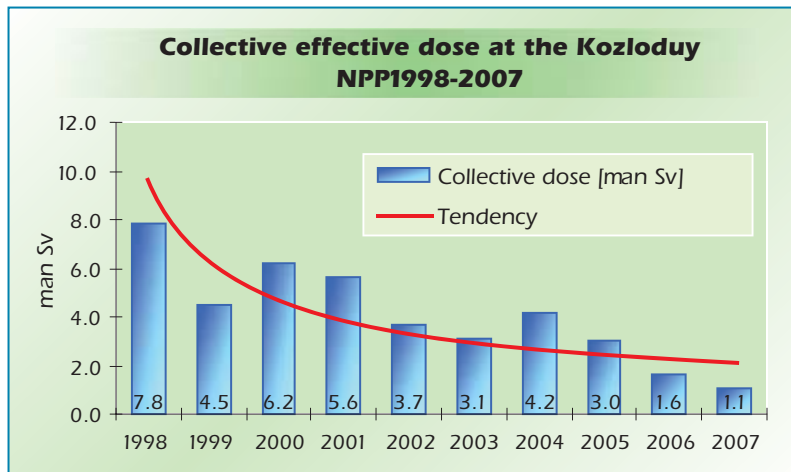
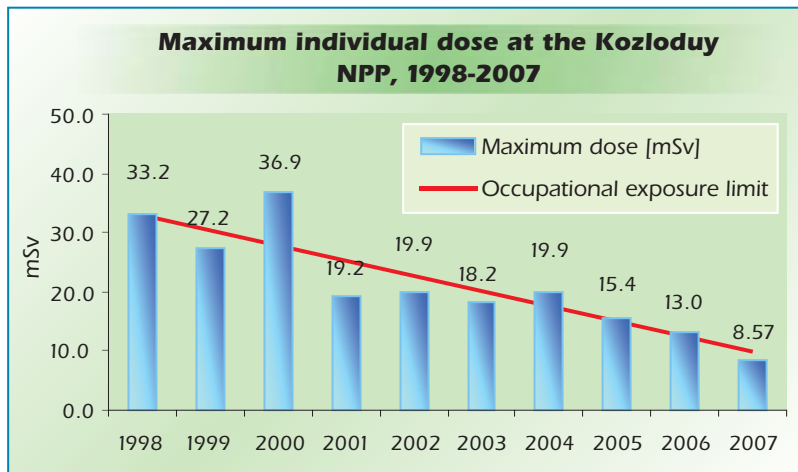
Occupational Exposure of Staff

The collective dose from external and internal exposure of the 3181 controlled persons at the Kozloduy NPP in 2007 was 1060.46 man.mSv. For the PP-1 and PP-2 staff the collective effective dose was 719.16 man.mSv, i.e. 68% of the total collective effective dose. For the staff of other structural units of the Kozloduy NPP the collective dose was 111.13 man.mSv (10%), and for external organizations 230.17 man.mSv (22%). The individual doses from internal exposure are below the levels of registration, 1 mSv, and are evaluated as zero in accordance with the Regulation 35 of the Ministry of Health of 7 November 2005 on the Conditions and Order of Performing Individual Dose Control of Persons Working with Sources of Ionizing Radiation.

Compared to the number of reactors, in 2007 the collective dose was 0.4 manSv/unit. This dose is lower than the average value of the indicator of the PWR type, 0.60 manSv/unit, according to the data in the WANO'2007 Performance Indicators Report.

In 2007, the average individual effective dose was 0.34 mSv distributed as follows:

- For PP-1 staff – 0.37 mSv
- For PP-2 staff – 0.56 mSv

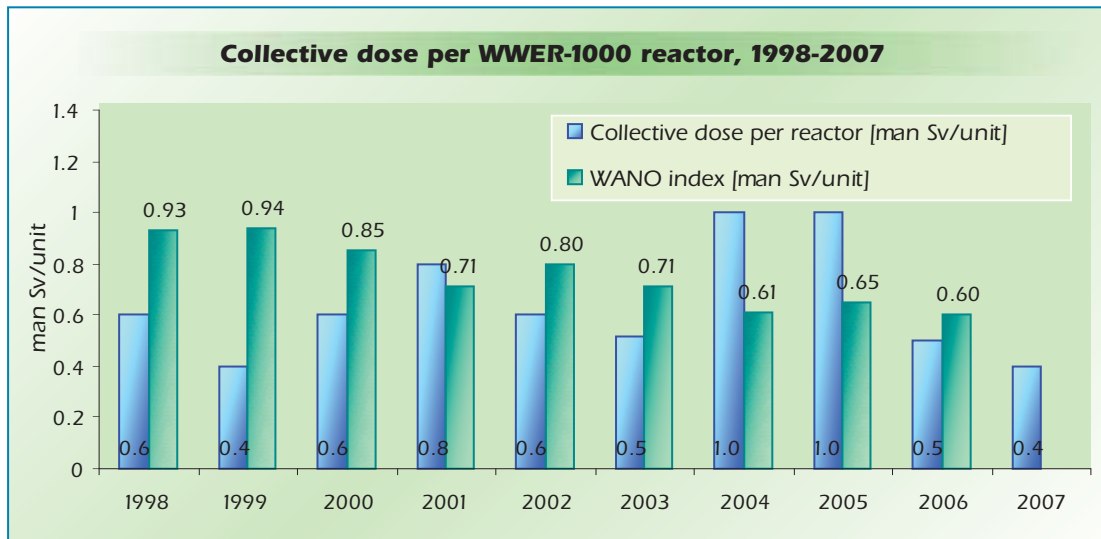


- For other structural units of the Kozloduy NPP – 0.20 mSv
- External organizations – 0.20 mSv.

In 2007, the maximum individual dose per PP-2 employee was 8.57 mSv which is 17% of the limit determined by the RBNRP for occupational exposure for one year.

In 2007, the collective effective dose at the Kozloduy NPP is 35% lower than the previous year. The collective

dose for external organizations' staff has decreased two times which shows that the planning and control of repair activities performed by external organizations has improved.



Radioactive Releases, Population Exposure Dose, Environmental Monitoring

The limits for discharges of radioactive substances to the environment in normal operation of Kozloduy NPP are included in the Units' technical specifications containing the limits and conditions for operation. These limits are updated from time to time following the tendencies of continuous reduction of real discharges to the environment and in accordance with the good international practices.

At the end of 2006, the Kozloduy NPP submitted to the NRA an application for issuing a permit for changing the limits on gaseous discharges from the ventilation stacks of the Kozloduy NPP site. The new limits set a condition of an annual population exposure dose not exceeding 50 µSv. The annual limit legally provided by the Regulation on Ensuring the Safety of Nuclear Facilities is 250 µSv generated as a result of the impact of liquid and gaseous discharges in normal operation of the Kozloduy NPP. The dose evaluation was made with computer modeling by the PC CREAM methodology.

In 2007, following a thorough analysis of the submitted documents the NRA issued the respective permits for changing the limits on discharges of each individual Kozloduy NPP unit. The specific values of limits are provided in the table below.

Discharge components	RNG [TBq]	I-131 [GBq]	LLA [GBq]	H-3 [TBq]	C-14 [GBq]
Old limits	25 550	511	730	-	-
New limits	5 600	65	50	250	30 000

In 2007, the ventilation stacks of the Kozloduy NPP released to the atmosphere 1.190 TBq radioactive noble gases, 0.104 GBq Iodine-131, and 0.070 GBq long-lived aerosols. These values are significantly lower than the 2006 values and represent 0.02%, 0.16% and 0.14%, respectively, of the new limits introduced in 2007. The total activity of technological discharge and waste effluents into the Danube River during the year is 0.283 GBq,

and of tritium is 22.117 TBq and are 0.04% and 12% of the annual limits, respectively.

The organization of radio-ecological monitoring of the environment is specified in programmes, which are approved by the NRA and are in conformity with the recommendations of the IAEA and the best international practices. The programmes define the subjects of control, frequency, controlled indicators and methods of analysis. The Kozloduy NPP also carries out model assessment of the population exposure dose in the area of the NPP as a result of the radioactive discharges to the atmosphere and hydrosphere. Besides the radiation monitoring of the environment, radiation measurements on the site are also carried out. Subjects of control are the gamma background, underground waters, atmospheric precipitations, vegetation, and soil. For the purposes of radiation monitoring of underground waters, samples from over 180 drilled wells on the site are controlled. In 2007, a total of 3870 laboratory analysis and measurements of 2398 environmental samples (including atmospheric air, drinking, surface and underground waters, soils, and foods) were carried out. The analysis of the results of radiation control and model assessments of the population exposure dose in the Kozloduy NPP area shows that they meet the requirements of the national legislation.

The maximum effective exposure dose of the population from the liquid and gaseous discharges of Kozloduy NPP to the hydrosphere and atmosphere in 2007 was 4.57 $\mu\text{Sv/a}$ and was many times lower than the annual dose per person from discharges provided in the Regulation on Ensuring the Safety of Nuclear Facilities – 250 $\mu\text{Sv/a}$. It accounts for only 0.2 % of the population exposure by the natural radiation background typical of that geographical region – 2.4 mSv/a. The evaluation of the maximum effective dose also includes the estimated share of tritium and ^{14}C emissions which is determined based on pilot measurements and data published by the Scientific Committee on Effects of Atomic Radiation 2000.

The comparison between the 2007 data and the data from previous years and with the data prior to the plant commissioning proves the absence of unfavourable tendencies in the radioecological situation as a result of the Kozloduy NPP operation. The radiation parameters are within the normal range with background values typical of the region.

Radiation Situation in the Restricted Area

The restricted area (RA) is under constant control of the radiation situation exercised with the use of automated information systems for remote measurement of the dose rate, the specific volume activity of air in the premises of the units and of water in the technological circuits.

A specific programme for radiation protection and estimated dose budget was developed for the PAO of Units 5 and 6. The implementation of programmes was controlled by the NRA. The necessary timely steps were taken, during the repair activities, for localizing the contaminated areas, performing decontamination, placing limitation barriers and labels and exercising further radiation control. Following the completion of repair works, a comparative analysis of the actually received exposure dose and the dose budget was made as a result of which some measures were suggested for even better planning of the next outage and effective implementation of the ALARA principle. If necessary and at the recommendation of the NRA different specific programmes were developed for radiation protection of particular non-standard operations with an expected increased exposure dose.

The analysis of the results of the radiation control exercised in the RA of the Kozloduy NPP Units in 2007 shows that the controlled parameters do not exceed the permissible values determined in compliance with the RBNRP. The protective radiation barriers have been properly functioning and have ensured effective protection to the RA staff.

KOZLODUY NPP OPERATION CONTROL

The safety and radiation protection control of nuclear operations at the Kozloduy NPP is exercised by the Kozloduy NPP Site Operation Control Department. By making daily inspections, the inspectors of the department control the compliance with the limits and conditions of safe operation, observation of the regular test schedules, condition of operational order in the premises, and compliance with the provisions of the licenses and permits issued. The daily condition is reported and discussed at meetings with the Deputy Chairman of the NRA.

In 2007, the following specific operational activities were subject to increased control:

- Removal of Units 3 and 4 from the NEPS, cooling and setting them in condition E
- Movement of Units 1-4 SNF
- Radiological investigation of the equipment and premises of Units 1 and 2
- Performance of activities under the programme for experimental commissioning and maintenance of secondary circuit AMETA WCR of Unit 6
- Control of discharge through Sempell valves of Units 5 and 6
- Operation of Units 5 and 6 at the end of the fuel cycles
- Application of safety measures during the draining activities of EWT – Unit 6 during the PAO'07
- Meeting the requirements of the programmes and safety measures during the preparation and repair works of a pipeline section feeding steam to the Unit 6 HPD.

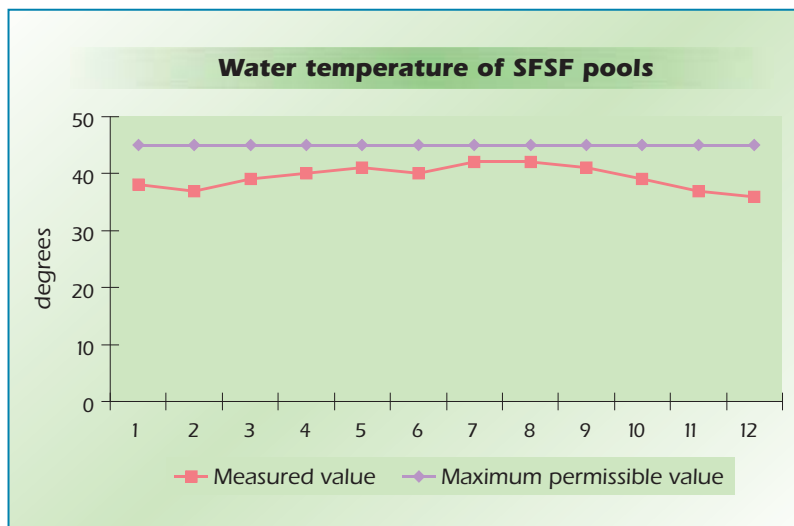
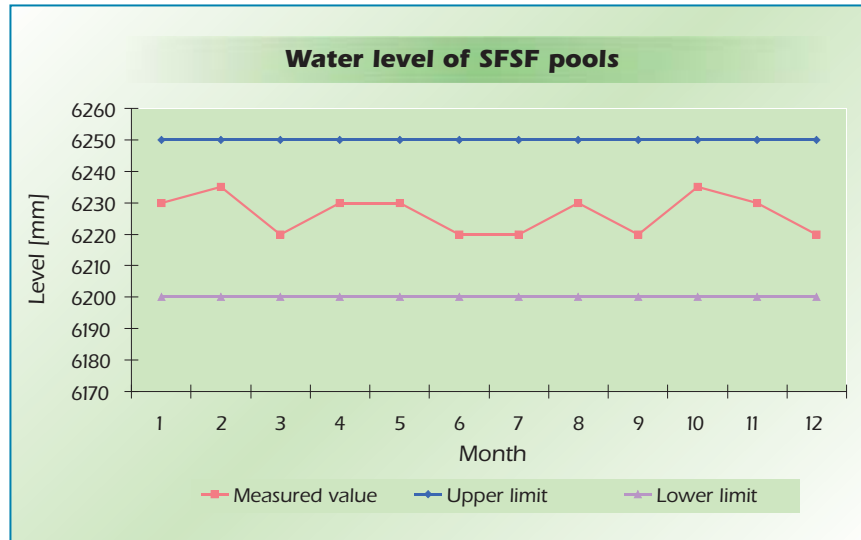
In 2007, the inspectors of the department participated in the discussions of the following operational events:

- Falling of a container with RAW during the execution of technological transportation operations
- Pipeline leakage in the AB-3 entrance link corridor
- Contamination of premises at the AB-3
- Failure of the heat exchanger of a planned cooling system
- Shutting-off of TG-10 for repairing secondary circuit steam leakage.

