UKRAINE

NATIONAL REPORT

On Compliance with the Obligations under the Joint Convention
on the Safety of Spent Fuel Management
and on the Safety of Radioactive Waste Management

KYIV 2008

FOREWORD

Ukraine signed Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (further – Joint Convention) on 29th September 1997 and was one of the first countries to ratify it by the Law of Ukraine on 20 April 2000.

Since coming into force of the Joint Convention on 18 June 2001 Ukraine became an active participant of all processes and events that take place in frames of convention in order to fulfill its tasks. First and Second National Reports of Ukraine were presented to the Parties of the Joint Convention at the review meetings, comments and recommendations of the First and Second Review Meetings were implemented in frames of national action plans.

This Third National Report of Ukraine was prepared by the State Nuclear Regulatory Committee of Ukraine in full compliance with the requirements of the Joint Convention and Guidelines Regarding the Form and the Structure of National reports INFCIRC/604 as well as the Summary Report of the Second Review Meeting of the Contracting Parties (JC/RM.2/03/Rev.1) and the Synopsis prepared by the IAEA Secretariat.

By submitting this National report Ukraine completely fulfills its obligations according to Article 32 of the Joint Convention.

This Report as well as the previous ones is based on the legislative and regulatory documents in force in Ukraine, official reports of state executive authorities responsible for development and implementation of state policy in the area of nuclear energy use and state enterprises – operating organizations – operators.

Key goal of this Report is to provide impartial information to the Contracting Parties of the Joint Convention and to the public of Ukraine regarding the safety status of spent fuel and radioactive waste management, actions taken by Ukraine to protect personnel, population and the environment from hazardous impact of ionizing radiation, highlight changes that took place since Second Review Meeting of the Contracting Parties and identify issues to be resolved.

When preparing the information on releases and discharges from NPPs, the data on releases and discharges into the environment submitted by Ukraine to the IAEA "International Database on discharges of radioactive material in environment" (DIRATA) was used.

Based on the materials presented in the Report and according to the powers entrusted by the Cabinet of Ministers of Ukraine the Chairperson of the State Nuclear Regulatory Committee of Ukraine declares the following:

Ukraine adheres to the established principle of safety of human and the environment at all stages of spent nuclear fuel and radioactive waste management in the area of nuclear energy use.

In this regard *Ukraine completely fulfills its obligations under the Joint Convention*, which is proved by:

- defining and development of legislative and regulatory basis on safety in the area of nuclear energy use;
- functioning of state regulatory authority on nuclear and radiation safety with relevant competence and which establishes safety requirements and criteria, develops and approves norms, rules and standards on nuclear and radiation safety, performs licensing and state supervision and applies sanctions and corrective actions provided by the law in case of violations;
- independence of state regulatory authority on nuclear and radiation safety from other state authorities, institutions and officials that perform activities related to the use of nuclear energy, independence from local authorities and entities of citizens;

- carrying out of safety assessment of existing facilities for spent nuclear fuel and radioactive waste management and implementing of measures directed at increase of safety level;
- development of emergency preparedness and response system;
- entrusting of the licensee with full responsibility for safety and implementation of measures directed at protection of human and the environment;
- development of safety culture and introduction of safety self-assessment activities.

The actual data in this Report, except for those specifically stated, are provided as of 1 July 2008. The changes that will take place by May 2009 will be additionally reported by the Delegation of Ukraine at the Third Review Meeting.

Kyiv, September 2008

Olena Mykolaichuk

Chairperson of the State Nuclear Regulatory Committee of Ukraine

TABLE OF CONTENTS

List of Abbreviations

BRW	Biological Radioactive Waste
ChNPP	Chornobyl NPP
DSFSF	Dry Spent Fuel Storage Facility
EIA	Environmental Impact Assessment
HLW	High-Level Waste
ICSRM	Industrial Complex for Solid Radioactive Waste Management
IEC	Information/ Emergency Center of the SNCRU
Liquid Radwaste	Liquid Radioactive Waste
LRSF	Liquid Radioactive Waste Storage Facility
LRTP	Liquid Radioactive Waste Treatment Plant
ME	Ministry of Ukraine of Emergencies and Affairs of Population Protection from the Consequences of Chornobyl Catastrophe
MEP	Ministry of Environmental Protection of Ukraine
MFE	Ministry for Fuel and Energy of Ukraine
MHU	Ministry of Health of Ukraine
MM	Mass Media
MRDCU	Ministry of Regional Development and Construction of Ukraine
NASU INR	Institute for Nuclear Research of National Academy of Sciences of Ukraine
NNEGC ENERGOATOM	State Enterprise National Nuclear Energy Generating Company ENERGOATOM
NPP	Nuclear Power Plant
NRU	National Report of Ukraine (on compliance with the obligations of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management)
NSC	New Safe Confinement
OA	Observation Area
Radwaste	Radioactive Waste
RICP	Radioactive Waste Interim Confinement Point
RL	Reference Level
RS	Radiation Sources
RWDP	Radioactive Waste Disposal Point
SAR	Safety Analysis Report
SCSRNSD	Specially Conditioned Solid Radwaste Near Surface Disposal
SDFSU	State Department of Fire Safety of ME of Ukraine
SE KhNPP	Separated Entity “Khmelnytsky NPP”
SE RNPP	Separated Entity “Rivne NPP”
SE SUNPP	Separated Entity “ South Ukraine NPP”
SE ZNPP	Separated Entity “Zaporizhzhya NPP ”
SF	Spent Fuel
SFA	Spent Fuel Assembly
SFSF	Spent Fuel Storage Facility
SIP	Shelter Implementation Plan
SISCU	State Committee of Ukraine on Industrial Safety, Protection of Labor and Mining Supervision
SISP	State Interregional Specialized Plant for Radioactive Waste

	Management
SLWSF	Solid and Liquid Waste Storage Facility
SNRCU	State Nuclear Regulatory Committee of Ukraine
Solid Radwaste	Solid Radioactive Waste
SRSF	Solid Radioactive Waste Storage Facility
SSE	State Specialized Enterprise
SSE Complex	State Specialized Enterprise “Complex”
SSE ChNPP	State Specialized Enterprise “Chornobyl NPP”
SSERPE Ecocenter	State Specialized Research and Production Enterprise “Ecocenter”
STC CMRW	Scientific and Technical Center for Decontamination and Complex Management of Radioactive Waste, Material and Radiation Sources
SUNEI	Sevastopol National University for Nuclear Energy and Industry
UkrDO “Radon”	Ukrainian State Association “Radon”
USSE	Unified State System for Prevention and Response to Man-induced and Natural Emergencies

Section A.

