DEAR READERS!

We offer to your attention the Annual Report on Nuclear and Radiation Safety in Ukraine-2007.

The Report gives you the insights of the legal framework in the nuclear energy field; the main areas of activity of regulatory bodies in this area; activities, which have been performed throughout the reporting period to enhance the level of nuclear and radiation safety in Ukraine.

While preparing the Report for publishing, experts of the State Nuclear Regulatory Committee of Ukraine strived to provide the most complete and objective information to community on the status of nuclear and radiation safety in Ukraine; moreover, we tried to do that for you, dear readers, in the most convenient and easily understood form.

We hope, that with your help, we'll be able to receive the answer to the question of whether or not have we managed to achieve the challenging objective.

We would be grateful for all of your comments, advises and wishes as to the improvement of the of this Report structure.

If, after you have read the Report, there would be more questions from you, do not hesitate to ask them during our telephone hotlines or during the visiting hours for citizens arranged by the management of the State Nuclear Regulatory Committee of Ukraine. The info on the time and place of these arrangements you may find at the web-site of the State Nuclear Regulatory Committee of Ukraine: www.snrc.gov.ua.

CHAIRPERSON
of the State Nuclear
Regulatory Committee of Ukraine

Olena Mykolaichuk

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List of Abbreviations

ChNPP – Chernobyl NPP
CMU – Cabinet of Ministers of Ukraine
ETC – Emergency Technical Centre
FCM – Fuel-Containing Masses
FE – Fuel Element
FS – Feasibility Study
IAEA – International Atomic Energy Agency
IAMS – Shelter integrated automated monitoring system
ICSRM – Industrial Complex for Solid Radioactive Waste Management
IEC – Information/Emergency Center
INES – International Nuclear Events Scale
IRS – Ionizing Radiation Source
KhNPP – Khmelnitsky NPP
KNRI – Kyiv Nuclear Research Institute of the National Academy of Sciences of Ukraine
LRTP – Liquid Radwaste Treatment Plant
MFA – Ministry of Foreign Affairs
MFE – Ministry of Fuels and Energy
MHB – Multi-Place Hermetical Basket
MJU – Ministry of Justice of Ukraine
MUE – Ministry of Ukraine for Emergencies and Affairs of Population Protection from Consequences of the Chernobyl Catastrophe
NASU – National Academy of Sciences of Ukraine
NAEK "Energoatom" – National Nuclear Generating Company "Energoatom"
NI – Nuclear Installations
NM – Nuclear Materials
NNPT – Nuclear Non-Proliferation Treaty
NPU – Nuclear Power Unit
NPP – Nuclear Power Plant
NSC – New Safe Confinement
NSCKPI – National scientific centre "Kharkiv Physics/technical Institute"
PE – Public Enterprise
PPS – Physical Protection System
SO – Scheduled Outage
RA – Regulatory Act
Radwaste – Radioactive Waste
RIA – Risk-Informed Approaches
RNPP – Rovno NPP
RWDP – Radioactive Waste Disposal Point
SA – State Association
SAR – Safety Analysis Report
SE – Separate Entity
SEIAS – State emergencies informational and analytical system
SFA – Spent Fuel Assembly
SFSF – Storage Facility for Spent Nuclear Fuel
SINEI – Sevastopol Nuclear Energy and Industry Institute
SIP – "Shelter" Implementation Plan
SISP – State Interregional Specialised Plant
SNF – Spent Nuclear Fuel
PSA – Probabilistic Safety Analysis
SRW – Solid Radioactive Waste
ICSRM – Solid Radioactive Waste Management Industrial Complex
SSE – State Specialized Enterprise
SSTCNRS – State Science and Technical Centre For Nuclear and Radiation Safety
TACIS – Technical Assistance For The Commonwealth Of Independent States
URSS – Ukrainian Radiation Safety Standards
VSC – Ventilated Storage Cask
WWER – Water Cooled Power Reactor
SUNPP – South Ukraine NPP
ZNPP – Zaporizhzhya NPP

Legal Framework in the Nuclear Energy Field

The legal regulation of relations in nuclear energy is necessitated by the potential danger of activities in this area.

The first nuclear regulations were developed in the former Soviet Union in the mid-1950s when the use of nuclear energy was controlled by Soviet authorities. They were mostly departmental-level documents that did not deal with rights, obligations and responsibilities in the area of nuclear energy.

Ukraine gained its independence in 1991 and thus acquired a powerful arsenal of nuclear weapons and five nuclear power plants operating 14 units. From the Soviet Union, Ukraine inherited a large number of organisations and industrial enterprises that used ionizing radiation sources, enterprises that employed radioisotope devices, and several radioactive ore mining and milling plants. However, there was no legal framework to regulate the relations in nuclear energy. This was the reason for Ukraine to start the active development of its own nuclear legislation in the first years of its independence.

The Ukrainian nuclear legislation was based on the Concept of State Nuclear Regulation and Management approved by Resolution of the Verkhovna Rada No. 3871–XII dated 25 January 1994. The Concept identified the major principles to set the basis for nuclear legislation. This was a crucial step toward establishing a legal framework in the area of nuclear energy, even though it currently needs to be updated and amended.

The next step was adopting the Law of Ukraine «On Use of Nuclear Energy and Radiation Safety» by the Verkhovna Rada on 8 February 1995, which was a basic law with regard to the safe use of nuclear energy and radiation safety. It was the first law to set forth the priority of human and environmental safety, rights and obligations of citizens in the area of nuclear safety, to regulate the use of nuclear installations and ionizing radiation sources, etc. In addition, the Law stated rights of citizens and their associations to get information on nuclear energy and radiation safety and to participate in shaping policy in this area, socioeconomic living and working conditions nearby uranium ore mining plants, nuclear installations and radioactive waste management facilities, and citizen's rights to be recompensed for the harm caused by the adverse effect of ionizing radiation in the use of nuclear energy. This Law also outlined the competences of authorities and regulators in the area of nuclear energy and radiation safety, established state safety regulation in the area of nuclear energy, determined the legal status of legal and natural entities that undertook activities in nuclear energy and radiation safety, identified requirements for the location, construction, commissioning and decommissioning of nuclear installations and radioactive waste management facilities, applied access control procedure at sites where nuclear installations and radioactive waste management facilities were located, regulated the operator's liability for nuclear damage, enforced the liability for legislative incompliance in the area of nuclear energy and radiation safety, etc.

This Law promoted further development of nuclear legislation in Ukraine. In particular, the following laws were adopted: "On Radioactive Waste Management" (30 June 1995), "On Uranium Ore Mining and Milling" (19 November 1997), "On Human Protection Against Ionizing Radiation (14 January 1998), "On General Principles of Further Operation and Decommissioning of the Chornobyl NPP and Transformation of the Ruined Fourth Unit of This NPP into an Ecologically Safe System" (11 December 1998), "On Authorising Activity in the Area of Nuclear Energy" (11 January 2000), "On Physical Protection of Nuclear Installations, Nuclear Materials, Radioactive Waste, Other Ionizing Radiation Sources" (19 October 2000), "On Civil Liability for Nuclear Damage and Its Financial Assurance" (13 December 2001), "On Settling Nuclear Safety Issues" (24 June 2004), "On Procedure for Making Decisions on Siting, Design and Construction of Nuclear Installations and Radioactive Waste Management Facilities of National Significance" (8 September 2005) and other regulations.

The national nuclear legislation also includes a number of international treaties entered into by Ukraine. Primarily, it is the Nuclear Non-Proliferation Treaty (NPT) entered into by Ukraine as a non-nuclear-weapon state in December 1994. Article 3 of the Treaty obliges each non-nuclear-weapon member state to accept safeguards as set forth in an agreement to be concluded with the International Atomic Energy Agency (IAEA). Ukraine entered into such an agreement on 21 September 1995 and the Verkhovna Rada ratified it on 17 December 1997.

It also includes the Vienna Convention on Civil Liability for Nuclear Damage of 1963, which puts the absolute liability for nuclear damage on the operator. This Convention entered into force for Ukraine on 12 July 1996.

Ukraine also obeys the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (26 September 1986), Convention on Early Notification of a Nuclear Accident (30 December 1986), Convention on the Physical Protection of Nuclear Material (5 September 1993), Nuclear Safety

Convention (17 December 1997), and Joint Convention on the Safety of Radioactive Waste Management (20 April 2000).

The national nuclear legislation also includes regulations of the Cabinet of Ministers that establish law implementation mechanisms, regulations of central executive bodies, rules and standards that identify safety criteria and requirements for nuclear facilities, ionizing radiation sources and terms and technical requirements to regulate the safety of operations and procedures in nuclear energy.

Although Ukraine has established its own nuclear legislation, the number of regulations increases every year owing to improving relations in nuclear energy.

The application of the current legal regulation shows that there are many gaps, inconsistencies and overlaps of individual regulatory provisions in the area of nuclear energy and rules of adjacent legislation. This complicates the application of certain laws and leads to their ambiguous interpretation and inefficiency. Therefore, competent authorities continuously revise old and develop new regulations, also in the context of adapting the national legislation to EU laws.

The improvement of nuclear legislation continued in 2007. In particular, based on the major objective of the state regulation of nuclear and radiation safety, national and world tendencies in the development of nuclear energy, and issues in the regulatory control of nuclear and radiation safety identified in the «Strategic Action Plan of the State Nuclear Regulatory Committee of Ukraine for 2005-2007» and «Programme for Developing and Reforming the Nuclear Regulatory System of Ukraine», the SNRCU continued updating the legislative and regulatory framework in nuclear energy in order to:

- *improve requirements for safety assessment and verification of nuclear installations, their upgrading, ageing management and lifetime extension beyond designed period;*
- *develop and improve regulatory and legislative framework for decommissioning of power units, construction and commissioning of spent fuel storage facilities;*
- *improve regulatory and legislative framework for the safety of radioactive waste management;*
- *ensure systems for physical protection of nuclear installations, nuclear materials, radioactive waste, other ionizing radiation sources in Ukraine;*
- *improve regulatory and legislative framework for the management of ionizing radiation sources;*
- *improve regulatory and legislative framework for the safety of radioactive material transport;*
- *develop and implement a quality programme for regulatory activity.*

The improvement of the national nuclear legislation in 2007 resulted in passing, on SNRCU's initiative, the Law of Ukraine «On Amending Article 11 of the Law of Ukraine On Physical Protection of Nuclear Installations, Nuclear Materials, Radioactive Waste, Other Ionizing Radiation Sources» No. 623-V on 8 February 2007. The amendments permitted improving the access procedure for foreigners to carry out special activities, adapting current legislation to international standards, and, as a result, improving the effectiveness of Ukraine implementing international treaties, in particular, those for Chornobyl NPP decommissioning and Shelter transformation into an ecologically safe system.

In addition, the SNRCU drafted the Law of Ukraine «On Ratifying the Convention on the Physical Protection of Nuclear Material» and the Law of Ukraine «On Amending Some Laws of Ukraine Regarding the Ratification of the Amendment to the Convention on the Physical Protection of Nuclear Material» and then agreed these draft Laws with other central executive bodies and submitted them to the Cabinet of Ministers. These law need to be adopted by Ukraine to accept the obligations under the Amendment to the Convention on the Physical Protection of Nuclear Material as an international treaty. (The Amendment was signed by state parties to the Convention, including Ukraine, at the Diplomatic Conference in Vienna in July 2005.)

The SNRCU also drafted the Law of Ukraine «On Amending the Law of Ukraine on Authorising Activity in the Area of Nuclear Energy. The Law of Ukraine «On Authorising Activity in the Area of Nuclear Energy» needed to be amended to eliminate drawbacks and settle contradiction in licensing revealed in the application of current legislation. The adoption of this draft Law will make licensing in nuclear energy stricter and more comprehensive. The licensing procedures themselves will become more predictable and transparent. It should be also noted that the draft Law makes nuclear energy users responsible for incompliance with licensing procedures identified in it or incompliance with or inappropriate fulfilment of conditions set for activities in nuclear energy to be licensed according to law. This both covers a substantial gap in the current national legislation which previously imposed administrative sanctions on natural persons and meets the requirements of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and the Nuclear Safety Convention ratified by Ukraine. The draft Law is being reagreed because of changes in the Government.

To keep the state supervision over nuclear energy, the SNRCU developed the draft Law «On Amending

Article 2 of the Law of Ukraine On Basic Provisions on State Supervision (Control) over Economic Activity», which establishes that the Law in question does not apply to relations in the state supervision over compliance with nuclear and radiation safety requirements.

In 2007, the Cabinet of Ministers approved a number of regulations on nuclear and radiation safety developed by SNRCU experts.

- Cabinet Resolution No. 939 of 18 July 2007 approved technical specifications on containers for radioactive waste storage and disposal and an action plan to apply the specifications. The technical specifications identify requirements for containers for radioactive waste storage and disposal, requirements on packing and marking, and compliance assessment procedures used to check whether containers meet technical requirements. The Resolution was adopted to ensure conditions to raise the competitive capacity of national production, simplify the procedure for mutual acceptance of compliance assessment results and customs clearance of export and import operations and decrease intervention of state control bodies into economic activities.

- Cabinet Resolution No. 1196 of 3 October 2007 «Some Aspects of Radioactive Material Transport» established a procedure to issue permits for international transport of radioactive materials and amended the Provisions on the Procedure for Radioactive Material Transport through the Territory of Ukraine (approved by Cabinet Resolution No. 1373 of 15 October 2004). This Resolution was adopted to ensure safety in international transport of radioactive material and to bring regulations that govern the international transport of radwaste, IRS and nuclear materials into line with the EU requirements and IAEA recommendations.

- Cabinet Resolution No. 1253 of 24 October 2007 «On Amending Some Resolutions of the Cabinet of Ministers of Ukraine Regarding the State Registration of Ionizing Radiation Sources» appropriately amended the Procedure for State Registration of Ionizing Radiation Sources (approved by Cabinet Resolution No. 1718 of 16 November 2000) regarding the payment for state registration of IRS and the Provisions on the State Register of Ionizing Radiation Sources and Payment for Their Registration (approved by Cabinet Resolution No. 847 of 4 August 1997). The Resolution will ensure complete financial control over payments relating to the Register, minimise payment for the registration, which will cover only costs needed to maintain the Register (the amount of payment for state registration of radiation sources is established by the Ministry of Finance upon agreement with the SNRCU), ensure reliable funding and efficiency of the Register (costs for state registration of sources will simultaneously go into the pool of the State Budget to compensate for budget expenses to maintain the Register).

- Cabinet Resolution No. 1382 of 5 December 2007 approved technical specifications on sealed ionizing radiation sources. These technical specifications will promote the high level of occupational health and safety, radiation and industrial safety, increase competitive capacity of domestic products through bringing national standards into compliance with EU requirements, simplify procedures for mutual acceptance of compliance assessment results and customs clearance of export and import operations, and decrease intervention of state control bodies into economic activities.

In 2007, the development of standards and rules on nuclear and radiation safety was underway. A number of regulations was adopted over the year in order to:

- ***improve the regulatory and legislative framework for the safety of radioactive material transport to comply with international rules***

In order to comply with the Nuclear and Radiation Safety Rules for Transport of Radioactive Materials (PBPRM-2006) (approved by Ordinance of the State Nuclear Regulatory Committee of Ukraine No. 312 of 30 August 2006 and registered in the Ministry of Justice of Ukraine, Reg. No. 1056/12930 of 18 September 2006), the «Procedure for Issuing Certificates for Safe Transport of Radioactive Materials» was developed and then approved by SNRCU Ordinance No. 119 of 6 September 2007 and registered in the Ministry of Justice, Reg. No. 1079/14346 of 20 September 2007.

- ***improve the regulatory framework for the management of ionizing radiation sources***

In order to establish requirements and conditions for using IRS in radiotherapy, the «Safety Requirements and Conditions (Licensing Terms) for the Use of Ionizing Radiation Sources in Radiotherapy» was developed and then approved by SNRCU Ordinance No. 193 of 28 December 2007 and registered in the Ministry of Justice, Reg. No. 31/14722 of 18 January 2008.

- ***improve the regulatory framework for the safety of radioactive waste management***

SNRCU Ordinance No. 81 of 29 May 2007 approved the «General Safety Provisions for Radioactive Waste Disposal in Geological Repositories». These provisions identify basic criteria, requirements, and conditions to ensure nuclear safety in radwaste disposal in stable geological formations (geological repositories) at all lifetime stages to protect personnel, the public and the environment against harmful effects of ionizing radiation.

SNRCU Ordinance No. 161 of 7 November 2007 approved the «Conditions and Procedure for Issuing Individual Permits for Activities at the Stages of Operation or Closure of Radioactive Waste Repositories». Ukraine adopted these Conditions and Procedure to identify activities to be carried out by the operator only pursuant to an individual permit and to establish terms to issue such permits and a list of documents to confirm the applicant's capability and willingness to perform these activities.

The regulatory and legislative framework was further improved to ensure the safety of nuclear installations and implement a quality assurance programme in regulation (the SNRCU regulations developed in the reporting period are listed in Annex 1).

Furthermore, the SNRCU proceeds with developing a hierarchic pyramid of Ukrainian legislative and regulatory documents on nuclear and radiation safety under Tacis Project U3.IA/03-1 (UK/RA/06) «Transfer of Western European Regulatory Methodology and Practices to the Nuclear Safety Authority of Ukraine» to ensure the efficiency of nuclear regulatory control. The concept of a hierarchic pyramid of legislative and regulatory documents on nuclear and radiation safety was discussed and approved at meetings of the SNRCU Working Commission for Regulation and SNRCU Board (29 November 2007).

This effort will result in a list of regulations and systemised regulatory approaches in specific areas of nuclear and radiation safety as follows:

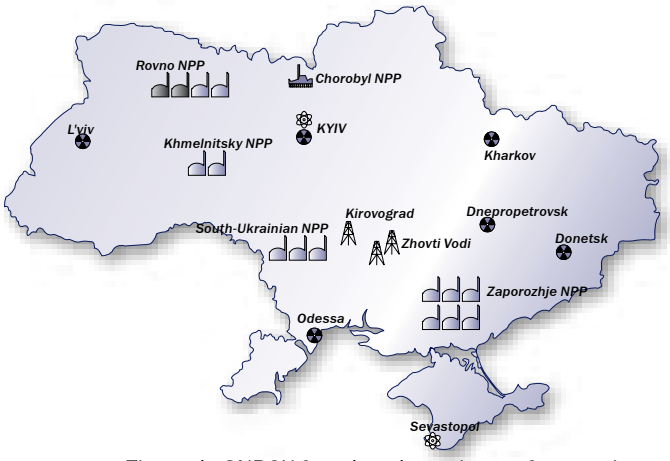
1) *a hierarchy of the regulatory and legislative framework will be established;*
2) *gaps, inconsistencies and overlaps will be revealed;*
3) *a list of regulations to be developed will be made;*
4) *a list of regulations to be revised will be made;*
5) *SNRCU competence regarding regulations to be revised or developed will be determined;*
6) *priorities in the development/revision of documents will be set.*

Detailed information on regulations, international conventions, standards, and rules in the area of nuclear energy can be found at the SNRCU website www.snrc.gov.ua under Regulations.

State Regulation of Nuclear and Radiation Safety

The State Nuclear Regulatory Committee of Ukraine is the main competent central executive body that regulates nuclear and radiation safety in Ukraine. It was established by Presidential Decree in December 2000.

As a regulator, the SNRCU is independent of organisations using nuclear energy. Pursuant to international requirements, the SNRCU is responsible for issuing official permits, taking regulatory actions, carrying out reviews and assessments, conducting inspections and applying sanctions, as well as implementing safety principles, criteria, provisions and guidelines.



The main SNRCU functions in nuclear safety regulation are to:

- *identify safety criteria, requirements and conditions in the area of nuclear safety (regulation);*
- *issue permits and licences for activities in this area (licensing);*
- *conduct state supervision over compliance with laws, regulations, standards and rules on nuclear and radiation safety (supervision);*
- *take lawful sanctions in case of violations (enforcement).*

The SNRCU regulates the safety of:

- *15 power units operating in Ukraine:*
  - *6 units at Zaporizhya NPP,*
  - *4 units at Rivne NPP,*
  - *3 units at South Ukraine NPP,*
  - *2 units at Khmelnitsky NPP;*
- *3 units at Chornobyl NPP under decommissioning;*
- *2 spent fuel storage facilities in operation at Zaporizhya and Chornobyl NPPs and that under construction at Chornobyl NPP;*
- *2 research reactors;*
- *radioactive waste storage facilities and radioactive waste management plants:*
  - *6 Radon Specialised Enterprises,*
  - *Kompleks State Specialised Enterprise,*
  - *Tekhnotsentr State Specialised Enterprise;*
- *uranium milling plants;*
- *radioactive material transport through the territory of Ukraine;*
- *use and production of ionizing radiation sources, radiation technologies.*

As of 31 December 2007, the SNRCU's staff numbered 221, including 101 men and 120 women. Seventy percent of employees graduated from technical universities. Most of them had gained working experience in industry, design and research institutions when joined the regulator.

It should be noted that the number of regulatory staff has increased as compared with 2006 (168 persons), as well as funding (Figure 2.1)

In order to strengthen professional potential of the regulator in 2007, heads of subdivisions actively formed backup staff and trained candidates to perform their official duties in future.

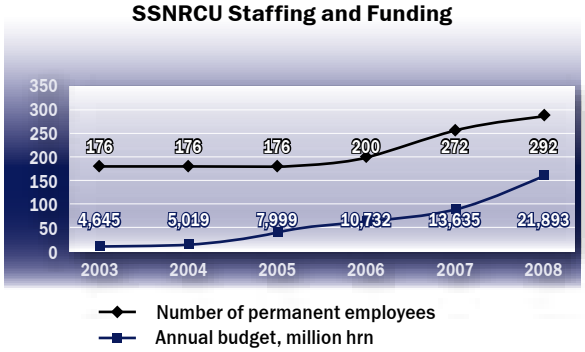
SNRCU staff, as state employees, are retrained at least every five years. The results are duly considered in their certification and subsequent promotion.

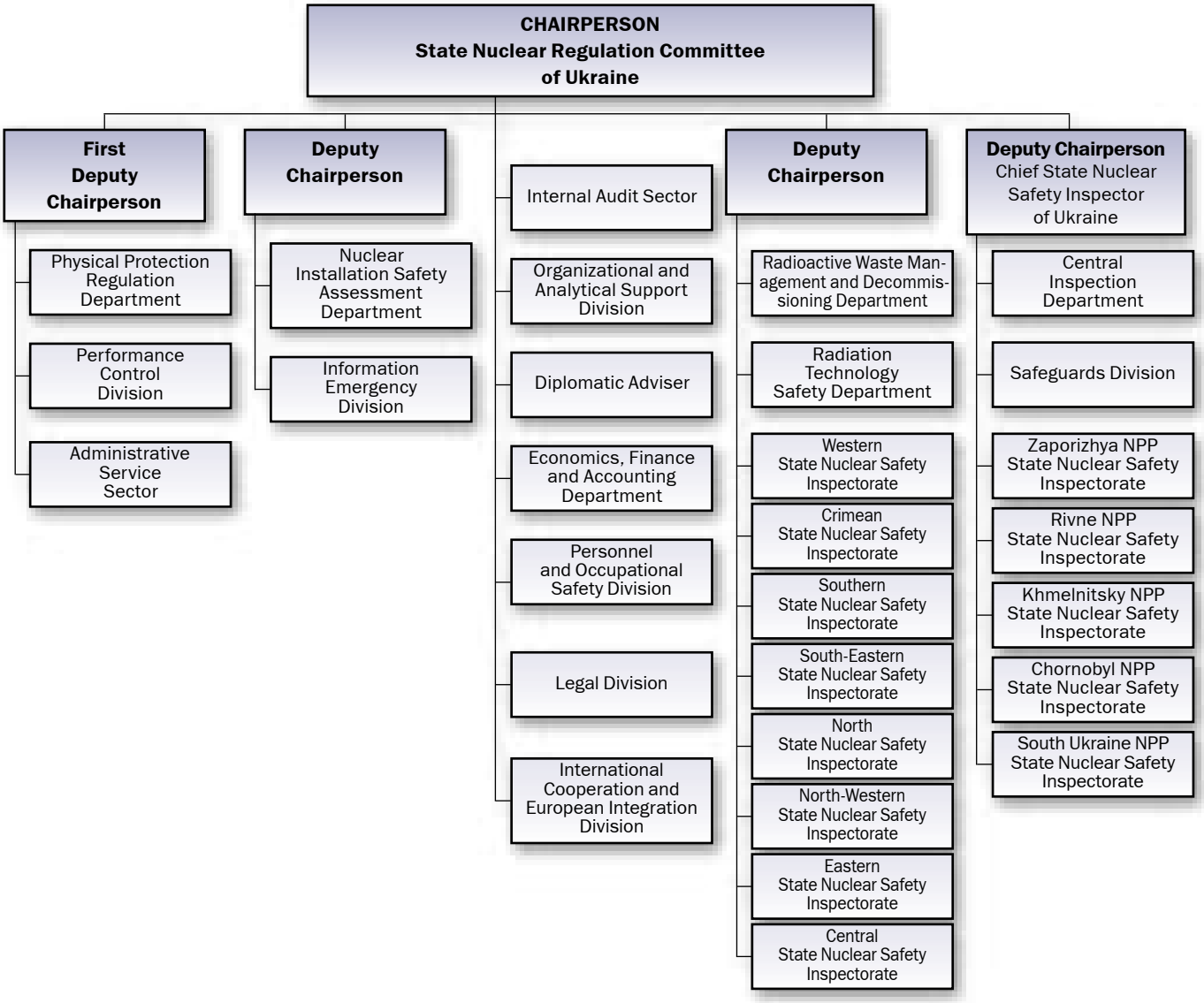
In 2007, 55 SNRCU employees passed training under different programmes, including international ones.