SPENT FUEL STORAGE FACILITY (SFSF)

The spent nuclear fuel from WWER-440 and WWER-1000 reactors is stored in the SFSF pools in an appropriate water chemistry regime. A basic requirement for ensuring safety of SNF storage is maintaining the integrity of defensive barriers: cladding of the fuel rods, structure of the fuel storage pools, and structure of the ventilation system facility. For the purposes of maintaining the leak tightness of the SNF assemblies and of the SNF pools, the respective water chemistry regime (WCR) is observed in order to suppress

the corrosion processes. The efficiency of the SFSF systems and facilities is maintained in accordance with the requirements of the technological specifications and the operation instructions. The functional capacity of structures, systems and components is regularly inspected in order to find out any hidden defects and to guarantee their efficiency. The planned repair works were fully completed and thus the required efficiency of equipment was ensured. The programme for transporting 96 assemblies with SNF from WWER-1000 (8 containers) and 240 assemblies with SNF from WWER-440 (also 8 containers) to Russia was implemented.



The Kozloduy NPP submits to the NRA monthly reports on the operational condition containing specific parameters used for the assessment of the operational condition and safety. The quality of the maintained WCR is assessed with the chemical indicator. The level and temperature of water at the SFSF are maintained within the range of operational limits for normal use. The use of SFSF is made according to the technological specifications and effective instructions, and in compliance with the license for operation issued by the Chairman of the NRA.

RAW MANAGEMENT

The NRA carries out the state regulation of the RAW safe management by applying the permit regime under the ASUAE and exercising control over the compliance of requirements and standards for nuclear safety and radiation protection. In the performance of these activities the NRA is guided by the internationally adopted principles of safety in the RAW management and by the requirements of the relevant national laws and international documents.

RAW FROM THE Kozloduy NPP

The liquid RAW generated in the course of NPP operation represent liquid radioactive concentrates (evaporation concentrate (EvC) and organic RAW – water suspensions of spent resins and sorbents and small amounts of radioactively contaminated oils. The different liquid RAW follow different technological patterns and are stored separately in tanks at the auxiliary buildings (AB) of the Units.

The solid RAW are sorted at their place of generation according to radiometric characteristics and type of material. The solid RAW which are activated materials with a fairly high activity are stored in special facilities located at the main reactor halls of the Units 1-4 and in the AB-3 of Units 5 and 6. The generated low- and medium-level solid RAW are collected at specially designated for this purpose places from which they are transported to the RAW SE facility for processing and conditioning.

The amounts of RAW generated in 2007 and the amounts stored at the end of the year in the NPP facilities are illustrated in the table below:

RAW generated 2007			RAW stored as of 31 December 2007		
Solid [m ³]	Metals [tons]	EvC* [m ³]	Solid [m ³]	EvC [m ³]	Sorbents [m ³]
769	75	416	1962	6842	719

* Amount of liquid RAW (EvC) delivered to the RAW SE

The processing and conditioning of radioactive wastes generated from the Kozloduy NPP operation is carried out by the Specialized Department (SD) RAW Kozloduy of the State Enterprise Radioactive Waste (SE RAW). The SD RAW-Kozloduy facilities receive solid low- and medium-level short-lived RAW and evaporation concentrates (EvC), which are processed in order to be transformed into a form that can allow their safe storage and subsequent disposal. After the respective processing the received RAW are packed in a special reinforced concrete container (SRCC) and as a result three types of packages are obtained:

- SRCC-1 containing solid RAW which are not placed in a cement matrix
- SRCC-2 where the solid RAW are cemented with "pure" cement
- SRCC-3 where the cement matrix is made using liquid radioactive concentrate.

The following table provides data for the packages produced during recent years with accumulation, by categories.

Package type	2004	2005	2006	2007
SRCC-1	128	186	261	276
SRCC-2	10	28	73	132
SRCC-3	106	182	284	415
Total	244	396	618	823

Operational Condition of the SD RAW Kozloduy Facility

The operation of the nuclear facility for the Kozloduy NPP's radioactive waste management is carried out in accordance with the terms of its operating license. In 2007, some activities were performed, in compliance with the license terms, related to the enhancement of safety, such as the characterization of liquid RAW of the Kozloduy NPP in terms of radionuclides important for the long-term safety in their management, the measures included in the Schedule for Execution of Components, Details and New Installations, the Programme for RAW Management on the "Lime" Plant Site, etc.

The NRA renders an account of the radiation protection condition on a monthly basis. In 2007, the radiation parameters at all SD RAW-Kozloduy facilities were below the permissible limits, there were no hazardous radiation effects on the nuclear installation site and the Kozloduy NPP's site, and no violations or exceeding of the dose limits for occupational exposure of the controlled staff were observed.

One operational event was reported at the SD RAW Kozloduy during 2007 classified as a deviation "outside" the INES scale. The deviation did not cause any radioactive contamination, overexposure or injuries to the staff.

Regulatory Inspections

One inspection was held at the SD RAW Kozloduy in 2007 with the purpose of exercising current control on the compliance with the operating license conditions and examination of activities important to the safety of the nuclear facility. The following issues were considered during the inspection: organization of operation, receipt and sorting of RAW, characterization and inventory of RAW, control and documentation of the RAW movement, radiation protection and radiation control, emergency planning and preparedness, supervision, maintenance and repair of equipment, and quality management. As a result, instructions were given the observance of which would be subject to subsequent control by the NRA.

RAW FROM NUCLEAR APPLICATIONS

The RAW generated as a result of the use of radioactive substances in industry, medicine, agriculture, research activity and others are managed in a centralized manner in the Novi Han Near-Surface Repository for Radioactive Waste Specialized Department (SD RAW Novi Han NSR) of the SE RAW. The RAW generated during the last years in the country consists mainly of disused sealed radioactive sources and smoke detectors (SDt) which are usually delivered to the SD RAW Novi Han NSR without any preliminary processing and often in their original packaging and working containers.

In 2007, the following RAW were accepted for storage at the SD RAW Novi Han NSR:

Accepted RAW	Number of Sources	Main Radionuclides
Sealed sources	3856	Cs-137, Co-60
SDt	13681	Am-241, Kr-85
Gama irrigators	0	-
Other – uranium protections	24	Depleted uranium

The operation of SD RAW Novi Han NSR is carried out in accordance with the conditions of the operating license issued in July 2006. A Programme for Enhancement of the Safety of SD RAW Novi Han NSR of the SE RAW is implemented in compliance with the license terms. In 2007, the implementation of the next steps of the Programme was completed and reported as follows:

- Investigation of the condition of civil constructions and materials of the engineering facilities for disposal. Studying the Russian technologies for investigation of the condition of engineering barriers for RAW disposal

in repositories of the Radon type;

- Introduction of fire-resistant primary packages with the required solidity for placing RAW in the repository units;
- Protection against rain at the sites for RAW storage by developing a system of technical means;
- Reconstruction and expansion of the Data Center for Radiation Control and Monitoring;
- Equipping a warehouse for storage of radiation monitoring samples;
- Equipping of four workplaces for removal of sources from SDt;
- Developing a program for studying the condition of engineering barriers of the repository units for the purpose of assessing the remaining lifetime and operational lifetime of the RAW storage facility;
- Introduction of an integrated information database on the RAW management activities at the near-surface repository.

Site and environment radiation monitoring programs were implemented at the SD RAW Novi Han NSR and a system of indices for facility's safe operation was implemented. The results show that throughout the year the values of radiation parameters were within the normal range for the site. No deviations from the facility's normal operation were observed.

Regulatory Inspections

In 2007, eight inspections were held at the SD RAW Novi Han NSR intended to exercise current control on the compliance with the operating license conditions and examination of activities important to the safety of the facility. The main aspects of the inspection were: receiving the RAW at the facility, control and documentation of RAW movement, radiation protection of the staff, radiation control of the site and staff, safe storage of RAW, emergency preparedness, repair and maintenance of the facility and measures for enhancement of the facility safety. As a result, instructions and recommendations were given and the compliance with them will be subject to subsequent control by the NRA.

NATIONAL REPOSITORY FOR DISPOSAL OF RAW

Under the Strategy for Spent Fuel and Radioactive Waste Management of 2004 and Resolution of the Council of Ministers No. 683 of 25 July 2005, till 2015 the SE RAW should construct a National Repository for Disposal of RAW (NRD RAW) with money from the Radioactive Waste Fund. It is planned that the National Repository will be an engineering near-surface multi-barrier nuclear facility designed for the management of RAW from nuclear facilities and nuclear applications generated in the country. The repository will be of a module type allowing a step-by-step development of its different elements and gradual increase of its capacity. The expected amount at the first stage of its construction is 50 000 m³.

The selection of a site for the NRD RAW is made in accordance with the terms of the permit issued by the NRA. According to the permit, the selection of site for the NRD RAW should be made in four phases as the activities in each phase should be planned and executed in the form of a plan which is subject to the approval of the Chairman of the NRA. At the end of each phase of the site selection a report of the results of the performed activities will be submitted. In 2007, two reports were submitted to and approved by the NRA: the report for the implementation of the second phase "Collection of Data and Analysis of Regions", and the report for interim verification of the compliance with the permit conditions.

Regulatory Inspections

Under the 2007 Plan for the NRA Control Activity over Nuclear Facilities, in April an inspection was made of the compliance with the conditions of the Site Selection Permit. The main conclusions from the inspection are as follows:

- An organization was established ensuring efficient management of the process of site selection;



- Upon planning the major activities, the requirements of the legal framework and the Strategy for Spent Fuel and Radioactive Waste Management of 2004 were considered;
- The quality assurance system introduced to the SE RAW ensures quality of the activities and the obtained data in the NRD RAW site selection.

IRT-2000 RESEARCH REACTOR

With the Resolution of Council of Ministers No. 332 of 17 May 1999 the operation of IRT-2000 Research Reactor was terminated. Based upon a detailed cost-benefit analysis made in 2001 the Council of Ministers adopted a decision on the reconstruction of IRT-2000 into a low-power reactor.

The safety of the IRT 2000 Research Reactor is ensured through the implementation of measures stipulated in the program for nuclear safety and radiation protection that requires storing of the spent fuel in an appropriate water chemistry regime at the pit repository pool and maintaining the efficiency of basic systems, such as the dosimetric control system, the air ventilation and purification system IRT-2000 operational premises, and the WCR maintenance system. For the purposes of managing the existing and newly occurring corrosion damages and ageing processes, a program is implemented for monitoring of structures, components and systems important to safety.

The radiation protection of the staff is secured through a system of measures projected in the operational documents, and the exposure dose is monitored in accordance with the legal framework requirements. The average annual doses received by the staff do not show any exceeding of the normative limits of the annual effective dose determined in the Regulation for Basic Norms for Radiation Protection (RBNRP). For the purposes of optimization of the radiation protection, the NRA stresses the need of introducing administrative control limits for the annual effective dose.

Regulatory Inspections

In 2007, two topical inspections were carried out examining the system for control and accounting of radioactive material, the data on the additional protocol, and the state of radiation protection and radiation control.

The NRA made recommendations for the calibration of dosimetry equipment and the amendments and modifications made to the operational documents, as well as for the staff's job descriptions. Based on the findings made while implementing the Program for Monitoring and Management of the Remaining Lifetime and Equipment Ageing of the IRT-2000, a program was developed for the repair and replacement of tanks for liquid RAW in the radiochemistry laboratory (category 1) and a contract was signed for the production and installation of three new tanks. A total of 11 recommendations were made for the improvement of operational activity and their implementation is controlled by the NRA.

The environmental radiation monitoring is performed under an extended programme including control over the total beta activity of air and aerosols flowing into the main collector where the common and special ventilation are mixed before being released into the ventilation stack, and control over the presence of radionuclides in soil, water and plant samples taken from within the reactor and the INRNE-BAS (including the drain water in the reactor building). The analysis of the beta activity are carried out within the range and time intervals provided in the program. The results of the 2007 monitoring show lack of contamination of the controlled area.