A.1. Introduction

The development of nuclear energy use in part of the Energy Strategy of Ukraine until 2030 and Action Plan of the Government and is stipulated by providing safety of spent nuclear fuel management and safety of radioactive waste management including their disposal. The Strategy foresees the preservation of the part of NPP electric power production in general productivity at achieved level – almost half from total annual power production in Ukraine, which in 2007 constituted 92,7 billion kW/hour.

Ukraine as a Contracting Party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (further - Joint Convention) provides for practical implementation of the provisions of the Joint Convention according to its objectives and safety fundamentals of the IAEA.

Major events and changes that took place since the Second Review Meeting of the Contracting Parties to the Joint Convention are reflected in the relevant sections of this Report. The list of operating SFSF and facilities for radwaste management is given in Annexes to this Report.

The Resolution of the Government approved a Concept of State Environmental Program on Radioactive Waste Management. The draft Laws on Radwaste Management Fund and on approval of new State Environmental Program on Radioactive Waste Management were approved by the Government and Verhovna Rada of Ukraine. Under the support of the European Commission and in frames of implementation of Action Plan Ukraine-EU a Strategy on Radioactive Waste Management was developed and submitted for approval by the Government. Draft Resolution of the Government "On Approval of Strategy on Radioactive Waste Management" is under review by the concerned parties, including public, based on relevant communicative strategy.

The Action Plan for 2006-2010 with regard to the execution of the Energy Strategy of Ukraine until 2030 is under implementation now, which among others include site selection for construction of dry-type centralized storage facility for long-term storage of spent nuclear fuel from Rivne NPP, Khmelnytsky NPP and South-Ukraine NPP.

The unloading of spent nuclear fuel from the core of power units 1,2,3 of the ChNPP into SFSF-1 allowed SSE ChNPP to reduce risks while carrying out of preparatory works on implementation of project of New safe confinement.

In August 2008 SSE Technocenter applied to the SNRCU for license for operation of first line storages of the "Vector" complex, which should ensure disposal of low and intermediate level short lived radwaste, generated as a result of Chornobyl accident.

During 2007 the state expertise of technical and economic substantiation of second line of "Vector" complex was performed – a ground for performing design of storage for high-level radwaste and spent sources of ionizing radiation and for storage of long-lived radwaste.

The issue of safety of radwaste management was reviewed in frames of Integrated Regulatory Review Service Mission (IRRS Mission), which was held in Ukraine in June 2008.

A.2. Basic conclusions from the Second Review Meeting

Based on the review results of the National Report of Ukraine (NRU-2005) at the Second Review Meeting of the Contracting Parties during next three years it was recommended to perform the following activities and report at the Third Review Meeting about:

- construction status of new safe confinement at ChNPP;
- construction of "Vector" complex for low and intermediate level radwaste;
- increase of staff number of the regulatory authority:
- preparatory activities for transfer of waste from UkrDO "Radon" to complex "Vector".

Information on implementation of these recommendations is presented in corresponding sections of the NRU-2008.

Furthermore, national plans on development of legislative and regulatory system took into account provisions of the Summary Report of the Second Review Meeting (JC/RM.2/03/Rev.1) and in particular provisions on accumulation of financial resources and development of NPP decommissioning concept and plans on management with "historical waste".

Section B. POLICIES AND PRACTICES (Article 32, paragraph 1)

B.1. Policy for Spent Fuel Management

Principles of State policy in the area of spent fuel management are stated in Article 5 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" (outlined in sub-section B.1 of the NRU-2003).

Energy Strategy of Ukraine until 2030 (further - Energy Strategy of Ukraine), approved by the Resolution of the Government, defines the steps on implementation of so-called "suspended" decision for SF of Ukrainian NPPs – long-term (up to 50 years and more) storage of SF with following approval of final decision on either processing or disposal.

The policy on Ukrainian NPPs SF management foresees :

– temporary storage of SF in plant spent fuel pools with the purpose to reduce its residual thermal-flux and provide for safe transport of SF for long-term storage in storage facilities;
– safe operation of plant interim dry-type storage facility at Zaporizhzhya NPP (ZDSFSF);
– construction, commissioning and safe operation of centralized spent fuel storage facility (CSFSF) for RNPP, KhNPP, and SUNPP;
– transport of SF from Rivne NPP, Khmelnytsky NPP and South-Ukraine NPP to Russian Federation for temporary storage and following processing (until commissioning of CSFSF);
– completion of construction, commissioning and safe operation of SFSF-2 of ChNPP that will provide for storage of all amount of SF from this plant;
– scientific and technical support on Ukrainian NPPs SF management;
– improvement of regulatory basis in the area of Ukrainian NNPs SF management;
– activities on defining of final stage of nuclear-fuel cycle, selection of technologies on safe SF management after completion of the period of its long term storage;
– informing of the public about the safety of spent fuel management at Ukrainian NPPs.

B.2. Practices Pertaining to Spent Fuel Management

Spent Fuel Management in Ukraine is performed according to the following directions:

– SF of WWER-440 type reactors of SE RNPP is stored in reactor spent fuel pools during but not less than 5 years and after is transferred for processing to the Russian Federation;

– SF of WWER-1000 type reactors of SE RNPP, SE KhNPP and SE SUNPP is stored in reactor pools during but not less than 5 years and transferred for interim storage and following processing to the Russian Federation;

– SF of WWER-1000 type reactors of SE ZNPP is stored in reactor pools during but not less than 5 years and then is stored in ventilated containers VKZ-WWER-1000 (upgraded VSC-24) at the site of plant dry-type SF storage facility (ZDSFSF) commissioned at the site of SE ZNPP;

– SF of RBMK – 1000 type reactors at the site of SSE ChNPP is stored in reactor pools of units 1, 2 and 3 and pools of spent fuel storage facility (SFSF-1);

– SF of WWR-M research reactor of NASU INR (Kyiv) is stored in SF storage facility of research reactor WWR-M;

– Research rector IR-100 of the SUNEI (Sevastopol) has no SF – based on the definition of spent fuel in the Joint Convention.