In order to strengthen SNRCU territorial subdivisions – State Nuclear Safety Inspectorates – by giving them a status of legal entity, the «Provisions on SNRCU State Regional Nuclear and Radiation Safety Inspectorate» were developed and then approved by SNRCU Ordinance No. 139 of 16 October 2007.

In addition, the implementation of a quality control system (QCS) was started in 2007 in compliance with

Figure 2.1
SSNRCU Staffing and Funding





DSTU ISO 9001-2001. An organisational structure was established to support the quality system: a general representative was appointed to deal with QCS at the SNRCU, a quality control commission was established at the SNRCU and QCS representatives from subdivisions were appointed, who act in compliance with the approved «Provisions on QCS Representatives from SNRCU Subdivisions». The heads of subdivisions and quality representatives from subdivisions were trained under the programme «Quality Control System and Internal Audit». In 2007, the «General Quality Guideline of SNRCU», 3 quality guidelines for individual activities, 16 guides for basic performance processes at the SNRCU, composition of internal auditors for the SNRCU QCS and an internal audit programme for the SNRCU QCS were also approved. According to the schedule, internal audits and a certification audit are planned for the first six months of 2008 to check QCS implementation.

Pursuant to the SNRCU quality control policy, the QCS is regarded as a tool to ensure the proper performance of SNRCU tasks. The QCS includes internal mechanisms that ensure its continuous improvement and thus effectiveness of SNRCU efforts.

In order to assure that the SNRCU can properly perform its tasks and provide high-quality services, the following priorities have been established:

- *continuously improve regulation taking account of technical advances and management techniques for the benefit of nuclear and radiation safety;*
- *ensure openness and transparency of state regulation;*
- *identify and continuously analyse how objectives of the SNRCU activity are reached, which are intended to perform tasks and functions, provide services to all customers and reach the regulatory goal, apply a process-oriented approach to manage activities to achieve the stated objectives;*
- *continuously analyse needs and expectations of SNRCU customers (the public, government, nuclear energy users, central and local executive bodies, international organisations, etc.), direct SNRCU efforts to the maximum possible satisfaction of safety and protection needs;*
- *encourage personal interest of SNRCU employees in the implementation and improvement of regulation and QCS; support and motivate appropriate initiatives;*
- *systematically analyse results of SNRCU efforts and QCS to identify needs and potential for improvement and make appropriate justified decisions;*
- *keep mutually beneficial relations with SNRCU partners and stakeholders to strengthen regulatory capabilities.*

To develop recommendations on significant issues and important areas of state regulation of nuclear and radiation safety, the SNRCU set up a Board, which is a standing advisory board whose decisions are approved by SNRCU Ordinances. The SNRCU Board is convened at least every three months. Managerial staff and experts from other central and local executive bodies, local governments, people's deputies, representatives of enterprises and organisations subjected to SNRCU regulatory control, public and mass media take part in Board meetings.

In 2007, the SNRCU Board met nine times to discuss essential issues of nuclear and radiation safety, such as the safe management of radioactive waste at Chornobyl NPP and Exclusion Zone, safety and security of ionizing radiation sources in Ukraine, etc.

At the beginning of each year, the SNRCU Board traditionally discusses the safety enhancement of operating nuclear power units, which is the first priority of state policy in nuclear energy. On 25 January 2007, the SNRCU Board discussed the status of measures taken in 2006 under the Concept for Safety Improvement of Operating NPPs. It was concluded at the meeting that there were favourable trends in safety improvement and upgrading measures at operating power units in 2006 as compared with 2003-2005 when the «Comprehensive Programme for Upgrading and Safety Improvement of Nuclear Power Units» was not implemented properly. At the same time, NAEK Energoatom was recommended to take measures to improve the existing management and engineering support system, establish personal responsibility of NAEK Energoatom top-level management for specific areas and inculcate a high level of safety culture in each company employee.

The SNRCU Board also pays attention to the lifetime extension of NPP units beyond the designed period as discussed at the meeting of 24 April 2007. It should be noted that NPP lifetime extension beyond designed period is envisaged by the Energy Strategy of Ukraine till 2030, which provides for the lifetime extension for 12 of the 15 operating power units. RNPP-1,2 and SUNPP-1 are pilot units for lifetime extension. Having analysed the status of lifetime extension measures at power units, the College concluded that the lifetime of RNPP-1,2 could be extended in due period but immediate and complete measures should be taken to improve safety and eliminate deficiencies. The SNRCU also identified a number of measures for NAEK Energoatom to extend the lifetime of RNPP-1: develop and agree programmes and guidelines to assess the technical state and reassign the lifetime of critical power unit components; assess the technical state and reassign, first of all, the lifetime of critical components of the reactor pressure vessel and reactor internals and structures; complete implementing the ageing management programme at Rivne NPP; qualify equipment; increase containment leak-tightness to minimise the probability of the maximum emergency release to the values specified by current NRS standards and rules; develop and implement a surveillance specimen programme for the reactor pressure vessel beyond the designed period; bring cables into compliance with appropriate requirements, including the replacement of combustible cables with those that do not propagate fire; complete the periodic safety verification report; re-register thermal mechanical equipment and piping and make appropriate records in their certificates.

The SNRCU Council discussed and analysed conditions for further operation of ChNPP-1 systems and components on 22 September 2007 and concluded that the state of ChNPP-1 systems and components related to spent fuel storage and radwaste management permitted their safe operation beyond the designed period based on a ChNPP safety assessment of the above-mentioned systems and components, favourable findings of a regulatory review on nuclear and radiation safety and inspection at unit 1.

Advisory functions are also performed by the Scientific Council and Public Council at the SNRCU.

Draft concepts, guidelines, standards and rules that are being developed or are to be agreed upon and implemented were presented at meetings of the Scientific Council in 2007. In particular, representatives of all stakeholders were involved to discuss essential issues of external exposure survey of personnel at nuclear power plants, medical institutions and other industrial enterprises and a unified system for monitoring and record of individual doses.

It should be noted that individual exposure survey is a key task in protecting personnel and the public against the adverse effect of radiation and is an important quantitative criterion to assess the actual level of nuclear and radiation safety. Therefore, the SNRCU, in its licensing and supervision, primarily assesses the licensees' capability to ensure proper radiation protection of personnel and take successive measures to decrease doses.

According to the Ministry of Health, individual dose survey is needed for approximately 42,000 employees in Ukraine: among them 14,636 NAEK Energoatom employees (including temporary-duty personnel), 9,100 medical workers (radiation therapists) and personnel of enterprises in the Exclusion Zone, including ChNPP and Shelter, and other industrial, educational and scientific enterprises.

An enlarged meeting of the SNRCU Scientific Council involving representatives of industry, medical and scientific institutions and the public was held in June 2007 to comprehensively assess problems in establishing the unified state system (USS) for monitoring and record of individual doses in compliance with the Law of Ukraine «On Human Protection Against Ionizing Radiation» (14 January 1998) and Cabinet Resolution «On Approving the Procedure for Establishing a State System for Monitoring and Record of Individual Doses to the Public» (No. 379 of 23 April 2001) and to find potential ways for their resolution.

It was many times emphasised in the discussion of the above issues that state bodies, industrial organisations that use nuclear energy and scientific institutions should combine their efforts to promptly establish a unified state system for monitoring and record of individual doses in line with national legislation for the public, personnel, employers and officials to obtain objective information on actual doses received by any person for a certain period of time in order to ensure social protection, pension benefit, compensation, recreation, prevention of occupational diseases, etc.

Territorial dose survey services currently exist only in 13 regions of Ukraine and effective individual dose survey systems can determine only doses of hard gamma radiation, while the Radiation Safety Standards of Ukraine (NRBU-97) provide for the transfer to neutron and beta radiation monitoring. Available dosimeters and survey instruments need to be upgraded, and the unification of technical approaches, information bases, analytical systems, independent dose audit, etc., remain very important.

In addition, siting criteria for radioactive waste disposal facilities, such as potential determination of quantitative safety parameters and timeframes for realistic scientific prediction of the state of natural barriers in the disposal systems (pursuant to Article 9 of the Law of Ukraine "On Radioactive Waste Management" regarding the state regulation of design and exploratory developments of candidate sites for radioactive waste manage-

LICENSING IN 2007

LICENSED ACTIVITY	Number of Licences		
	Granted/ reissued	Amended	Cancelled
Radwaste treatment, storage and disposal		**3**	1
Design of nuclear installations or radwaste disposal facilities	**7**	-	1
IRS use	**233**	**29**	-
IRS production	**5**	**1**	1 *(suspended)*
Radioactive material transport	**15**	**2**	-
Physical protection and nuclear materials and nuclear installations	**13**	-	-
Operation of a nuclear installation or radwaste disposal facility	**1**	**7**	1 *(suspended)*
Construction of a nuclear installation or a radwaste disposal facility	-	**1**	**1**
Uranium ore processing	**2**	-	**1** *(suspended)*

More detailed information on licences issued can be found at the SNRCU website www.snrc.gov.ua under Activity.

INSPECTIONS CONDUCTED IN 2007

SNRCU SUBDIVISIONS	Planned inspec-tions	Off-schedule inspec-tions	Planned inspectors' investiga-tions	Off-schedule inspectors' investiga-tions
Nuclear Installation Safety Assessment Department (NISAD)	7	-	-	1
Central Inspection Department (CID)	4	-	-	-
Physical Protection Regulation Department (PPRD)	6	2		-
Radiation Technology Safety Department (RTSD)	4	2	2	6
Radioactive Waste Management and Decommissioning Department (RWD)	10	6	9	-
Safeguards and Transport Safety Department (STSD)	6	-	3	-
State Inspectorate at ZNPP	17	7	-	-
State Inspectorate at RNPP	20	-	-	1
State Inspectorate at KhNPP	24	6	-	1
State Inspectorate at ChNPP	13	11	-	-
State Inspectorate at SUNPP	20	12	-	-
Northern State Inspectorate	13	15	29	27
North-Western State Inspectorate	35	30	2	19
Western State Inspectorate	5	8	10	26
Southern State Inspectorate	48	2	10	8
South-Eastern State Inspectorate	128	7	13	6
Central State Inspectorate	50	15	12	17
Eastern State Inspectorate	21	17	21	23
Crimean State Inspectorate	19	39	15	18
Total	**450**	**179**	**126**	**153**

ment facilities) were discussed with relevant experts at meetings of the SNRCU Scientific Council in 2007.

The SNRCU Public College was set up in 2005 to ensure efficient dialog with the public. Based on it, the Public Council was established in 2006. The 35 members of the Council include representatives of mass media, scientists and people from all regions of Ukraine where nuclear facilities are located. The Public Council is chaired by Sergiy Kurykin, Leader of the Green Party. His deputies are Anna Golubovska-Onisimova, Honorary President of the All-Ukrainian Ecological Public Organisation VEGO «MAMA-86», and Boris Prister, Academician, Ukrainian Academy of Agrarian Sciences. Four meetings of the Public Council were held with the public and mass media in 2007 to discuss the safety of Chornobyl NPP, draft regulations «NPP Safety. General Provisions», «Siting Requirements for Radioactive Waste Disposal Facility» and «Basic Technical Requirements for New NPP Units», consider the draft concept of the state target programme for informing the public on nuclear and radiation safety, draft concept for state regulation of nuclear and radiation safety, etc.

In addition, a joint meeting of the Public Councils of the Ministry for Environmental Protection of Ukraine and SNRCU was held in July 2007 to consider the compliance with water legislation and safety requirements for water use in operation and siting of nuclear power facilities. The recommendations, proposals and comments provided by members of the Public Council were properly considered by the Committee. Some of them were introduced into draft SNRCU regulations.

Information on Public Council decisions can be found at the SNRCU website www.snrc.gov.ua under Public Council.

Other SNRCU advisory bodies, such as the Working Commission for Regulation and Licensing Commission,

actively worked to coordinate activities and ensure collective and open decisions in respective areas.

The Working Commission for Regulation was set up to resolve contradictory regulatory issues that are within SNRCU competence. It is primarily intended to prepare a long-term programme for developing regulations on nuclear and radiation safety, an annual plan of SNRCU regulatory activities and to provide recommendations to resolve contradictory issues in the development, agreement and approval of regulations.

The SNRCU Licensing Commission is intended to make proposals on making decisions to grant, refuse to grant, reissue, extend, suspend, cancel and renew a licence for the use of nuclear energy.

In 2007, the SNRCU actively applied the major instruments of state regulation, such as law-making, licensing and supervision over uses of nuclear energy.

The SNRCU's law-making activity is discussed in detail in the previous section.

SNRCU supervision is intended to protect personnel, the public and the environment against the adverse effect of ionizing radiation and radioactive contamination resulting from practices at relevant facilities.

State supervision includes planned and off-schedule safety inspections of routine operations and inspectors' investigations.

Planned inspections are conducted in compliance with annual supervision plans. These inspections are aimed at assessing the nuclear licensees' compliance with safety requirements.

Off-schedule inspections are conducted if planned inspections or events at relevant facilities have revealed shortcomings in the licensee's activities that require more detailed or frequent checkups.

Inspectors' investigations are intended to check the applicant prior to issuing a licence or permit for the use of nuclear energy. Inspectors' investigations are intended to check whether the information submitted by the applicant to the SNRCU to issue a licence or permit represents the actual state of affairs and to check whether there are conditions to carry out activities applied for.

Following the inspections, SNRCU inspectors issued the following number of prescriptions (notes, inspection certificates):

In 2007, the SNRCU also exercised enhanced supervision over the safety of uranium ore processing

SUBDIVISION	Prescriptions/violations	Notes/letters	Inspection certificates/ prescriptions in «Systematic Surveillance Logbooks»
NISAD	7/152	–/–	1/–
CID	4/23	–/–	–/–
PPRD	8/48	–/–	–/–
RTSD	3/19	–/–	8/–
RWD	15/74	1/–	9/–
STSD	2/5	4/–	3/–
State Inspectorate at ZNPP	7/15	16/1	–/–
State Inspectorate at RNPP	10/48	13/–	1/–
State Inspectorate at KhNPP	10/51	27/–	1/9
State Inspectorate at ChNPP	23/114	1/–	–/12
State Inspectorate at SUNPP	46/228	1/–	–/22
Northern State Inspectorate	24/59	4	56
North–Western State Inspectorate	59/160	6	21
Western State Inspectorate	12/28	1	36
Southern State Inspectorate	38/196	12	18
Southern–Eastern State Inspectorate	125/731	10	19
Central State Inspectorate	52/249	13	29
Eastern State Inspectorate	33/146	5	44
Crimean State Inspectorate	49/263	9	33

PARTICIPATION IN IAEA INSPECTIONS

SNRCU SUBDIVISION	Participation in IAEA Inspections
STSD	9
State Inspectorate at ZNPP	16
State Inspectorate at RNPP	9
State Inspectorate at KhNPP	10
State Inspectorate at ChNPP	5
State Inspectorate at SUNPP	14

Enforcement measures taken in 2007 in relation to legal and natural entities that failed to comply with standards, rules and regulations on nuclear and radiation safety:

SNRCU SUBDIVISION	95 KUpAP		KUpAP Article 188-18		TOTAL	
	Number of cases/ persons called to account	Amount of fine (UAH)	Number of cases/ persons called to account	Amount of fine (UAH)	Number of cases/ persons called to account	Amount of fine (UAH)
State Inspectorate at ZNPP	-	-	-	-	-	-
State Inspectorate at RNPP	-	-	1/1	340	1/1	340
State Inspectorate at KhNPP	-	-	-	-	-	-
State Inspectorate at ChNPP	2/2	340	2/2	340	4/4	680
State Inspectorate at SUNPP	-	-	-	-	-	-
STSD	-	-	-	-	-	-
RTSD	-	-	-	-	-	-
RWD	-	-	-	-	-	-
PPRD	-	-	-	-	-	-
NISAD	-	-	-	-	-	-
CID	-	-	-	-	-	-
Northern State Inspectorate	1/1	170	-	-	1/1	170
North-Western State Inspectorate	1/1	170	3/3	510	4/4	680
Western State Inspectorate	3/3	510	-	-	3/3	510
Southern State Inspectorate	-	-	1/1	1700	1/1	1700
South-Eastern State Inspectorate	15/15	2720	13/13	3380	28/28	6100
Central State Inspectorate	2/2	340	8/8	3740	10/10	4080
Eastern State Inspectorate	8/8	1785	-	-	8/8	1785
Crimean State Inspectorate	1/1	170	12/12	2040	13/13	2210
Total	33/33	6205	40/40	12050	73/73	18255

and transformation of the former uranium ore processing plant in Dneprodzerzhinsk into an ecologically safe system (6 inspections were conducted, 5 fines were imposed and 2 criminal cases were filed).

In 2007, the SNRCU also exercised enhanced supervision over the safety of Shelter Implementation Plan and ChNPP facilities. In the event of problems to be immediately solved to prevent the adverse effect on safety, the SNRCU made all possible (according to law) efforts before ChNPP and Ministry of Emergencies and informed the Cabinet of Ministers of Ukraine. Such issues included, for example, measures on Shelter liquid radwaste management, stricter monitoring of the first start-up stage of the new safe confinement, etc.

In 2007, the SNRCU also exercised enhanced supervision over radwaste management in the Exclusion Zone. Relevant aspects were discussed twice at meetings of the SNRCU College, enforcement measures were taken, including the suspension of the licence issued to the radwaste disposal enterprise.

The SNRCU pays special attention to public relations and interface with mass media.

Active and continuous dialogue with the public and close relations with the mass media are an integral component of the SNRCU's activity.

The Committee's managers answer questions from citizens during weekly personal consultations. Twice a month, SNRCU managers are contactable over hot lines about nuclear and radiations safety regulation in Ukraine. The consulting hours and direct telephone lines are published at the SNRCU website www.snrc.gov.ua.

The SNRCU prepares annual reports on nuclear and radiation safety in Ukraine to highlight the national policy in the area of peaceful use of nuclear energy and compliance with nuclear and radiation safety requirements in Ukraine.

The SNRCU website is a source of on-line information on nuclear and radiation safety for the public (www.snrc.gov.ua). It publishes daily information on the status of Ukrainian NPP units and operational events. Brief information on operational safety of nuclear power units is published on a weekly basis. The website also offers special news, regulations, action plans and reports of the SNRCU and participation in the discussion of draft regulations and essential aspects of nuclear and radiation safety.

To ensure efficient dialogue with the public, SNRCU management actively participates in meetings of the Public Council as described above and holds regular outdoor meetings with the public.

A meeting with representatives of local public and mass media was held on 7 June 2007 within the working visit of Olena Mykolaichuk, SNRCU Chairperson, to the South Ukraine NPP (the town of Yuzhnoukrainsk). The implementation of measures under the «Concept of Safety Improvement of Operating NPPs», preparedness for the measures planned for the repair outage in 2007 and preparation for lifetime extension of SUNPP-1 beyond the designed period were discussed at the meeting.

The safety and lifetime extension of Ukrainian NPP units were also discussed in Rivne at the meeting of the SNRCU Chairperson with local public and mass media on 7 September 2007 within the working visit of SNRCU management to Khmelnitsky NPP.

In 2007, in order to improve public awareness, SNRCU management decided to organise an annual topical meeting on of nuclear and radiation safety basically for SNRCU experts and representatives of public organisations, both Ukrainian and international.

The seventh anniversary of SNRCU establishment (5 December 2007) was a good reason for conducting the first workshop.

Following consultation with the public, in particular by members of the SNRCU Public Council, the following subject areas were identified to be discussed at the first topical meeting on nuclear and radiation safety:

- *«Design Safety of NPP Units»*
- *«Safety of Ionizing Radiation Sources»*
- *«NPP Operational Safety and Safety Culture»*
- *«Public Involvement in Making Decisions on Nuclear and Radiation Safety»*

Four subject sessions were organised in the form of panel discussions which involved experts of the SNRCU and state enterprises subjected to SNRCU regulatory control, representatives of organisations and enterprises dealing with nuclear energy, experts on nuclear and radiation safety from different countries and representatives of mass media and public.

In summary, workshop participants pointed out that substantial favourable trends were observed in nuclear and radiation safety of Ukraine owing to joint efforts of different experts. However, there are a number of issues to be resolved as soon as possible. They include improvement of the legislative and regulatory framework on nuclear and radiation safety, improvement of safety culture, training of young skilled staff both for the operator and regulator, etc.

Workshop materials can be found at the SNRCU website.

SCIENTIFIC AND TECHNICAL SUPPORT TO STATE REGULATION IN NUCLEAR ENERGY

There are three state enterprises that provide scientific and technical support to the SNRCU. This allows the SNRCU to achieve its goals more efficiently.

THE STATE SCIENTIFIC AND TECHNICAL CENTRE FOR NUCLEAR AND RADIATION SAFETY (SSTC NRS) has provided technical support to the SNRCU since its establishment. SSTC NRS is intended to render scientific, analytical, expert, technical, engineering, methodological, information and advisory support to regulatory activity.

SSTC NRS scientific activity involves analysis of advanced international experience in nuclear regulation and safety assurance. Based on this analysis, the national system of regulations on nuclear and radiation safety and regulatory and safety assurance practices are developed and harmonised.

In 2007, SSTC NRS conducted 500 studies, including 24 studies aimed at developing the system of nuclear and radiation safety regulations. During the year, Centre experts carried out 327 state reviews on nuclear and radiation safety and 49 assessments to lay the basis for regulatory decisions. Also, 70 research efforts and 30 analytical studies were undertaken.

SSTC NRS conducted studies on developing system of nuclear and radiation safety regulations to govern first-priority areas in nuclear energy, in particular, such as radioactive waste management, NPP siting, etc.; provisions for up-to-date safety regulation methodologies, including approaches to the classification of NPP instrumentation and control systems, risk-informed approaches, ALARA implementation at NPPs, elimination of excessive conservatism in spent fuel management regulation and use of alternative nuclear fuel.

Scientific support to SNRCU licensing activity constitutes to 70% of the total annual scope of work. SSTC NRS carried out its expert activities in line with SNRCU first-priority tasks identified in the Strategic Plan for 2005-2007 regarding safety assessments. In 2007, state reviews on nuclear and radiation safety were carried out in the following areas: implementation of upgrading measures at operating power units, reassignment of the NPP lifetime and ageing management of safety-related equipment and systems, introduction of alternative nuclear fuel, Chornobyl NPP decommissioning and Shelter transformation into an ecologically safe system, completion and commissioning of spent fuel storage facilities, radioactive waste management and completion of the safety assessment for operating power units following the review of safety analysis reports.

Topical Meeting on Nuclear and Radiation Safety

Studies on developing the state regulatory strategy were intended to analyse and implement advanced methodologies in regulation and identify and justify safety principles, criteria and objectives needed to implement regulatory policy and technical requirements.

In 2007, 19 studies were underway to support SNRCU supervision efforts.

SSTC NRS experts took part in 10 comprehensive inspections conducted by SNRCU at nuclear power facilities.

Safety issues are identified and analysed on the basis of comprehensive research, in particular, in the area of instrumentation and control systems, lifetime

characteristics of the reactor pressure vessel and safety-related systems, neutron physical, thermal hydraulic, emergency processes, etc.

Research programmes are underway to extend the computational basis for analysis and assessment of nuclear installations. Thermal hydraulic processes are modelled and analysed using up-to-date programmes and codes, which are verified and validated for further use.

Several new upgraded and automated information systems appeared for analytical and information support of SSTC NRS in 2007. In particular, a pilot project is underway to create a knowledge base on NPP instrumentation and control systems, which consists of 12 separate databases.

STATE ENTERPRISE «STATE CENTRE FOR QUALITY REGULATION OF SUPPLIES AND SERVICES» was set up within the system of state regulation of nuclear and radiation safety in 1992. The Centre has five regional specialised subdivisions: Ivano-Frankivsk, Lviv, Nikopol, Sumy and Kharkiv.

The Centre provides services by verifying the conformity of equipment and components used in safety-related systems at nuclear energy facilities.

The Centre's primary task is independent verification that products meet national standards, rules and regulations on nuclear and radiation safety.

In 1997, the Centre was accredited as a production certification body SERTATOM. In 2001, it became a quality system certification body within the UkrSEPRO national system.

In December 2007, the Centre was accredited in the branch certification system for equipment, products and technologies (EPT Certification System) of the Russian Federation.

In order to confirm compliance of NPP safety-related equipment, the Russian Federation has, in addition to the GOST-R national certification system, the EPT Certification System established in 1998 for obligatory certification of equipment and products, including their verification for compliance with Russian standards, rules and regulations on technical, nuclear and radiation safety.

The Centre was accredited as a certification expert centre (CEC) in the EPT Certification System by state authorities of the Russian Federation, such as Rosatom, Rostekhnadzor and Rostekhregulirovanie. The accreditation procedure lasted for eight months. The Centre's testing laboratory for automated control systems was also accredited in the EPT system.

The Centre accreditation owed to joint successive efforts of the regulatory bodies of Russia (Rostekhnadzor) and Ukraine (SNRCU) and to recognition of the technical competence of Ukrainian certification body.

It should be noted that Ukrainian manufacturers of nuclear engineering products repeatedly draw attention of state authorities to the technical barriers between Ukraine and Russia in mutual supplies and to the need to renew conditions for mutual acceptance of certification results, which existed before the Russian Federation established the branch EPT Certification System.

The Centre accreditation is an important step toward harmonising the relations between the Russian and Ukrainian regulators as regards conformance verification for the benefit of NPP nuclear safety.

THE STATE ENTERPRISE «INFORMATION TECHNOLOGY CENTRE FOR NUCLEAR ENERGY» («INFOATOM») was founded in 1994. Its activities are mainly intended to provide information and analytical support to the SNRCU, participate in informing the public on the status of nuclear and radiation safety, design, develop, implement and maintain computer networks and automated information databases on nuclear and radiation safety necessary for the SNRCU for efficient regulatory activity.