NUCLEAR MATERIAL ACCOUNTING AND CONTROL

Bulgaria is a country that has no nuclear weapons and has entered into an agreement with the International Atomic Energy Agency for the implementation of the Safeguard System under the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) (effective date: 29 February 1972). According to the Agreement, Bulgaria agrees to perform its obligations under the Safeguards with regard to any source or special fissile material in its peaceful nuclear activity. The IAEA exercises such control in Bulgaria through the Nuclear Regulatory Agency. The nuclear facilities that are subject to inspection include: IRT-2000 research reactor, Kozloduy NPP Power Units 1-6, and the spent fuel storage facility at the site of the Kozloduy NPP. In 2007, 15 inspections were carried out with IAEA inspectors on the compliance with the Safeguards at the Kozloduy NPP.

Following the positive conclusion made by the IAEA on compliance with the Safeguards under the NPT in the Republic of Bulgaria, the IAEA has applied a new system under the Safeguards called Integrated Safeguards. The Integrated Safeguards System is an optimal combination of all IAEA measures for compliance with the Safeguards, including within the framework of the Additional Protocol, and allows the achievement of maximum efficiency in the use of human and financial resources. The Integrated Safeguards System applies only to countries with a widely developed nuclear program for which it is concluded that it is exclusively designed for peaceful purposes. This allows the reduction of the number of inspections by the IAEA in the respective country.

Reports under the Additional Protocol

The Additional Protocol to the agreement between the Republic of Bulgaria and the IAEA for implementation of the Safeguards under the Treaty on the Non-Proliferation of Nuclear Weapons was ratified in October 2000. Under the provisions of the Protocol, the Republic of Bulgaria shall prepare and provide to the IAEA information relating to the country activities in the field of nuclear fuel cycle on an annual basis. The complete information provided under the Safeguards Implementation Agreement in combination with the Additional Protocol is used by the IAEA for adopting a conclusion on the Republic of Bulgaria's compliance with the NPT. The 2006 a Report by the Republic of Bulgaria under the Additional Protocol was sent to the IAEA.

IAEA inspectors, together with NRA experts, carried out two inspections on the sites of the Kozloduy NPP, and one on the site of the IRT 2000 of the INRNE-BAS. The purpose of inspections under the Additional Protocol made by the IAEA was to find out whether the information about the buildings, premises and their use presented in the 2006 National Declaration corresponded to their actual purpose and use. The conclusion from the inspections made was that no undeclared activity was performed on these sites.

Euratom Inspections

Following Bulgaria's accession to the European Union, the first Euratom inspection on the Safeguards implementation was carried out in May 2007. Throughout 2007, a total of four inspections were held on the site of the Kozloduy NPP, and one inspection on the site of the research reactor of the BAS in Sofia.

SAFETY ANALYSES, ASSESSMENTS AND EXAMINATIONS

One of the major activities of the NRA is reviewing and assessing the condition of nuclear safety and radiation protection in the nuclear facilities. The scope and objectives of the assessments and analyses vary depending on the stage of the given nuclear facility and in general, the purpose is to assess the extent to which the license holders and the nuclear facilities comply with the normative and regulatory requirements in the site selection, design, construction, commissioning, decommissioning, and during the entire term of operation. The process includes review and assessment of the submitted documents in all aspects of nuclear safety and radiation protection, including the normal operation and operational events, organization and management factors, human factor impact, quality management, radiation exposure of staff and population, etc.

The results of the assessments and analyses of the documents justifying safety submitted by the license holders and applicants form the basis of the NRA's regulatory decisions. In order to ensure timely and quality performance of its functions with respect to the safety review and assessment, the NRA has developed and maintains the necessary number of experts. The experts of the Safety Analyses, Assessments and Research Department work in close cooperation with the licensing and inspection activity units of the Nuclear Facility Safety Regulation Department as the employees of both departments participate in the course of inspections and in the processes of review and assessment, as applicable depending on the required competence. Most of the employees of both departments have Master's or PhD degree in nuclear energy, physics, metal science, chemistry, etc. Since 2003 the NRA's own capacity for carrying out regulatory reviews and assessments has been constantly increasing by increasing the professional knowledge and practical skills of the staff and recruiting new experts and inspectors.

Documents for Obtaining Licenses and Permits

The licensing regime is regulated by Chapter 3 of the ASUNE, and the required documents, conditions and order for issuing permits are defined in the Regulation on Issuing Licenses and Permits on the Safe Use of Nuclear Energy.

The process of review and assessment of the documents accompanying the applications for issuing licenses/ permits can be summarized in the following main stages:

- Identifying the expert or team of experts to take part in the reviewing and assessment of documentation, the person in charge of the assignment and of the distribution of work and responsibilities among the team experts, including in isolated cases methodical instructions for performance of the assignment;
- Reviewing and assessing the application and the submitted documentation for compliance with the effective normative documents and, where appropriate, with respect to the applicable documents of IAEA or other regulatory authorities. The applicant will be asked, if necessary, to provide additional information for the purposes of assessment performance;
- Recording the results of the assessment in the form of an expert opinion of the departments, including a proposal for issuing an administrative act or motivated refusal;
- If there is a discrepancy found out in the course of assessment between the provided information and the safety requirements, formulated comments on their elimination will be sent to the applicant and meetings will be held with representatives of the applicant for discussing and explaining such comments.

In the cases where the submitted documents contain information for the assessment of which special knowledge is required the Chairman of the NRA may assign the review and assessment of these documents

to external consultants proposed by the respective director. The experts of the engaged departments will prepare a technical assignment for performing the audit and will participate in the procedure of acceptance of the completed work.

In 2007, the assessed documents refer mainly to the implementation of technical decisions on safety-related modifications and to the introduction of changes to the technical specifications and other technical documentation of the Kozloduy NPP Units, the design of the Belene NPP, etc. Eighty-seven expert opinions were given on the issues of nuclear facilities' safety, including a significant number of recommendations and suggestions for license terms.

Kozloduy NPP

Issuing Permits for Units 1-4

The documents were assessed and expert opinions were given with respect to the issuing of permits for the realization of technical decision, the more important of which were related to the following:

- Replacing earth leakage trips in the CDS 0.4kV of Units 3 and 4;
- Disconnection of protection of input breakers of the first-category safe supply section of Units 3 and 4;
- Replacing battery AB-3I;

The additional analyses and argumentations of the safety were assessed with respect to a number of selected initiating events typical of the condition E which are in line with the requirements of the amended operating licenses of Units 3 and 4.

Issuing Permits for Units 5 and 6

The documents were assessed and expert opinions were given with respect to the realization of technical decisions related to the implementation of modifications and amending the technical specifications for safe operation and to the implementation of steps under the Modernization Program. The more important changes include:

- Amending the TS of Unit 5 with respect to the amended limits on the contents of radioactive substances in gaseous discharges from the ventilation stacks;
- Amending the TS of Units 5 and 6 – implementation of IRCS-related technical decisions;
- Amending the TS of Unit 6 with respect to the replaced breakers 0.4 kV of type A3700 and the reconstruction of the CDS;
- Replacing secondary circuit UCTM of Unit 5;
- Modernizing the autonomous system for radiation control for each safety system of Unit 5;
- Introducing a system for control of critical parameters in emergency and post-emergency situations of Units 5 and 6;
- Replacing the grid's 24-port switches model 2900 of the OVATION system;
- Modernizing the prime cause alarming devices under the RSS/AWP system, the equipment for imaging of information of the main control room – HY52 panel, and introducing C regime of the automatic power regulator APM-04P;
- Replacing power units BKL of the safety systems with modernized ones;
- Replacing the power supply of CE CPS drives and amending the technical specifications for the operation of Unit 6 and the instructions for operation of the reactor installation;
- Replacing hermetic cable penetrations type VGU-1/500 and VGU-1/100 of cable electro conductive lines providing the power supply to electrical equipment in the containment of Units 5 and 6;
- Conservation of remaining in reserve old hermetic cable penetrations;

- Modification in the patterns for integrity control of the currents for control of breakers 6 kV type ZAK-1 at master switch –normal operation, diesel generator and electrical motors of Unit 5;
- Dismantling of pipelines of the system 5VF of Unit 5;
- Placement of 12 inner core detectors in the reactor core of Unit 6;
- Replacing power assemblies 5.6HG60-68 of Units 5 and 6;
- Replacing the bundles of the system for pre-pressurization of the containment of Unit 6, and installation of an automatic control system of the pressure power in the bundles of Units 5 and 6;
- Assessment of the actual technical condition of the anchor sets of the system for pre-pressurization of the containment construction of Unit 6;
- Enhancing safety in case of rupturing of main pipeline for feed-water in the containment of Unit 5.

Assessment of Documents for Compliance with License Terms

- Programs, instructions and schedules for performing PAO-2007 of Units 5 and 6;
- Summary reports on the results of the implementation of programs, assessments and operational control during and after the PAO-2007 of Units 5 and 6;
- Analysis of the postulated initiating events for Units 3 and 4 in condition E under the Regulation on Ensuring Safety during Spent Nuclear Fuel Management;
- Format and contents of the reports with neutron-physical characteristics of Units 5 and 6 submitted to the NRA for review and assessment under the terms and conditions of the operating licenses.

Assessment of Specific Programs, Instructions and Methods

Procedure for maintaining primary and secondary circuit WCR suppressing the corrosion processes on the inner surfaces of the equipment of Units 3 and 4 which are shut down for a long period of time;

Procedure for experimental determination of leakages through the control valve of the impulse protection device of 5.6YPI0B01;

Work program for experimental maintaining of secondary circuit WCR of Unit 6 with a concomitant dosage of ammonia, monoethanolamin and hydrazine – AMETA WCR;

Work program for monitoring and control of the core during the 14th fuel cycle of Unit 5 with extraction of group 10 to a height of 90%.

Spent Nuclear Fuel Dry Storage Facility

During the implementation of the program for review and assessment of documents in order to approve the technical design for a dry storage facility for storing spent nuclear fuel (Review and Assessment of the documents, including the documents received in reply to the review in Stage I and the expert analysis received under Stage II) an opinion was issued with respect to the new revision of the Interim Safety Analysis Report (ISAR) of the SNFDSF.

Belene NPP

In 2007, the work on the NEC PLC application for issuing a permit for the design of the Belene NPP continued.

The new revision of the technical assignment for the nuclear plant's design was assessed. Based on the results of the experts' work and their opinion on the submitted documents, permits were issued in May and June for the design of Units 1 and 2 of the Belene NPP, respectively.

The following actual conditions were stated as arguments for the issuing of the permit:



- All necessary documents were submitted required under the Regulation on the Order for Issuing Licenses and Permits for the Safe Use of Nuclear Energy;
- The instructions given by the Chairman of the NRA on modifying and amending the submitted documents and on submitting additional documents were followed;
- The conditions of the Order on the Belene Site Approval issued by the NRA Chairman applicable to the designing of the nuclear facility were met;
- The review and assessment of the submitted documents confirm the compliance with the provisions of the ASUNE and the regulations on its implementation.

In 2007, a Memorandum of Understanding was signed by IRSN (France), GRS (Germany) and the NRA for cooperation in nuclear safety. The objective of this cooperation was to join experts' efforts in the assessment of the technical design and to ensure high level of safety of the Belene NPP. It was negotiated to sign a separate agreement that will determine the scope of cooperation, the contents and form, the terms and conditions, including the financial terms, etc. The agreement implementation is expected to start in 2008.

RADIATION PROTECTION AT SITES WITH SOURCES OF IONIZING RADIATION

Licensing Regime for Activities with the Use of Sources of Ionizing Radiation (SIR)

Under the ASUNE, the activities related to the use of ionizing radiation can be performed only after obtaining the respective licenses and permits from the NRA. The licensing regime is a basic mechanism creating a relation between the effective legislative and regulatory system with the responsibilities of the regulatory authority and the responsibilities of the legal entities and individuals for ensuring radiation protection in activities related to the use of SIR.

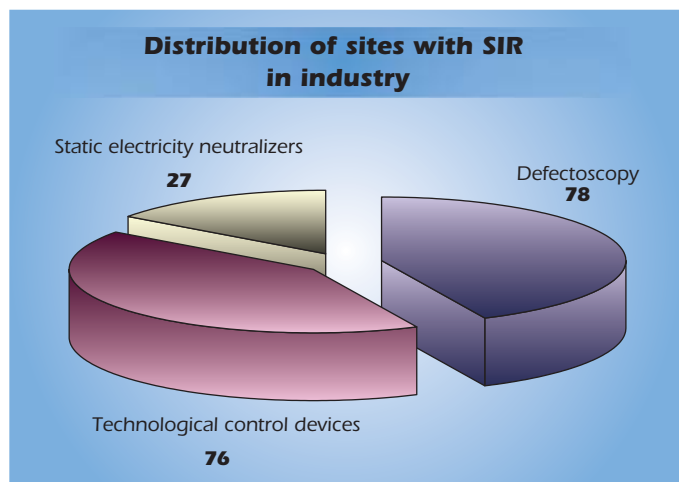
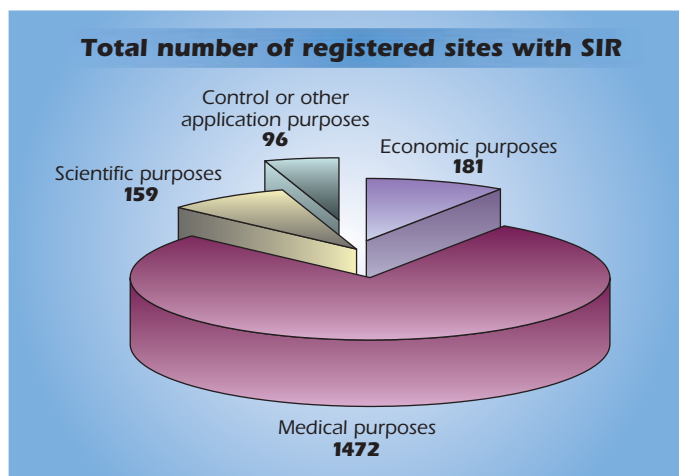
The licensing regime is regulated by the Regulation on Issuing Licenses and Permits for the Safe Use of Nuclear Energy. The general requirements to the license and permit holders, the principles, standards and rules for radiation protection in the activities related to the use of SIR are determined in the ASUNE, the RBNRP and the Regulation on Radiation Protection in Activities Related to the Use of SIR. The NRA maintains a public register of the issued licenses and permits.