The works on preparation to the construction of CSFSF continue, this will provide for storage of SF from Ukrainian NPPs with WWER type reactors during estimated operation period – 100 years. The total capacity of the storage will allow to store no more than 17000 spent fuel assemblies.

According to the Law of Ukraine "On Decision Making Procedure for Sitting, Design, Construction of Nuclear Facilities and Objects for Radioactive Waste Management of State Importance" the decision on sitting, design and construction of CSFSF is taken by the Verhovna Rada of Ukraine through adopting relevant law, the draft of which should pass an agreement procedure.

Feasibility study for CSFSF construction was developed by "Kyiv Research and Development Institute "Energoproekt" ltd." and passed all necessary state expertise on safety issues with conclusions, foreseen for this stage of design.

Consulting Company TS ENERCON carried out alternative expertise of Feasibility study of CSFSF based on the requirements of the IAEA and the European Atomic Agency the Hungarian. Expertise resulted in positive conclusions.

NNEGC ENERGOATOM according to the requirements of Ukrainian legislation held an information campaign on CSFSF construction plans and safety aspects for the population and the environment in the process of construction and operation of CSFSF.

Ukraine as a party to the Convention on Assessment of Impact on the Environment in Transborder Context informed the Republic of Belarus as a closest to the proposed site for CSFSF country on possible impact of storage facility in transboundary context. The issues of potential impact were discussed at the level of competent authorities of Ukraine and Belarus. For that purpose relevant information materials on CSFSF and answers to the question of Belarusian experts about impact of the storage on the environment of near border territories of the Belarus were sent to the Ministry of natural resources and protection of the environment of the Republic of Belarus.

Works on the construction of CSFSF are carried out according to the contract concluded between NNEGC ENERGOATOM and the winner of international tender for construction of CSFSF – Holtec International (USA). Design and construction of CSFSF is to start after the adoption by the Verhovna Rada of Ukraine of the Law on construction of CSFSF.

B.3. Policy for Radioactive Waste Management

Major principles of state policy in the area of radioactive waste management are stated in the Article 5 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" and Article 3 of the Law of Ukraine "On Radioactive Waste Management" and outlined in sub-section B.3 of the NRU-2003.

At present the Complex Program on Radioactive Waste Management, approved by the Government, is under implementation (period of validity until 2010). It is aimed at implementation of State policy on radwaste management.

Key tasks of this Complex Program are:

- improvement of legislation in the area of radwaste management at all stages and enhancing of radiation safety in process of radwaste management;
- improvement of radwaste management systems at NPPs;
- providing for activities in the area of radwaste management according to the legislation and recommendations of international organizations, which Ukraine is a party to;
- commissioning of first line of complex on decontamination, transportation, processing and disposal of radwaste, which is assigned for radwaste from territories contaminated as a result of Chornobyl accident (further Complex "Vector");
- design and construction of second line of Complex "Vector", assigned for processing and long-term storage of high-level and long-lived radwaste;
- technical re-equipment and re-profiling of UkrDO "Radon" for collection and temporary container storage of radwaste from national industrial, medical, scientific and other institutions, organizations and enterprises;
- creation of preconditions for solving issues of high-level and long-lived radwaste disposal;
- improvement of state system of account and control of radwaste.

Measures included in the Complex Program are structured according to the sections depending on radwaste origin and foresee:

– management of radwaste from NPPs and radwaste that are generated during decommissioning of operating NPPs;

– radwaste management in the process of decommissioning of nuclear facilities located at the industrial site of ChNPP and transformation of the Shelter into ecologically safe system;

– management of radwaste, generated as a result of Chornobyl accident;

– management of radwaste generated at the industrial enterprises, in medical, research and other institutions.

With the purpose of implementation of state strategy in the area of radioactive waste management directed at the protection of the environment, health of the population from impact of ionizing radiation the Cabinet of Ministers of Ukraine approved Concept of State purposeful ecological program on radioactive waste management. Based on this Concept the Law of Ukraine "On State Purposeful Ecological Program on Radioactive Waste Management" was developed, agreed with the Government and approved by the Verhovna Rada and this Law defines policy in the area of radwaste management for 2008-2017.

B.4. Practices Pertaining to Radioactive Waste Management

Management of operational radwaste is performed at the sites of NPPs.

The primary tasks on management of operational radwaste from NPPs, taking into account plans on NPP lifetime extension are:

- modernization of available and establishing of new technological lines of preliminary and deep processing of solid and liquid radwaste at NPPs;
- taking out from NPP's storages and processing of earlier accumulated radwaste;
- improvement of radwaste transporting systems;
- modernization and enlargement of container stock for collection, transportation, storage and disposal of radwaste.

To maintain mentioned activities several TACIS projects on supply and commissioning of radwaste processing facilities are implemented at ZNPP and RNPP (installation on super pressing, incineration installation at ZNPP, impressment installation, installation on separation and fragmentation, system of radiation control and certification, installation on super pressing for RNPP).

Major technical decisions on management system and long-term storage of high-level radwaste are to be developed until 2010 and primary measures are to be implemented, which will allow to accept and manage radwaste after SF processing and return from Russian Federation.

UkrDO "Radon" provides for accumulation, assorting and storage of radwaste generated in non-nuclear sector or as a result of emergency situations with RS. Industrial, medical and scientific enterprises move to the UkrDO "Radon" solid radwaste and spent RS.

Disposal of radwaste generated as a result elimination of consequences of Chornobyl accident, rehabilitation of Exclusion Zone[1], NSC preparatory works (NSC site and foundation) and decommissioning of ChNPP power units is performed by SSE Complex in storages of RWDP „Buriakivka". In 2008 the construction was completed and licensing of specially conditioned near-surface storage facility for solid radwaste (SCSRNSD) at the site of Complex "Vector" started.