Infoatom experts developed draft «Concept for State Target Programme for Informing the Public on Nuclear and Radiation Safety», «Concept for Establishing the SNRCU Information Centre», analysed the safety of IRS use in Ukraine at the regional and branch levels, analysed legal provisions for SNRCU compliance with international conventions and standards on nuclear safety and prepared appropriate proposals.

New systems were developed for the SNRCU analytical and information system (AIS). The Forum service was developed and introduced at the SNRCU website. The upgraded SNRCU website was tested.

Infoatom took part in the development of SNRCU quality control system documents in compliance with DSTU ISO 9000-2001, such as «Procedure for Development, Implementation, Revision and Registration of Quality Control System Documents», «Requirements for the Structure and Content of Quality Control System Documents».

The Register automated system was upgraded and maintained. Personnel of the state register of ionizing radiation sources were trained.

Infoatom rendered information and technical support to the SNRCU and thus maintained AIS and software and hardware system of the SNRCU Information Emergency Centre, provided advice on the operation of AIS subsystems, e-mail systems and software installed at workstations.

Nuclear Safety in Ukraine

3.1. NUCLEAR ENERGY IN FUEL AND POWER COMPLEX OF UKRAINE

Presently Ukraine has four nuclear power plants: Zaporizhya, South Ukraine, Rivne and Khmelnitsky that operate 15 units with the total installed capacity of 13,835 MW. Since 1996, they have been operated by the National Nuclear Energy Generating Company Energoatom (NAEK Energoatom).

In 2007, nuclear power plants (NPP) produced 92,740 million kW•h, which constituted 101.2 % of the planned value. As compared with 2006, the electricity production increased by 2,474 million kW•h. NPPs produced 47.4 % of the total electricity in Ukraine.

Since 2002, in accordance with applicable law and based on a comprehensive safety assessment of nuclear installations and assessment of the operator's capability to take all safety measures, the SNRCU issued licences to the NAEK Energoatom to operate nuclear installations at the South Ukraine NPP (SUNPP), Zaporizhya NPP (ZNPP), Rivne NPP (RNPP) and Khmelnitsky NPP (KhNPP).

The licences establish conditions of and restrictions on the above activity and specify process systems and boundaries of the sites they apply to. The licences authorise the NAEK Energoatom to conduct all operations at nuclear installations on its own or jointly with contractors. At the same time, the Law of Ukraine «On Nuclear and Radiation Safety» imposes the entire responsibility for the operational safety of nuclear installations on the operation.

The licences also identify activities or operations that may be undertaken only under an individual SNRCU permit. Permits to start up power units after

scheduled repair outage involving core reloading are issued to the NAEK Energoatom only provided that measures identified in the previous permit and terms of valid licences, in particular safety improvement measures, have been implemented completely.

To verify, on a permanent basis, whether NPPs comply with terms of operating licences, the SNRCU:

- *reviews and assesses NAEK Energoatom reports on compliance with these terms;*
- *conducts inspections at each NPP to check how measures identified in licences are implemented;*
- *hold meetings prior to finishing the routine repair at each power unit and making a decision to permit transfer to hot zero power;*
- *convene the SNRCU College to discuss the operator's adherence to licensing terms.*

The SNRCU pays special attention to measures under a number of safety improvement programs for operating NPPs and to the development of safety analysis reports for NPP units.

Funding of operation termination and decommissioning measures, including the development of design documentation, is one of the key aspects in safe decommissioning of NPP units. A decommissioning fund for nuclear installations is required to be established pursuant to national legislation and international obligations of Ukraine. The establishment and accumulation of the operator's fund for funding operation termination and decommissioning measures for nuclear installations in Ukraine are regulated by law (Law of Ukraine «On Settlement of Nuclear Safety Issue» of 24 June 2004 and Cabinet Resolution No. 594 of 27 April 2006 «Aspects of Establishment, Accumulation and Use of Decommissioning Fund for Nuclear Installations»), which is to be done through a special account opened in an authorised bank. However, the costs the NAEK Energoatom transfers to this account are redirected within the State Budget of Ukraine to other needs that have nothing to do with a decommissioning fund; there is no assurance of their return in the needed amount for the stated purpose. Therefore, there is a legislative mechanism for fund accumulation in Ukraine but it does not actually function, which is violation of nuclear legislation and may lead to higher tariffs to cover necessary expenses in future.

NPP	Planned, million kW•h	Produced, million kW•h	Accomplished plan, %
ZNPP	**42,748**	**43,619**	**102.0**
RNPP	**16,084**	**16,301**	**101.3**
KhNPP	**14,397**	**14,785**	**102.7**
SUNPP	**18,385**	**18,035**	**98.1**

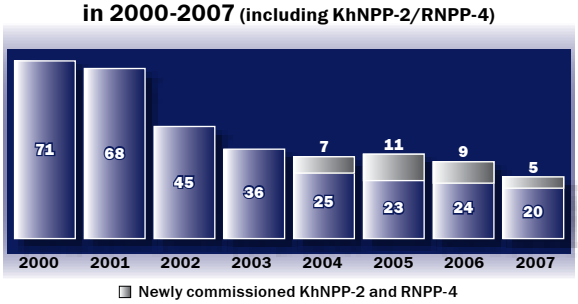
General Characteristic of NPPs Operating in Ukraine

NPP	Unit	Reactor type	Installed capacity	Start-up date	Year of the end of design life
ZAPORIZHZHYA	1	VVER-1000/V-320	1000 MW	Dec 1984	2014
	2	VVER-1000/V-320	1000 MW	Jul 1985	2015
	3	VVER-1000/V-320	1000 MW	Dec 1986	2016
	4	VVER-1000/V-320	1000 MW	Dec 1987	2017
	5	VVER-1000/V-320	1000 MW	Aug 1989	2019
	6	VVER-1000/V-320	1000 MW	Oct 1995	2025
RIVNE	1	VVER-440/V-213	420 MW	Dec 1980	2010
	2	VVER-440/V-213	415 MW	Dec 1981	2011
	3	VVER-1000/V-320	1000 MW	Dec 1986	2016
	4	VVER-1000/V-320	1000 MW	Oct 2004	2034
SOUTH UKRAINE	1	VVER-1000/V-302	1000 MW	Dec 1982	2012
	2	VVER-1000/V-338	1000 MW	Jan 1985	2015
	3	VVER-1000/V-320	1000 MW	Sep 1989	2019
KHMELNYTSKY	1	VVER-1000/V-320	1000 MW	Dec 1987	2017
	2	VVER-1000/V-320	1000 MW	Aug 2004	2034

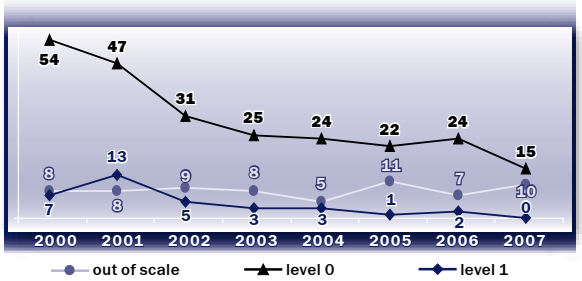
3.2. NPP OPERATIONAL EVENTS

Strict account of incidents and other events that occur in NPP operation, thorough investigation of their causes and measures to eliminate the drawbacks revealed and prevent similar events in future are major tools to maintain a proper level of operational safety. The appropriate procedure is established by the "Provisions on the Procedure for Investigation and Record of Operational Events at Nuclear Power Plants".

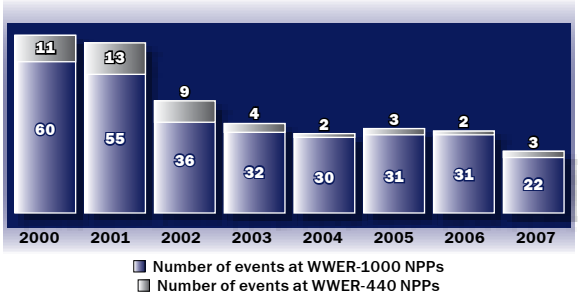
Number of Operational Events at Ukrainian NPPs in 2000-2007 (including KhNPP-2/RNPP-4)



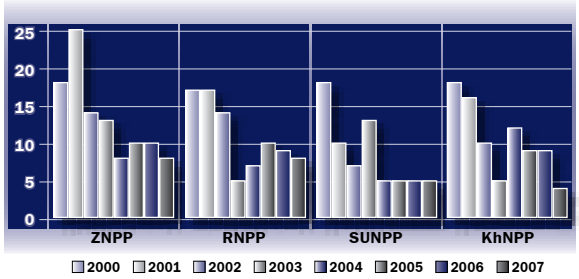
INES Rating of Operational Events at Ukrainian NPPs in 2000-2007



Distribution of Operational Events by Reactor Type in 2000-2007



Distribution of Operational Events by Reactor Type in 2000-2007



In 2007, 25 operational events occurred at Ukrainian NPPs, including 8 at ZNPP, 8 at RNPP, 5 at SUNPP and 4 at KhNPP.

The above bar chart shows that the number of operational events at Ukrainian NPPs tends to decrease in recent years.

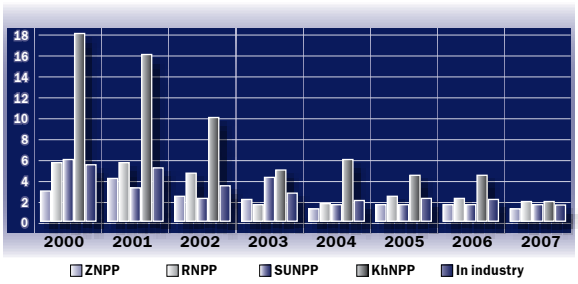
The largest number of events was recorded in 2000 (71) and abruptly decreased in 2002.

The number of operational events at Ukrainian NPPs still tended to decrease from 2001 to 2004. This tendency also remained in 2005-2007 for power units that were operational before 2004. However, the total number of events remained practically unchanged in 2004-2006 as new power units were commissioned in 2004 (KhNPP-2 and RNPP-4) and there were occurrences in commissioning.

The International Nuclear Event Scale (INES) is widely used to assess the safety significance of events in world nuclear energy and was specially developed for informing the public. All events that occurred at Ukrainian NPPs in 2007 were ranked as «deviation» or «out of scale» by INES. The latter level has no safety relevance and is out of scale. INES rating of events at operating NPPs is shown below.

It should be noted that the largest number of events per unit for the last eight years occurred at KhNPP. This indicator for KhNPP was two to three times higher than that for the industry. The KhNPP situation was discussed by the SNRCU College in August 2006. Since prompt and efficient measures were needed to decrease the number of operational events at KhNPP, the NAEK Energoatom was requested to analyse the effectiveness of the operational experience feedback system, quality of event investigations at Ukrainian NPPs and performance of the quality system in the areas of assessments and discrepancy management and corrective actions. The SNRCU should conduct a number of inspections, in particular, to check the KhNPP quality control system in the area of discrepancy management and corrective actions and to check repair and maintenance measures on KhNPP safety-related systems.

Average Number of Events per Unit in 2000-2007



Distribution of Operational Events at Ukrainian NPPs by Categories in 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
E01	0	0	0	0	0	0	0	0
E02	4	4	1	1	3	2	0	0
E03	1	2	0	0	0	0	0	0
E04	0	0	0	0	0	1	0	0
E05	26	19	14	7	13	15	20	17
E06	1	0	0	0	0	0	1	0
E07	21	21	9	8	2	6	8	1
E08	14	17	12	14	7	6	4	4
E09	5	1	1	2	2	0	0	0
E10	11	11	8	6	7	4	4	3

Depending on symptoms and consequences, NPP operational events are classified by categories as shown in Table 3.2.1.

Events are mainly caused by power unit disconnection from the grid (E05 category) and power decrease by more than 25 % (E08 category).

All these events were rated as “out of scale” by INES, but they are accompanied by transients at the reactor that affect the safety, increase the number of loading cycles and shorten the lifetime of the main unit equipment (there are some types of equipment whose lifetime expires in several years) and nuclear fuel (spike effects).

Table 3.2.1 EVENTS

Category E01/1
One occasional release to the environment not exceeding annual release limit and/or effluents, that results in contamination of the NPP site and sanitary and protection zone and increase in effective dose rate above 1.1 μSv/h. Exposure of individuals of the NPP staff to doses reaching the dose limit.

Category E01/2
One occasional release to the environment exceeding by the five times the permitted daily release. Increase of activity concentration of radionuclides in air of serviced premises, contamination control area over and above the allowed concentration for the personnel (PC_A^{inhal}). No impact to the radiation situation outside the NPP site.

Category E02
Violation of limits and/or safe operation conditions that did not turn into an accident, except events under categories E03, E04.

Category E03
Inoperability of safety systems or safety system channels in a number which exhausts their redundancy.

Category E04
Inoperability of individual safety system channels with maintaining reserve or non-redundant elements of safety systems for a time exceeding period permitted by the Technical Specifications.

Category E05
Shutdown of the reactor or disconnection of the unit from the grid in the process of operation of the unit caused by: failures of equipment (elements); faults of the personnel and/or wrong decisions; external man-induced or natural factors.

Category E06
Drop of and/or damage of fuel assemblies, fuel elements, absorbing elements during transporting and other technical manipulations with fresh and spent fuel, which did not lead to accidents or events under categories E01-E02.

Category E07
Failures of the equipment and pipelines important for safety, which belong to groups A and B, elements of safety classes 1 and 2**, controls of the control and protection system equipped with a drive(s), which did not lead to accidents and events categorised under A01-E06, E08-E10.*

Category E08
Decrease of power of NPP unit by 25% $N_{el.}$ of the previous capacity level and more caused by: failures of equipment (elements); faults of the personnel and/or wrong decisions; external man-caused or natural factors (except events referred to in section 4.4 of this Provision).

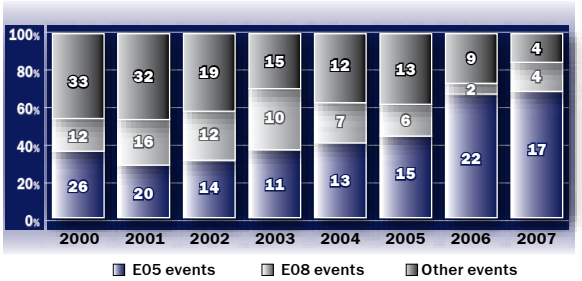
Category E09
Activation of any safety system or safety system channel, which performs functions other than safety ones.

Category E10
Inoperability of a safety system channel(s) for a period not exceeding that permitted by the Technical specifications (except when checking up or conducting routine maintenance of separate safety system channels).

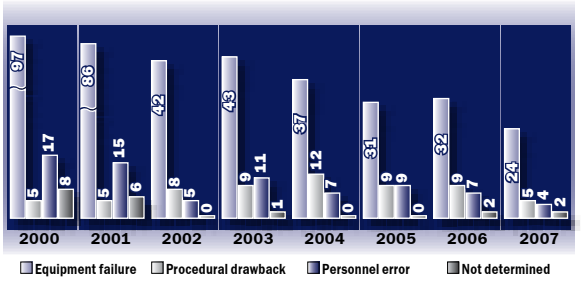
** – groups A and B specified in the "Rules of Installation and Safe Operation of Equipment and Pipelines of Power Units', (PNAE G-7-008-89) approved by the State Nuclear Supervision Committee of the USSR in 1989.*

*** – safety classes specified in the General Provisions on Nuclear Power Plant Safety approved by decree of the State Nuclear Regulation Administration of Ukraine No. 63 of 9 December 1999 registered with the Ministry of Justice of Ukraine 6 March 2000, reg. No. 132/4353.*

Percentage of E05 and E08 Events



Average Number of Events per Unit in 2000-2007



An analysis of root causes shows that most events are caused by failures of equipment (steam generators, different valves, elements of electronic circuits, logical units, relays, circuit breakers, control rod drives, etc.) It should be noted that equipment frequently fails because of poor-quality repairs in scheduled outages but this cause is never recorded in event investigation reports.

The number of events caused by drawbacks in procedures remains high. They result, first of all, from inadequate attention of NPP administration to the analysis of procedures (delayed revision of operational and repair documentation, etc.)

The number of NPP operational events that occurred previously constitutes half their total number on average. This tendency remains practically unchanged over all years.

The recurrence of operational events is mainly due to the poor quality of their investigation since the NAEK Energoatom fails to take measures to extend the results of such investigations to all other NPPs of Ukraine.

In addition, on-site commissions record the recurrence of events only at their own NPPs. The operator does not analyse the recurrence of events in general.

In order to prevent similar events in future, not only equipment needs to be replaced but previous events should be analysed both at each NPP and in the entire industry and operational experience lessons should be learnt.

Since 2000, the effectiveness of on-site commissions for event investigation has been analysed. The results show that causes were determined incorrectly and/or inadequate corrective actions were identified almost for half the events. This indicator remains practically unchanged for the last years.

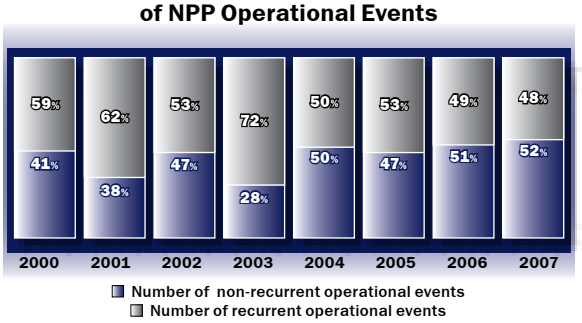
3.3. UPGRADING AND SAFETY IMPROVEMENT OF NPP UNITS

International missions were conducted from 1992 to 1998 at all nuclear power plants of Ukraine to verify safety compliance of operating nuclear installations with international requirements. Based on the IAEA missions, appropriate recommendations were made.

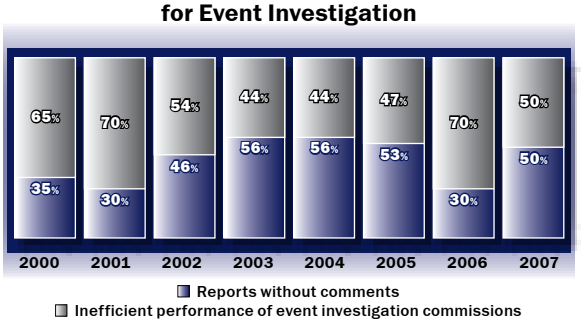
In order to implement IAEA recommendations and fulfil obligations of Ukraine in compliance with the Nuclear Safety Convention, the Ministry for Fuel and Energy of Ukraine and NAEK Energoatom developed the «Comprehensive Programme for Upgrading and Safety Improvement of Nuclear Power Units» (henceforth – Comprehensive Programme), which was approved by Cabinet Resolution No. 504-r of 29 July 2002.

The Comprehensive Programme provided for 389 measures at 13 nuclear power units of Ukraine in 2002-2005.

Recurrence of NPP Operational Events



Effectiveness Analysis of On-Site Commissions for Event Investigation



The results of the Comprehensive Programme were discussed at the meeting of the SNRCU College on 19 January 2006.

The College stated that the Comprehensive Programme was implemented by 33.42% and the performance of NAEK Energoatom was considered unsatisfactory.

In order to further implement safety improvement measures and fulfil Ukraine's obligations to bring target safety indicators for power units to internationally recognised standards, rules and regulations on nuclear and radiation safety, Cabinet Resolution No. 515-r of 13 December 2005 approved the «Concept for Safety Improvement of Operating NPPs» (henceforth – Concept). According to the Concept, the NAEK Energoatom developed and the SNRCU and Ministry for Fuel and Energy agreed upon a list of administrative and technical measures to implement the Concept (henceforth – List). The List is a document containing a brief description of existing issues or safety deficiencies at operating NPP units and safety improvement measures in compliance with areas identified in the Concept (9 areas altogether: 1-8 - «Design Safety», 9 - «NPP In-Depth Analysis and Safety Justification»). All safety improvement measures are to be implemented by 2010.

For implementing measures on the List, the SNRCU and Ministry for Fuel and Energy prepared Joint Resolution No. 19/10 of 25 January 2006 «On Activities on Safety Improvement of Operating Nuclear Power Units».

According to the Joint Ordinance, all measures from the List are to be implemented by 2010. In doing so, 274 pilot projects are to be completed by 2008 in all nine safety improvement areas. Not less than 31 projects are to be implemented in 2006, not less than 74 in 2007 and all projects are to be completed in 2008.

The results of the measures under the Concept for 2006 were considered at the meeting of the SNRCU College on 25 January 2007. The College stated that the NAEK Energoatom submitted reports on 40 measures out of 53 to the SNRCU, which constituted 76% of the planned number. The SNRCU accepted 14 reports, i.e. 26% of the planned number. Hence, the performance of the NAEK Energoatom was considered inadequate.

In the late 2006, the NAEK Energoatom agreed the schedule for administrative and technical measures for 2007 with the SNRCU. Considering the measures not implemented in 2006, the schedule included 116 pilot measures and 26 adapted measures.

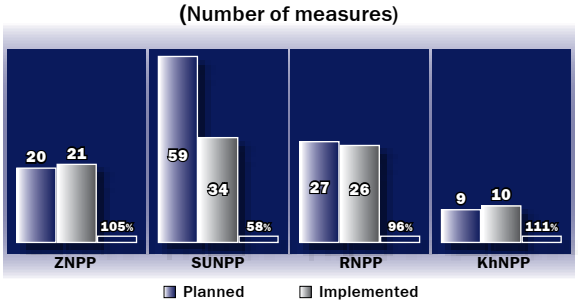
Since the SNRCU issued permits for reactor operations only provided that the measures scheduled for 2007 had been completed, the NAEK Energoatom made significant progress in implementing measures under the Concept in the reporting period. In particular:

- *the NAEK Energoatom submitted 128 reports on pilot measures and 71 reports on adapted measures to the SNRCU. The SNRCU accepted 92 and 52 reports, respectively;*
- *the measures accepted by the SNRCU included those planned for 2008 but implemented by the NAEK Energoatom ahead of schedule.*

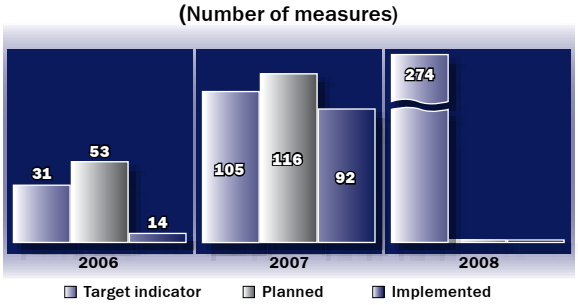
The main factors that may cause delays in some pilot measures under the Concept are the following:

- *there are some problematic measures that provide for analyses and calculations to identify ways to eliminate safety deficiencies, as planned for 2006-2007, but the operator currently has no technical decisions for their implementation;*
- *relevant equipment at some pilot power units may not be replaced completely by the end of 2008 since producers cannot manufacture and deliver it on a timely basis.*

Implementation of the Concept at NPPs
(Number of measures)



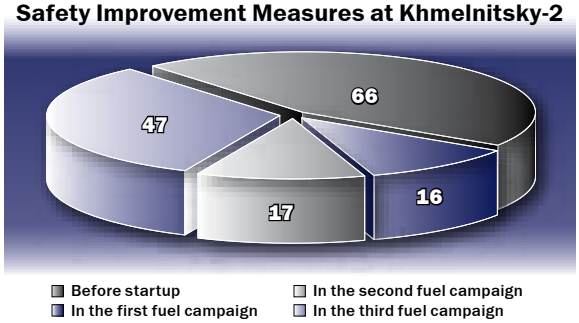
Implementation of the Concept in 2006 and 2007
(Number of measures)



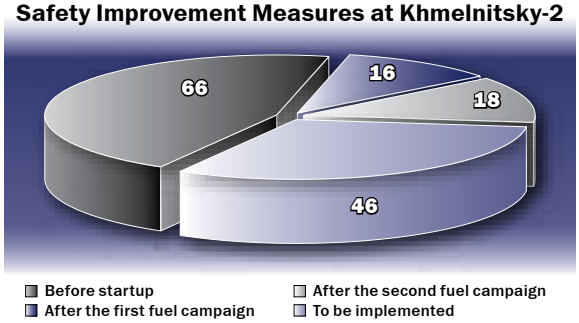
3.4. POST-COMMISSIONING UPGRADING MEASURES AT KHMELNITSKY-2 AND RIVNE-4

In order to comply with the Law of Ukraine on the Ratification of the Guarantee Agreement between Ukraine and the European Atomic Energy Community (No. 2818-IV of 7 September 2005), post-commissioning safety improvement measures at Khmelnitsky-2 and Rivne-4 are to be implemented over three fuel campaigns in accordance with implementation schedules agreed upon with the SNRCU.

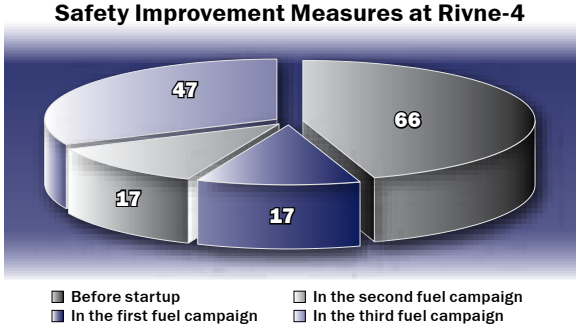
Planned Upgrading and Safety Improvement Measures at Khmelnitsky-2



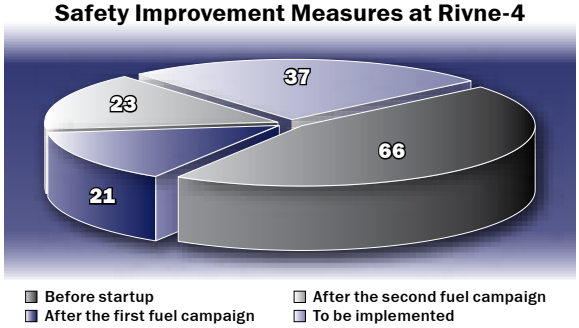
Actually Implemented Upgrading and Safety Improvement Measures at Khmelnitsky-2



Planned Upgrading and Safety Improvement Measures at Rivne-4



Actually Implemented Upgrading and Safety Improvement Measures at Rivne-4



Eighty post-commissioning measures are to be implemented at Khmelnitsky-2 and 81 measures at Rivne-4.