As of 31 December 2007 the total number of license and permit holders involved in activities related to the use of SIR is 1327 (224 legal entities use and/or store sealed and open radioactive sources; 908 use generators of ionizing radiation; 66 use both generators and radioactive sources; 129 perform activities related to the use of SIR as services provided to other persons).

The total number of sites with SIR registered and controlled by the NRA (except for the sites with smoke detectors) is 1908 distributed among the areas of application as follows:

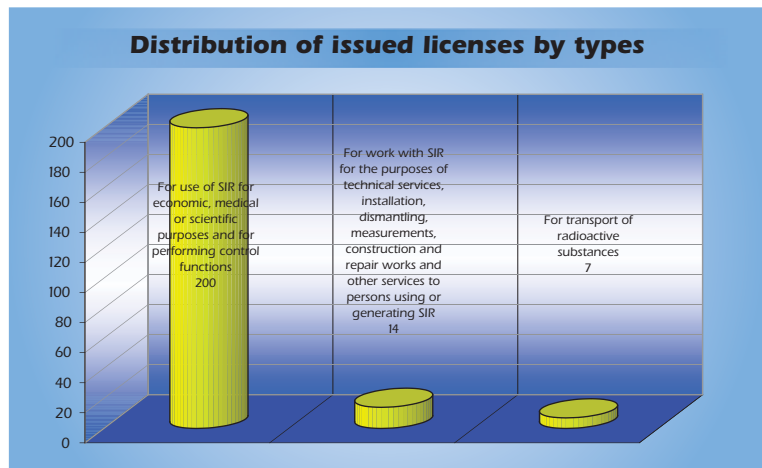
- Industrial purposes – 181 sites (78 – non-destructive testing; 76 – technological control devices; 27 – static electricity neutralizers);
- Medical purposes – 1472 sites;
- Scientific purposes (researches, education, agriculture) – 159 sites;
- Control or other application purposes – 96 sites.

The number of sites using smoke detectors with the approval of the NRA is 76, as the number of radioactive sources incorporated in the detectors is 20 494.



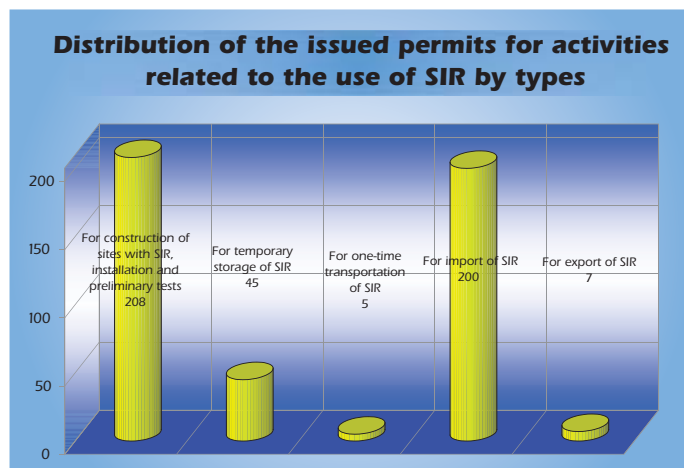
In 2007, a total of 221 licenses were issued distributed by types as follows:

- For use of SIR for industrial, medical or scientific purposes and for performing control functions – 200;
- For work with SIR for the purposes of technical services, installation, dismantling, measurements, construction and repair works and other services to persons using or generating SIR – 14;
- For transport of radioactive substances – 7.



In 2007, under Article 21 of the ASUNE 188 valid licenses were modified and 35 licenses were terminated by request of their holders.

In 2007, 465 permits for activities related to the use of SIR were issued and they were distributed by types as follows:



- For construction of sites with SIR, installation and preliminary tests – 208;
- For temporary storage of SIR – 45;
- For one-time transportation of SIR – 5;
- For import of SIR – 200 (126 – for medical purposes, 26 – for scientific purposes, 48 – for industrial purposes);
- For export of SIR – 7.

An integral part of the permits for import and export of SIR issued by the NRA are the certificate templates provided by the Regulation on the Conditions and Order for Registration and Permission of Foreign Trade Transactions. In 2007, 900 certificates for import or export were issued. The radioactive sources imported

in 2007 were intended mainly for medical purposes. They included technetium generators (^{99m}Tc – 485) and radiopharmaceuticals for the nuclear medicine (a total of 1072 packages: ^{32}P – 5, ^{131}I – 241, ^{125}I – 762, ^{123}I – 64), sources of brachytherapy (^{192}Ir – 1). 100 diagnostic and dental x-ray apparatuses were imported. 80 ^{192}Ir sources were imported for the purposes of non-destructive testing. For the support of technological control devices 12 ^{137}Cs sources and 199 other types of sources were imported.

In accordance with the requirements adopted as an amendment and modification of Regulation No. 30 on the Conditions and Order for Securing Safety to Persons in Cases of Medical Radiation, the NRA reviewed and amended 6 valid licenses relating to measurements of technical parameters and medical radiological equipment. The respective persons can perform activities related to quality control of the used radiological equipment based on the license issued by the NRA and following the registration in the MH. This is the actual initiation of the control ensuring the use of quality radiological equipment meeting the contemporary requirements for protection of patients in case of medical irradiation.

Accounting and Control of SIR

Under the ASUNE, the license and permit holders using and/or storing SIR shall:

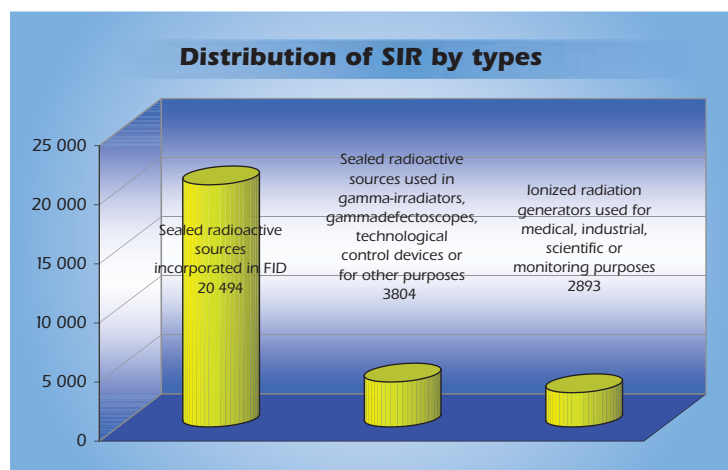
- Make an inventory and maintain a report of the SIR, and shall provide regular information to the NRA for the accounting results;
- Appoint qualified persons to be responsible for the internal control of SIR;
- To inform the NRA, the MI and the MH immediately in case any SIR are missing or stolen.

The requirements, conditions and order for maintaining the report of SIR are determined in the Regulation on Radiation Protection in Activities Related to the Use of SIR. A commission appointed with an order by the site manager inspects the availability, location and condition of the used and stored SIR on an annual basis. A copy of the act issued by the Commission responsible for the inventory is submitted to the NRA by the end of the first quarter of the following calendar year. If any lack or illegal use of SIR are established, then the site manager should notify the NRA and the MI immediately.

The NRA maintains a National Register of the Sources of Ionizing Radiation in the Republic of Bulgaria (NRSIR) that is established on the basis of the Code of Ensuring Safety and Security of Radioactive Sources published by the IAEA in 2004 and adopted for implementation by Bulgaria. All radioactive sources of categories 1 to 5, including the ionizing radiation generators, are included in the NRSIR.

The register includes data on the activity, radionuclide contents, type, technical characteristics and location of the different types of SIR, including data on the license and permit holders performing activities related to the use of SIR. The NRA provides information from the NRSIR, as prescribed by law, to all interested state institutions.

As of 31 December 2007, a total number of 27 191 SIR are registered in the NRSIR distributed by types as follows:



- Sealed radioactive sources used in gamma-irradiators, non-destructive testing, technological control devices or for other purposes – 3804;
- Sealed radioactive sources incorporated in SDt – 20 494;
- Ionizing radiation generators used for medical, industrial, scientific or monitoring purposes – 2893.

Category 1 comprises of sealed high-level sources (single activity from 200 to several thousand TBq) used in gamma-irradiation installations. With the NRA's approval, 18 gamma-irradiation installations are used in the country (seven for industrial and scientific purposes, and eleven for medical purposes – telegammatherapy). The number of the sealed sources charged in them is 285. The gamma-irradiators operating with cobalt-60 (159 sources) are fifteen, and the other three use cesium-137 (126 sources).

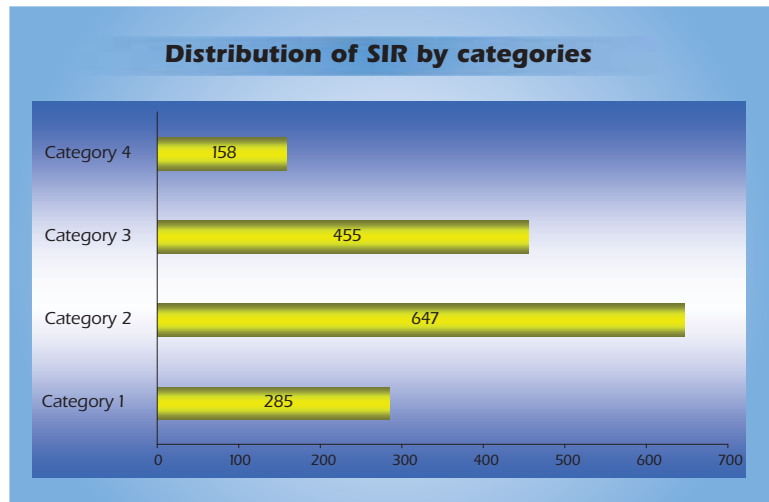
In 2007, the most powerful gamma-irradiator in the country (3668 TBq cobalt-60), which is used for industrial purposes at Sopharma PLC, Sofia, was recharged with ten "fresh" sources. It is planned to put in operation a gamma-irradiation installation in the town of Stamboliyski designed for the sterilization of medicine formulations, medicinal and cosmetic products. The installation is charged with twelve sources cobalt-60 the total activ-

ity of which is about 685 TBq. A new gamma-irradiation installation is expected to be put in operation in the NCRRP (twenty four sources cobalt-60 with a total activity of about 669 TBq) under an EU-financed project.

Fourteen non-usable gamma-irradiators were received for safe long-term storage at SD RAW Novi Han NSR (the total activity of the incorporated sources was about 1000 TBq).

Category 2 comprises of activities with sealed high-level sources used for non-destructive testing, brachytherapy, ionizing radiation metrology, scientific or monitoring purposes. With the NRA's approval, 78 license and permit holders use and store a total of 234 industrial radiographers (104 used, 130 stored) which are regularly recharged with Iridium-192 or Selenium-75.

A total of 117 high-level sources corresponding to Category 2 are used and stored in six sites (109 in INRNE, 2 in the Kozloduy NPP, 6 in the Bulgarian Institute of Metrology).



The activities with sources used for brachytherapy, including low- and medium-dose brachytherapy, are conservatively associated with Category 2. There are eleven sites registered in the NRA in which sealed sources are used for brachytherapy – their total number is 296 (155 cobalt-60, 115 cesium-137, 24 strontium-90, 1 iridium-192, 1 ruthenium-106).

Category 3 comprises of sealed radioactive sources used in technological control devices (TCD – level meters, density meters, moisture/density meters, etc.). The total number of registered TCD is 455 (the number of sources incorporated in them is 517) which are used and saved in 76 industrial sites.

Category 4 comprises of static electricity neutralizers (SEN) which are used mainly in the furniture and textile industry. The total number of registered SEN is 158 (the number of sources incorporated therein is 1747). With the approval of NRA, 37 SEN are used in 5 sites, and the other 121 SEN are stored in 21 sites. Category 4 also includes sources used in metrological inspection facilities (graduation lines), in laboratories and sites working with different types of control measuring devices.

Category 5 comprises of all types of smoke detectors and radioactive sources used in laboratories and radiation measuring devices, smuggled goods detectors, etc.