B.4.1. Radioactive Waste Management at Operating NPPs

During the reported period (2007) deep evaporation facility UGU-1-500 of the RNPP and centrifuge at KhNPP were commissioned, which were supplied and assembled as a part of implementation of TACIS project.

In frames of implementation of measures on life-time extension of power units 1,2 of RNPP the works on review of technical condition of storages for temporary storage of solid and liquid radwaste and enlargement of storage capacity necessary to accept radwaste generated in beyond design operation period of power units are implemented. Also the building for complex on solid radwaste processing is constructed.

The construction of solid radwaste treatment complex unit and storage facility for saline fusion at the site of ZNPP is underway.

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1 Exclusion Zone – territory that suffered from radioactive contamination as a result of Chornobyl accident and where the population was evacuated in 1986.

B.4.2. Radioactive Waste Management at ChNPP and the Shelter

Radwaste at ChNPP is stored in special storages, constructed according to the ChNPP designs. Radwaste storage facilities are equipped with special protection systems: special ventilation system, special sewerage system, physical protection and alarm; radiation control system; storage perimeter monitoring holes to control the condition of ground waters.

The collection of ChNPP liquid radwaste is performed with pipeline system. Accumulated liquid radwaste is stored in two storages at the ChNPP site connected with each other with special pipelines. Liquid radwaste is stored in tanks. This is low and intermediate level liquid radwaste: evaporation bottoms, pulp of spent ion exchange resin, pearlite pulp.

Spent radioactive oil is stored in temporary storage designed for 144m^3 of oils. It includes two tanks of 72 m^3 bulk.

Solid radwaste accumulated during the operation of ChNPP and elimination of 1986 accident consequences is temporary stored in the solid radwaste storage facility at the ChNPP site. At present modules of storage facility are closed down.

Low and intermediate solid radwaste, generated as a result of works on termination of operation of power units and implementation of activities on Shelter transformation into ecologically safe system, are collected in the containers and moved to the RWDP „Buriakivka", SSE Complex located in the Exclusion Zone.

High-level solid radwaste is stored in containers KTZV-0.2 and is placed in special temporary storage for solid high-level waste storage facility at the ChNPP site.

Information about radwaste stored at the site of SSE ChNPP is given in Annex 4 of this Report.

"Integrated program on radwaste management at the stage of ChNPP operation termination and Shelter transformation into ecologically safe system" is developed and implemented at SSE ChNPP. The purpose of this Program is to establish and provide integrated optimized scheme for radwaste management at ChNPP taking into account existing and planned objects for radwaste management at the SSE ChNPP and Exclusion Zone.

SSE ChNPP perform administrative, technical and organizational measures to support at minimal possible level the amount of radwaste generation, in particular:

- decontamination of dismantled radiation-contaminated equipment;
- creation and operation of the site for temporary storage of technological contaminated materials generated as a result of works on Shelter transformation into ecologically safe system and could be repeatedly used in future.

SSE ChNPP continues construction of objects for radwaste management with international financial support:

1. Liquid Radioactive Waste Treatment Plant (LRTP):

A number of design modifications was implemented at LRTP and namely: modification of system of withdrawal of liquid radwaste from storage tanks and movement to LRTP for processing; creation of automated management system of technological process; elaboration of composition for liquid radwaste processing with optimization purpose and compliance of cemented radwaste with the acceptance criteria for storage in SCSRNSD. Development of final safety analysis report (SAR) taking into account SNRCU comments to the interim SAR is underway. In 2006 the contract with project contractor – international consortium was broken off. After the meeting of Donor Assembly of the Nuclear Safety Account in 2007 works on completion of LRTP were renewed. According to the agreed during this meeting "Strategy on completion of plant construction for liquid radioactive waste treatment" the works that should be

completed were divided in 4 separate packages and are to be performed by Ukrainian contractors.

2. Industrial complex for solid radwaste management (ICSRM), which includes:

– Lot 0 – Temporary storage – interim storage of low and intermediate level long lived and high-level radwaste, which is constructed inside the building of storage facility for liquid and solid radwaste of ChNPP,

– Lot 1 – facility for removal of solid radwaste,

– Lot 2 – solid radwaste processing plant,

– Lot 3 – specially conditioned near-surface storage facility for solid radwaste (SCSRNSD) at the site of Complex "Vector".

Lot 0 - all construction and assembling works are completed except for assembly and commissioning of ventilation system. Lots 1 and 2 – all construction works are completed, assembly and testing of equipment is performed. The construction of SCSRNSD is completed, the storage was accepted by Working and State Acceptance Commission.

Estimated period for construction completion of LRTP – end of 2010. Period for completion of construction of ICSRM according to the "Complex Program on Chornobyl NPP decommissioning" – march 2009.

B.4.3. Radioactive Waste Management in the Exclusion Zone

Implementation of practical measures on radwaste management in the Exclusion Zone is performed by SSE Complex and SSE Technocenter.

SSE Complex performed the following works within the reported period based on license issued by the SNRCU:

– collection and movement of radwaste generated as a result of decontamination of Exclusion Zone territories;

– operation of RWDP „Buriakivka" that accepts for disposal radwaste from Exclusion Zone, SSE ChNPP, waste from decontamination of Shelter premises and other enterprises at Exclusion Zone;

– monitoring of RWDP "Pidlisnyy " and "3rd line of ChNPP" and RICP that were constructed in the Exclusion Zone during the first years of elimination of consequences of Chornobyl accident;

– scheduled works on provision of RWDP and RICP radiation safety;

– decontamination of working clothes, individual protection means, equipment and metal manufacturing.

SSE Technocenter within the reported period and based on the license issued by the SNRCU performed works on construction of radwaste disposal storages of first line of Complex "Vector" and in particular Startup complex, which includes infrastructure objects and storage facilities for radwaste disposal - one facility for each type (1st type storage is for radwaste disposal in reinforced concrete containers. One storage facility contain 4668 containers with total radwaste capacity 9800m^3 ; 2nd type storage contain up to 9420m^3 of radwaste in bulk).