The implementation of safety improvement measures under the Khmelnitsky-2/Rivne-4 upgrading programme will ensure the safety level in line with international standards and eliminate a number of deviations from current safety rules.

According to the schedule for post-commissioning measures:

- *80 measures are to be implemented at KhNPP-2 (16 in the first, 17 in the second and 47 in the third fuel campaign);*
- *81 measures are to be implemented at RNPP-4 (17 in the first, 13 in the second and 51 in the third fuel campaign).*

The third fuel campaign at KhNPP-2 has been completed, and the SNRCU confirmed that 41 measures were implemented as of the end of the fourth quarter.

The third fuel campaign started only on 25 July at RNPP-4, and the SNRCU confirmed that 43 measures were implemented as of the end of the fourth quarter.

The NAEK Energoatom informed the SNRCU by Letter No. 15554 dated 25 December 2007 that 18 measures for KhNPP-2 and 6 measures for RNPP-4 could not be implemented in full scope by the end of the third fuel campaign. This was caused by delay in credit arrangement and basically by a substantial period of time needed to manufacture equipment. Conceptual decisions and technical specifications were developed and agreed for these measures, tenders were conducted and contracts for equipment supply and development of design estimates were arranged or concluded.

Experts of Khmelnitsky and Rivne NPPs, NAEK Energoatom Directorate and KhNPP-2/RNPP-4 project management unit analysed the status of each measure that could not be completely implemented by the end of the third fuel campaign. The analysis shows that current safety will not be significantly affected if the measures in question are carried over from the third to fourth scheduled outage. Experts of the SNRCU (SSTC NRS) and Euratom (Riskaudit) have

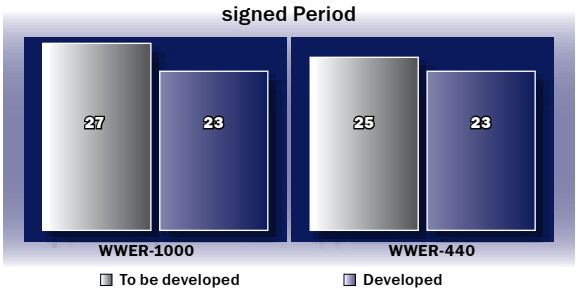
agreed that the measures can be carried over to the fourth scheduled outage without an adverse effect on safety.

3.5. NPP LIFETIME EXTENSION BEYOND DESIGNED PERIOD

Activities on lifetime extension of NPP units beyond the designed period are carried out in compliance with the «Comprehensive Programme for Lifetime Extension of Operating Nuclear Power Units» approved by Cabinet Resolution No. 263-r of 29 April 2004 (henceforth – Comprehensive Programme).

Rivne-1,2 and South Ukraine-1 were identified as pilot power units for lifetime extension beyond the designed period. Their designed lifetime expires at the end of 2010, 2011 and 2012, respectively.

Development of Typical Technical Regulations for Lifetime Extension of WWER-1000 and WWER-440 Beyond Designed Period



In order to implement the Comprehensive Programme, the NAEK Energoatom developed schedules for lifetime extension measures at Rivne-1,2, South Ukraine-1 and Zaporizhya-1 and agreed them upon with the SNRCU.

According to the above schedules, key measures on lifetime extension were taken mainly at Rivne-1,2 in 2007.

The following measures were taken in the scheduled outage at Rivne-1,2 that involved reactor reloading:

- *safety-related system components that are subject to ageing management, in particular critical components, were examined;*
- *three new cable routes (approximately 1000 m long for unit 1 and 760 m long for unit 2), new power and control cables for the first safety train were installed (to 113 km long for unit 1 and 156 km long for unit 2) using cables that do not propagate fire;*
- *16 and 19 measures on the replacement and/or additional installation of equipment were implemented at units 1 and 2, respectively, under the integral safety improvement programme.*

To summarise the implementation of the Comprehensive Programme at Rivne-1 in 2006-2007, 25 measures under the Concept for Safety Improvement were taken, a programme for power unit preparation for lifetime extension and a licensing plan were developed and feasibility study was conducted, based on which the NAEK Energoatom concluded that the lifetime of the power unit could be extended.

At the same time, the schedule for the following lifetime extension measures for Rivne-1 is not adhered to:

- *completion of technical condition assessment for critical components, first of all, reactor pressure vessel;*
- *increase of containment leak-tightness to decrease the probability of the boundary emergency releases to the values established by current standards and rules on nuclear and radiations safety;*
- *development of a periodic safety verification report;*
- *implementation of the ageing management programme;*
- *equipment qualification practices.*

Lifetime extension activities are implemented in Ukraine for the first time. Therefore, one of the main tasks in regulatory control of lifetime extension beyond the designed period is to take actions, within SNRCU authority, to assist the NAEK Energoatom to eliminate drawbacks in planning, organisation, management and monitoring of lifetime extension at Rivne-1 on a timely basis, make appropriate conclusions to prevent such drawbacks in the implementation of similar lifetime extension measures at Rivne-2, South Ukraine-1 and Zaporizhya-1. These actions include meetings of the SNRCU College, meetings for obtaining permits to take power units out of scheduled repairs, individual permits to operate power units after scheduled outage, inspections, regulatory prescriptions, etc.

Spent Fuel Management

4.1. SPENT FUEL MANAGEMENT AT OPERATING NPPS

Spent nuclear fuel resulting from the production of energy in nuclear reactors is one of the most important components of the NPP process cycle.

After its use in the reactor, nuclear fuel is unloaded to reactor cooling pools to be stored for a period necessary to decrease residual energy release (4-5 years).

Residual energy release is process induced by radioactive decay of fission products.

After cooling in the reactor pools, spent fuel is loaded into special containers that ensure its safety in transport and is sent to a spent fuel storage facility.

There are several approaches to subsequent management of spent fuel in the world:

1. *DEFERRED DECISION is intended for long-term spent fuel storage that permits a decision on subsequent spent fuel management taking into account future technologies and economic factors. The deferred decision is used by Argentina, Denmark, Spain, Canada, Lithuania, Germany, Norway, South Korea, Poland, Slovakia, Hungary, Czech Republic, Croatia.*
2. *PROCESSING of spent fuel is intended to obtain components and substances whose use is economically sound. However, it should be noted that a country that processes nuclear fuel returns back high-level waste. This, in turn, requires an appropriate infrastructure to manage this waste.*
3. *DISPOSAL is intended for spent fuel cooling and burial in deep geological formations (USA, Finland, Sweden).*

Ukraine adheres to the deferred decision approach to preserve valuable energy resources for their potential use in future.

Spent fuel from Rivne, Khmelnitsky and South Ukraine NPPs is transported to Russia: WWER-1000 spent fuel for storage and WWER-440 spent fuel (RNPP-1,2) for processing.

In 2001, Zaporizhya NPP commissioned a dry spent fuel storage facility (DSFSF) for long-term storage of spent fuel from all six ZNPP units. The DSFSF service life constitutes 50 years. The DSFSF design is based on the proven technology of the US Duke Engineering & Services Company and meets standards, rules and regulations on nuclear and radiation safety. The spent fuel storage site is designed to accommodate 380 containers to hold over 9000 spent fuel assemblies.

According to the Action Plan 2006-2010 for implementing the Energy Strategy of Ukraine till 2030, which was approved by Cabinet Resolution No. 427 of 27 July 2006, a dry storage facility for spent fuel is planned to be constructed in 2006-2010. On 26 December 2005, the NAEK Energoatom and US Holtec International Company signed a contract to construct a central dry storage facility for spent fuel (CSFSF) for Rivne, Khmelnitsky and South Ukraine NPPs based on the proven dry storage technology.

As of the end of 2007, the NAEK Energoatom completed the feasibility study for CSFSF construction and started public hearings. All decisions on CSFSF will be made pursuant to the Law of Ukraine «On Procedure for Making Decisions on Siting, Design and Construction of Nuclear Installations and Radioactive Waste Management Facilities of National Significance».

4.2. SPENT FUEL MANAGEMENT AT CHORNOBYL NPP

Spent fuel of Chornobyl NPP is stored in the unit 3 reactor, reactor pools and interim spent fuel storage facility (ISF-1) at the ChNPP site.

ISF-1 was commissioned on 12 December 1986

ISF-1 consists of five cooling pools designed to accommodate 4,380 spent fuel assemblies each (actually about 4,300). The canyon before the cooling pool can additionally accommodate to 380 spent fuel assemblies. One pool is backup.

The design provides for spent fuel storage in sealed canisters which serve as a barrier to the spread of radionuclides and ensure the integrity of fuel assemblies.

In 2007, ChNPP continued measures under the «Work Programme for Establishing and Justifying the Period and Conditions for Further ISF-1 Operation».

In April 2007, the SNRCU agreed upon the draft «Structure and Content of ISF-1 Safety Assessment Report» developed by ChNPP to apply for an ISF-1 operational licence.

In June 2007, SNRCU and ChNPP experts held a meeting to determine, in particular, the deadline for submission of the ISF-1 Safety Analysis Report and application package to obtain an ISF-1 operational licence.

On 5 November 2007, the ChNPP submitted the application for an ISF-1 operational licence to the SNRCU based on previous agreement. On 6 December 2007, the SNRCU completed its preliminary review.

Some part of the application documents, such as the ISF-1 Safety Analysis Report, was submitted to

Riskaudit for technical assessment under the Tacis Project UK/TS/35 «Support to the State Nuclear Regulatory Committee of Ukraine in Licensing Activities related to TACIS/NSA Financed Decommissioning Facilities of Chernobyl NNP-site assistance Projects».

Findings of the regulatory review of the ISF-1 Safety Assessment Report and ISF-1 target inspection are planned to be considered in the first quarter of 2008. In case of favourable findings, the SNRCU College will consider the possibility to issue a licence to operate ISF-1.

It should be noted that the designed capacity does not allow ISF-1 to accommodate all spent fuel from the power units and its designed lifetime expires in December 2016. To solve this issue, a spent fuel storage facility (ISF-2) is under construction at the ChNPP site.

The dry interim storage facility for spent fuel (ISF-2) is designed for long-term storage of Chornobyl NPP spent fuel and is a necessary condition for decommissioning of units 1, 2 and 3 and ISF-1.

ISF-2 is designed to accommodate 25,000 spent fuel assemblies. The designed period for spent fuel storage is 100 years.

The contractor for the project is FRAMATOME/AREVA Consortium. The construction was started in June 2000 and was to be completed in 2003 as contracted. However, substantial design drawbacks were revealed in May 2003 and the ISF-2 construction was terminated.

Even the first concrete storage modules for spent fuel showed cracks because of drawbacks in the construction process.

However, the management of leaky fuel elements turned to be the most pressing issue. The contractor failed to deal with fuel drying (water removal from leaky fuel elements). The concept for spent fuel storage developed by the designers in 2004 using the so-called Poral patch was rejected as it did not meet fundamental principles of nuclear and radiation safety.

The poor quality of the design and construction was also confirmed by ISF-2 audit conducted by Swedish SKB International Consultants in 2006.

The Assembly of Donors of the Nuclear Safety Account met on 27 June 2006 in London to find potential ways to solve the problem. It considered proposals of Holtec International (USA) to solve the fuel drying issue. The proposals were accepted in general, and the previous contract was terminated and a new one was drafted based on the Holtec International conceptual proposals in late 2006.

On 1 April 2007, the ChNPP and FRAMATOME/AREVA entered into a Contract Termination Agreement, based on which incomplete ISF-2 was transferred in its current condition to ChNPP on 23 April 2007.

According to the Donor nations' decision made on 14 December 2006, the SKB International Consultants (Sweden) audited the Holtec International commercial proposals as to the estimated value of ISF-2 completion in late February 2007.

At the meeting of the Assembly of Donors on 18 July 2007, the SKB Company stated that the Holtec International proposal had no technical shortcomings. The SNRCU Chairperson, Olena Mykolaichuk, also confirmed that the Ukrainian regulator had no principal objections to project licensing. Therefore, it was confirmed that contracting Holtec International would not contradict the EBRD purchasing procedures and a contract with ChNPP may be concluded after an appropriate legal review.

Following the discussion, the Assembly of Donors decided to conclude a two-phase contract with Holtec International and to allocate costs for Holtec International to implement the first phase.

The first phase of the project is intended to design a cask, specify purchasing conditions and determine the final scope and cost. The second phase is intended to complete the storage facility and manufacture the casks. The project is to take 52 months.

On 3 August 2007, Holtec International received authorisation-to-proceed from ChNPP and thus started personnel recruitment in Ukraine and other preparations for the ISF-2 completion project.

On 28 August 2007, the SNRCU considered the ISF-2 Licensing Plan and submitted a non-objection letter regarding the use of this document in the ISF-2 completion project to the ChNPP.

On 17 September 2007, the contract for completion of the dry spent fuel storage facility at the ChNPP site (Contract No. ChNPP/C-2/10/062 between ChNPP and Holtec International) was signed.

During 2007, ChNPP and Holtec International held a number of meetings to discuss technical and contractual aspects, in particular, the Conceptual Decision on ISF-2 Project Modernisation.

Radioactive Waste Management

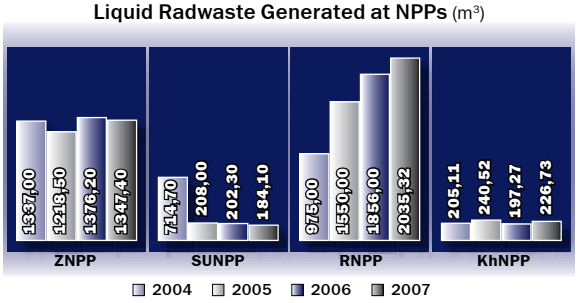
5.1. RADIOACTIVE WASTE MANAGEMENT AT OPERATING NPPS

Solid and liquid radioactive waste results from operation of NPP units and scheduled repairs.

Liquid radioactive waste generated in NPP operation includes:

- *regeneration and flushing water;*
- *discharges from sampling lines;*
- *used filtering material waters;*
- *discharges of radiochemical laboratories;*
- *decontamination water;*
- *discharges of active laundry and shower systems;*
- *discharges of active water treatment equipment.*

Figure 5.1.1.
Liquid Radwaste Generated at NPPs (m^3)



Liquid radioactive waste is to be collected and processed before reuse.

Solid radioactive waste results from:

- *operation of plant equipment and structures;*
- *reconstruction and upgrade of equipment;*
- *equipment decommissioning;*
- *plant decontamination;*
- *equipment maintenance and repair;*
- *replacement of worn-out components;*
- *replacement of personnel overalls and individual protection means;*
- *health and sanitary operations in the strict-access area.*

Figures 5.1.1–5.1.2 show the dynamics of radioactive waste generation in 2004-2007.

The NPP design incorporates systems needed to treat liquid radioactive waste (the so-called active water treatment systems) in which secondary radioactive waste is generated: evaporation bottoms, used sorbents, slurry, etc.

In order to decrease waste volumes, bottoms are additionally evaporated (to obtain salt fusion cake) and slurries are treated in centrifugation systems (installed at the KhNPP and RNPP).

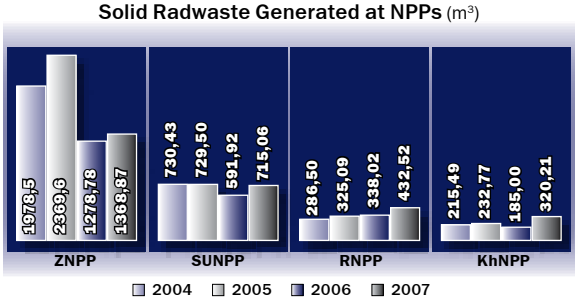
In order to minimise waste volumes, solid radwaste is removed to incinerators (ZNPP) and compaction units (ZNPP, SUNPP).

Figures 5.1.3-5.1.4 show the volumes of radioactive waste processed at Ukrainian NPPs.

There are no indicators of liquid radwaste processing at the SUNPP nor solid radwaste processing at the RNPP and KhNPP since there are no relevant facilities.

For temporary storage of liquid radwaste, each NPP operates relevant storages that constitute flat-bottom cylindrical reservoirs from 100 to 750 m3 in volume

Figure 5.1.2.
Solid Radwaste Generated at NPPs (m^3)



that are placed in reinforced concrete rooms of active water treatment buildings.

In order to collect and store solid radwaste resulting from plant operation, there are special storages that are also located in active water treatment buildings. These storage constitute cells closed with lockable hatches to prevent the spread of radioactive contamination and limit exposure to personnel.

Figures 5.1.5-5.1.6 show the dynamics of radwaste accumulation in plant storage facilities.

As required by safety regulations, each NPP has an individual radwaste management programme whose implementation is monitored by the SNRCU on a permanent basis.

The programmes provide for administrative and technical measures to minimise radwaste and improve the radwaste management system. Some measures are intended to minimise floor drain waters that mainly contribute to the total volume of primary liquid radwaste.

It should be noted that the storage facilities are 40 to 70% filled.

Special attention is paid to the construction and commissioning of liquid and solid waste processing

Figure 5.1.3.
Volumes of Liquid Radwaste Processed (m³)

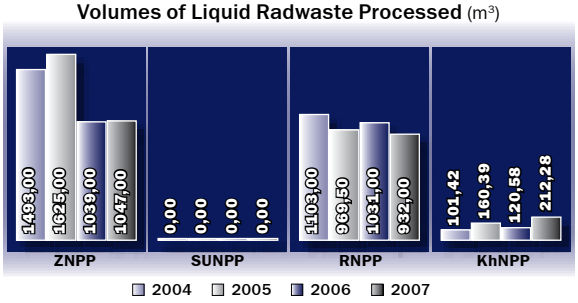
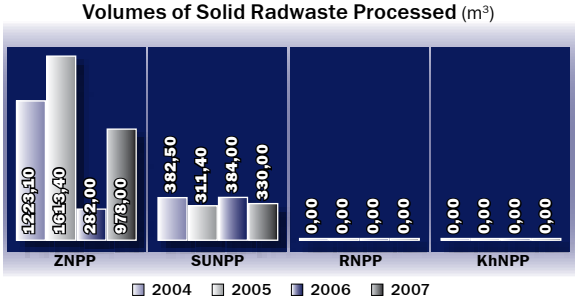


Figure 5.1.4.
Volumes of Solid Radwaste Processed (m³)



systems to reduce the volume of both accumulated and newly generated radwaste. The following design documents were subjected to regulatory assessment for commissioning of the:

- *deep evaporator for liquid radwaste at the SUNPP;*
- *centrifugation unit at the KhNPP;*
- *solid radwaste processing plant at the RNPP.*

5.2. MANAGEMENT OF RADIOACTIVE WASTE RESULTING FROM USE OF IONIZING RADIATION SOURCES

The State Radon Association deals with the management of radioactive waste generated in the use of ionizing radiation sources in national economy. The Radon Association includes six state interregional specialised plants (SISPs): Kyiv, Donetsk, Odesa, Kharkiv, Dnipropetrovsk and Lviv.

The primary objectives of radwaste management at Radon SISPs are to:

- *collect and store radwaste to prevent its adverse effect on people and the environment;*
- *improve effectiveness of these plants including radiation safety.*

The Kharkiv, Lviv, Odesa, Dnipropetrovsk and Kyiv SISPs receive low- and intermediate-level waste. The Donetsk SISP operates only a radwaste decontamination and transportation station.

The SISPs receive solid radwaste, biological waste contaminated with radioactive substances (biological radwaste) and spent ionizing radiation sources (IRS).

Biological radwaste is placed separately from solid radwaste in special storage facilities with layered cementation.

Spent IRS are stored in biological shielding as ordinary radwaste or in a special pit designed to store unshielded IRS.

The SISPs do not currently receive liquid radwaste. This waste is preliminary solidified and is stored as solid radwaste. Internal liquid radwaste is stored in special facilities.

The SISPs have:

- *45 reservoirs to store solid radwaste: 29 in operation, 16 preserved;*
- *3 reservoirs to store biological radwaste: 2 in operation, 1 preserved;*
- *11 reservoirs to temporarily store liquid radwaste: 10 in operation, 1 preserved;*
- *14 reservoirs to store spent IRS: 11 in operation, 3 preserved;*

In addition:

- *Kyiv SISP operates a solid radwaste storage shed;*
- *Odesa SISP has a site equipped to store radioisotope thermoelectric generators (RITEGs) and sites to store solid radwaste in UUK-3- and KTZ-3-type containers.*

Figure 5.1.5.
Accumulation of Liquid Radwaste in Plant Storages (m³)

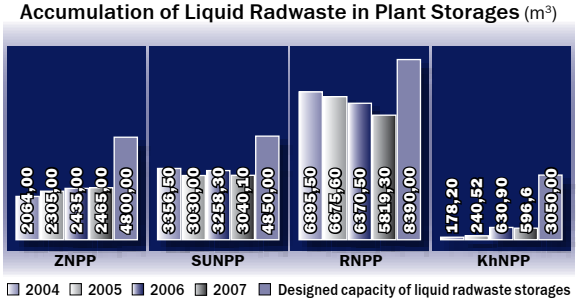
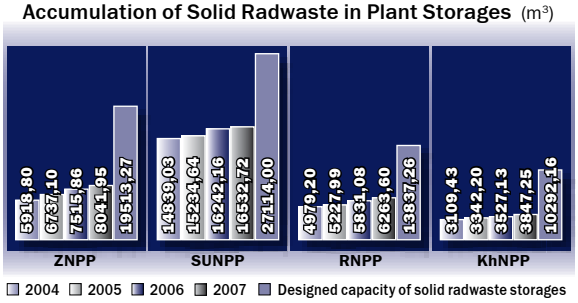


Figure 5.1.6.
Accumulation of Solid Radwaste in Plant Storages (m³)



According to the law, the Radon SISPs manage radwaste under licences issued by the SNRCU. The licences specify both the scope of authorised activity and special terms imposed on it to improve the level of safety.

Prior to transfer to the SISPs, waste is collected and stored in situ within the period determined by current legislation.

In 2007, inspections were conducted at the Lviv SISP (from 25 to 29 March) and Kyiv SISP (21 May, 27 November).

- *admissible radionuclide concentration in working areas at any SISP;*
- *radiation monitoring parameters for category B.*

Radiation protection of category C (public) living within the SISP observations areas is ensured by adherence to radiation safety standards and rules in radwaste management at SISPs and timely fulfilment of radiation monitoring procedures within the observation areas. Based on a list of radiation monitoring parameters and radiation monitoring points, deviations from current radiation safety standards of Ukraine can be revealed in a timely manner and a hazard level for all public categories can be promptly assessed.

RADON SISPS	Solid radwaste (including shielded IRS)				Liquid radwaste		Biological radwaste		IRS (unshielded)		TOTAL ACTIVITY, Bq
	Mass (*) kg	IRS number	Mass w/o shield, kg	Activity, Bq	Vol., m³	Activity, Bq	Vol., m³	Activity, Bq	Vol., m³	Activity, Bq	
Dnipropetrovsk	3101.65	1397	972	$2.69E^{+12}$	0	0.00	0	0	438	$9.50E^{+12}$	$1.22E^{+13}$
Kyiv	23085.55	1866	2825.5	$5.13E^{+11}$	0	0.00	0	0	0	$0.00E^{+00}$	$5.13E^{+11}$
Lviv	4316.90	305	3233.9	$4.90E^{+11}$	0	0.00	0	0	4	$3.23E^{+04}$	$4.90E^{+11}$
Odesa	1554.70	2075	848	$2.76E^{+12}$	0	0.00	0	0	0	$0.00E^{+00}$	$2.76E^{+12}$
Kharkiv	138777.44	2523	568.44	$2.58E^{+12}$	0.56	$6.90E^{+05}$	0	0	0	$0.00E^{+00}$	$2.58E^{+12}$

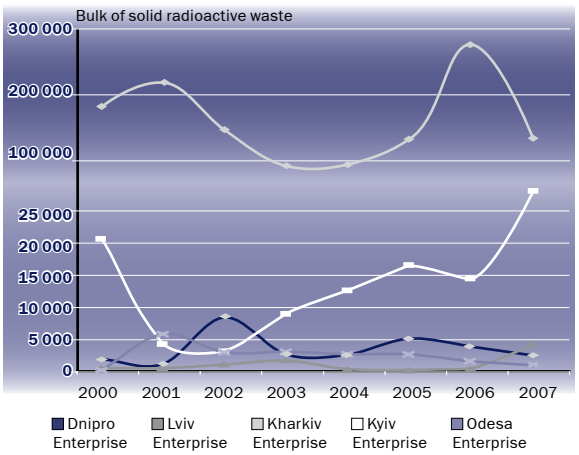
As of 31 December 2007, the SISPs stored the following:

Figures 5.2.1–5.2.3 show the dynamics in the accumulation of solid radwaste and shielded and unshielded IRS at the Radon SISPs in 2000-2007.

In 2007, there were no cases when reference levels were exceeded for:

- *individual equivalent doses to category A personnel;*

Figure 5.2.1
Accumulation of Solid Radwaste at Radon SISPs



5.3. RADIOACTIVE WASTE MANAGEMENT IN EXCLUSION ZONE

The Chornobyl Exclusion Zone is a part of the Ukrainian territory contaminated with radionuclides as a consequence of the Chornobyl disaster. A substantial amount of radwaste is accumulated in the Exclusion Zone as a result of the accident. This radwaste greatly varies in radionuclide composition and specific activity.