The largest number is the number of SDt-incorporated radioactive sources that are used for fire prevention in enterprises, warehouses, offices, banks, hotels, museums, theaters, libraries and other public buildings. The different types of SDts contain a small amount of radioactive substance which is safely isolated and structurally secured and, therefore, SDts are not a real threat to the population and environment. The radiation risk for the people is insignificant and that is why SDts refer to the category of lowest risk, Category 5.

The NRA applies a strategy for reducing the number of SDt used in the country and their replacement with other types of fire-alarm detectors without radioactive sources. During the last years over 100 000 SDt-incorporated sources were dismantled and delivered for storage at the SD RAW Novi Han NSR. The accounting and control responsibilities were lifted from over 450 sites after removing the SDts from them.

In 2007, 141 sites delivered for storage at the SD RAW Novi Han NSR 13 681 SDt-incorporated sources, and other 46 sites are in the process of delivering SDTs for storage at the SE RAW.

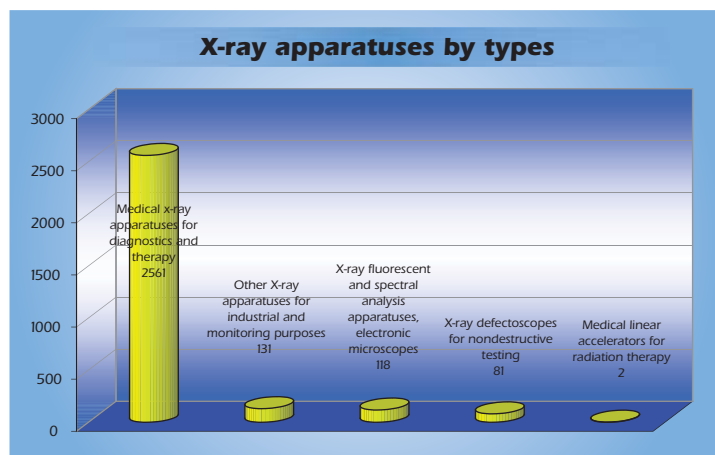
The regulatory control on the import and use of SDTs has been exercised after adopting the Law on the Use of Atomic Energy for Peaceful Purposes in 1985. Until then a large number of SDTs had been imported in Bulgaria which were not registered and were under no regulatory control by the NRA, and, therefore, their location was not known. The NRA, together with the MI, the National Security State Agency and the National Fire Safety and Civil Protection Service have taken reasonable steps and measures to identify former and existing owners of sites with SDTs storing or using SDTs without the NRA's permission. The NRA has been performing on-site inspections with the assistance of the MI and the National Security State Agency, recommendations were given and other legal actions were performed (the ownership of 73 sites with SDTs is currently investigated). A program was developed and established for carrying out special inspections in over 100 sites with SDTs in 2008 in order to find out their actual condition.

The NRA and the Ministry of Defense (MD) have taken reasonable steps to update the information about the available SDTs and other radioactive sources located at military sites. As a rule, strict accounting and control of all types of radioactive sources is maintained at the MD's sites.

Open Radioactive Sources

Open radioactive sources are mainly used in medicine for nuclear diagnostics (in vitro, in vivo), metabolite radiation therapy and medical biological examinations, as well as for scientific research. There are 91 sites registered in the NRA in which open radioactive sources are used. Depending on the radiotoxicity of the radionuclides used and the permissible activity on the workplace, the operations with open radioactive sources are divided into three categories according to the Regulation on Radiation Protection in Activities Related to the Use of SIR:

- 1st category operations with open radioactive sources – performed at 1 site;
- 2nd category operations with open radioactive sources – performed at 37 sites;
- 3rd category operations with open radioactive sources – performed at 53 sites.



As of 31 December 2007 there are 2893 ionizing radiation generators registered in the NRSIR distributed by areas of application as follows;

- Medical x-ray apparatuses for diagnostics and therapy – 2561;
- X-ray devices for non-destructive monitoring – 81;
- Other x-ray apparatuses for industrial and monitoring purposes – 131;
- X-ray fluorescent and spectral analysis apparatuses, electronic microscopes – 118;
- Medical linear accelerators for radiation therapy – 2.

And the medical x-ray apparatuses are divided by types as follows:

- Conventional x-ray apparatuses for graphic and scope examinations – 1493;
- Computerized tomography – 155;
- Mammography – 183;

- Fluorography – 40;
- Angiographs – 31;
- Lithotripters, densitometers – 38;
- Dental (stomatological) x-ray apparatuses – 585;
- Therapeutic x-ray apparatuses – 36.

In 2007, the NRA presented at an international forum organized by the IAEA a National Report on Applying the Code of Ensuring Safety and Security of Radioactive Sources. The Code was published by the IAEA in 2004 and was subsequently adopted by our country. 72 countries attended the forum. The National Report of Bulgaria included summarized information on the regulatory infrastructure for management and control of radioactive sources in the country, and an emphasis was made on the created National Register of SIR. A strategy was presented for establishing and restoring the regulatory control on the "orphan" sources, the mechanisms for notification and interaction between the competent authorities when identifying such SIR, the regulatory approach to import and export of radioactive SIR.

The achieved results and the work of the competent Bulgarian authorities in this field were given a positive assessment by the IAEA.

Inspection Activity at Sites with SIR

Under the ASUNE, the NRA performs:

- **Prevention control** in the process of issuing licenses, permits and certificates for qualification;
- **Current control** on the compliance with the terms of the issued licenses, permits and certificates for qualification;
- **Subsequent control** on the compliance with the recommendations or prescriptions given by the controlling authorities.

The purpose of such regulatory inspections and the imposition of enforcement measures is to ensure performance of the relevant activities by the license holder in a safe manner and in compliance with the requirements, standards and rules of radiation protection. The recommendations given by the controlling inspectors within their powers under the ASUNE are binding. The compulsory administrative and enforcement measures provided by the ASUNE are applied only after all other options were exhausted.

The planned inspections (routine, topical or complex) at the sites with SIR are carried out under an established annual plan. The scope and intervals of inspections are differentially determined according to the type (category) of the respective SIR, the level of radiation risk and the complexity of the performed activities.

Upon inspection of sites with SIR the following is examined:

- Compliance with the conditions of the issued licenses and permits, and the requirements for radiation protection in operations with the use of SIR established with normative acts and internal documents;
- Condition of the premises and equipment at the site, availability and use of tools for radiation monitoring or individual dosimetric control;
- Availability and method for maintaining the documentation relating to the radiation protection and emergency preparedness at the site;
- Qualification and certification of the staff;
- Compliance with instructions and recommendations related to the radiation protection, emergency preparedness and physical protection at the sites.

The inspection activity is performed under an established Instruction for Carrying out Inspections at Sites with SIR which is based on the IAEA recommendations. The NRA inspectors use in their practice control sheets

and unified forms of statements of findings and other documents accustomed to the specific character and complexity of the inspected sites.

The inspection activity of the state health control authorities is carried out independently from the NRA under different plans and programs.

In accordance with the NRA Annual Control Activity Plan, topical inspections were performed at 76 sites with SIR in 2007. Under an additionally adopted program, further 69 sites with SIR were inspected. For the purposes of commissioning of new sites with SIR, 35 acceptance commission's inspections were conducted. 14 recommendations were given and 3 reports of violation were issued.

A system for control and assessment of internal and external exposure of persons working in an environment of ionizing radiation was developed in the country. The results of the occupational radiation monitoring in nuclear facilities and sites with SIR show that there are no deviations from the legal dose limits. Individual dosimetric control and medical monitoring of staff was performed at the controlled sites in compliance with the legal requirements. No deviations from the occupational radiation limits were observed at the sites with SIR. The average annual individual effective dose of the controlled persons (about 9000 in the country) employed in nuclear facilities and sites with SIR was **below 1 mSv**. The individual and collective doses from occupational radiation were maintained as low as it was reasonably achievable considering the social and economic factors in the country.

In 2007, the NRA exchanged valuable practical experience with the Romanian regulatory body (CNCAN) in terms of the inspection activity at sites with SIR. Close relations were established between the NRA and the CNCAN on management and expert levels which is a very important and useful step with regard to the accession of both countries as EU Member States and the expected joint activity related to the regulatory control of import, export and transportation of radioactive materials through the Bulgarian-Romanian border.

Transportation of Radioactive Substances

Under the ASUNE, transportation of radioactive substances can be made within the country only after issuing a one-time permit or license by the NRA based on the documents submitted in accordance with Chapter IV of the Regulation on the Conditions and Order for Issuing Licenses and Permits for Safe Use of Nuclear Energy and in compliance with the Regulation on the Conditions and Order for Transportation of Radioactive Substances and the treaties on international transportation of hazardous goods ratified by the Republic of Bulgaria.

Since 1 January 2007 the NRA has been strictly complying with the provisions of the Council Regulation 93/1493/Euratom on shipments of radioactive substances between Member States. The Council Directive 92/3/Euratom was conveyed into the Bulgarian legislation, and so was the Commission Decision 93/552/Euratom whereby the Standard Document for the Supervision and Control of Shipments of Radioactive Waste referred to in Council Directive 92/3/Euratom was introduced. In 2007, there were no cases of such shipments requiring the application of the mentioned document.

In 2007, a NRA representative was accepted as a member of the Advisory Committee established pursuant to Article 21 of Directive 2006/117/Euratom. The Committee developed a standard document for supervision and control of shipments of radioactive waste and spent nuclear fuel.

Implementation of European Legislation

The Bulgarian legislation on radiation protection is harmonized with the standards and criteria on radiation protection applied in the Member States. The radiation protection requirements provided in Directive 96/29/

Euratom and other EU documents were adequately translated into the respective Bulgarian normative acts. The harmonization achieved between the Bulgarian legislation and the contemporary international requirements for radiation protection recommended by the IAEA and the ICRP and applied in the EU is a result of the systematic and methodical operation of the state institutions responsible for the radiation protection in the Republic of Bulgaria. The competent state authorities, their functions and responsibilities related to the application of and control over the compliance with the normative requirements for radiation protection are defined in the ASUNE, the Act on Health, the Act on Environmental Protection and the relevant secondary legislative acts on their implementation. The Regulation on the Basic Norms of Radiation Protection projects the requirements for radiation protection contained in the key EU Directives in this field, namely Directive 96/29, Directive 97/43 and Directive 90/641. The Regulation on Radiation Protection in Activities Related to the Use of Sources of Ionizing Radiation is based on Directive 96/29 and Directive 122/2003.

The legal framework in this field is the foundation on which the national regulatory infrastructure is developed for ensuring radiation protection of the population and protection of the environment against harmful effects of ionizing radiation.

With regard to the accession of Bulgaria to the EU, at the beginning of 2007 the NRA and the MH prepared a joint National Report on Radiation Protection in the Republic of Bulgaria which illustrated the actual condition of radiation protection in the country, the existing problems in this field and the necessary measures for their solution. Based on that report the NRA and the MH adopted a Plan for Action in the Implementation of the European Union Legislation in the Field of Radiation Protection 2007/2008 which included a complex of legislative and administrative measures. According to the plan, it is expected to develop, revise and update a total of 18 normative acts in the field of radiation protection by the end of 2008 (including: amending the ASUNE and seven regulations, developing three new subordinate acts, updating two medical standards and one regulation, developing other documents /guidelines, methodical instructions, etc./ relating to the implementation of the new legislation).

In 2007, the prepared technical assignments for three projects in the field of radiation protection related to the management of high-level sources, relief from the regulatory control of materials with high contents of natural radionuclides and shipment of radioactive materials. The projects were financed by the EU under the PHARE Program and the main objective was to apply the good European practice in these specific fields.

The active cooperation with the IAEA was also very important for increasing the level of radiation protection in the country. In 2007, the NRA, jointly with the MH, took part in the implementation of an international regional project on assessment of the population exposure.

EMERGENCY PREPAREDNESS AND RESPONSE

Under the ASUNE, the persons involved in activities related to the use of nuclear energy and ionizing radiation and in the management of radioactive waste and spent fuel are required to take measures for the prevention of incidents and accidents and for the limitation and elimination of their consequences. The measures for emergency planning and maintaining emergency preparedness should be defined in emergency plans as follows:

- Domestic (national) Emergency Plan for Protection of the Population in Case of a Nuclear or Radiation Accident;
- Internal Emergency Plans for each individual nuclear facility or site with SIR, including emergency plans of the respective ministries, departments or local administration and local self-government authorities.

The conditions and order for the development of emergency plans, the persons who will implement the emergency plans, their obligations, the measures for maintaining emergency preparedness, the measures for limitation and elimination of consequences, the methods for informing the population, and the criteria for applying protection measures are defined in the Regulation on Emergency Planning and Emergency Preparedness in Case of a Nuclear and Radiation Accident. According to the Regulation, the emergency plans are updated on a regular basis.

The Ministry of State Policy for Disasters and Accidents and the National Civil Protection Service DG established therewith are responsible for the organization of the development, maintaining and coordination of the National Emergency Plan implementation. The National Emergency Plan regulates the obligations and responsibilities of the ministries and departments that participate in the activities related to the management of crises, disasters, accidents and calamities, including cases of nuclear or radiation accidents. The International Emergency Plan for Action in Case of a Nuclear or Radiation Accident is an integral part of the National Emergency Plan and includes:

- Actions in case of accidents in nuclear facilities;
- Actions in case of transboundary transportation of radioactively contaminated air masses;
- Actions in case of radiation accidents (radioactive contamination) related to the use, storage or transportation of radioactive substances.