Infrastructure objects of the Startup complex also should provide for operation of SCSRNSD constructed at the site of Complex "Vector" under financial support of European Commission in frames of program on ChNPP decommissioning and is an integral component of industrial complex on ChNPP solid radwaste management.

The construction of Startup complex except for SCSRNSD is performed for the cost of State budget.

The date of commissioning of the Startup complex of the first line of Complex "Vector" –

2008.

First line of Complex "Vector" should provide for disposal of low and intermediate level short lived radwaste generated as a result of Chornobyl accident and includes 16 storages of 1st type and 40 storages of 2nd type.

Second line of Complex "Vector" should provide for:

– processing and long term storage of long lived radwaste generated as a result of Chornobyl accident;

– disposal of short lived radwaste generated as a result of Shelter operation and those to be generated in the process of Shelter transformation into ecologically safe system;

– disposal of short lived radwaste generated as a result of NPPs operation and those to be generated in the process of NPPs decommissioning;

– disposal and long term storage of radwaste generated at the industrial enterprises, medical and research institutions;

– storage of high level radwaste to be generated during processing of SF from Ukrainian NPPs in Russian Federation.

In 2007 the Feasibility study of second line of Complex "Vector" was agreed. The positive conclusion of state expertise is a basis for the development of designs of facilities.

B.4.4. Radioactive Waste Management at UkrDO "Radon"

Specialized activity on radwaste management, generated as a result of use of RS in industry, medicine, research, etc is performed by six State Interregional Specialized Plants for Radioactive Waste Management of UkrDO "Radon": Kyiv SISP, Donetsk SISP, Odessa SISP, Kharkiv SISP, Dnipropetrovsk SISP, Lviv SISP.

Kyiv SISP, Odessa SISP, Kharkiv SISP, Dnipropetrovsk SISP, Lviv SISP based on the corresponding licenses issued by the SNRCU perform the following:

- acceptance and storage of low and intermediate level solid radwaste and radwaste in the form of spent RS;
- radwaste transportation;
- decontamination of special transport vehicles, transport containers and other equipment, special work clothes and means of individual protection;
- conditioning of radwaste aimed at minimizing of radwaste volume.

Donetsk SISP performs only transportation of radwaste, decontamination of special work clothes and means of individual protection.

SISPs do not accept liquid radwaste. Waste is accepted only after solidification and stored as solid radwaste. Liquid radwaste produced by SISP itself is stored only in special storage facilities.

Biological radwaste is stored separately from solid radwaste in special storage facilities.

Radwaste in the form of spent RS is stored in bio-shielding in storages for solid radwaste or without bio-shielding in special storages of well type.

B.4.5. Management of Radioactive Waste from Research Reactors

SUNEI (Sevastopol)

Solid radwaste of the SUNEI research reactor IR-100 (Sevastopol) is collected in places of its generation, sorted with preparation of certificates for separate types of solid radwaste, accounted and temporary stored in the storage facilities at the site of research reactor with following movement to Odessa SISP.

Liquid radwaste is collected in temporary storage vessels (metal tanks) through special sewerage system, which are located in the underground storages at the site of research reactor and after holding up and dilution up to the existing standards is fused in sewer according to the "Instruction on radwaste management".

SUNEI has no facilities for radwaste processing.

NASU INR (Kyiv)

Solid radwaste of the research reactor WWR-M of the NASU INR (Kyiv) is collected in places of its generation, sorted with preparation of certificates for separate types of solid radwaste, accounted and temporary stored in the storage facilities at the site of the research reactor with following movement to Kyiv SISP.

Liquid radwaste is collected in temporary storage vessels (metal tanks) through special sewerage system, which are located in the underground storages at the site of research reactor. In 2003 a facility on liquid radwaste processing with applying of deep evaporation method and following cementing of residue was commissioned.

B.5. Criteria Used to Define and Categorize Radioactive Waste

During the reported period there were no changes in criteria requirements used to define and categorize radwaste.

Detailed information on this issue was presented in sub-section B.5. of the NRU-2005.

Section C. SCOPE OF APPLICATION (Article 3)

Management of SF and radwaste Ukraine treats as it is stated in Article 2 of the Joint Convention.

Ukraine has no facilities on SF processing.

Mining and processing of uranium ore is performed in Ukraine and as a result the tailing pits of SE "SkhidGZK" store waste from processing of uranium ore. According to the Norms on Radiation Safety in Ukraine waste from uranium mining industry as well as waste related to the mining of other minerals are treated as TENORM and are not declared by Ukraine as radwaste. Taking into account the recommendations of the First Review Meeting of the Contracting Parties to the Joint Convention information on waste from uranium milling industry is given in Annex 10 to this Report.

Ukraine does not implement any military or defense programs, which also result in generation of SF and radwaste. But on the territory of Ukraine there are remains of former activities of the Soviet army – radwaste disposal points, which are kept by the Ministry of Defense of Ukraine and where relevant decisions are taken based on the safety assessments.

The requirements of the Joint Convention are applied in Ukraine in relation to radwaste safety management generated as a result of introduction of military and defense programs but finally transferred in civil programs and relevant management is performed in frames of such programs.

Section D. INVENTORIES AND LISTS (Article 32, Paragraph 2)

D.1. List of Spent Fuel Management Facilities Subject to This Convention, Their Location, Main Purpose and Essential Features

SF in Ukraine is generated at nuclear power plants and research reactor.

The list of facilities is given in Annex 1 to this Report.

At present nuclear power plants of Ukraine operate reactors WWER-1000 (13 units) and WWER-440 (2 units). SF management systems are similar and include transport and technological equipment for loading and out-loading of reactors and transport containers and spent fuel pools.

The plant interim dry-type SF storage facility for SF of WWER-1000 is operated at ZNPP. Design capacity of the storage facility constitutes 380 containers. Each container is designed for storage of 24 spent fuel assemblies. As of June 2008 64 storage containers VKZ-WWER-1000 were loaded at the storage site. Transport and technological equipment for loading and out-loading of storage containers was installed at all power units of SE ZNPP.