Radwaste totals (Shelter excluded) some 2.8 million m³ including over 2.0 million m³ of radwaste with the total activity of about $7x10^{15}$ Bq that is located at radwaste disposal sites (RWDS) and radwaste interim confinement sites (RICS).

The State Specialised Enterprises «Kompleks» and «Tekhnocentre» (SSE Kompleks and SSE Tekhnocentre) are the main radwaste management enterprises in the Exclusion Zone.

Pursuant to the SNRCU's licence, the SSE Kompleks collets and transports radwaste in the Exclusion Zone, operates the active Buryakivka RWDS, monitors the inactive Pidlisny RWDS and ChNPP Stage III RWDS and RICS. In addition to the scope of

authorised activity, the licence specifies special measures to ensure radiation safety of the environment. First-priority measures are to bring the RWDS and RICS in the Exclusion Zone into compliance with current radiation safety standards and rules since these sites were established in extreme post-accident conditions in 1986 and are potentially dangerous for the environment.

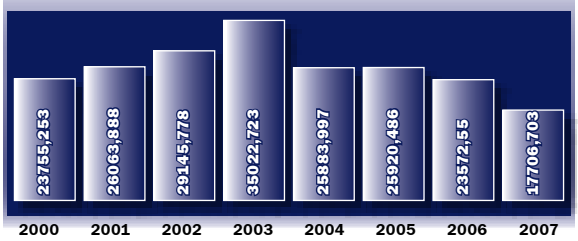
The Buryakivka RWDS was constructed in 1986 immediately after the Chornobyl accident and has been operated since 1987. As of 31 December 2007, the Buryakivka facilities contained radwaste totalling to about 1,102,000 m^3 and total activity of $2.47x10^{15}$ Bq.

The Buryakivka designed capacity is being exhausted: the reserve of 30 design trenches 22,000 m3 in volume each (designed capacity of 15,000 m^3 was increased as agreed with the regulator) is about 40,000 m^3. Therefore, the Ministry for Emergencies, as a state control body in radwaste management, resolved to reconstruct the Buryakivka RWDS by constructing six additional trenches to place 120,000 m^3 of radwaste. The reconstruction project was agreed upon by the SNRCU in 2001. In February 2006, the SNRCU reviewed the technical decision to modify the reconstruction project. Based on the review findings, the technical decision was returned for revision since it did not contain safety verification for Buryakivka RWDS.

At the Pidlisny RWDS (operational from December 1986 to 1988), modules A-1 and B-1 having the total capacity of 22,880 m^3 are partially filled with long-lived high-level waste (3,960 m^3, $1.0E^{+15}$ Bq) and low- and intermediate-level waste (7,040 m^3, $2.5E^{+12}$ Bq).

The ChNPP Stage III RWDS (operational till the end of 1986) has radwaste with the total volume of about

Figure 5.3.1
Accumulation of Solid Radwaste at SSE Kompleks in 2000-2007 (Weight, t)



26,200 m^3 and activity of $3.91E^{+14}$ Bq.

The Pidlisny and ChNPP Stage III RWDS are not operable, and the SSE Kompleks carries out routine safety activities at the sites. Radiation and environmental monitoring of the disposal sites revealed no exceeding of reference levels for radionuclide contamination of air and soil.

The SSE Kompleks removes radwaste from RICS for redisposal. For example, it investigated the removal of radwaste from trench T-5 of Naftobaza site 5.1 located at the Dniper riverside. Based on the experience gained, a project should be developed for radwaste removal from other trenches of this RICS.

The reference level of annual individual effective external dose for Kompleks personnel of category A is 5 mSv/y and the reference level of ^{137}Cs inhalation for category A personnel is 11 kBq/y.

The average annual dose for Kompleks personnel is about 1.5 mSv (The dose limit is 100 mSv for 5 years (20 mSv per year)).

The SNRCU and SSE Kompleks carried out the following activities in 2007:

Figure 5.2.2.
Accumulation of Shielded IRS at Radon SISPs

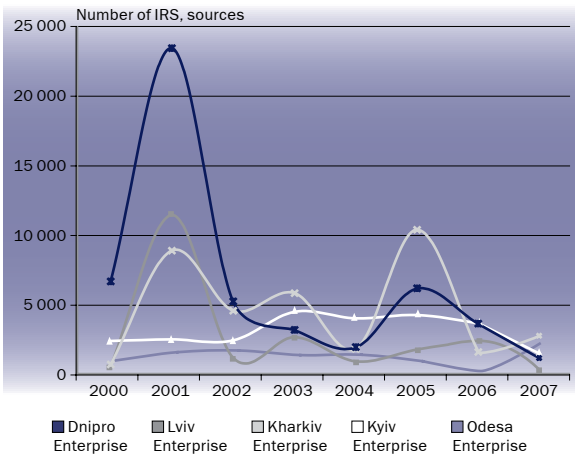
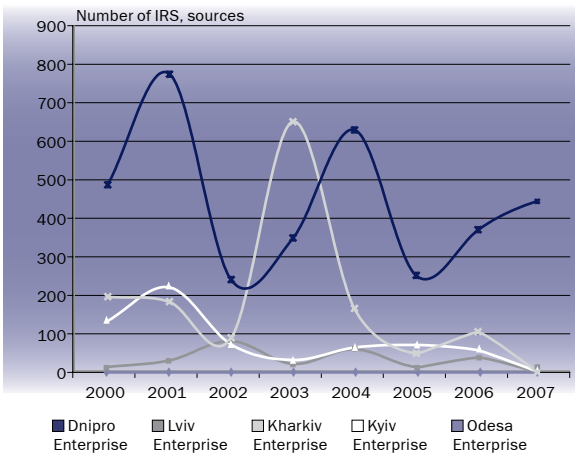


Figure 5.2.3.
Accumulation of Unshielded IRS at Radon SISPs



- ***4-6 April:*** *off-schedule comprehensive inspection to check compliance with safety standards and rules in radioactive material transport, processing, storage and disposal and conditions of Licences OV No. 000219, EO No. 000144 and EV No. 000155. An inspection prescription was issued according to which the Kompleks was to develop measures to fulfil special requirements of Licence EO No. 000144 (preserve Buryakivka RWDS, prepare plans for closure of ChNPP Stage III RWDS and Pidlisny RWDS, carry out a comprehensive review of Naftobaza RICS);*
- ***15 May:*** *target inspection of SSE Kompleks interaction with subcontractors to check compliance with nuclear and radiation safety requirements in decontamination and fragmentation of radioactive metal structures in the Exclusion Zone. An inspection prescription was issued according to which the SSE Kompleks was to involve subcontractors that were licensed to process, store and dispose radioactive waste;*
- ***4-8 June:*** *off-schedule inspection of the Chornobyl NPP and SSE Kompleks to check the operability of ChNPP safety-related system equipment, compliance with current rules on dismantling and reuse of ChNPP equipment and radiation monitoring of ChNPP equipment being dismantled. Inspection Prescription No. 03-18/07 of 14 June 2007 was issued according to which the Chornobyl NPP and SSE Kompleks were to develop a joint procedure for dismantling and decontamination of equipment to be transferred to the SSE Kompleks in Chornobyl NPP decommissioning;*
- ***13 December:*** *off-schedule inspection of the SSE Kompleks to check fulfilment of Inspection Prescription No. 03-18/07 of 14 June 2007. The inspection revealed that the equipment dismantled and accepted from the ChNPP was placed at a special site in the radwaste decontamination shop. The SSE Kompleks does not use the decontaminated equipment. The ChNPP State Inspectorate issued Inspection Prescription No. 24-21-2007 of 17 December 2007.*

SSE Kompleks activities were discussed at the meetings of the SNRCU College on 19 April and 20 December 2007. As a result, the SNRCU made appropriate regulatory decisions to enhance monitoring of the Kompleks activities (SNRCU College Order No. 3 of 19 April 2007 and No. 17 of 20 December 2007).

On 19 September 2007, the SNRCU reissued the licence for radioactive material transport to the SSE Kompleks for three years.

However, the SNRCU Licensing Commission decided to suspend the licence on 14 November 2007 since the SSE Kompleks failed to fulfil special conditions of Licence EO No. 000144 for operation of radioactive waste disposal facilities. The SSE Kompleks, in cooperation with the Ministry for Emergencies, formally fulfilled all conditions to renew the licence that were identified by the Licensing Commission on 14 November 2007. Hence, Licence EO No. 000144 was renewed by the SNRCU Licensing Commission on 7 December 2007 in view of ChNPP needs for preparing the site for the New Safe Confinement. Nevertheless, the SNRCU College made a decision on 20 December 2007 to recommend the Ministry for Emergencies to immediately conduct a comprehensive inspection of the SSE Kompleks to check its capability to perform its obligations and licensing conditions.

Based on the SNRCU's licence, the SSE Tekhnocentre constructs the Vector complex. The Vector complex is constructed:

1st stage (under the approved design):
- *to dispose short-lived radwaste resulting from the Chornobyl disaster;*

2nd stage (under the comprehensive radwaste management programme):
- *to process and provide long-term storage of long-lived radwaste resulting from the Chornobyl disaster;*
- *to dispose short-lived radwaste resulting from Shelter operation and waste to be generated in Shelter transformation into an ecologically safe system;*
- *to dispose short-lived radwaste resulting from NPP operation and waste to be generated in decommissioning of all NPPs;*
- *to dispose or provide long-term storage of radwaste generated at industrial enterprises, medical, research and other institutions;*
- *to store high-level waste to result from processing spent fuel from Ukrainian NPPs in the Russian Federation.*

In order to efficiently use allocations from the State Budget, minimise capital inputs and facilitate Vector commissioning, the start-up system was singled out in the 1st stage design, which includes two radwaste disposal facilities (TRO-1, TRO-2) and infrastructural facilities.

The infrastructural facilities of the start-up system should also support operation of the engineered near-surface disposal facility for solid radioactive waste (Lot 3) of the industrial complex for solid radioactive waste management at the Chornobyl NPP, which is under construction at the start-up system site and is funded by the European Commission under the ChNPP decommissioning programme.

The start-up system is constructed under the project that obtained a favourable finding of a comprehensive review including nuclear and radiation safety, ecological and other reviews according to current legislation.

The construction of the start-up system was started in March 1998.

The construction is funded from the State Budget of Ukraine, Vector Start-up System Construction item.

The actual funding provided in the previous year and the investment use rate were not adequate to complete the construction in 2004 as envisaged by the Comprehensive Programme for Radioactive Waste Management. Verkhovna Rada Resolution No. 975-V of 20 April 2007 established a new deadline for start-up system commissioning: 2008.

The annual funding of the start-up system for 2007 amounted to 42,553 thousand UAH including 17,000 thousand UAH from the general fund (2,000 thousand UAH was additionally provided to prepare start-up system facilities for operation) and 25,553 thousand UAH from a special fund of the State Budget.

As of 25 December 2007, the construction was funded in the amount of 40,391 thousand UAH and 38,705.732 thousand UAH has been used.

The allocated funds are used for the following purposes: 2,729.340 thousand UAH to repay the credit debt in 2006; 38,081.402 thousand UAH to fund activities in 2007.

According to the SSE Tekhnocentre, the following activities were carried out at the construction site:

- *TRO-1 – installation of lighting systems and lightning protection and power supply networks;*
- *TRO-2 – installation of valves and panel forms and concreting of facility compartment walls;*
- *firehouse, staff facilities and office building, switchyard TP 110/10, outdoor and indoor switchgears – finishing work;*
- *Lot 3 – according to the SSE Tekhnocentre, all Lot 3 construction and installation operations have been completed. Individual and comprehensive tests of equipment and systems have been conducted.*

As of 25 December 2007, 140,008.760 thousand UAH has been allocated and 133,576.776 thousand UAH has been used since the construction beginning. Based on a comparison of these costs with those for the construction of the start-up system (170,021.228 thousand UAH), one can conclude that 30,012.468 thousand UAH should be allocated till the end of construction and activities should be carried out for 36,444.452 thousand UAH: i.e., 17.65% and 21.4%, respectively, of the estimated cost of the start-up system.

In 2007, the SNRCU carried out the following activities at the SSE Tekhnocentre:

– 27-31 August: comprehensive inspection of the ChNPP and SSE Tekhnocentre to check compliance with permits and licences in the construction of the industrial complex for Chornobyl solid radwaste management (ICSRM). Lot 1, Lot 2 and the interim storage facility are under construction at the Chornobyl site. Lot 3 is being constructed at the SSE Tekhnocentre site of the Vector complex. The German NUKEM Company was contracted to implement the entire ICSRM project. The European Commission is the international investor under the ICSRM project. The inspection commission checked the Lot 3 availability and quality of documents developed to obtain a licence for radwaste disposal facility operation and to arrange project management at the SSE Tekhnocentre, train personnel for operation of the radwaste disposal facility, implement a quality programme in the construction of the disposal facility and prepare for its operation.

An inspection prescription was issued to identify measures to be taken by the SSE Tekhnocentre for efficient management of Lot 3 completion, timely submission of licensing documents, etc.

Shelter Transformation into Ecologically Safe System. Chornobyl NPP Decommissioning

6.1. SHELTER SAFETY

In Shelter-related activities, the SNRCU is governed by the fundamental principle, which is to ensure nuclear and radiation safety and protect personnel, the public and the environment.

Shelter activities are carried out under Licence EO No. 000033 issued by the SNRCU in December 2001. The licence established the scope of authorised activity, its conditions and Shelter transformation into an ecologically safe system within the Shelter Implementation Plan (SIP).

Shelter nuclear safety is ensured through a system of administrative and technical measures for nuclear hazardous activities and routine monitoring of fuel-containing materials (FCM), which must remain subcritical (if critical levels are exceeded) and a self-sustained chain fission reaction must be prevented by introducing neutron-absorbing mixtures.

The Shelter safety is assessed on a permanent basis through routine measurements of FCM monitoring parameters (exposure dose rate of γ-radiation, neutron flux density).

In 2007, monitoring systems recorded no incidents caused by changes in the above FCM parameters. Exposure dose rate of γ-radiation and neutron flux density in FCM accumulations have not essentially changed and remain within indicators for previous years.

In 2007, radiation indicators tended to be stable. Reference levels of γ-radiation exposure dose rate and radioactive contamination were not exceeded at off-site facilities, site and Shelter attended and periodically attended rooms. Shelter releases and radioactive airborne concentrations in Shelter rooms and on adjacent territories did not exceed reference levels.

In 2007, the concentration of radionuclides (excepting ^{137}Cs) and fission elements in water accumulations inside the Shelter also tended to increase, as observed for many years. This is due to the long-term destruction of lava-like FCM and leaching of radionuclides leading to greater migration of radionuclides in Shelter rooms and outside it.

In order to improve the situation and decrease the volume of water penetrating inside the Shelter, in 2007 the SNRCU agreed a technical decision to repair the light roof over the Shelter central hall. This work is to be done in 2008.

Radiation and dosimetry monitoring is carried out and doses to ChNPP and contracting personnel are recorded during Shelter-related activities.

In the reporting period, the average individual dose to ChNPP personnel who worked at the Shelter was less than last year's indicators and constituted 2.82 mSv*.

The average individual doses of contracting personnel were 5.85 mSv. This is approximately 24% higher than in the previous year since most activities were carried out at the Shelter and within its local area under radiation impact and there was almost a fivefold decrease in the number of contractors as compared with 2006.

Solid and liquid radioactive waste is generated during Shelter-related activities.

Solid radwaste (soil, scrap metal, mixed construction waste) resulted mainly from SIP designs: stabilisation measures, operations under the new safe confinement design (removal of the pilot wall berm), upgrading of physical protection systems.

As compared with 2006, the total amount of solid radwaste resulting from Shelter operation and SIP activities decreased by 255 tons (by 23.4%) and its total activity decreased by 3.77×10^{10} Bq (by 39.2%).

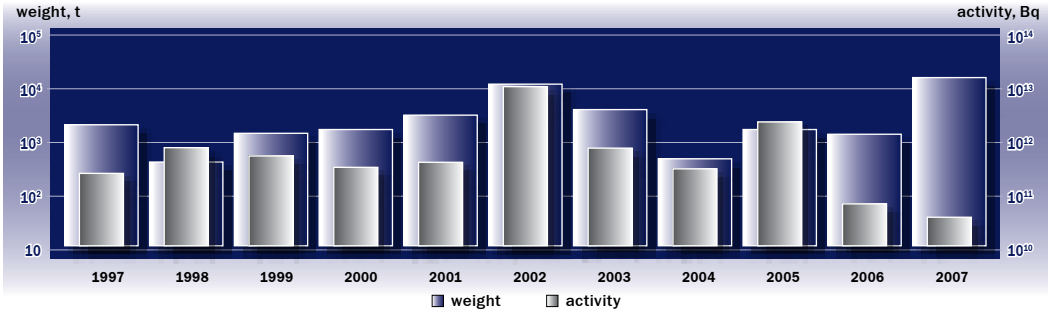
The amount of solid radwaste decreased in 2007 because the total scope of actual Shelter activities under SIP designs reduced, in particular, main stabilisation measures were completed, earthwork for the reconstruction of guarding perimeter was finished and thus the amount of accompanying waste decreased as compared with previous years.

Shelter liquid radwaste is generated in the decontamination of rooms, equipment and tools, dust suppression, operation of airlocks and results from natural factors: penetration of precipitation into the Shelter through loose places and moisture condensation.

As compared with 2006, the volume of liquid radioactive waste removed from the Shelter in 2007

** According to the Radiation Safety Standards of Ukraine (NRBU-97), the effective dose limit for personnel who deal with ionizing radiation sources on a permanent or temporary basis is 20 mSv/y on average for any successive five years but no more than 50 mSv for one year.*

Generation of Solid Radwaste in Shelter Activities



decreased by 789 m^3 (by 21.8%) and its total activity decreased by 4.1×10^{10} Bq (by 35.7%).

Uncontrolled water penetration into the Shelter with precipitation through loose places in structures, routine dust suppression, water condensation and other factors lead to radioactive water accumulations in Shelter rooms This liquid radwaste contains high concentration of transuranium elements, organic compounds and chemicals that can complicate its processing. In addition, water contained in the Shelter accelerates the destruction of fuel-containing materials and leads to uncontrolled movement of radioactive substances in the Shelter.

In order to resolve issues related to Shelter liquid waste management, the ChNPP developed the Conceptual Technical Decision for Liquid Radwaste Management in Shelter Transformation into an Ecologically Safe System in 2006, which was agreed upon by the SNRCU. To implement this decision, the ChNPP developed a plan of measures. However, the issue of funding is open and so is complete implementation of the measures.

The management of fuel-containing materials is another important aspect of Shelter safety. The ChNPP developed the Conceptual Technical Decision on Measures for Monitoring of Fuel-Containing Materials. The measures under this technical decision are intended to assess the FCM condition and predict FCM long-term behaviour with the purpose of developing the ultimate FCM removal strategy. The SNRCU reviewed this technical decision and concluded that measures on FCM monitoring were insufficient and returned it for revision.

The Presidential Decree of 29 November 2007 «On Some Measures for Shelter Transformation into an Ecologically Safe System» provides for the development and implementation of first-priority SIP activities over 2008-2012 and draws special attention to the management of liquid radioactive waste and fuel-containing materials. This Decree also envisages funding of the first-priority activities from the State Budget of Ukraine.

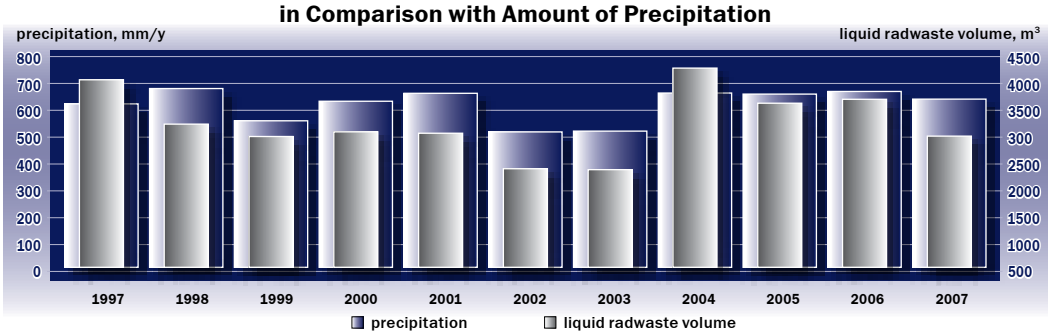
Representatives of the ChNPP State Nuclear Safety Inspectorate and SNRCU Headquarters supervise the safety of Shelter-related activities.

6.2. SHELTER NEW SAFE CONFINEMENT

The new safe confinement for the Shelter (NSC) is one of the main SIP designs.

On 17 September 2007, contractual documents were signed after tendering procedures by the ChNPP and Novarka Consortium, as the Contractor, for design, construction and commissioning of the first start-up complex of the Shelter new safe confinement (NSC SC-1).

Volumes of Removed Liquid Radwaste in Comparison with Amount of Precipitation



According to the initial contract schedule, the NSC SC-1 Contractor determined the following key dates:

- *completion of design stage – November 2008;*
- *authorisation to proceed with construction – May 2009;*
- *commissioning – March 2012.*

The pilot wall berm was removed in preparation for ChNPP NSC SC-1 implementation in 2007. This work is intended to prepare the southern area of the Shelter territory for NSC foundations.

The SNRCU also takes measures for proper implementation of this design.

In order to ensure expedient review of design documentation and efficient regulatory decisions, the SNRCU activated the Interagency Regulatory Task Force in licensing of Shelter-related activities and ChNPP decommissioning. The first meeting of the Task Force with refreshed composition was held in September 2007.

In December 2007, the SNRCU issued an order for regular meetings between the SNRCU, ChNPP and NSC SC-1 Contractor to decrease regulatory risks in the NSC SC-1 design and improve the state regulation of nuclear and radiation safety under this design.

6.3. SHELTER STRUCTURAL STABILISATION

The primary objective in stabilising the Shelter containment is to decrease the risk of its collapse that may involve a potential release of radioactive dust to the atmosphere.

As of the beginning of 2007, the ChNPP completed six emergency stabilisation measures at the Shelter. Measure 2 is still uncompleted. Within this measure, the ChNPP transferred 50% of loads from beams B1/B2 to newly constructed metal structures instead of 80% as envisaged by the design.

From December 2006 to September 2007, the ChNPP monitored the structures in transferring 50% of load and calculated the load transfer to metal structures based on the monitoring results. It was found that transferring 80% of load would be optimal. The ChNPP developed an appropriate technical decision to complete load transfer, which was considered and agreed upon by the SNRCU.

The working design on Shelter structural stabilisation provided for a measure without a number: stabilisation (repair) of the light roof over the Shelter central hall. This measure is mainly intended to prevent water penetration into the Shelter and is not related to the primary objective of Shelter structural stabilisation. The numberless measure was not originally recommended since its implementation would involve high doses.

In May 2007, the ChNPP informed the SNRCU on its intention to implement this measure and developed the Technical Decision «On Repair of the Light Roof over the Shelter Central Hall» and justified a possible decease in doses to personnel through careful work-out of the process and radiation protection. This technical decision was agreed upon by the SNRCU.

The above stabilisation measures are to be taken in 2008.

6.4. CHORNOBYL NPP DECOMMISSIONING

ChNPP units 1, 2 and 3 are in the stage of operation termination. Unit 1 was shut down in November 1996, unit 2 in October 1991 and unit 3 in December 2000.

For reference: operation termination is the final stage in the operation of a nuclear installation over which nuclear fuel is completely removed from it or is placed in spent fuel storage facilities designed for long-term safe storage.

The designed lifetime of Chornobyl-1 expired on 26 September 2006. After the pre-term operation of unit 1 operation, the ChNPP takes measures for decommissioning in compliance with the Programme for Unit 1 Operation Termination.

The measures implemented at unit 1 make it impossible to use it to produce power: nuclear fuel has been removed from the reactor, numerous systems and components have been taken out of service, many of them have been dismantled. There are only systems and components in operation that are needed for storage of spent fuel in cooling pools and management of radioactive waste.

Considering radwaste present at the unit, the ChNPP takes measures to extend the lifetime of systems and components for spent fuel storage and radwaste management.

Pursuant to SNRCU College Decision No. 5 of 9 March 2006, the ChNPP developed and the SNRCU agreed upon a work programme to determine new service time based on the shortest residual life of critical components and ageing management of unit components.

In September 2007, the ChNPP submitted the «Safety Assessment Report for Chornobyl-1 Systems and Components Associated with Spent Fuel Storage and Radwaste Management» to the SNRCU, which was submitted to the State Scientific Centre for Nuclear and Radiation Safety for review.

From 29 to 31 September 2007, SNRCU experts conducted a target inspection of systems and components associated with spent fuel storage and radwaste management.

On 21 September 2007, the further operation of ChNPP-1 systems and components needed for spent fuel storage and radwaste management was considered by the SNRCU College.

On 26 September 2007, based on the review findings for the «Safety Assessment Report for Chornobyl-1 Systems and Components Associated with Spent Fuel Storage and Radwaste Management», results of the target inspection and College Ordinance No. 11 of 21 September 2007 "On Conditions of Further Safe Operation of Chornobyl-1 Systems and Components Beyond Designed Period", the SNRCU agreed upon the ChNPP Decision «On Possibility of Further Operation of Unit 1 Systems Relevant to Safety of Spent Fuel and Radwaste Management Beyond Designed Period until Critical Components Are Investigated».

The ChNPP continues work under the schedule for the investigation of ChNPP-1 critical components agreed upon by the SNRCU on 24 October 2007.