For the purposes of emergency planning and emergency responses, the necessary material and technical means for: notification, early warning and communication; forecast and assessment of the emergency situation; radiation monitoring; elimination of consequences and rendering urgent help on the site of the accident; performing engineering restoration works; individual protection of emergency teams; and medical help to the victims were provided in the country in compliance with the effective laws.

Emergency centers for emergency teams' operation in the elimination of consequences of nuclear or radiation accidents have been maintained on a national and local level. Material and technical means for radiation monitoring in normal and emergency situations have been provided (5 mobile laboratories, over 50 gamma-spectrometric installations, 1000 portable radiometric appliances, equipment for individual dosimetric control of internal and external

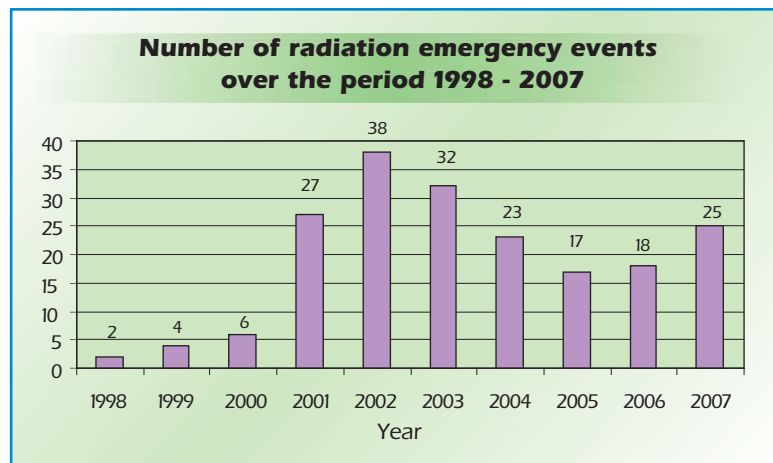


exposure, systems of automated control and forecast of radiation situation in accidents). An off-road vehicle was designed for the liquidation of radiation accidents when operating in heavy radiation situations.

The preparedness for action and response in case of a nuclear or radiation accident was monitored and maintained with regular drills and trainings held on a departmental, local, national and international level. The competent state authorities regularly participated in international exercises in emergency response initiated by the IAEA, NATO and the EU. A total of 23 national and international exercises have been held for the last 10 years in the country. The license holders carried out regular trainings of staff in the emergency plans and emergency drills for actions in case of nuclear and radiation accidents. The NRA coordinated and organized international meetings, workshops and courses for increasing the qualification in the field of emergency planning and maintaining emergency preparedness.

The Bulgarian legislation in this field was brought in line with the requirements and criteria applied in the EU and recommended by the IAEA and the IRPC. The ASUNE, The Act on Crisis Management, the Act on Protection against Disasters, the Act on Health, and the relevant regulations on their implementation define the principles, requirements, order and method of maintaining emergency preparedness and responding in case of radiation incidents and accidents. An adequate infrastructure was developed provided with the necessary human, technical and material resources for emergency response and ensuring radiation protection in case of nuclear or radiation accidents.

The distribution by years of the emergency events with radioactive sources and materials that occurred over the period 1998 – 2007 (25 events in 2007) is shown on the figure. The total number of events for these ten years was 193. Over 75% of the cases were related to the discovery



of radioactive sources and materials which had accidentally been disposed with the metal scrap (these are usually appliances or parts covered with luminous fluorescent paint /containing Radium-226), equipment and elements of uranium production or of other activities containing high concentration of natural radionuclides). Interdepartmental emergency teams of the NRA, the Ministry of Health, the Ministry of Interior, the National Civil Protection Service Directorate-General and the Radioactive Waste State Enterprise are formed for the liquidation of such incidents which are case-specific and if any "orphan" radioactive sources and materials are discovered in the country, then a coordinated procedure for action is applied. The radioactive sources and materials discovered are being isolated, transported and delivered for safe storage at the SD RAW Novi Han NSR. A special module, Incidents with Sources, is created in the NRA's integrated information system where all emergency events related to radioactive substances are registered. The NRA website constantly publishes updated information about the radiation incidents that have occurred in the country.

The Strategy for Preventing Incidents with Radioactive Sources and Materials applied by the competent state authorities in the country includes:

- Exercising strict border control for detecting goods and materials with increased radioactivity in order to prevent illegal import, export or traffic of nuclear or radioactive materials;
- Developing and introducing normative documents and standard procedures for prevention of incidents and for response in cases of illegal import, export or traffic of nuclear or radioactive materials, or cases of discovering radioactive scrap or "orphan" sources;

- Licensing companies for implementing radiation control of metal scrap and in sites with radioactive sources;
- Exercising preventive control in enterprises working with scrap and conducting inspections at sites with radioactive sources and metal scrap where the needed instructions and recommendations will be given;
- Ensuring physical protection at the sites with radioactive sources and conducting inspections in this aspect;
- Studying and applying the good practice of the EU Member States for providing security and ensuring safety of radioactive sources and for prevention of incidents with metal scrap.

The tendency of the number of incidents related to the discovery of radioactive sources and materials in metal scrap to increase is a global problem. On account of this tendency, the IAEA and the EU recommend relevant technical and organizational measures for preventing radiation incidents with metal scrap. With respect to these recommendations, in 2007 the NRA developed Guidelines for the Control of Metal Scrap and Response to Discovering Radioactive Scrap. Automated systems for radiation control of the received scrap were installed at the major metallurgical plants (Kremikovtsi, Stomana-Pernik, KCM-Plovdiv). The companies working with scrap undertake measures for preventive radiation control upon storing, shipping and marketing scrap by using their own radiometric appliances and/or the services of organizations licensed by the NRA to perform such activity. Internal emergency plans were developed and sites for isolation and handling of radioactively contaminated scrap were envisaged. The companies licensed by the NRA should notify the competent authorities immediately after discovering any "orphan" sources or radioactively contaminated scrap.



The strict border control with respect to the detection of goods and materials with increased radioactivity and the developed system for interaction between the competent authorities contributes to a great extent to the prevention of illegal import, export or traffic of nuclear or radioactive materials and, respectively, to the prevention of radiation incidents in the country

In 2007, the NRA and the Border Police Directorate-General (Ministry of Interior) signed an agreement for cooperation in this aspect. A program was developed for joint inspections on the border checkpoints (BCPs) in the country, and procedures were introduced for response

to detecting illegal import, export or traffic of nuclear or radioactive materials and for discovering "orphan" radioactive sources.

In 2007, the NRA and Border Police DG, jointly with the EU, the IAEA and the U.S. Government, implemented projects for equipping the BCPs with stationary and portable detectors for monitoring the radioactivity of cargoes. At the end of 2007, the NRA, in coordination with the Border Police DG, initiated a project financed by the EU for the supply and installation of radiometric installation in three BCPs located on the western border.

All BCPs in the country were provided with mobile measuring installations for detection of sources of ionizing radiation, and automated stationary appliances for radiation control were installed at three border checkpoints. The obligations of the checkpoint officials related to the exercise of radiation control and responding in cases of incidents are regulated by the relevant legislation. Training was held of Border Police officials in the effective exercise of radiation control. The emergency teams of the regional structures of the Ministry of State Policy for Disasters and Accidents and the Regional Inspectorate of Protection and Control of Public Health acting

jointly with the Border Police upon detection of illegally trafficked radioactive materials are also equipped with the necessary appliances for radiation measurement.

In 2007, the NRA, the MI and SE RAW completed international projects financed by the IAEA and the USA for enhancing physical protection at hazardous sites and for ensuring the safety of high-level sources.

In 2007, most of the activities related to the installation of a system for consequence forecasts and solution support in nuclear accidents (RODOS system) under a project of the EU PHARE Programme were completed. The planned computer equipment with the respective software was supplied.



INTERNATIONAL COOPERATION

Being a body implementing the international cooperation of the Republic of Bulgaria in the field of safe use of nuclear energy, ionizing radiation and in the management of radioactive waste and spent nuclear fuel, the Nuclear Regulatory Agency organized its activity throughout 2007 in a manner ensuring maximum efficiency in the pursuit of the objectives set.

The cooperation with the International Atomic Energy Agency was based on the new two-year Programme for Technical Cooperation 2007/2008 where Bulgaria participated with six national projects. The implementation of the projects under the PHARE Programme initiated in the past years and the cooperation with the Joint Institute of Nuclear Research – Dubna also continued. The interaction with foreign nuclear safety and radiation protection regulators within the European Nuclear Regulators Association (WENRA) and on a bilateral basis had a major place in the processes of harmonization of practices and legal framework. When Bulgaria became a full Member State of the EU, the NRA joined the different EU structures in their operations related to the peaceful use of nuclear energy.

An important moment of the NRA's international activity in 2007 was the celebration of the 50th anniversaries of the IAEA and the Bulgarian regulatory authority.

50 Years NRA – 50 Years IAEA

The Jubilee Forum – 50 Years Nuclear Regulatory Agency – 50 Years International Atomic Energy Agency was held in July in Sofia. The forum was organized by the NRA and over 200 guests attended, including IAEA representatives, members of the Bulgarian Parliament, scientific institutes, heads of nuclear regulatory authorities from Europe and USA, representatives of Bulgarian and foreign engineering organizations and Bulgarian licensees. Congratulation statements were expressed by Mr. Ivaylo Kalfin, Vice Premier and Minister of Foreign Affairs, Minister Rumen Ovcharov, Mr. Ramadan Atalay, Chairman of the Parliamentary Commission of Energy. The President of the Republic of Bulgaria Mr. Georgi Parvanov also sent his congratulation address. Mr. Tomihiro Taniguchi, Deputy Director General and Head of Department of Nuclear Safety and Security Department, expressed his congratulations to the forum on behalf of the IAEA Director General Dr. Mohamed ElBaradei. Presentations were made with regard to the development of the Bulgarian regulatory authority, strengthening the cooperation of our country with the IAEA, as well as the interaction of the nuclear sector and the scientific organizations with the IAEA in the aspect of peaceful use of nuclear energy.



A visit to the Kozloduy NPP was arranged within the jubilee events where the guests from the IAEA, USA, Russia, Italy and Germany observed the current condition of the plant and visited Power Unit 6 and the control rooms of Power Units 2 and 3.

International Atomic Energy Agency

The implementation of the new Programme of the IAEA Technical Cooperation Department 2007/2008 was initiated in 2007 where Bulgaria took part with the following national projects:

- BUL 3/003 – Enhancement of Radioactive Waste Management (continuation of Programme 2005/2006);
- BUL 4/013 – Strengthening the National Nuclear Power Infrastructure (continuation of Programme 2005/2006);
- BUL 4/014 – Refurbishment of the Research Reactor (continuation of Programme 2005/2006);
- BUL 9/021 – Strengthening the Capacity of the Nuclear Safety Regulatory Authority (continuation of Programme 2005/2006);
- BUL/6/007 – Clinical Application of Advanced Conformal Radiotherapy by Introduction of Intensity Modulated Radiation Therapy (IMRT) (new);
- BUL/6/008 – Routine Application of Highly Specialized Total Body Irradiation Prior to Bone Marrow Transplantation (new).

The project for strengthening of the regulatory authority's activity continues to be implemented during the current two-year cycle. With a view to the forthcoming development of a new nuclear power in Bulgaria and the related licensing process, the project is oriented towards providing expert assistance to the NRA in the assessment of the Belene NPP safety. In the meantime the activities related to the improvement of the inspector training system and the safety assessment capacities will continue to be implemented.

In accordance with the Country Programme Framework for Providing Technical Assistance to Bulgaria by the IAEA signed in 2003, two medical projects were approved with the participation of the Specialized Hospital for Active Treatment in Oncology, Sofia, and Queen Giovanna University Hospital. This is indicative of the expansion of areas of cooperation with the IAEA considering the fact that the last joint project in the field of medicine was completed in 1991.

With respect to the regional projects for the Europe region Bulgaria participates in 35 projects related to the development of reactor technologies, nuclear safety, safety assessments, nuclear knowledge preservation, nuclear technologies application in medicine and agriculture.

In 2007, the new proposals of Bulgaria on national and regional projects for the programme cycle 2009-2011 were submitted to the IAEA. They are going to be considered and assessed by IAEA experts and will be finally approved by the International Agency's Board of Directors at the end of 2008. The proposals are for cooperation with the regulatory authority in the aspect of low-level radioactive waste treatment, prevention of the loss of nuclear knowledge in case of fluctuation of NPP staff, training of staff in applying ionizing radiation in medicine, control of diseases in stock-breeding, use of ionizing radiation in the quality control of foods.

The seminars, training courses, technical meetings, conferences and other scientific forums organized by the IAEA in 2007 were attended by 152 Bulgarian scientists and specialists of the NRA, the MEE, the NEC-



PLC, the Kozloduy NPP, the INRNE, SE RAW, the NCRPP, Risk Engineering, Enpro Consult, Institute of Energy, Institute of Geology, Nuclear Medicine Central Laboratory, and other scientific institutes, medical units and departments.