Three RBMK-1000 reactors of the ChNPP are in the process of decommissioning. SF management systems for these reactors are similar and include pool for temporary storage of SF as well as transport and technological equipment for loading and out-loading of pool and transport containers for SF movement.

SF of RBMK-1000 reactors is stored in pools of power units 1,2,3 of ChNPP and SFSF-1.

D.2. Inventory of Spent Fuel Subject to This Convention

According to the requirements of the Law of Ukraine ‘’On the Use of Nuclear Energy and Radiation Safety” the account of SF is performed in frames of state system on account and control of nuclear material.

Inventory list of SF taking into account changes during the reported period is given in Annex 2 to this Report.

D.3. List of Radioactive Waste Management Facilities Subject to This Convention, Their Location, Main Purpose and Essential Characteristics

General description of existing in Ukraine facilities for radwaste management is presented in NRU-2003 and NRU–2005.

In 2007 the deep evaporation facility UGU-1-500 was commissioned for commercial operation at RNPP with design capacity 500 decimeters^3 /hour and centrifuge for purification of trap waters was commissioned in commercial operation at SE KhNPP with design capacity 3-5-m^3/hour.

The list of facilities on radwaste management as of 1 July is given in Annex 3 to this Report.

D.4. Inventory of Radioactive Waste Subject to This Convention

When preparing radwaste inventory lists the data that is submitted by Ukraine to the international database of the IAEA “The Net-Enabled Waste Management Database” (NEWMDB) was used.

The inventory lists of radwaste as of 1 July 2008 are given in Annex 4 to this Report.

With the purpose to avoid non-controlled accumulation of radwaste and provide for on-line control over location and movement of radwaste, storage and disposal conditions Ukraine introduced State radwaste account system.

State radwaste account includes maintenance of State Register of Radioactive Waste and Sate Cadastre of Storages and Points of Temporary Radioactive Waste Storage.

To provide for constant upgrade and timely changes to State Register of Radioactive Waste and Sate Cadastre of Storages and Points of Temporary Radioactive Waste Storage state inventory of radwaste and radwaste storages are held once per 3 years, including storages for temporary storage of radwaste at the territory of their producers.

First state inventory of radwaste at the whole territory of Ukraine was held in 1999-2000, second – 2003, third – 2007.

Inventory lists of radwaste as of 1 July 2008 are given in Annex 4 to this Report.

D.4.1. List of Radioactive Waste in Temporary Storage at Nuclear Fuel Cycle Facilities and Research Reactors

Paragraphs 4.1–4.3 of Annex 4 to this Report contain data on radwaste accumulated in storages located at the sites of NPPs of NNEGC ENERGOATOM, SSE ChNPP and research reactors as of 1 July 2008.

D.4.2. List of Radioactive Waste That Has Been Disposed

Paragraph 4.4 of the Annex 4 to this Report contain information on radwaste generated as a result of Chornobyl accident and disposed in near-surface storages of RWDP „Buriakivka" of SSE Complex as of 1 July 2008.

D.4.3. List of Radioactive Waste Resulting from Past Practices

Paragraphs 4.5 and 4.6 of Annex 4 to this Report contain data on radwaste generated in past as a result activities of industrial enterprises, research, scientific and other medical institutions in process of liquidation of radwaste storages of Ministry of Defense and as a result of Chornobyl accident as of 1 July 2008.

This radwaste is stored in storages of SSE Complex and SISP UkrDO "Radon" and is under regulatory control. The safety of storage is provided by the licensee.

D.5. List of Nuclear Facilities Under Decommissioning and Status of Decommissioning Activities at Those Activities

During the reported period the works at power units of SSE ChNPP under preparatory stage for decommissioning were implemented and in particular termination of operation. Performance of these works is the obligation of a licensee – SSE ChNPP- according to the license for decommissioning of nuclear facilities of ChNPP issued by the SNRCU in 2002. Detailed list of activities is outlined in the "Complex program on ChNPP decommissioning" approved by the Cabinet of Ministers of Ukraine in 2000 with changes, approved by Interagency commission on complex solution of Chornobyl issues as of 29 November 2007.

The list of nuclear facilities under decommissioning is given in Annex 5 to this Report.

Section E. LEGISLATIVE AND REGULATORY SYSTEM

E.1. Implementing Measures (Article 18)

Requirements and regulatory provisions on nuclear safety in Ukraine are defined in laws, resolutions of the Cabinet of Ministers of Ukraine and regulatory documents of central executive authorities. Mentioned requirements and provisions include norms, rules and standards that establish criteria and safety requirements, define conditions and establish technical requirements for regulation of safety of processes, operations and procedures during performance activities in the area of nuclear energy use. The system of nuclear legislation include international treaties of Ukraine, the obligatory nature of which is acknowledged within the established order and constitute an integral part of national legislation.

National legal basis in the area of nuclear and radiation safety was presented in NRU-2003 and NRU-2005.

The list of regulatory documents in the area of nuclear energy use, which became effective during 2005 – 1st half of 2008 is given in Annex 6 to this Report.

E.2. Legislative and Regulatory Framework (Article 19)

E.2.1. National Safety Requirements and Regulations for Radiation Safety

With the purpose to enhance efficiency of regulatory activities the work on improvement of nuclear legislation and development of national regulatory basis continued. Further upgrading of existing legislation in the area of nuclear energy use was directed at solution of following topical issues:

1. Beyond design lifetime extension of nuclear facilities.
2. Decommissioning and construction of nuclear facilities and commissioning of spent nuclear fuel storage facility.
3. Implementation of Complex program on radioactive waste management:
   - Management of high-level waste;
   - Radwaste disposal in geological repositories.
4. Provision of nuclear materials non-proliferation regime, functioning of state system for accounting and control of nuclear material.
5. Physical protection system of nuclear facilities, nuclear material, radioactive waste, other sources of ionizing radiation in Ukraine.
6. Review of the requirements and safety rules for activities with ionizing radiation sources.
7. Safety of transport of radioactive material.
8. Legislation support of the SNRCU territorial infrastructure development.
9. Development and introduction of management system of the regulatory activity.