6.5. RADIOACTIVE WASTE MANAGEMENT AT CHORNOBYL NPP

Chornobyl NPP radwaste is managed based on SNRCU licences:

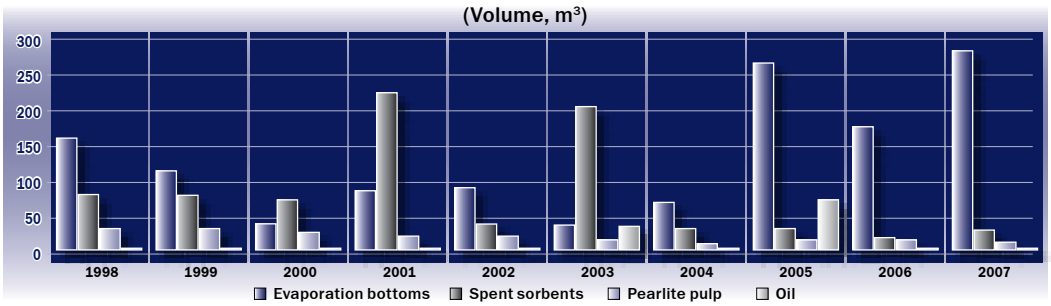
- *Licence EO No. 000040 of 22 March 2002 to decommission Chornobyl NPP;*
- *Licence EO No. 000033 of 30 December 2001 to operate the Chornobyl Shelter;*
- *Licence OV No. 000334 of 23 September 2006 to transport radioactive materials.*

Radioactive waste is stored in special storage facilities at the ChNPP. There is a network of wells to monitor groundwater parameters along the perimeter of the storage facilities.

Liquid radwaste resulting from the previous operation is stored in two storages at the ChNPP site, which are connected with each other by special piping for liquid radwaste transportation, and in temporary storage for used radioactive oil:

- *liquid radwaste storage designed to hold 26,000 m³ including 5 reception tanks of 5000 m³ and 2 reception tanks of 500 m³ made of stainless steel;*
- *liquid and solid radwaste storage, where only liquid radwaste is stored, designed to hold 12,000 m³ including 12 stainless steel reception tanks of 1000 m³;*
- *temporary storage for used radioactive oil designed to hold up to 144 m³ o oil. It includes two tanks of 72 m³.*

Figure 6.5.1.
Generation of Liquid Radwaste
(Volume, m³)



Liquid radwaste placed in storage tanks has low- and intermediate-level activity and is:

- *evaporation bottoms;*
- *pulp of spent ion-exchange resins;*
- *pearlite pulp.*

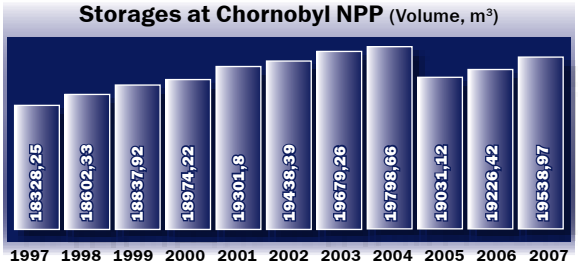
In 2007, the ChNPP generated and transferred for storage 284 m3 of evaporation bottoms, 22.1 m3 of spent ion-exchange resins and 6.45 m3 of pearlite pulp, radioactive oil was not generated (Figure 6.5.1). As of the end of 2007, the ChNPP liquid radwaste storages contained 13,157 m3 of evaporation bottoms, 4,024.65 m3 of spent ion-exchange resins, 2,252.52 m3 of pearlite pulp and 104.8 m3 of spent radioactive oil. The total volume of accumulated liquid radwaste is 19,538.97 m3 (Figure 6.5.2.).

Solid radwaste resulting from ChNPP operation and mitigation of the 1986 accident is stored in the solid radwaste storage at the ChNPP site that is designed to store solid radwaste of activity groups I, II and III. The solid radwaste storage is a surface concrete structure divided into three groups of compartments. The storage compartments have been preserved and the storage does not receive any radwaste since the industrial complex for solid radwaste management is being constructed. The total volume

of solid radwaste in the storage is as follows: 1,096 m^3 of group I waste, 926.5 m^3 of group II waste and 506.93 m^3 of group III waste.

Low- and intermediate-level solid waste resulting from operation termination and Shelter transformation into an ecologically safe system is transported to the Buryakivka radwaste disposal site (RWDS) of the SSE Kompleks in the Exclusion Zone. In 2007, 3,256.7 m^3 (2,838.08 t) of low- and intermediate-level waste was transferred to the Buryakivka RWDS for disposal.

Figure 6.5.2.
Accumulation of Liquid Radwaste In Temporary Storages at Chornobyl NPP (Volume, m^3)



High-level waste is collected into containers (KTZV-0.2) designed to transport and store solid radwaste of group III and is placed into the special temporary storage for solid waste at the ChNPP site. In 2007, the temporary storage for solid high-level waste received 0.19 m^3 (0.011 TBq) (Figure 6.5.3.).

The temporary storage for solid radwaste accommodates approximately 0.81 m^3 of high-level and long-lived solid waste with the total activity of about 0.5 TBq.

6.6. RADIOACTIVE WASTE MANAGEMENT INFRASTRUCTURE AT CHORNOBYL NPP

Infrastructure facilities for radwaste management are constructed at the ChNPP site within international assistance projects for Chornobyl NPP decommissioning. They include:

- *Liquid radwaste treatment plant (LRTP).*
- *Industrial complex for solid radwaste management (ICSRM) consisting of:*
- *Lot 1- solid radwaste retrieval facility,*
- *Lot 2 – solid radwaste processing plant,*
- *Temporary storage for low- and intermediate-level long-lived and high-level radwaste (henceforth – temporary storage),*
- *Lot 3 – engineered near-surface disposal facility for solid radwaste constructed at the Vector site (Tekhnocentre utility).*

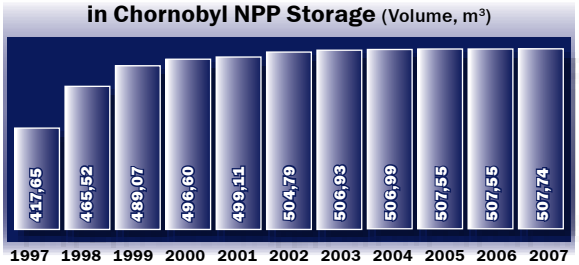
Liquid Radwaste Treatment Plant

The liquid radwaste treatment plant (LRTP) is intended to process liquid radwaste resulting from operation, including its retrieval from ChNPP storage facilities, and to process liquid radwaste to be generated in ChNPP decommissioning.

The project is funded by Donor Countries through the EBRD Nuclear Safety Account.

The LRTP has been actually completed, but there are a number of activities to be carried out prior to its

Figure 6.5.3.
Accumulation of Group III Solid Radwaste in Chornobyl NPP Storage (Volume, m^3)



commissioning: in particular, correct design drawbacks, create a system for the retrieval of liquid waste from storage tanks, conduct additional research to confirm characteristics of the final product in terms of its safe disposal in Lot 3. After the ChNPP terminated the contract with the contractor (international consortium) because of failure to fulfil contractual obligations in 2006, no work has been practically done at the plant.

The Assembly of Donors to the Nuclear Safety Account agreed the ChNPP strategy for completion of the liquid radwaste treatment plant at the meeting in London on 18 July 2007. According to the strategy, work to be done is divided into packages, which will be performed by national contractors after tendering and contracting in compliance with EBRD rules.

As of the end of 2007, tender procedures have not been completed, which may cause delays in plant commissioning and increase risks posed by the limited lifetime of the ChNPP liquid radwaste storage to be emptied by 2011 and by the degradation of equipment installed at LRTP.

Industrial Complex For Solid Radwaste Management

The project is funded by the European Commission within the Tacis Programme and by contribution from the State Budget of Ukraine.

As noted above, the complex includes the following facilities:

Lot 1 is intended for solid radwaste retrieval from the ChNPP solid radwaste storage (Lot 1 is based on its building) and transfer to the Lot 2 sorting facility.

Lot 2 is intended for sorting of solid radwaste of all categories and processing (fragmentation, incineration, compaction, cementation) of low- and intermediate-level short-lived solid radwaste retrieved at Lot 1 and ChNPP decommissioning waste. Lot 2 also provides for packaging of long-lived and high-level radwaste resulting from sorting into 200-litre drums and its subsequent transfer to the temporary storage.

Temporary storage is intended for interim (for 30 years) storage of long-lived and high-level radwaste to result from sorting at Lot 2 and for storage of high-level radwaste to result from preparation for the construction of the Shelter New Safe Confinement. This storage is created by reconstructing and reequipping of room 138 in the ChNPP liquid and solid radwaste storage facility, which has not been operated so far.

The deadline for ICSRM completion at the ChNPP site is March 2009 in accordance with due changes to the Comprehensive Programme for Chornobyl NPP Decommissioning. However, the deadlines for these activities are not determined and neither are deadlines for completion of projects. Because of uncertain schedule for a number of activities, such as comprehensive active tests at Lots 1 and 2 and installation of input ventilation, the period of completion may be longer.

Lot 3 at the Vector site with the capacity of 50,250 m3 is designed for the disposal of concrete containers from Lot 2 and 200-l drums from LRTP.

As of the end of 2007, all construction and installation operations at Lot 3 have been completed. Individual and comprehensive commissioning tests of equipment and systems have been conducted.

In the first quarter of 2008, the SSE Tekhnocentre is planning to submit an application and documentation package to the SNRCU to obtain a licence to operate the disposal facility within the first start-up stage of the Vector complex.

Draft licensing documents which should contain safety justification for the disposal system in the operational phase and in long-term after-closure period are being reviewed by the SNRCU. The SNRCU initiated and arranges expert interaction to resolve issues as to the content of the safety analysis report and waste acceptance criteria for Lot 3.

Coordination of projects is one of the most important aspects in the ChNPP radwaste management infrastructure. Considering that ICSRM facilities and LRTP are a unified engineering complex, safety issues in further disposal of conditioned radwaste in Lot 3 should be solved in relation with safety justification for ChNPP radwaste management facilities.

The Chornobyl NPP and SSE Tekhnocentre should:

- *ensure compliance of radwaste packages after processing (sorting, conditioning, packaging) with (radiological, chemical, physical) waste acceptance criteria for Lot 3;*
- *justify these characteristics in the LRTP and Lot 2 safety analysis reports in terms of applicable techniques for radwaste sorting, processing and conditioning;*
- *cooperate in establishing procedures and methods to monitor characteristics of the LRTP and Lot 2 final product;*
- *commission the facilities in compliance with mutually agreed schedules considering that waste packages from Lot 2 and LRTP are to be loaded into Lot 3 disposal modules in a specific order.*

Ionizing Radiation Sources

Ukraine uses ionizing radiation sources (IRS) in medicine, industry, agriculture, scientific research, education and other areas. The use of IRS for their intended purpose is highly beneficial. However, should a radiation source be used by persons without special skills, consequences may be severe. Failure to comply with safety standards and rules in the use of IRS may cause routine or potential exposure of personnel and/or the public and contamination of the environment.

A radiation source constitutes radioactive substance concentrated in small volume and hence is very dangerous for people contacting with it, which may lead to extremely severe consequences (radiation burns, serious illnesses, amputation of extremities and even death).

Therefore, it is very important that IRS be used only for their intended purpose and under regulatory control.

How can loss, theft or accident be prevented? How can contaminated materials be revealed before their use?

In order to decrease the probability of radiation accidents, systems for state regulation of radiation safety are established in the world. They are systems of measures to regulate IRS uses. Ukraine, like most other countries, exercises regulatory control over IRS and associated legal activities.

One of the SNRCU first-priority tasks is to implement measures to exclude possible IRS loss or theft, comply with physical protection requirements, exercise efficient state supervision and licensing of IRS uses, and ensure high-quality IRS account and control.

The use of IRS is subjected to the authorisation principle, which is set forth in the Laws of Ukraine «On Use of Nuclear Energy and Radiation Safety», «On Authorising Activity in the Area of Nuclear Energy», «On Human Protection against Ionizing Radiation» and «Procedure for Licensing Individual Activities in Nuclear Energy» approved by Cabinet Resolution No. 1782 of 6 December 2000.

The production and use of IRS are subject to licensing according to the law .

The use of IRS whose activity is lower than the «Levels of Exemption from IRS Regulatory Control Based on Specific and Total Activity» (approved by Cabinet Resolution No. 1718 of 16 November 2000) requires no state regulation.

The use of IRS that meet the exemption criteria and are identified in the «List of Ionizing Radiation Sources Whose Use Is Exempt from Licensing» approved by Cabinet Resolution No. 912 of 1 July 2007 requires no licensing. In 2006, the SNRCU initiated amending the IRS list to incorporate new types and models of radiation sources.

The State Nuclear Regulatory Committee of Ukraine is supported by the IAEA in making permanent efforts to ensure IRS safety and security.

Within this international activity, special attention is paid to:

- *prevent illicit trafficking of IRS;*
- *regulate the safety of spent IRS*
- *renew control over IRS revealed in illicit trafficking;*
- *take preventive measures to restrict access to vulnerable IRS to exclude their loss or theft;*
- *comply with requirements for IRS physical protection;*
- *exercise state supervision and licensing of IRS uses;*
- *keep state account and control of IRS.*

In order to enhance state supervision over nuclear and radiation safety and implement international safety regimes on the Ukrainian territory, the Government of Ukraine (Cabinet Resolution No. 796 of 7 June 2006) resolved to renew activities of the SNRCU State Nuclear Safety Inspectorates. There are currently eight state inspectorates that cover 27 territorial units of Ukraine and are located in Kyiv, Rivne, Ivano-Frankivsk, Odesa, Donetsk, Dnipropetrovsk, Simferopol and Kharkiv.

In recent years, most enterprises that use IRS for non-medical purposes have obtained licences. Enterprises that have no licence are issued prescriptions to terminate the use of IRS, and enforcement actions are taken under the law.*

The primary licensing of medical institutions and establishments that use radiation sources for diagnosis and treatment is underway applying a differenti-

** The IRS production and use include activities identified in the «Safety Requirements and Conditions (Licensing Terms) for the Use of Radiation Sources» approved by SNRCU Ordinance No. 125 of 2 December 2002 and registered in the Ministry of Justice of Ukraine, Reg. No. 978/7266 of 17 December 2002 and in the «Conditions and Rules on the Production of Ionizing Radiation Sources» approved by Ordinance of the Ministry for Environment and Natural Resources of Ukraine No. 111 of 20 March 2001 and registered in the Ministry of Justice, Reg. No. 334/5525 of 11 April 2001.*

ated approach depending on IRS potential hazard. Ukraine has about 3000 medical establishments (excluding dental rooms) that use IRS. There are 52 cancer centres that use high-level radiation sources, over 2,699 x-ray units and 57 computer tomography units. The wide use of IRS for treatment and diagnosis requires radiation protection of patients.

The first step in ensuring effective radiation protection is to analyse Ukrainian and EU legislative practices of radiation protection in IRS use for medical purposes. This effort was started in 2007, and the following research activities have been completed so far:

- *Analysing the safety of ionizing radiation sources in Ukraine, including those in medicine;*
- *Analysing the technical state of x-ray examination devices as a component of radiation protection for patients of medical establishments (by example of the Kharkiv region);*
- *Analysing medical exposure of patients for single-type diagnostic procedures using different types (classes) of equipment, and comparing its levels with international and national recommended values and doses existing in EU countries.*

The research efforts have established that:

- *35% x-ray diagnostic equipment that was examined has expired its lifetime and is not suitable for further use. Its further use may cause changes in x-ray characteristics and thus lead to exposure of patients;*
- *measures taken to monitor doses to patients in x-ray examination procedures in medical establishments and provision of dosimeters and protection means are inadequate to ensure radiation protection of patients and personnel in compliance with Ukrainian legislation;*
- *measures currently taken to determine doses received by personnel during diagnostic procedures are inadequate to ensure their account and record and make it impossible to identify the most optimal exposures to patients in diagnostic procedures;*
- *there are no guidelines or recommendations approved by the Ministry of Health of Ukraine to determine procedure for monitoring of doses received by patients in medical diagnosis.*

In order to improve the regulatory and legislative framework in this area, in 2007 the SNRCU started developing regulations to determine requirements for a quality system for IRS medical uses (draft document is ready) and safety conditions and requirements (licensing terms) for IRS use in radiotherapy (approved by SNRCU Ordinance No. 193 of 28 December 2007 and registered in the Ministry of Justice of Ukraine, Reg. No. 31/14722 of 18 January 2008).

The SNRCU first-priority tasks for 2008 include the formation of state policy in the safety of IRS use. A further analysis of Ukrainian and EU legislative practices of radiation protection in IRS medical uses (treatment and diagnosis), establishment of priorities in this area and ways of their implementation will constitute a part of this policy. The implementation of these priorities will improve radiation protection of patients and staff and safety and security of IRS used in medicine.

A clear and society-acceptable strategy of reaching first-priority objectives of public policy is required to ensure IRS safety. In 2007, the SNRCU established a policy analysis team under the project «Enhancing the Institutional Capability of Central Executive Authorities to Shape Policy in the Context of Concept for Training and Consulting Development Centre for Top-Level Government Service». This team shapes Ukrainian policy in the safety of IRS use to be set forth in the Green Book (material for consultation on policy) and White Book (proposals on policy)*.

The policy in the safety of IRS use in Ukraine is to be developed to identify state-level measures and actions which would make the safety regulation system, infrastructure, scope of services and level of culture compliant with the extents and challenges of potential hazard in the application of radiation technologies in contemporary society. This task meets the society expectations in the area of safety and international obligations of Ukraine and is a necessary condition for the state to guarantee human rights for life, health and safety.

The Green Book was developed in 2007. It describes the current status of IRS safety, identifies existing issues, analyses options of their resolution, assesses the contribution of different alternatives to IRS safety and makes proposals of the Government of Ukraine to take timely actions to ensure proper radiation safety and protection, decrease the probability of radiation accidents, prevent IRS illicit trafficking and exclude the IRS use for terrorist acts.

The conclusion in the Green Book states that a number of systematic measures are needed to reach policy objectives to:

- *ensure compliance of the regulatory system with the current state of social relations in the IRS production and use and with IRS potential danger;*

** In EU states, policy documents are prepared in the form of Green and White Books, which is an ordinary bureaucratic instrument to ensure efficiency, openness, predictability and consistency of governmental activities.*

- *ensure safety and security of spent IRS, search and renew control of orphan IRS;*
- *establish a well-developed system of radiation safety services as the basis for keeping and maintaining staff and technical potential of the country in the area of high technologies.*

The draft Green Book is placed for public consultation and discussion with interested parties at the SNRCU website www.snrc.gov.ua.

All IRS that are not exempt from state control are subject to state registration, which is obligatory.

For state control and account, IRS are recorded in the State Register in compliance with the «Procedure for State Registration of Ionizing Radiation Sources» approved by Cabinet Resolution No. 1718 of 16 November 2000. The initial data entry on IRS in Ukraine in the Register are based on state IRS inventory taken in compliance with the Procedure for State IRS Inventory (approved by Joint Ordinance of the Ministry for Environmental Protection and Ministry for Industrial Policy of Ukraine No. 16/22 of 18 February 2000 and registered in the Ministry of Justice, Reg. No. 187/4408 of 24 March 2000).

On 29 March 2007, the interagency commission composed of representatives of the Ministry of Finance, Security Service of Ukraine, SNRCU, State Customs Service, Ministry for Industrial Policy and Ukrainian State Enterprise «Izotope» accepted the State IRS Register into commercial operation.

Presentation of the State Register of Ionizing Sources with participation of the SNRCU Chairperson, Olena Mykolaichuk, and U.S. Ambassador Extraordinary and Plenipotentiary to Ukraine, William Taylor

As required by regulations, spent sources, whose lifetime has expired, are to be transferred to specialised enterprises for radioactive waste management since they are dangerous for health of personnel, the public and the environment. The operation of spent IRS may lead to a radiation accident. Moreover, spent sources may be used for criminal purposes.

Today, the pressing issue to be solved as soon as possible is further management of individual spent high-level IRS that have not been transferred to specialised enterprises for radioactive waste management and their users have to store them in situ for quite a substantial period of time (10 and more years). Such IRS are mainly high-level sources produced before 1990 that are intended for use in x-ray, instrumentation and diagnostic devices, therapeutic facilities and thermoelectric generators.

Presentation of the State Register of Ionizing Sources with participation of the SNRCU Chairperson, Olena Mykolaichuk, and U.S. Ambassador Extraordinary and Plenipotentiary to Ukraine, William Taylor

In view of a potentially dangerous situation in this area, the SNRCU took actual and administrative steps to develop a state target problem to resolve it. The State Programme «Safe Storage of Spent High-Level Ionizing Radiation Sources» (henceforth – Programme) was approved by Cabinet Resolution No. 1092 of 3 August 2006. The programme is planned for 2007-2009 and tentative budget funding is 11.98 million UAH, including 1.74 million UAH for 2007, no less than 0.5 million UAH is to be provided within international technical assistance.

The programme provides for creating a register of spent high-level IRS (HL IRS), developing their retrieval technologies, creating an infrastructure for HL IRS management and retrieval and temporary storage of HL IRS in a specialised storage facility. The SNRCU and Ministry for Emergencies are appointed performers of the Programme.

According to the action plan under the Programme, the SNRCU created the HL IRS register in 2007. It was created jointly with newly established SNRCU State Nuclear Safety Inspectorates, State IRS Register, Radon State Interregional Plants, Ministry of Health, National Academy of Sciences of Ukraine and other organisations.

At present, the HL IRS register includes 18 owner organisations that keep 1692 sources with the total recorded activity of 1.7 E^{+17} Bq. A great number of these sources have been used for more than 20 years (from 1985-1986). It should be noted that 335 sources or 20% of the total number are placed in storage facilities at two specialised plants. Most of the sources are located in different facilities and some part in containers. These are mainly sources containing ^{60}Co, approximately 300 sources contain ^{137}Cs.

Because of limited funding of the Programme from the State Budget of Ukraine, the SNRCU applied to the IAEA for assistance to implement the Programme at individual sites. Based on previous agreement, IAEA experts visited four facilities in Kyiv and Odessa specialised plant in March 2007. During the visit, six facilities with spent high-level sources in Kyiv and 13 facilities at the Odesa specialised plant were examined. The IAEA provided its interim agreement for funding the repatriation of high-level sources (radioisotope thermoelectric generators) from the Odesa specialised plant.

Based on the examination, all the facilities were included in the IAEA integral action plan for 2008, which envisages technical assistance regarding the above-mentioned high-level IRS.

According to the action plan under the Programme, the SNRCU entered into a contract with the Specialised Enterprise «Promizotope» to examine spent high-level sources that are not longer used. Under the contract, spent sources located at «Sterilizatsia-3» facility at the Gemoplast Corporation were examined, in particular: certification and operational documentation for «Sterilizatsia-3» facility was collected and analysed; facility maintenance procedures were studied; available documentation on spent high-level IRS subject to examination was analysed; a programme and working schedule for examination of the sources were developed and agreed with the Gemoplast Corporation and SNRCU; radiation survey of the HL IRS storage territory was conducted; 240 IRS (100% of the planned) were examined and checked for integrity.

According to the SNRCU, 32 radiation incidents with IRS occurred in 2007: including 13 incidents when radioactive scrap metal was revealed, 13 when illicit trafficking of IRS and nuclear material was revealed, 3 attempts to transfer materials with high content of natural radionuclides through the national frontier; 1 incident with IRS seal failure; 1 incident with theft of equipment contaminated with radiation; 1 incident when a radioactive contaminated area was revealed at an unauthorised industrial disposal waste dump. Twenty-one incident or 65% occurred in the Donetsk region.

Of special concern is poor radiation safety in handling scrap metal. Data that are reported to the SNRCU on the detection of radioactive scarp metal show that all cases when radioactive scrap metal was revealed are recorded at acceptance radiation monitoring at metallurgical plants equipped with Kordon-type dosimetry stands. In recent years, the licensee of the Ministry for Industrial Policy has never reported that radioactive scarp metal was revealed in radiation monitoring on its own site.

There are cases when acceptance and exit radiation monitoring is conducted only formally and conditions of preparation and processing of scrap ferrous and nonferrous metal are violated. The review of documents submitted to the SNRCU revealed that the measured exposure dose rate (EDR) and flux density were not written by hand in the certificates «On Explosive, Chemical and Radiation Danger of Scrap Ferrous Metal» like other indicators but were typed in on a beforehand prepared certificate form. According to correspondence with the State Technical Regulation and Consumer Policy Committee of Ukraine regarding a case when radioactive scrap metal was detected, it was found that some radiation monitoring protocols were falsified.

In this regard, control needs to be enhanced over organisations that are contracted by licensees of the Ministry for Industrial Policy as regards radiation monitoring.

Within interaction and coordination regarding the detection of radioactive scrap metal, the SNRCU regularly informs the Ministry for Industrial Policy, as a state regulatory body for scrap metal handling, about organisations that are involved the supply of radioactive scarp metal. Based on this interaction in the reporting period, two owners of contaminated scrap metal were deprived of licences for this activity and 17 licensees were requested to take measures to comply with licensing terms.

Uranium Milling Safety

Uranium ore processing on the Ukrainian territory was started at the end of the 1950s and was a top secret while elementary ecological requirement were not met. Two enterprises dealt with uranium ore mining and milling at that time: Eastern Ore Mining and Milling Works (Zhovti Vody, Dnipropetrovsk region) (henceforth – SkhidGZK) and Dnieper Chemical Works (Dniprodzerzhynsk, Dnipropetrovsk region). Today, SkhidGZK processes uranium ore used for producing fuel for nuclear power plants. The Dnieper Chemical Works was shut down in 1991.