A delegation of the Republic of Bulgaria headed by the Chairman of the NRA took part in the 51st Regular Session of the General Conference of the IAEA which was held from 17 to 21 September 2007 in Vienna. The members of our delegation participated in the scientific forum of the Conference "Challenges and Development of Nuclear Energy", and also in the session of the Member States of the Europe region receiving technical assistance, the session of the senior regulators, and in bilateral meetings. A meeting was held with the delegation of the Russian Federation headed by Mr. Kirienko, Head of Rosatom State Corporation. At the meeting the Bulgarian delegation presented issues regarding the transportation of spent nuclear fuel and finding direct route between both countries. The issue regarding the Protocol to the Agreement on Nuclear Fuel Supply to Bulgaria was also discussed in terms of Bulgaria's EU membership. A meeting was also held with the leaders of the Romanian delegation which was attended by Mr. Vilmos Zsombori, President of the Romanian regulatory body (the National Commission for Nuclear Activities Control, CNCAN), and Mr. Augustin Aculai, Director of the Nuclear Agency. The participants at the meeting discussed questions of public acceptability of nuclear energy in both countries and issues regarding the transportation of nuclear fuel throughout Romania in terms of the EU membership of both countries. A meeting was also held, by request of the Bulgarian delegation, with representatives of the IAEA Nuclear Safety and Security Department where the IAEA expert mission in Bulgaria in 2008 for assessment of the implementation of the Modernization Program of Kozloduy NPP Units 5 and 6 was discussed.

During the session the IAEA member states from the European region in November, a new initiative of the Europe Division of the Regional Profile Technical Cooperation Department was presented and discussed. The purpose of the initiative was to develop a mid-term programme (2009-2013) of topical regional projects. The role of the member countries is essential since they have to identify those problems in the region which have to be solved by priority within the initiative. The final decision on the initiative will be made in 2008.

Convention on Nuclear Safety

The preparation for the forth review of the national reports of the countries under the Convention on Nuclear Safety (CNS) was initiated in 2007. Experts of the NRA, the MEE, the Kozloduy NPP and the NEC-PLC executed in close cooperation and submitted to the Council of Ministers the Bulgarian National Report. With its Decision No. 632 of 25 September the Council of Ministers approved the forth National Report of the Republic of Bulgaria on the fulfillment of its obligations under the CNS, appointed the members of the Bulgarian delegation for the organizational session on the review preparation and the members of the delegation for the review itself. At the end of September, the National Report was submitted to the IAEA within the terms set. The Report is published on the NRA website www.bnra.bg.

A delegation of NRA representatives participated in the organizational session on the preparation of the forth review which was held also in September. During the session the leaders of the review were appointed, the member states were divided into groups, the persons in charge of the groups and the requirements for the report presentation format were determined, etc. In compliance with the procedure rules, the Bulgarian delegation prepared and presented to the other states parties to the Convention its questions and comments on their national reports.

The review of the national reports under the Convention will be held at the IAEA in April 2008. The Delegation of Bulgaria for the forth review headed by the NRA Chairman will include members of the MEE, the NRA, the Kozloduy NPP, the NEC-PLC and the the Bulgarian Permanent Mission in Vienna.

EU Structures

Bulgaria is now a full member of the European Union and the NRA representatives have joined different EU bodies and structures involved in the development and implementation of the European Community law in the field of peaceful use of nuclear energy.

Following the approval of the Council of Europe of March 2007, with decision of the European Commission of July 2007 a High Level Group (HLG) was established on the issues of nuclear safety and radioactive waste management. The purpose of its establishment was to gradually develop general understanding and possible creation of additional European rules in the field of nuclear safety and management of radioactive waste. The members of the group include all 27 EU Member States and representatives of the European Commission. The group held its first session in October where the new Operational Rules were presented and a Chairman was selected – Mr. Andrej Stritar, director of the regulatory body of Slovenia. The group concluded that it had to be in the position to independently express its own views and suggestions for improvement of safety. The transparency of its work would be an essential element for the purpose of informing the EU institutions and citizens on the issues of nuclear safety. Bulgaria was represented in the group at a level chairman and deputy chairman of the NRA.

Bulgaria is represented among the new members of the Scientific Technical Committee Euratom at the level of deputy chairman of the NRA. The head of the NRA Radiation Protection and Emergency Preparedness Department was designated as the representative of Bulgaria under Article 31 and Article 37 of the Euratom Agreement. In the EC working groups on the issues of nuclear energy, the NRA experts joined the management and support of nuclear regulators group, the system for prompt notification in case of nuclear accident (the European Community Urgent Radiological Information Exchange, ECURIE), on the issues of applying the Euratom Safeguards, the Advisory Committee on the implementation of Directive 2006/Euratom on the supervision and control of shipments of radioactive material and spent nuclear fuel.

PHARE Programme of the European Union

In 2007 continued the implementation of the following projects under the PHARE Programme initiated during the previous years:

- 2004/016-815.01.02 for providing assistance to the NRA in the review of the Updated Safety Report on Units 6 and 6 of the Kozloduy NPP and the assessment of compliance with the international standards;
- 2004/016-815.01.03 for providing assistance to the NRA in the development of a capacity in the field of elaborating regulatory guidelines, safety assessment, staff training and quality management.

In November started the implementation of PHARE Project 2005/017-519.01.01 on providing support to the NRA in the aspect of establishing regulatory requirements on the basis of assessment of the probabilistic safety analysis (PSA) of the Kozloduy NPP Units 5 and 6.

In accordance with the EC decisions, new programme instruments with five-year programme cycle were created, starting in November 2007: the Instrument for Pre-Accession (IPA) and the Instrument for Nuclear Safety Co-operation (INSC) replacing the PHARE and the TACIS, respectively. The purpose of the creation of these two new instruments was to expand the range of countries with an opportunity to receive the respective support in the field of nuclear safety and radiation protection improvement.

Joint Institute for Nuclear Research (JINR) - DUBNA

In 2007, Bulgaria continued its work as a member of the Committee of Plenipotentiaries of JINR Member States and at the meetings of the Financial Committee. Bulgarian scientists participated in the sessions of the JINR

Research Council and in the meetings of the Programme Advisory Committees. 16 scientists and specialists from Bulgaria were sent to the JINR laboratories on a long term contract. 60 scientists and specialists were sent on short business trips to Dubna where they participated in experiments, joint assignments and agreements, and scientific events. The Russian specialists had 13 short business trips to Bulgarian institutes and universities.

In 2007, under the bilateral agreement between the Republic of Bulgaria and the JINR, scientists of the BAS institutes and Bulgarian universities proposed 26 projects with priority financing on topics from the JINR topical plan which were approved by the Commission for Cooperation. Their total cost amounts to 37 500 US Dollars. Following the proposition of Bulgarian scientists working at the JINR, the Committee also approved 18 projects for financing worth 30 500 US dollars.

In 2007, the Commission for Cooperation held 3 meetings chaired by the Deputy Chairman of the NRA. The participants at the meetings discussed issues on the projects for priority financing, the plan for three-month and short business trips, propositions for long-term work, extension of working contracts and other current issues relating to the cooperation between Bulgaria and the JINR. Issues regarding the participation in the meetings of the Committee of Plenipotentiaries of JINR Member States, the Financial Committee and the sessions of the Scientific Council were also discussed.

European Nuclear Regulators Association (WENRA)

The Western European Nuclear Regulators Association (WENRA) was established in 1999 as a non-government organization having as its members the chairpersons and governing officials of the regulatory authorities in the field of nuclear safety of the European countries operating nuclear power plants. The main objectives of WENRA are to develop a common approach to nuclear safety, to ensure independent potential for safety reviews in Member States and to build a network of managers of the European regulatory authorities for exchange of experience and discussing issues of importance to the nuclear safety. Further information on the WENRA policy and activity is available on the website of the organization at: www.wenra.org.

The Nuclear Regulatory Agency has been a member of WENRA since March 2003 and it takes active part in harmonization activities. In order to harmonize the safety approaches of the European countries, WENRA created two working groups – one on nuclear power plant safety (Reactor Harmonization Working Group), and the second one on safety of decommissioning and management of radioactive waste and spent fuel (Working Group on Waste and Decommissioning). The purpose of their creation is to achieve constant improvement of safety and to minimize the differences among the Member States.

The working groups analyze the existing situation and the different approaches to safety, compare the national approaches to safety with the IAEA safety standards, identify the differences and make suggestions for possible elimination without having a negative effect on the final safety levels. The suggestions are based on the good practices and modern requirements to the existing nuclear power plants and installations for management of radioactive waste.

In January 2007 the National Plan for Action in the Harmonization of Approaches to the Safety of the Existing Nuclear Plants was updated. The plan identified the practices of the regulator and the operator that needed harmonization in line with the reference levels adopted by the WENRA and the terms for realization. Bulgaria committed itself to taking steps towards the harmonization of regulatory requirements by 2010. With view of that, the projected regulatory guidelines are being developed by priority. Preparation works continued for the articulation of national views on the compliance with the requirements for reference levels of radioactive waste and spent fuel management.

Further information on the reference levels and steps taken by the country is available on the NRA website www.wenra.org which has a link to the WENRA website.

Forum of WWER Regulators

The NRA continued its active participation in the operation of the Forum of Regulators of the countries operating reactors of the WWER type. The annual meeting of the chairpersons of the regulatory bodies was held in Dubna, Russian Federation, from 3 to 5 July. The participants at the high-level meeting discussed and considered the future directions and activities for enhancing the safety of the WWER reactors. The Working Group on Assessment of Digital CMDA was replaced by the new Working Group on Safety Management. The Forum was presided over by Ukraine where the next 2008 meeting will be held.

The NRA chairs the Working Group on Operational Experience Feedback and the last meeting of the group was held at the NRA's training centre in December. Topical information was exchanged at the meeting on specific issues regarding the safety of WWER reactors and a programme was developed for the Forum's future activity in improving the operational experience feedback.

In 2007, the Working Group on the Use of PSA by the Regulators held two meetings. The focus was on the comparison of results from analyzed initiators, PSA applications in the regulatory practice and the role of the human factor in the analyses. The activities were performed in compliance with the work programme coordinated with the Forum.

Bilateral Cooperation

Romania

As a result of the cooperation established with the Romanian regulatory body, the CNCAN, the first events with the participation of leaders and experts from both countries were held in 2007. Three joint inspections were conducted in Romania and Bulgaria in the field of control of sources of ionizing radiation which enabled the exchange of experience in practical application of the legal frameworks in the respective fields of both countries. At the invitation of the Romanian body, representatives of the NRA management visited the CNCAN, the Cherna Voda NPP and the Nuclear Research Centre in Pitesti. Both countries concluded that this cooperation was beneficial and, therefore, has to be maintained.

USA

In 2007, NRA experts participated in several events organized by the U.S. Department of Energy in Bulgaria. A meeting under the Global Threat Reduction Initiative was held in January, training on the subject of Protection of Radioactive Sources was carried out in May, and in December on the subject of International Weapons of Mass Destruction Investigation.

A USNRC delegation headed by Mr. Peter Lyons, Deputy Chairman of the American regulatory body, visited Bulgaria within the celebration of 50 years NRA – 50 years IAEA. The delegation included four representatives of the USNRC Head Office in Washington, DC. The American delegation also visited the Kozloduy NPP where it observed the current condition of the plant and visited PP-1 and PP-2. The Accident Management Center was also visited.



Germany

Within the framework of the three-year Cooperation Agreement between the GRS and the NRA in the field of nuclear safety and radiation protection, the joint activities continued regarding the review of the probabilistic safety analysis report, level 2 for the Kozloduy NPP Units 5 and 6. Two meetings were held where the results of the preliminary review of the different parts of the report were presented on a step-by-step basis. As a result of the conclusions on the documents submitted for review and in order to improve the contents of the PSA reports, level 2, for Units 5 and 6, it was agreed to establish joint expert groups between the GRS, the NRA and Risk Engineering to make a thorough analysis of the different parts of the report in order to identify both the strong and the weak spots in the draft. The GRS experience will significantly contribute to this nuclear safety-specific field in terms of the report's compliance with the international requirements.

NATIONAL INIS CENTER

Bulgaria has been a member of the International Nuclear Information System (INIS) since its creation in 1971. At the end of 2007 the total number of bibliographical records in the INIS database already reached 2.9 million.

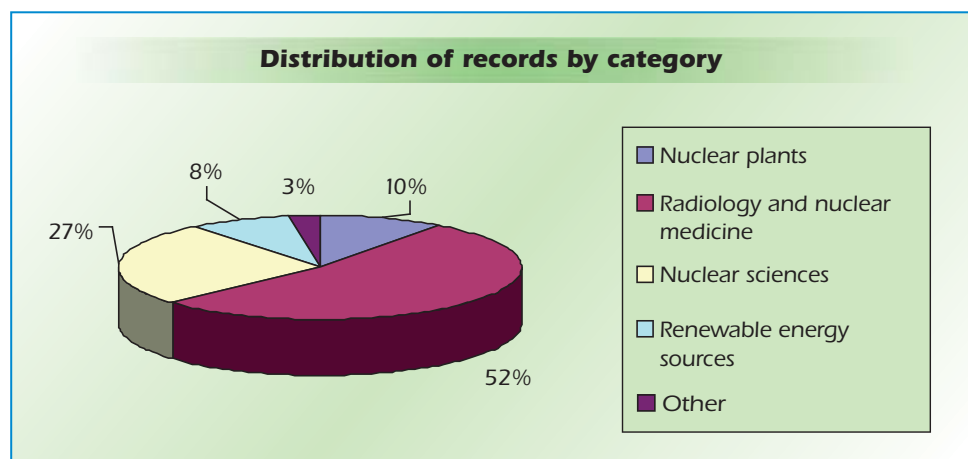
The Bulgarian National INIS Center is responsible for entering into the database documents published in Bulgaria and reports from conferences or other events held in our country. The Center provides information to users in the country on all issues relating to the peaceful use of nuclear energy and some economic and environmental aspects of conventional power industry.