One of the approved Resolutions of the Cabinet of Ministers of Ukraine “Issues of State Nuclear Regulatory Committee of Ukraine” is directed at the SNRCU providing with financial and human resources for establishment of regional state inspections on nuclear and radiation safety, which allowed SNRCU to perform its functions on supervision in the area of nuclear energy use in full scope.

Also the development and adoption of the following regulations was made: regulation that defines criteria on NPP site selection; regulation that defines criteria for radwaste storage facility site selection; regulation that regulates issues related to the creation of infrastructure for radwaste management in Ukraine; new and revised regulations that define criteria for use of RS taking into

account potential danger of certain type of RS use. In total since presentation of NRU-2005 31 regulations was approved.

Taking into account that Article 51 of the Agreement on Partnership and Cooperation between Ukraine and European Union of 14 June 1994 foresees the obligations of Ukraine on gradual approximation of national legislation to the legislation of the Community within the defined in this Agreement areas and in particular laws and regulations in nuclear energy – the SNRCU performs systematic activities on improvement of nuclear legislation including norms, rules and standards on nuclear and radiation safety considering the requirements of the EU legislation, recommendations of the IAEA, experience of the regulatory authorities of other countries.

The list of legislative and regulatory documents of Ukraine in the area of nuclear and radiation safety, which came into force after presentation of NRU-2005 is given in Annex 6 to this Report.

The list of national and international reports of Ukraine in the area of nuclear and radiation safety, which were prepared after presentation of NRU-2005 is given in Annex 7 to this Report.

E.2.2. System of Licensing of Spent Fuel and Radioactive Waste Management Facilities

The purpose of the licensing system of activities in the area of SF and radwaste management is:

– to provide for use of those objects for SF and radwaste management, safety level of which comply with the international standards, including physical protection;

– performance of activities in the area of SF and radwaste management by persons and legal entities that can guarantee the implementation of legislation requirements, norms, rules and standards on nuclear and radiation safety.

Licensing system of activities in the area of SF and radwaste management consists of three main processes:

- licensing of activities of the operating organization, related to the single stage of lifecycle of nuclear facility (SFSF) or storage facility for radwaste disposal namely:
  - design of SFSF or storage facility for radwaste disposal,
  - construction of SFSF or storage facility for radwaste disposal after complex analysis of all aspects of safety provision in relevant design,
  - commissioning of SFSF,
  - operation of SFSF or storage facility for radwaste disposal,
  - decommissioning of SFSF,
  - closure of storage facility for radwaste disposal.
  - issuance of separate written permissions for works (in frames of license of operating organization);
- licensing of separate types of activities in the area of nuclear energy use:
  - design of SFSF or storage facility for radwaste disposal,
  - transport of radioactive material,
  - processing and storage of radwaste,
  - training of personnel for operation of nuclear facility (according to the list of job positions and specialties defined by the Cabinet of Ministers of Ukraine),
  - activities related to the physical protection of nuclear facilities and nuclear material;
- issuance of certificates for safe transport of radioactive material;
- issuance of permissions for international transport of radioactive material;
- issuance of conclusions during international transfer of radioactive material.

Detailed description of the licensing system in the area of SF and radwaste management is given in sub-section E.2.2 of the NRU-2003.

E.2.3. System of Prohibition to Operate a Spent Fuel or Radioactive Waste Management Facility without a Licence

According to the Article 26 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" it is prohibited in Ukraine to carry out any activity related to the use of nuclear facilities (SFSF) and sources of ionizing radiation (including facilities for radwaste management) by persons and legal entities that have no special permission (license) issued within the established order. Nuclear facility (SFSF), ionizing radiation source (including facility for radwaste management) can be used only for the purpose and the way foreseen in the terms of issued permission (license). Conditions and limits for safe use of nuclear facility (SFSF), ionizing radiation source (including facility for radwaste management), stated in the permission (license), must provide for necessary and adequate level of nuclear and radiation safety.

E.2.4. System of Appropriate Institutional Control, Regulatory Inspection, Documentation and Reporting

Institutional control of SF and radwaste management – it is a control performed by the licensees, relevant units of operating organizations (for example, for NPPs these are units of NNEGC ENERGOATOM) as well as the Ministry for Fuel and Energy and Ministry of Emergencies depending on bureaucratic subordination of the enterprises.

The tasks of the institutional control are:

At the stage of commissioning and decommissioning of facilities for SF and radwaste management – constant (daily) control of technologies, equipment and systems important for safety for compliance with the requirements of the operational documentation, norms, rules and standards on nuclear and radiation safety;

After closure of the storage facility for radwaste decommissioning – perform active and passive control. Active control – monitoring, control of integrity of storage barriers and implementation if necessary of reconstruction works. Passive control – limitations for performing agricultural activities within storage site, safe keeping of information on storage. Detailed information on carrying out of institutional control after closure of storage for radwaste disposal is given in sub-section H.7.

Regulatory control is performed through state supervision over compliance with the requirements on nuclear and radiation safety during SF and radwaste management and performed by the SNRCU and its regional offices (state regional inspections on nuclear and radiation safety) based on the Article 24 of the Law of Ukraine "On the use of nuclear energy and radiation safety" and according to the "Procedure for state supervision and safety provision in the use of nuclear energy" with following the principles:

- validity of issued prescriptions based on safety requirements;
- non creation (minimization) of limits and obstacles for normal operation of objects of state supervision during inspection or other supervisory actions;
- openness and availability for public of information on safety status based on the results of state supervision, if this information is not confidential;
- correspondence of amounts and forms of state supervision to the potential danger and achieved safety level at objects under supervision;
- introduction of responsibility for violation of legal safety regime and carrying out

of efficient prevention of violations.