SkhidGZK is the only enterprise that deals with uranium ore mining and milling in Ukraine. Uranium ore is processed to obtain uranium ore concentrate (U3O8) at the Hydrometallurgical Plant (Zhovti Vody). Uranium ore is mined at the Smolino and Ingul mines (Kirovograd region). A substantial amount of tailings is generated in uranium ore processing at the Hydrometallurgical Plant, which contain natural radionuclides. In 2007, uranium ore processing tails were stored at the Scherbakivske Tailing Pit located at a distance of 5 km from Zhovti Vody. The Scherbakivske Tailing Pit is 81% filled: i.e., it stores 34.00 x 106 t of uranium processing tails with the activity of 357.5 x 1012 Bq. The Brownstone Tailing Pit (henceforth – KBZ) that was operational in the 1960-1980 was decommissioned in 1996 and is now preserved. The KBZ Tailing Pit was partially preserved without any conclusion of the Ministry for Fuel and Energy. The project «Preservation of KBZ Tailing Pit» ZhV–GMZ 03 SP.P3 did not receive a favourable conclusion of state nuclear and radiation safety review.

The former underground leaching areas – Bratske and Devladovo – were passed to the initial land user without restrictions on their use in agriculture.

Releases of alpha-emitting long-lived uranic radionuclides (ore dust) at Hydrometallurgical Plant workshops and slurry pipeline leakage are the main radiation hazards that may affect the people and environment at the SkhidGZK. Radiation monitoring of facilities and dose survey of personnel are conducted in the controlled area and plant workshops on a permanent basis. Based on individual dose survey, reference level of external exposure of personnel were not exceeded at the SkhidGZK in 2007.

However, regular inspection in May 2007 revealed deviations from nuclear and radiation safety standards and rules in uranium ore processing. They are as follows:

- *partial preservation of the KBZ Tailing Pit and installation of the Altait surface complex were done without any conclusion of the state nuclear and radiation safety review;*
- *reference levels of radiation hazardous factors for the controlled area and observation area of the Hydrometallurgical Plant and tailing pits were absent;*
- *dose survey of agricultural products obtained within the controlled area of the Hydrometallurgical Plant and Scherbakivske Tailing Pit was absent;*
- *a programme for assessing internal exposure to personnel caused by uranium intake based on bioassays was not developed.*

The enterprise fulfilled seven of the nine inspection prescriptions by the established deadline. In this regard, administrative action was brought against two officials of the enterprise under Article 188-18 KUpAP.

Inspections conducted in March and December 2007 confirmed violation of standards, rules and regulations on nuclear energy especially as regards the safety of personnel at the Hydrometallurgical Plant and Smolino mine. The enterprise still needs an up-to-date dose survey system to be ensured by introducing individual dosimetry of internal exposure to personnel with use of personal dosimeters and uranium intake with use of biophysical analyses. In addition, it was noted that many administrative documents on radiation safety were absent at the enterprise, and projects that did not receive a favourable conclusion of the state nuclear and radiation safety review were prohibited.

In order to solve the above issues, the dosimetry laboratory of the enterprise was reequipped and research was conducted to implement individual dosimetry of radon and its daughter products. Individual dosimetry of radon and its daughter products is implemented by SkhidGZK under a contract with the Wisutec Company. As of the end of 2007, the first research stage was completed. In order to implement individual dosimetry of uranium and long-lived alpha-nuclides, SkhidGZK management staff are in negotiations with the Dobrynia Company to start urine analyses of Hydrometallurgical Plant workers for uranium content.

It should be noted that the most significant issue, which has not been solved at the SkhidGZK so far, is to approve «Guideline for Calculating Individual Doses to SkhidGZK Personnel and the Public» in due order.

Open areas with γ-EDR over 1.5 μSv/h were found at the plant territory near the mill and chemical reagents warehouse, which may cause unjustified

exposure to personnel. There are places within the Smolino mine (6-7% of the total area) where EDR can reach 7-70 μSv/h while exposure dose rate varies from 0.2 to 1.0 μSv/h on more than one third of the territory. Personnel routes mostly pass through this area, which may cause additional exposure. Hence, SkhidGZK management staff was required to take measures to decontaminate these territories.

Substantial attention should be also paid to rehabilitation and decontamination measures and radiation monitoring in populated centres located near the uranium ore mining and milling enterprises: Zhovti Vody, Kirovograd and Smolino.

In order to protect Zhovti Vody inhabitants against radiation effects and associated harm, protect the environment, prevent man-induced emergencies, conserve health and ensure social protection of the public, the state programme for radiation protection of the Zhovti Vody inhabitants for 2003-2012 (KVKP 3211030) was developed and approved by Cabinet Resolution No. 565 of 5 May 2003. The Ministry for Emergencies was appointed the main performer of the programme in 2007. To implement the programme, 9,000 thousand UAH was allocated from the State Budget.

The programme is funded from the State Budget of Ukraine and subvention from the state budget to the local budget of Zhovti Vody.

The programme is implemented in two areas: social and radiation protection of the public. The costs are mainly used to implement measures to resolve social problems of the town. Money is allocated to compensate for nutrition for children of school and preschool age and thus permit increasing the cost of school lunches and improving the food ration and to improve health of children and provide assistance in recreation and medical treatment of inhabitants that live or work in ecologically hazardous areas. The costs allocated for radiation protection measures were used to plant trees and gardens in Zhovti Vody and to construct protective structures in schools and kindergartens to reduce radon exhalation on ground floors and in basements and semi-basements. In order to reveal contaminated areas, the Scientific and Technical Centre for Decontamination and Comprehensive Radwaste conducts step-by-step gamma survey of the town. The implementation of the state programme was repeatedly discussed at session meetings of the town council. The reclamation and disposal of radiation sources at the Electron-Gaz Corporation, which stores 17,996 ionizing and neutron radiation sources with the total activity of 14,675 most of which were accumulated in 1990-1991, is a serious problem not only for the town but also for the entire region.

In order to prevent increase in contamination of the town and its outskirts, SkhidGZK experts conduct continuous ecological and radioecological monitoring of hazardous facilities of the enterprise. Monitoring results are analysed and finalised into a SkhidGZK quarter radiation safety report, which is submitted to the Ministry for Fuel and Energy and SNRCU. The monitoring results are used to take measures to eliminate the emergency situation caused by SkhidGZK uranium-related activities.

Dnieper Chemical Works is located in Dniprodzerzhinsk, Dnipropetrovsk region. The works processed uranium ore from 1946 to 1991.

After uranium ore processing was terminated in 1991, the Ministry for Fuel and Energy did not resolve

Characteristic of the Main Tailing Pits of the Former Dnieper Chemical Works

No	Tailing pit	Period of operation	Area, hectare	Tails, 10^6 tons	Vol., 10^6 m^3	Total activity, TBq
1	Western	1949-54	6.0	**0.77**	**0.35**	180
2	Central Yar	1951-54	2.4	**0.22**	**0.10**	104
3	Southeastern	1956-80	3.6	**0.33**	**0.15**	67
4	Dniprovske (D)	1954-68	73	**12.0**	**5.9**	1400
5	Lanthanum fraction	1965-88	0.06	**0.0066**	**0.0033**	130
6	Blast furnace No. 6	1982-82	0.2	**0.04**	**0.02**	330
7	Baza S (former uranium ore storage)	1960-91	25	**0.3**	**0.15**	440
8	Sukhachivske (S-1),	1968-83	90	**19.0**	**8.6**	710
9	Sukhachivske (S-2),	1983-92	70	**9.6**	**4.4**	270

to liquidate, preserve or redesign the works and thus violated the «Health and Sanitary Rules for Liquidation, Preservation and Redesign of Uranium Ore Mining and Milling Enterprises» (SP LKP-91) in force at that time. The status of uranium facilities was not determined either.

After the Dnieper Chemical Works ceased to process uranium ore, it was restructured. As a result, over 10 different specialised enterprises were created, such as Smoly, Tsirkoniy, PMGZ, Dnieper Chemical Works, Polikhim, etc. However, these enterprises did not deal with uranium ore processing, and engineering structures, including tailing pits (except for Sukhachivske Tailing Pit), were abandoned. Most of these tailing pits are not operated at present but they remain unpreserved and have an adverse effect on the environment, the public and personnel of enterprises located on the territory of the former Dnieper Chemical Works.

South-Eastern Tailing Pit, site for storage of dismantled equipment

Tailing pit in Lazo Street

Characteristic of the Main Tailing Pits of the Former Dnieper Chemical Works

Unauthorised and previously unknown waste pits and radioactive contaminated areas are also revealed at the Dnieper Chemical Works and outside (for example, in Lazo Street). The property of enterprises on the former Dnieper Chemical Works territory was and is distributed not taking into account the nature of contamination, location, improper storage and negative impact of uranium waste on the environment and health of workers. The total number of workers on the site is over 2,600 persons.

Based on radiation monitoring, the contamination of individual structures and areas is from 0.05 to 10 μSv/h and more while background is 0.02 μSv/h. As a result, the workers of these enterprises are subject to uncontrolled external and internal exposure.

It should be noted that there is still no objective information on radiation safety at all enterprises that were included in the Dnieper Chemical Works and enterprises that used Dnieper Chemical Works products or waste for their production purposes; neither is there information on the impact of former Dnieper Chemical Works enterprises on the environment and the public. Since radiation assessment of the territory and enterprises of the former Dnieper Chemical Works enterprises was started only at the end of 2005, it would take several years to obtain complete information, considering the amount of funding for radiation monitoring in 2006-2007.

For rehabilitation and reclamation of the former Dnieper Chemical Works, Cabinet Resolution No. 1846 of 26 November 2003 approved the state programme for transforming hazardous enterprises of the Dnieper Chemical Works into an ecologically safe system and ensuring public protection against adverse effect of ionizing radiation for 2005–2014 (henceforth – Programme). The Baryer enterprise take measures under the Programme, which obtained a licence for uranium processing activities as regards the liquidation, preservation or redesign of uranium facilities. The Ministry for Fuel and Energy monitors the implementation of the Programme.

According to the supervision action plan, SNRCU experts conducted planned inspection of the Baryer enterprise in September 2007. They revealed incompliance with Ukrainian laws, standards, rules and regulations on nuclear and radiation safety and incompliance with special licensing terms. In this regard, the SNRCU Licensing Commission terminated the

licence issued to the Baryer enterprise for uranium ore processing as regards the liquidation, preservation or redesign of uranium facilities. Based on the ordinance of the Ministry for Fuel and Energy submitted to the SNRCU, which confirmed conclusions of the inter-agency commission on further use of Baryer facilities, the licence was renewed in November. Based on the schedule for developing statements of work for liquidation or dismantling of Baryer facilities, the period of time for fulfilling special licensing terms, as regards submitting copies of statements of work for liquidation, preservation, redesign or transfer of Baryer facilities, was extended to 25 April 2008.

The three-year experience in radiation safety monitoring at Baryer uranium facilities indicates that there is an urgent need to revise and correct the Programme and administrative and technical measures. This issue was also raised by the Interagency Commission that discussed the further use of Baryer facilities.

To create a radiation monitoring system, the uranium tailing pits are being equipped with a network of monitoring wells. In particular, available design documentation on the existing wells is analysed, the wells are examined and their technical state is assessed to decide on possibility of their further use. These efforts are made under a contract with the Centre for Monitoring and Environmental Technologies (Kyiv) and Institute for Radiation Hygiene and Medical Ecology, Ukrainian Academy of Medical Sciences under an approved programme for monitoring of Baryer uranium facilities. It should be noted that the existing network of monitoring wells is insufficient and does not meet contemporary requirements. For example, there are no monitoring wells at the Central Yar and Baza S Tailing Pits, while only 10 out of 49 wells can be used at the Dniprovske Tailing Pit.

The current technical and radiation condition of the tailing pits and their physical protection do not comply with radiation safety requirements. Design and technical documentation on the existing tailing pits is absent. This does not comply with laws, standards and rules on nuclear safety, substantially decreases the effectiveness of measures, leads to the inefficient use of costs and leads to incorrect prospective planning of appropriate measures.

Inspection revealed that the tailing pits of the enterprise were neither operated nor preserved. The technical and radiation condition and physical protection of the tailing pits did not comply with radiation safety requirements. The territory is either open or partially enclosed. The only enclosed tailing pit is Dniprovske. Workers of the enterprises located at the former Dnieper Chemical Works site can freely access the territory of the tailing pits, and local population can access the territory of the Baza S Tailing Pit. The EDR at separate areas of the tailing pits reaches 50-70 μSv/h. These areas are enclosed along the perimeter and are provided with warning signs. There is a site for temporary storage of dismantled piping fragments at the South-Eastern Tailing Pit territory. The site is enclosed with a wire-mesh fence at a distance of 0.5 m from containers. EDR at the site fence is 50-60 μSv/h. There is free access to the site fence. Used oilwell tubing contaminated with technologically-enhanced naturally-occurring radioactive materials is stored directly on ground at the Dniprovske Tailing Pit near the checkpoint. The exposure dose rate at a distance of 0.1 m for the tubing reaches 70 μSv/h. There are also three metal tanks near the checkpoint, which are contaminated with technologically-enhanced naturally-occurring radioactive materials. These tanks are placed at the tailing pit without any agreement with the regulatory bodies (Permit CEC No. 8 of Dniprodzerzhinsk expired on 1 September 2007). There is about 1 km of access railroad passing the tailing pit embankment nearby the left bank of the Konoplyanka river. There is a technological lane 10-15 m in width nearby the railroad. The lane was constructed due to territorial re-planning of the tailing pit. The carbon- and iron-containing sludge field (sludge reservoir of the Dnieper Metallurgy Plant) is developed at the controlled area of the Ecology-2000 Tailing Pit. This work is agreed upon by the Baryer enterprise and is carried out under the project agreed upon by the SNRCU. The enterprise incorporated the recommendations set forth in the conclusion of state nuclear and radiation safety review. Radioactive contaminated soil was removed from the northern part of the tailing pit and structures were demounted on the Baza S territory during November-December 2006. Debris, structural fragments and removed soil are piled near storage bin ruins. This waste is not confined. There is a pit left after the soil removal where water can be accumulated from surrounding territories. Water infiltration may flood the territory, which will change its hydrochemistry and redistribute radioactive contamination. This work was carried out under the project that did not receive a favourable conclusion on nuclear and radiation safety since it did not comply with legislation on uranium ore processing. Since this work violated nuclear and radiation safety requirements, the Dniprodzerzhinsk inter-district nature conservation prosecution office of the Dnipropetrovsk region opened criminal case No. 44079018 against the Baryer Director.

In the framework of the Programme, experts of the Baryer enterprise and specialised institutes prepared the «Guideline: Radiation Health and Safety Regulation of Activities at Dnieper Chemical Works Facilities», which was approved by Ordinance of the Ministry of Health No. 3 of 11 January 2007.

Emergency Response and Preparedness

The Law of Ukraine «On Protection of Population and Territories against Man-Induced and Natural Emergencies» of 18 June 2000 has set the organisational framework for the Unified State System for Prevention of and Response to Man-Induced and Natural Emergencies (henceforth - USSE) that is established in Ukraine.

According to Cabinet Resolution No. 1198 of 3 August 1998, the SNRCU is responsible for the establishment and operation of the USSE functional subsystem «Safety of Nuclear Power Facilities».

The functional subsystem «Safety of Nuclear Power Facilities» operates at two levels: national and facility levels.

Facility-level activities are carried out by on-site State Nuclear Safety Inspectorates.

At the national level, the SNRCU Emergency and Information Centre (EIC) is the key element of the subsystem. The EIC is staffed with the most skilled experts of the SNRCU and subordinated organisations.

In EIC normal (routine) operation, 24-hour duty is maintained, operational information is received from Ukrainian NPPs, information on NPP events is analysed and recorded and then entered into a computer database. Summaries on the status of Ukrainian NPPs and information on NPP operational events are published at the SNRCU website www.snrc.gov.ua.

The main EIC systems are as follows: reliable power supply system, telephone conversation recording system, automated notification system for EIC personnel and the remote monitoring system for the Zaporizhya (units 1-6) and Rivne (units 1-3) NPPs, which is intended for on-line transmission of plant process and radiological parameters to the EIC.

In 2007, «Provisions on Training of Persons Involved in SNRCU Emergency Training in the Event or Threat of a Radiation or Other Accident» (henceforth – Provisions) were developed to regulate activities of the functional subsystem.

In 2007, the EIC was operated in routine mode: 24-hour duty was maintained by SNRCU relevant personnel, communication with competent contact points of Sweden, Turkey, Finland, Romania, Poland and Byelorussia was tested in compliance with intergovernmental agreements with these countries, on-line communication with the IAEA emergency centre was tested within the ConvEx 2a exercise in January, information placed on the IAEA NEWS and ENAC password-protected websites was analysed and distributed.

NAEK ENERGOATOM EMERGENCY CENTRES

The NAEK Energoatom emergency preparedness and response system is included in the USSE functional subsystem «Nuclear Energy and Fuel and Energy Complex», which is within the competence of the Ministry for Fuel and Energy of Ukraine.

The functional subsystem includes the main and backup emergency centres of the NAEK Energoatom, as well as a separate subdivision: Technical Centre for Emergencies located in the village of Bilogorodka, Kyiv region.

In the event of an emergency at NPP, experts of the Technical Centre for Emergencies are sent to the

Training Exercise at the SNRCU Emergency and Information Centre

site and are put at command of the NPP accident mitigation leader. If necessary, the centre uses robotics and other unique equipment to assist emergency personnel in radiation and engineering survey, collection and confinement of radioactive waste, decontamination, etc.

The NAEK Energoatom main emergency centre is located in the Headquarters in Kyiv and the backup emergency centre is established and operates at the former Chornobyl NPP off-site emergency centre in the village of Dniprovske, Chernigiv region. During 2006, the meeting room for the NAEK Energoatom Commission for Emergencies was refurbished in the backup emergency centre, and one of the rooms was transformed into workplaces for the engineering support group and was equipped with advanced computer equipment.

In order to ensure a reliable communication link in emergencies, the NAEK Energoatom installed a satellite system that covers the main and backup emergency centres, Technical Centre for Emergencies, Rivne, Zaporizhya, Khmelnitsky and South Ukraine NPPs. An automated notification system was put in operation for the NAEK Energoatom Commission for Emergencies.

In addition to the above main and backup emergency centres of the NAEK Energoatom, current regulations provide for on-site and off-site (in the observation area) emergency centres at each NPP.

An on-site centre is intended to manage accident confinement and mitigation actions at the NPP site and in the controlled area. An off-site centre is to be involved in the event of such accidents when the on-site centre cannot be used.

The NPP emergency centres are brought into compliance with the regulation «Requirements for NPP On-Site and Off-Site Emergency Centres», which became effective in 2004, under the schedule agreed upon by the SNRCU. This work is to be completed in 2007.

EMERGENCY TRAINING AND EXERCISES

The Radiation Safety Standards of Ukraine (NRBU-97) require emergency training of the operator's personnel who are involved in emergency response actions.

In June 2007, such emergency training took place at the research reactor of the Nuclear Research Institute (NRI), National Academy of Sciences of Ukraine. The SNRCU activated its EIC for the training.

In order to prepare the SNRCU personnel involved in the EIC for the training, a workshop was conducted to elucidate the operation of the emergency centre, aspects of the INES application in emergency response, procedures of information exchange with the IAEA and other organisations, etc.

During the training, the EIC personnel worked out tasks imposed on the SNRCU. The most important of them are notification of a radiation accident through mass media, early notification and periodic reporting to the Cabinet of Ministers and Ministry for Emergencies within the Governmental Information and Analytical System for Emergencies (GIAS), international information exchange within the Convention on Early Notification of a Nuclear Accident and appropriate bilateral agreements with other countries.

During the training, information received from the NRI was analysed, additional data on the state of equipment, radiation survey and accident mitigation measures were requested. Based on the analysis, a press release for mass media and notification for the Cabinet of Ministers and Ministry for Emergencies were prepared within the GIAS and for other countries within bilateral international agreements and the IAEA emergency centre, Latvia, Poland and Hungary were actually notified.

Upon completion of the training, a report was developed in compliance with SNRCU procedure. Based on the report, corrective measures are identified to be implemented to improve the SNRCU and NRI emergency preparedness and their interaction in emergencies.

Accounting for and Control of Nuclear Materials

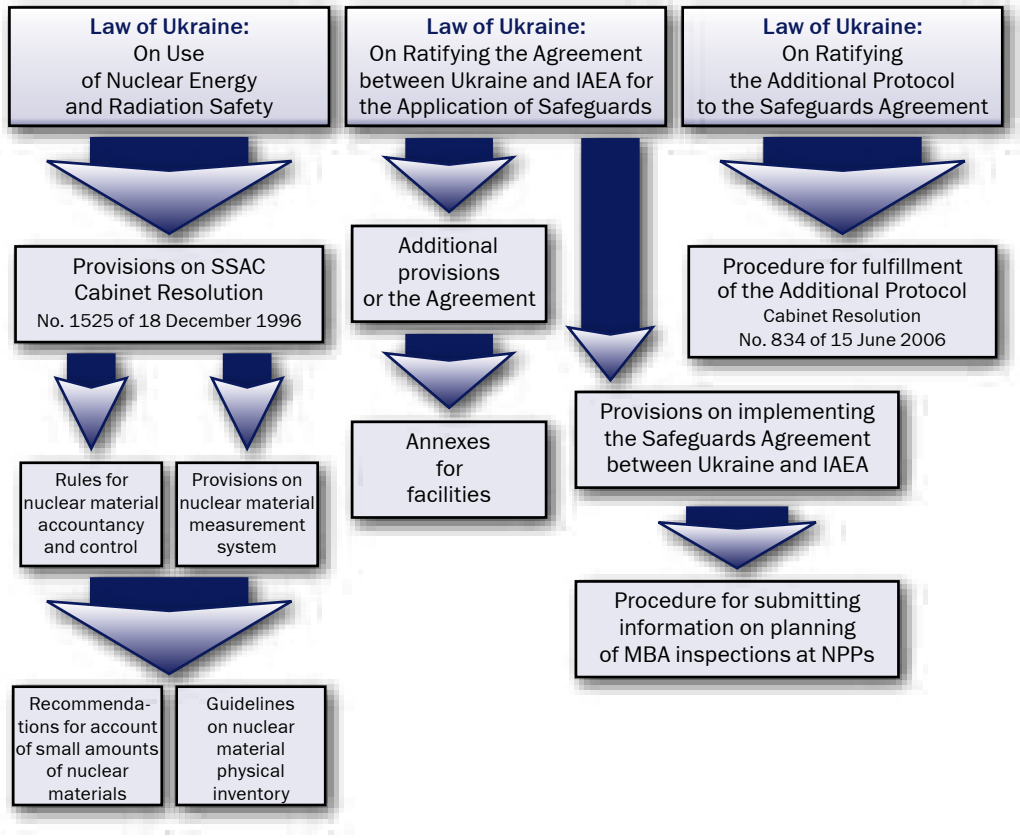
The SNRCU and other central executive bodies ensure fulfilment of Ukraine's international obligations regarding nuclear weapon non-proliferation. Cabinet Resolution No. 1830 of 27 December 2006 entrusted the SNRCU with the coordination of implementing the Agreement between Ukraine and the International Atomic Energy Agency for the Application of Safeguards in connection with the Treaty on Non-Proliferation of Nuclear Weapons and Additional Protocol to the Agreement.

In 2007, to implement the Safeguards Agreement and Additional Protocol, the SNRCU:

- *prepared and provided timely and updated information for Ukraine's declaration as required by the Additional Protocol;*
- *submitted quarter declarations of export of equipment and materials covered by Article 2.a.ix of the Additional Protocol to the Safeguards Agreement;*
- *arranged and provided 5 additional accesses in a timely manner in compliance with the Additional Protocol;*
- *prepared and submitted 207 reports to the IAEA on physical inventory and changes in nuclear material inventory;*
- *sent 20 preliminary notifications on export/import of nuclear materials;*
- *arranged and conducted 75 IAEA inspections;*
- *arranged agreement of central executive bodies for 35 IAEA candidate inspectors to act in Ukraine;*
- *prepared and submitted schedules for main equipment repairs and physical inventory in each nuclear material balance area and information on radiation doses received by IAEA inspectors in Ukraine.*

The SNRCU regularly cooperates with the IAEA in implementing the Safeguards Agreement and Ad-

Figure 10.1.
Regulatory and legislative framework for application of nuclear non-proliferation safeguards



ditional Protocol. For example, a meeting of the IAEA Working Group was held on 14-15 March this year to discuss the application of safeguards and measures for further cooperation between Ukraine and the IAEA under the Safeguards Agreement and Additional Protocol.

The implementation of the Safeguards Agreement in Ukraine is based on data of the state system for accounting for and control of nuclear materials (SSAC). To ensure efficient performance of the SSAC in compliance with international obligations on nuclear non-proliferation, Ukraine developed a regulatory and legislative framework, which is continuously improved. The SNRCU also contributes to the improvement. The regulatory and legislative framework for safeguards is schematised in Figure 10.1.

An information system is one of the most important SSAC components. Experts have developed and maintain a state databank for nuclear materials, which provides information on the amount and composition of nuclear materials in any material balance area, which is needed in compliance with international agreements of Ukraine.

If necessary, such information is also provided to state authorities. There are 121 enterprises where account of nuclear materials is kept. These enterprises and facilities are geographically distributed by material balance areas: RKQ0 – 11, RKQ1 – 23, RKQ2 – 17, RKQ3 – 33 and RKQ4 – 37 enterprises.

The enterprises provided data on the application of safeguards in 2007. Based on these data, the following reports were processed and submitted to the IAEA:

141 reports on changes in nuclear material inventory (ICR);

66 reports on nuclear material inventories (PIL+MBR).

IAEA inspections in Ukraine are associated with the Agreement between Ukraine and the IAEA for the Application of Safeguards in connection with the Treaty on Non-Proliferation of Nuclear Weapons. IAEA inspections in Ukraine involve, as a rule, SNRCU inspectors who are responsible for the interaction with IAEA inspectors.