Over 450 records were reviewed and categorized for INIS in 2007, of them 200 were abstracted and indexed. The abstracted and indexed conventional literature (159 records) included articles from the following magazines: Energy, Radiography and Radiology, Science, The Bulgarian Journal of Physics, BAS Reports, Bulgarian Nuclear Society Reports. 41 records from the so called non-conventional or difficult to access literature were abstracted and indexed throughout the year. These were the reports from the 2006 Energy Forum International Conferences which was held in Bulgaria; the full texts of all records were entered into the INIS database.

The following information services were provided over the last year:

- Reference and processing of requests for informational search and providing bibliographical information from the INIS databases to Bulgarian users;
- Providing 57 full texts from the INIS database to Bulgarian users;
- Providing 6 full texts from Bulgarian sources to other national INIS centers;
- Providing specialized literature, most of which IAEA publications and several scientific journals and technical magazines in Bulgarian and Russian, for temporary use by Bulgarian users.

Information on the INIS system and the services provided by





the National Center is available for users on the website of the National Center which is part of the NRA website.

Another method for promoting the system is its presentation on various forums related to INIS subject-matter where demonstrations are made of the system capacities aimed at expanding the range of consumers. Representatives of the Bulgarian INIS Center participated in three international conferences held in Bulgaria in the last year.

PUBLIC RELATIONS

The public relations in the field of nuclear regulation are associated with two field-specific factors. On the one hand, the public significance of the sector involves the provision of accurate, detailed and maximum accessible information to the media and the public in any crisis moment. On the other hand, the constant technological development of the sector and its priority economic importance to Bulgaria make it particularly interesting to the media. In the public communications on the NRA the leading element is the interest of the entire society.

The mission of the regulatory body is not to promote or support the development of nuclear energy or radiation technologies, but to ensure protection of population, workers and the environment, as well as the safety of nuclear facilities and sources of ionizing radiation. The main communication task of the public relations at the NRA is to support this mission for the clearer understanding by the general public, which is a prerequisite for maintaining the trust in the regulatory body.



The most important event in 2007, in terms of public communication, was the 50th anniversary of the NRA. A press conference was organized in connection with the anniversary celebration. It was held the day before the jubilee conference (9 July 2007). The press conference was attended by journalists from the Bulgarian National Television, Nova Television, the Bulgarian National Radio, Darik Radio, the Bulgarian Telegraph Agency and all national daily newspapers. The discussed topics included: 50th anniversary of the agency and the time schedules for the construction of new nuclear power. The journalists spread the news that in 2009 we could expect the start of the construction of the second nuclear plant. The media also attended the jubilee conference held at the

Hilton Hotel on 10 July 2007 where they had the opportunity to interview the IAEA Deputy Director General Mr. Tomihiko Taniguchi.

One of the aims of the regulatory body in its communication with the audience is to deliver the appropriate information and messages and to support their proper understanding by the media and transmitting to the public. The tradition of the NRA to organize a journalist-training seminar was kept in 2007. It was attended by representatives of all national media, the Ministry of Economy and Energy, the Belene NPP and the PR agency hired by the SE RAW. The programme of the seminar included presentations providing information on the NRA activities in 2007, activities related to the use of SIR in Bulgaria, the international scale for assessment of events in nuclear facilities and events with SIR (INES), etc. In the seminar coverage the media considered the following topics: start of the construction of the Belene NPP; the Kozloduy NPP licenses; spent nuclear fuel of the Kozloduy NPP Units 1 and 2; construction of a spent nuclear fuel dry storage facility on the site of the Kozloduy NPP; radiation control on the border checkpoints, etc.

In 2007 we kept one more tradition. Students of the 10th grade of the Ivan Vazov School in Sofia visited the Nuclear Regulatory Agency. They had meetings with the Chairman of the NRA, Dr. Sergey Tsochev, and with officials of the Emergency Planning and Preparedness Department who familiarized them with the structure and functions of the department, and with the physical phenomenon of radiation, the related risks and methods of protection.

LIST OF ABBREVIATIONS

AB	Auxiliary Building
ALARA	As Low As Reasonably Achievable
ASUNE	Act on the Safe Use of Nuclear Energy
AWP	Alarm-Warning Protection
BAS	Bulgarian Academy of Sciences
BCP	Border Checkpoint
CDS	Complete Distribution System
CE CPS	Control Elements of the Control and Protection System
CMD	Council of Ministers Decree
CMDA	Control-Measuring Devices and Automation
CPUAE	Committee on the Peaceful Use of Atomic Energy
CUAEPF	Committee on the Use of Atomic Energy for Peaceful Purposes
EC	European Commission
EU	European Union
EvC	Evaporation Concentrate
EWT	Emergency Water Tank
HPD	High-Pressure Deaerator
HPES	Human Performance Enhancement System
HPIP	High Pressure Injection Pump
IAEA	International Atomic Energy Agency
INES	IAEA/NEA International Nuclear Event Scale
INIS	International Nuclear Information System
INRNE	Institute for Nuclear Researches and Nuclear Energy
IRCS	Internal-Reactor Control System
IRPC	International Radiation Protection Committee
IRS	Incident Reporting System
ISAR	Interim Safety Analysis Report
JINR	Joint Institute of Nuclear Research – Dubna
MD	Ministry of Defense
MEE	Ministry of Economy and Energy
MH	Ministry of Health
MI	Ministry of Interior
MSPDA	Ministry of State Policy for Disasters and Accidents
NCRRP	National Center for Radiobiology and Radiation Protection of the MH
NEC	National Electrical Company
NEPS	National Electric Power System
NPP	Nuclear Power Plant
NRA	Nuclear Regulatory Agency
NRD RAW	National Repository for Disposal of RAW
NRSIR	National Register of SIR of the Republic of Bulgaria

NSEC	Nuclear Scientific Experimental Center
PAO	Planned Annual Outage
PP-1	Power Productions 1, including Units 1 and 4
PP-2	Power Productions 2, including Units 5 and 6
RA	Restricted Area
RAW	Radioactive Waste
RAWPF	RAW Processing Facility
RBNRP	Regulation on the Basic Norms of Radiation Protection
RCL	Radio-Chemical Laboratory
RNG	Radioactive Noble Gases
RR	Research Reactor (IRT)
RSS	Reactor Scram System
SD	Specialized Department
SDA	Steam Dump to the Atmosphere
SDt	Smoke Detectors
SE RAW	State Enterprise Radioactive Waste
SEN	Static Electricity Neutralizer
SFP	Spent Fuel Pool
SFSF	Spent Fuel Storage Facility
SIR	Sources of Ionizing Radiation
SLS	Staggered Load System
SNF	Spent Nuclear Fuel
SRCC	Special Reinforced-Concrete Container
SS	Safety System
SSC	Structures, Systems and Components
TCD	Technological Control Devices
TDFP	Turbine Driven Feedwater pump
TG	Turbine Generator
TS	Technical Specifications (for Operation)
UCTM	Unified Complex Of Technical Means
USAR	Updated Safety Analysis Report
WANO	World Association of Nuclear Operators
WCR	Water Chemistry Regime
WENRA	Western European Nuclear Regulator's Association
WWER	Water Water Energy Reactor

ALARA	As Low As Reasonably Achievable
HPES	Human Performance Enhancement System
INES	IAEA/NEA International Nuclear Event Scale
INIS	International Nuclear Information System
IRS	Incident Reporting System
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulator's Association

CONTROLLED SITES AND TOPICS OF INSPECTION

Site	Period	Resource (Man/h) Number Of Inspectors	Topic	Recommendations and Findings
Kozloduy NPP	26-29 March 2007	256/8	Emergency Planning	14
Kozloduy NPP	02-04 May 2007	72/3	Preparation of 2007 Outage	2
Kozloduy NPP	16-18 May 2007	96/4	Development of the Safety Management System. Implementation of Recommendations from a Previous Inspection.	14
Kozloduy NPP	26-29 May 2007	206/7	Implementation of Recommendations for Joint Engineering and Scientific Support of Operation at PP-2	
Kozloduy NPP	03-05 June 2007	48/2	Radiation Monitoring at the Site	3
Kozloduy NPP	13-16 Aug 2007	256/8	Preparedness of Unit 5 for Start up following PAO'2007	4
Kozloduy NPP	25-28 Sept 2007	128/4	Organization of Operation of High Risk Facilities	5
Kozloduy NPP	02-04 Oct 2007	120/5	Condition of Civil Structures	
Kozloduy NPP	08-11 Oct 2007	128/4	Monitoring of the Radiation Situation at the NPP	3
Kozloduy NPP	25-27 Oct 2007	216/9	Preparedness of Unit 5 for Start up following PAO'2007	8
Kozloduy NPP	03-05 Dec 2007	192/8	Operation of Auxiliary Building 3 of the NPP	
Novi Han NSR RAW SD	8 regular	80/3	One-day Topical on Operation issues	25
RAW Kozloduy SD	19-22 Nov 2007	240/10	Inspection of the operation of RAW SE under the operating license of a nuclear facility for RAW management	4
RAW SE	04 April 2007	24/3	Inspection of the compliance with the terms of Site Selection Permit No. NH-3211 of 5 May 2006	4
Kozloduy NPP	7-9 Nov 2007	120/5	Inspection of the RAW management at the Kozloduy NPP Plc	5

Kozloduy NPP	5-7 Dec 2007	72/3	Inspection of the Kozloduy NPP Plc activities in relation to the preparation for decommissioning of an unit	7
Kozloduy NPP	22-23 May 2007	16/1	Receipt of fresh nuclear fuel. Inspection of the terms of fuel transportation permit	
Kozloduy NPP	28 June 2007	16/2	Inspection of the documents for SNF from WWER-440 prior to barge departure	
Kozloduy NPP	16-17 Sept 2007	16/1	Receipt of fresh nuclear fuel. Inspection of the terms of fuel transportation permit	
Kozloduy NPP	5-6 Nov 2007	16/1	Inspection of the documents for SNF from WWER-1000 prior to barge departure	
Kozloduy NPP	15 inspections	300/1	Joint inspections with the IAEA on Safeguards and the Additional Protocol	4
IRT-2000	25 June 2007	16/2	Inspection of the System for Accounting and Control of Nuclear Material and the information on the Additional Protocol	
IRT-2000	09 July 2007	32/4	Inspection of the radiation protection, radiation control, emergency planning and compliance with the NRA recommendations given at previous inspections	11
Total		2666		113

LIST OF OPERATIONAL EVENTS REPORTED TO THE NRA BY KOZLODUY NPP FOR 2007

Date	Unit	Description	INES Level
11 Jan 07	3	Failure of IHPIP-B to switch on when testing the SLS-I system under schedule due to a fault of the pump emergency push button.	0
5 Apr 07	Total	Accident during transportation of a container with solid RAW	0
23 Apr 07	5	Mechanic holdback and failure to restore breaker 5BX, k.4 in operating condition due to damaged geometry of breaker cells during installation	0
14 June 07	5	Reduction of the unit power due to 5RM50S01 shutdown	0
16 June 07	5	Reduction of the Unit 5 power due to TDFP-2 shutdown	0
16 July 07	5	Contamination of semi-serviced premises at the AB-3	0
28 July 07	6	Power failure of 6TQ24S07 in closed position. Defection of the opening contactor coil of 6TQ24S07	0
11 Aug 07	6	Taking channel III of the SS out of stand-by regime due to failure of 6VF60S05	0
17 Aug 07	6	Dropping of alternating voltage of UCTM during tests due to failure of a contactor in the supply assembly 6HG20	1
21 Aug 07	5	Failure of the 5TQ33D01 breaker to switch on during SLS	0
1 Sept 07	5	Shutting down of TG9 of NEPS due to a short circuit of the exciting loops – Manual actuation of the reactor scram system due to the disconnection of TG-9 from protection.	0
5 Sept 07	5	Power failure of section 5BA and launch of I programme SLS in channel I of the SS	0
27 Sept 07	AB-3	Occurrence of leakage from a pipeline link corridor at the entrance of AB -3	0
7 Oct 07	5	Loss of power supply of assembly 5LC01 III.6 and subsequent reduction of voltage of SDA 5TX80S05 due to a short circuit	0
9 Oct 07	5	Shutting down of 5QF11D02 during testing of programme I SLS	0
17 Oct 07	6	Failure of the offside bearing of pump 6TQ22D01. (The reactor remains with one pump of the system TQ2)	0
24 Oct 07	6	Failure of heat-exchanger 6TQ10W01 as a result of which an increased activity is registered of the service water at the heat-exchanger outlet	0
27 Oct 07	6	Unplanned switching on of programme I SLS in channel II of the SS due to power failure of section 6BB	0
27 Oct 07	6	Shutting down of DG 6GV during testing of programme I SLS	0
20 Nov 07	6	Unplanned switching on of programme I SLS in channel I of the SS due to power failure of section 5BV	0
24 Nov 07	6	Stopping Unit 6 and shutting down TG-10 for the elimination of a secondary circuit leakage	1

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Notes

A series of horizontal dotted lines for writing notes.



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