The primary declaration of Ukraine was prepared and submitted to the IAEA in 2006 as required by the Additional Protocol to the Agreement between Ukraine and the IAEA for the Application of Safeguards in connection with the Treaty on Non-Proliferation of Nuclear Weapons, which was ratified by the Law of Ukraine No. 3092-IV of 16 November 2005. After an initial analysis of the declared information, the IAEA provided the SNRCU with its comments. The IAEA stated that the quality and completeness of the primary declaration were quite satisfactory. The comments were incorporated, answers to requests and updated information for the Ukraine's declaration were prepared and sent to the IAEA in a timely manner (by 15 May).

The IAEA currently verifies Ukraine's declaration by analysing the documents submitted, comparing its data with open-source information and results of satellite photography of Earth and by verifying data through additional access of IAEA inspectors to Ukrainian enterprises. Since the implementation of the Additional Protocol, 10 additional accesses to sites were arranged and provided in a timely manner as stated in the declaration with 2- and 24-hour preliminary notification as required by the Additional Protocol.

Therefore, the implementation of the Safeguards Agreement and Additional Protocol to the Agreement enables Ukraine to assure the world community that it fulfils all obligations on nuclear non-proliferation and uses nuclear energy for peaceful purposes.

Nuclear Material Balance Area

Radioactive Material Transport

Radioactive materials are transported in connection with their use in energy, industry, medicine, radioactive waste management and nuclear fuel transit across Ukraine.

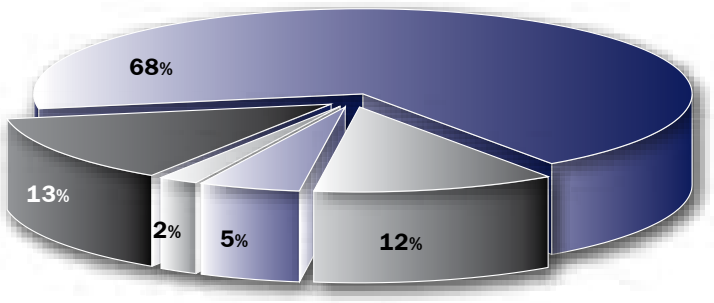
In 2007, the SNRCU issued 116 permits for international transport of nuclear materials. In particular:

- *fresh fuel transport for Ukrainian NPPs – 14;*
- *spent fuel transport from Ukrainian NPPs to Russia – 6;*
- *uranium ore concentrate transport from Ukraine – 2;*
- *transit of uranium ore concentrate from Czech Republic to Russia – 1;*
- *transit of fresh fuel from Russia to Slovakia, Hungary and Bulgaria – 11;*
- *transit of spent fuel from Bulgaria to Russia – 2;*
- *transit of spent fuel from the research reactor in Czech to Russia – 1;*
- *transport of other radioactive materials – 79.*

Transport activities are licensed as required by legislation. As of the end of 2007, 37 enterprises had licences for radioactive material transport. The NAEK Energoatom, Eastern Ore Mining and Milling Works, Ukrainian State Production Association Izotope, State Interregional Specialised Plants of State Radon Association, State Enterprise Ukrgeofizika, State Specialised Enterprise Kompleks and State International Airport Borispol undertake the greatest scope of radioactive material transport. In 2007, the SNRCU issued 7 licences to legal entities dealing with radioactive material transport and reissued 8 licences.

In 2007, nine certificates on approval of packaging design and special shipments of radioactive materials were granted and reissued.

Compliance of shipment participants with legislation and safety rules for radioactive material transport ensures the safety of the public, personnel and the environment. No incidents nor accidents occurred in radioactive material transport in Ukraine in 2007.



– fresh fuel transport for Ukrainian NPPs
– spent fuel transport from Ukrainian NPPs
– uranium ore concentrate transport from Ukraine
– transit transport of fresh and spent fuel and uranium ore concentrate
– transport of other radioactive materials

International Cooperation

Ukraine's international cooperation in the peaceful use of nuclear energy and nuclear and radiation safety is aimed at attaining world standards in safe operation of power units throughout their life cycle based on multilateral and bilateral international treaties and agreements.

Multilateral international cooperation is conducted within international organisations to which Ukraine is a member, multilateral international treaties, agreements, conventions, etc., entered into by Ukraine, and international programmes and projects for peaceful use of nuclear materials, application of advanced nuclear technologies, safety improvement of nuclear reactors and technologies, radioactive waste management, etc.

During 2007, Ukraine actively cooperated with the IAEA, first of all, within IAEA conventions to which Ukraine is a member, Technical Cooperation Programme and IAEA missions.

In order to fulfil obligations under the Nuclear Safety Convention* , Ukraine prepared the Fourth National Report on Nuclear Safety to be reviewed in April 2008.

A synopsis of IAEA safety standards relating to the Joint Convention articles was developed with participation of Ukrainian experts in June 2007 to perform request to the IAEA Secretariat of the Second Review Meeting of Parties to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management**.

On 16 September 2007, Ukraine signed into the Global Nuclear Energy Partnership (GNEP is unprecedented alliance formed by the USA, Russian Federation, France, China and Japan. Its members formally cooperate under bilateral or multilateral agreements within the IAEA), which became the 14th GNEP partner. The GNEP Statement of Principles was signed by the Ministry for Fuel and Energy, Yuriy Boiko.

On 17-21 September 2007, the 51st IAEA General Conference was held in Vienna. The Ukrainian Delegation headed by the SNRCU Chairperson, Olena Mykolaichuk, took part in the Conference. The Head of the Ukrainian Delegation highlighted important aspects for Ukraine in her speech, such as safety improvement of operating nuclear installations, mitigation of the Chornobyl accident consequences and Shelter transformation into an ecologically safe systems, fulfilment of Ukraine's obligations under the Additional Protocol to the Agreement between Ukraine and the IAEA for the Application of Safeguards and active cooperation within IAEA technical cooperation programmes.

In 2007, national research was conducted under the International Project on Innovative Nuclear Reactors and Fuel Cycle (INPRO) entered into by Ukraine in 2005. The first stage of national research under the project has been completed. In June, the 11th meeting of the INPRO Steering Committee was held in Vienna (Austria). The Ukrainian Delegation also participated in the Committee.

The cooperation between Ukraine and the IAEA under the Technical Cooperation Programme for 2007-2008 was based on 7 new national and 32 regional projects. The Beneficiaries to these projects are the Ministry for Fuel and Energy, Ministry for Emergencies and Public Protection against Consequences of the Chornobyl Disaster, Ministry of Health, State Nuclear Regulatory Committee, NAEK Energoatom, Chornobyl NPP, State Frontier Service, Ministry for Agrarian Policy, etc. Almost 150 representatives of the above ministries, state establishments and departments of Ukraine took part in IAEA measures (technical meetings, working groups, workshops, conferences, training courses, etc.) implemented in Ukraine and abroad.

The participation of the Ukrainian Delegation in the information exchange meeting on the imple-

** The Convention was signed by Ukraine on 20 September 1994 and became effective on 7 July 1998. (Law of Ukraine "On Ratification of the Nuclear Safety Convention" No. 736/97-VR of 17 December 1997). At present, 59 countries and Euratom are parties to the Convention. Meetings for review of national reports of Convention member parties are held every three years (Third Review Meeting was held in 2005). Prior to a next meeting, each Contracting Party submits a report on measures taken to fulfill each obligation under the Convention.*

*** The Convention was signed by Ukraine on 5 September 1997 and became effective on 18 June 2001 (Law of Ukraine "On Ratification of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management" No. 1688-III of 20 April 2000). At present, 40 countries and Euratom are parties to the Convention. Meetings of the parties are held every three years to review the fulfillment of obligations under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. The Second Review Meeting of Parties was held in the IAEA Headquarters in Vienna from 13 to 24 May 2006.*

mentation of the Code on Conduct on the Safety and Security of Radioactive Sources and Guidance on the Import and Export of Radioactive Sources held in the IAEA Headquarters in Vienna in June was also important. The meeting was attended by 122 representatives of 72 countries, 70 of them are IAEA member states. Ukraine successively implements the Code and is a country with a well-developed system of state regulation and safety and security of radiation sources. The meeting improved the image of Ukraine in the active implementation of the Code on Conduct on the Safety and Security of Radioactive Sources and Guidance on the Import and Export of Radioactive Sources.

Cooperation with the IAEA within OSART mission was continued. A scheduled OSART mission was conducted from 29 October to 14 November at the Khmelnitsky NPP with participation of experts from Czech Republic, Germany, Canada, Belgium, China, Slovakia, Russian Federation, Spain, France, Netherlands, USA and Iran. The final meeting pointed out the high level of plant preparedness for the mission and favourably assessed the KhNPP operational safety analysis.

Active cooperation between Ukraine and the European Union continued in 2007.

The 9th Meeting of the Ukraine-EU Cooperation Committee was held in Kiev in January to discuss, among other things, nuclear safety issues and nuclear material control. These aspects were also discussed at the 11th Meeting of the Ukraine-EU Cooperation Council (18 June 2007, Luxemburg) and 11th Ukraine-EU Summit (14 September 2007, Kiev).

One of the most important issues for Ukraine is to become a full member of the Energy Community Treaty, which became effective on 1 July 2006. One of the conditions for Ukraine to become a member to the Energy Community is a favourable assessment of nuclear and radiation safety at all Ukrainian NPPs. Nuclear and radiation safety of Ukrainian NPPs is assessed in compliance with the Ukraine-EU Action Plan in the area of energy and on the basis, among other things, of the Ukraine-EU Memorandum of Understanding on cooperation in the field of energy of 1 December 2005.

Speech of the SNRCU Chairperson at the 51st IAEA General Conference

At meetings of the special joint working group, the parties agreed to assess the safety of Ukrainian NPPs in compliance with para. 1. 5 of the Memorandum under the EC-IAEA-Ukraine project in the following areas: NPP design safety, NPP operational safety, radioactive waste and decommissioning, regulatory issues.

The IAEA mission in the area of regulatory issues is planned for June 2008 to verify activities of the state nuclear regulatory authority (IRRS mission).

Participants of Cooperation Forum of WWER Regulators (Dubna, Russian Federation)

International technical assistance within cooperation with the European Commission (TACIS nuclear safety programme) also plays an important role. This cooperation is based on the Memorandum of Understanding between the Government of Ukraine and EC on technical assistance in nuclear safety of 23 October 1995, «General Regulations for Financial Memoranda» signed on 28 December 1994 between the Government of Ukraine and Commission of the European Community and Grant Letters to TACIS Nuclear Safety Action Programmes.

In 2007, 33 projects were implemented in Ukraine, including 7 assistance projects in the area of design safety, 16 projects relating to on-site assistance and 10 regulatory support projects.

It should be noted that technical cooperation with the European Commission in the area of nuclear safety has been conducted in the framework of the new Instrument for Nuclear Safety Cooperation (INSC) for 2007-2013 instead of the TACIS programme since 2007. The INSC became effective under Council Regulation (Euratom) No. 300/2007 of 19 February 2007.

In the framework of cooperation with GUAM member states, the SNRCU Chairperson, Olena Mykolaichuk, participated, within the Ukrainian Official Delegation, in the Second Summit of the Organisation for Democracy and Economic Development (GUAM) on 18-19 June in Baku, Azerbaijan Republic.

At the summit, the Memorandum of cooperation and assistance on nuclear and radiation safety was signed between the GUAM member states. The SNRCU Chairperson signed the Memorandum on behalf of the Cabinet of Ministers of Ukraine. The Memorandum will promote the development of new cooperation areas in radiation safety, management of radioactive waste and radiation sources in GUAM member states and also efficient radiation monitoring for the benefit of public health and safety and the environment in the Black Sea and Caspian region.

In July 2007, the 14th meeting of the Cooperation Forum of WWER Regulators was held in Dubna

** The Forum of WWER Regulators joins heads of nuclear regulatory authorities in states operating WWER reactors (Armenia, Bulgaria, Hungary, Russia, Slovakia, Czech Republic, Finland and Ukraine). The Forum is convened once a year. Representatives from Germany, France, and IAEA are usually present as observers. In 2008, the Forum will meet in Ukraine. The main its task will be to exchange information on a wide circle of issues including the improvement of licensing standards and rules on state supervision of NPP operation, safety assessment of nuclear installations, analysis of NPP operational events, improvement of regulatory activities of nuclear safety authorities.*

(Russian Federation) to exchange information on regulatory policies and practices in nuclear safety in Forum member states*. The Ukrainian Delegation took an active part in this event. The next 15th Cooperation Forum of WWER Regulators will be held in Kiev in July 2008.

Bilateral cooperation on nuclear and radiation safety continued in 2007 in compliance with international intergovernmental and interdepartmental agreements.

To implement treaties, memoranda and implementing agreements, cooperation is conducted with the US Nuclear Regulatory Commission (US NRC), State Department and Department of Energy.

In 2007, five projects were implemented under the International Nuclear Safety Programme (INSP), which provides for measures on operational safety in Ukraine, personnel training, improvement of software, etc. The largest project is nuclear fuel qualification for Ukraine. Westinghouse fuel assemblies were loaded to the SUNPP-3 core within the International Nuclear Safety Programme in 2005.

Cooperation with the Non-Proliferation and Disarmament Fund is conducted in the area of training for state radiation safety inspectors. In April 2007, a workshop was conducted in Kiev for experts of the SNRCU regional subdivisions on the search and security of orphan IRS using detection systems. After the workshop, instrumentation equipment (73 pieces) was transferred to the state nuclear safety inspectorates for practical use.

During 2007, cooperation between the regulators of Ukraine and Germany was underway within projects for scientific and technical exchange in the area of nuclear safety with regulators of Central and East European Countries and Central Asia. A number of workshops was arranged on the interaction of regulatory authorities, radwaste management, state control of IRS uses, including those in medicine.

In the framework of cooperation with Finland, the SNRCU Chairperson, Olena Mykolaichuk, visited the regulatory authority of Finland (STUK) in the spring of 2007 to discuss issues significant for Ukraine, such as the construction of new power units and lifetime extension of operating units beyond the designed period.

In view of the Finnish experience in these issues and their significance for Ukraine, the cooperation with Finland is a priority area of SNRCU international activity.

Within cooperation with the Russian Federation, the Federal Service for Ecological, Technological and Atomic Supervision of the Russian Federation (Rostekhnadzor) headed by Konstantin Pilikovsky visited Ukraine in January 2007. The visit was intended to summarise the cooperation between the SNRCU and Rostekhnadzor, coordinate actions in the context of challenges posed by nuclear renaissance and prevention of nuclear terrorism and identify a joint strategy on a number of issues.

The cooperation between the regulators of Ukraine and Russia was started in 2002 when an interagency agreement was signed for information exchange in nuclear safety cooperation in peaceful use of atomic energy (14 August 2002, Moscow).

According to this agreement, the cooperation programme between the Rostekhnadzor and SNRCU for 2006-2007 was signed and is successfully implemented so far. The main cooperation areas

Training of SNRCU Inspectors

under the programme are exchange of information on regulations on nuclear and radiations safety being developed; experience in safety regulation of NPP lifetime extension; principles and approaches used to resolve problems associated with safety regulation in NPP commissioning and decommissioning; analysis of operational events at Russian and Ukrainian NPPs, etc.

During their visit to Ukraine, Rostekhnadzor representatives met with SNRCU management and experts, members of the Verkhovna Rada Committee for fuel and energy complex, nuclear policy and nuclear safety. They also visited the Chornobyl NPP, where members of the Russian Delegation familiarised with the state and issues of the Chornobyl projects.

Annual meeting between SNRCU and National Nuclear Energy Agency of Poland

In addition, the interaction with the Russian Federation was conducted within the Sub-commission for nuclear energy and nuclear materials of the Committee for economic cooperation of the Ukrainian-Russian Commission. On 23 April and 20 November 2007, joint meetings of the Sub-commission were held to discuss significant issues of Ukrainian-Russian cooperation in nuclear energy, measures on the consolidation and optimal use of industrial, raw, staff, and scientific resources, development of nuclear energy systems and joint entry to the markets of the third countries.

Cooperation with the Swedish Radiation Protection Authority (SSI) and Swedish Nuclear Safety Inspectorate (SKI).

In February, a workshop was conducted in Kiev on the experience in adaptation of Swedish legislation on radiation protection to EU requirements. The workshop was organised by the State Nuclear Regulatory Committee jointly with the Verkhovna Rada Committee for fuel energy complex, nuclear policy and nuclear safety and SSI. The workshop was attended by people's deputies, representatives of relevant ministries and departments and scientific institutes.

The second workshop was conducted in August with SSI support on the Swedish experience in implementing Euratom Directives and Ukrainian plan for implementing Directives.

In March 2007, the State Nuclear Regulatory Committee with support of the Swedish Nuclear Inspectorate (SKI) conducted international workshop in Kiev for representatives of state competent authorities and organisations on the Additional Protocol to the IAEA Safeguards Agreement and exchange of experience in other countries. The workshop was attended by representatives of the nuclear and radiation safety regulatory authorities of Finland (STUK), Norway (NPRA), Lithuania (VATESI) – experts in nuclear regulation and IAEA safeguards. The accountancy and control of nuclear materials and radiation sources were discussed at the workshop.

SNRCU and Rostekhnadzor management during working visit to the ChNPP

During the visit of the delegation of the Ministry for Fuel and Energy to Sweden in October, an implementing protocol was signed for long-term cooperation in the peaceful use of nuclear energy that determines the mechanism and conditions of technical assistance projects aimed at safety improvement at Ukrainian NPPs. The parties discussed possible cooperation areas in detail, special attention was paid to the verification of safety analysis and lifetime extension of nuclear power units.

Ukraine actively cooperates with the Czech Republic. At the end of 2007, the delegation of the State Office of Nuclear Safety of the Czech Republic visited the SNRCU. The delegation was led by Dana Drabova. The visit was intended to discuss the Agreement between the State Nuclear Regulatory Committee of Ukraine and the State Office of Nuclear Safety of the Czech Republic on cooperation in state regulation and supervision of nuclear energy of 19 September 2001 and Ukraine-EC Action Plan. During meetings with SNRCU management, results of bilateral cooperation and ways of its extension were discussed.

An important event of 2007 was also the visit of the Ukrainian delegation to the National Atomic Energy Authority of Poland (Warsaw).

The meeting discussed the improvement and adaptation of nuclear safety legislation to EU law, qualification improvement of inspectors in radiation protection, authorising activity in the management of radiation sources, management of waste containing naturally-occurring radionuclides, operation and development of the RODOS decision support system in the event of a radiation accident, Poland intentions on NPP construction and cooperation with Ukraine in this area and public relations.

Interaction with the AREVA Group (France) was an important area of international cooperation in 2007 under the Memorandum on cooperation in peaceful use of nuclear energy that was signed in June 2005.

In February 2007, the next meeting of the Coordination Committee of the Ministry for Fuel and Energy and AREVA Group was held in Kiev to determine areas of cooperation in AREVA experience in optimising scheduled outages at WWER-1000 NPPs, modernisation of NPP Kozloduy (Bulgaria), construction of new reactors, etc. In addition, cooperation was conducted with the French Company EDF within the Agreement on Partnership signed on 12 June 2003 and Programme of Partnership. On 15 February 2007, the next joint meeting of the Coordination Committee was held in Paris under the Partnership Programme between the NAEK Energoatom and EDF to identify the main areas of cooperation in 2007.

In 2007, there was active cooperation with the Republic of Korea. A meeting was held in June with the Korean Delegation, which was headed by the Deputy Minister for Trade, Industry and Energy and with participation of representatives from leading Korean energy companies. Agreement was reached as to further discussion of technical and administrative aspects of future cooperation and a visit of Ukrainian experts to Energy Corporation KEPCO, in particular, KHNP Utility and Scientific and Technical Centre KAERI, as well as the producer of power equipment DOOSAN. During the visit, which lasted from 8 to 15 September 2007, the Memorandum of Understanding was signed between the NAEK Energoatom and KEPCO and KHNP Companies. This document is intended to develop cooperation between the Ukrainian and South Korean Companies in design, commissioning, operation and maintenance of NPPs, scientific and technical cooperation, etc.

Annex 1

LIST
REGULATIONS DEVELOPED BY THE SNRCU IN 2007

Draft Laws:

1. «On Ratifying the Convention on the Physical Protection of Nuclear Material»;
2. «On Amending Some Laws of Ukraine Regarding the Ratification of the Amendment to the Convention on the Physical Protection of Nuclear Material»;
3. «On Amending the Law of Ukraine on Authorising Activity in the Area of Nuclear Energy»;
4. «On Amending Article 2 of the Law of Ukraine On Basic Provisions on State Supervision (Control) over Economic Activity».

Resolutions of the Cabinet of Ministers:

1. «On Approval of Technical Specifications on Containers for Radioactive Waste Storage and Disposal and Action Plan on Their Implementation» No. 939 of 18 July 2007;
2. «Some Aspects of Radioactive Material Transport», Resolution No. 1196 of 3 October 2007;
3. «On Amending Some Resolutions of the Cabinet of Ministers of Ukraine Regarding the State Registration of Ionizing Radiation Sources», Resolution No. 1253 of 24 October 2007;
4. «On Approval of Technical Specifications on Sealed Ionizing Radiation Sources», Resolution No. 1382 of 5 December 2007.

SNRCU Ordinances that are accepted and registered in the Ministry for Justice:

- «On Approving Amendments to Some Regulations of the State Nuclear Regulatory Committee of Ukraine», Ordinance No. 11 of 17 January 2007, registered in the Ministry for Justice, reg. No. 85/13352 of 31 January 2007;
- «On Listing Products with Their Codes in Accordance with UKTZED for Which the State Nuclear Regulatory Committee of Ukraine Issues Documents Needed for Customs Clearance and Customs Procedures», Ordinance No. 23 of 5 February 2007, registered in the Ministry for Justice, reg. No. 146/13413 of 19 February 2007;
- «On Approving the General Safety Provisions for Radioactive Waste Disposal in Geological Repositories», Ordinance No. 81 of 29 May 2007, registered in the Ministry for Justice, reg. No. 605/13872 of 11 June 2007;
- «On Approving the Procedure for Issuing Certificates on Safe Transport of Radioactive Materials», Ordinance No. 119 of 6 September 2007, registered in the Ministry for Justice, reg. No. 1079/14346 of 20 September 2007;
- «On Approving the Provisions on SNRCU State Regional Nuclear and Radiation Safety Inspectorate», Ordinance No. 139 of 16 October 2007, registered in the Ministry for Justice, reg. No. 1269/14536 of 14 November 2007;
- «On a List of SNRCU Officials Engaged in the State Regulation of Nuclear and Radiation Safety and Subjected to Certification, New Revision», Ordinance No. 151 of 30 October 2007, registered in the Ministry for Justice, reg. No. 1270/14537 of 14 November 2007;
- «On Approving Conditions and Procedure for Issuing Individual Permits for Activities at the Stages of Operation or Closure of Radioactive Waste Repositories», Ordinance No. 161 of 19 November 2007, registered in the Ministry for Justice, reg. No. 1352/14619 of 6 December 2007.

SNRCU Ordinances that are accepted and Submitted to the Ministry of Justice for registration:

- «On Approving Requirements and Rules for Long-Term Storage of Long-Lived and High-Level Waste Before Their Disposal in Deep Geological Formations», Ordinance No. 169 of 7 December 2007, submitted to the Ministry for Justice for state registration (letter of 7 December 2007, No. 24-16/6606);
- «On Approving Requirements for the Structure and Content of the Safety Analysis Report for Radwaste Storage Facilities», Ordinance No. 168 of 7 December 2007, submitted to the Ministry for Justice for state registration (letter of 7 December 2007, No. 24-16/6618);
- «On Approving Licensing Conditions and Rules for Use of Ionizing Radiation Sources in Radiotherapy», Ordinance No. 193 of 28 December 2007, submitted to the Ministry for Justice for state registration (letter of 29 December 2007, No. 17-16/7089);
- «On Approving General Safety Provisions for Nuclear Power Plants», Ordinance No. 162 of 19 November 2007, submitted to the Ministry for Justice for state registration (letter of 28 December 2007, No. 15-11/7049).

SNRCU Ordinances
(1st revision of regulation is prepared):

- «Forms of Documents for Special Inspections»;
- «Rules for Physical Protection of Ionizing Radiation Sources»;
- «On Amending the Regulation: Safety Requirements and Conditions (Licensing Terms) of IRS Use»;
- «On Amending the Regulation: Requirements for the Safety Analysis Report on IRS Use»;
- «Conditions and Rules for Uranium Ore Processing».

SNRCU Ordinances
(2nd revision of regulation is prepared and placed at the website for public consultation):

- «On Amending the Regulation: Procedure for State Safety Supervision in Nuclear Energy»;
- «Requirements for Periodic Safety Verification of Operating NPPs»;
- «Requirements for Modification of Nuclear Installations and Procedure for Their Safety Assessment».

SNRCU Ordinances
(regulations for which public consultation is completed and which are submitted for agreement to other central executive bodies (including re-agreement in connection with changes in the Government)):

- «Licensing Conditions and Rules for Use of Ionizing Radiation Sources in Radiotherapy»;
- «Conditions and Rules for Exemption of Radioactive Waste Placed in Near-Surface Disposal Facilities from Regulatory Control»;
- «Safety Requirements for Containers for Long-Term Storage and Disposal of High-Level Radioactive Waste Resulting from Spent Nuclear Fuel Processing»;
- «Requirements for Siting of a Nuclear Power Plant»;
- «Nuclear Safety Rules for NPP Reactors».

Resolutions of the Cabinet of Ministers that are submitted for agreement to other central executive bodies:

«On Amending Cabinet Resolution No. 813 of 2 June 2003: On Approving the Procedure for Interaction of Executive Bodies and Legal Entities Using Nuclear Energy in the Event of Illicit Trafficking of Radionuclide Sources".