The process of state supervision include three components:

Current safety assessment – SNRCU activities on review of materials, periodically submitted by the licensees to confirm the compliance of their activities with the safety requirements;

Inspection activity – complex of actions and measures on organization and carrying out of inspections as well as the control of implementation of issued orders directed at reveal, elimination and prevention of violations. Inspection activity is divided into inspectional check-ups (check-up of licensees) and inspectional expertise (inspection of applicant prior to issuing license or separate written permission for performing certain type of activity or operation within issued license);

Imposing sanctions (enforcement) – complex of compulsory measures that could be employed on licensee based on negative results (conclusions) of current safety assessment and/ or inspectional check-up with purpose to remove the revealed and prevention of possible violations and stimulation of licensee staff to enhance safety culture.

Supervision activity of the SNRCU is performed according to monthly and annual plans. In case if results of planned check-ups or analysis of reported information reveal safety shortage the beyond plan inspectional check-ups or response inspections are performed.

The legislation establishes the requirements for submission by the licensee of reports to the regulatory authority. Requirements to the periodicity and content of these reports are outlined in license conditions and relevant regulations (see Annex 6 to this Report).

E.2.5. Enforcement of Applicable Regulations and Terms of Licences

Enforcement measures prescribed by the legislation in case of violations of norms, rules and standards on nuclear and radiation safety in SF and radwaste management are one of the functions of safety regulation and is used by state inspectors on nuclear and radiation safety in the process of state supervision.

According to the Article 25 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" the state regulatory authority has a right to limit, terminate or stop operation of enterprises, institutions, organizations and objects in case of violation of requirements on nuclear and radiation safety, send to the licensee and their officials obligatory prescriptions on elimination of violations in the area of nuclear energy use.

In November 2007 the Licensing Commission of the SNRCU suspended the license of SSE Complex for operation of storages for radwaste disposal due to the non-fulfillment of license special conditions and in particular the violation of terms and violation of conservation technology of filled radwaste storages of RWDP „Buriakivka".

According to Article 244-12 of the Code of Ukraine on Administrative Violations nuclear and radiation safety state regulatory authorities review cases on administrative violations of natural entities, related to the violation of rules and norms of nuclear and radiation safety (Article 95) as well as non-fulfillment of the requirements (prescriptions) of officials of state nuclear and radiation safety regulatory authorities (Article 188-18). On behalf of state nuclear and radiation safety regulatory authorities Chief state inspector on nuclear and radiation safety of Ukraine and his deputies – 8 heads of regional inspections on nuclear and radiation safety and heads of resident inspections on nuclear safety at NPPs can impose administrative sanctions, including penalties. At practice, imposing of sanctions happens exceptionally. Procedures and criteria on imposing sanctions and the amounts are established in:

- Code of Ukraine on Administrative Violations;

– Procedure for state supervision over safety provision while nuclear energy use;

– Methodological recommendations on inquest of cases on administrative violations in the area of nuclear and radiation safety;

– documents of management system of the SNRCU "Manual on supervision activity, H-P3".

Mentioned procedures and criteria are applied taking into account safety culture principles, respect and trust to the licensees. The statistics of cases with imposing sanctions is given, among others, in annual reports on nuclear and radiation safety in Ukraine.

E.2.6. Allocation of Responsibilities of Bodies Involved in Different Steps of Spent Fuel and Radioactive Waste Management

Allocation of responsibilities and rights of all subjects of legal relations in the area of nuclear energy use is one of the main principles of state policy in the area of nuclear energy use and radiation safety according to the Article 5 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety".

Ministry for fuel and energy and Ministry of Emergencies are the executive authorities entrusted with function of governing SF and radwaste management.

Ministry for fuel end energy performs organizational and methodological provision and coordination of works related to the development and implementation of programs on SF and radwaste management during NPP operation period and during decommissioning of nuclear facilities and other objects of nuclear-industrial complex before movement of radwaste for disposal to specialized enterprise.

Ministry of emergencies organizes and coordinates work of specialized enterprises, facilities and organizations that perform radwaste management (collection, sorting, processing, storage and disposal).

According to the Decree of the President of Ukraine of 20 April 2005№ 681/2005 the functions of managing ChNPP were transferred from Ministry for Fuel and Energy to the Ministry of Emergencies.

Ministry of emergencies is responsible for performance of measures on radwaste management during decommissioning of nuclear facilities located at the industrial site of ChNPP and Shelter transformation into ecologically safe system.

Since the time of Second Review Meeting no changes in redistribution of powers among authorities responsible for different stages of SF and radwaste management happened.

E.3. Regulatory Body (Article 20)

The State Nuclear Regulatory Committee of Ukraine was established according to the Decree of the President of Ukraine in 2000 and acts based on the "Provisions of State Nuclear Regulatory Committee of Ukraine" approved by the Resolution of the Cabinet of Ministers of Ukraine in 2006. According to the mentioned legal acts the SNRCU performs functions of state nuclear and radiation safety regulatory authority, implements legislative and regulatory framework in compliance with Article 19 of the Joint Convention. The SNRCU has relevant powers, competence and resources to perform its functions and responsibilities in compliance with Article 20 of the Joint Convention.

Ministry of health participates in performing state regulation of radiation safety, which competence include development of norms on radiation safety, issuing of permissions for work with radioactive substances and other sources of ionizing radiation, state supervision within

sanitary-epidemiology legislation. Ministry of environment participates in regulation of radiation protection of the environment.

The SNRCU according to the paragraph 2 of Article 20 of the Joint Convention in its activities on state regulation of nuclear and radiation safety does not depend on central executive authorities, enterprises and institutions, which perform management in the area of nuclear energy use and SF and radwaste management.

In June 2008 the Integrated Regulatory Review Service Mission under the IAEA aegis was held in Ukraine (IRRS Mission). Based on the results of this Mission it was stated that Ukraine has system of state regulation of nuclear and radiation safety, which corresponds to the IAEA standards. The Mission concluded in number of recommendations and suggestions. In particular it was recommended to adopt Law of Ukraine on national authority on state regulation of nuclear and radiation safety. To implement the recommendations and proposals of the Mission the Action Plan was developed and submitted for approval by the Cabinet of Ministers of Ukraine.

During the reported period the enhancing of efficiency of the regulatory activity was implemented through institutional development of the SNRCU, developing of regulatory requirements based on systematic analysis of the legislation, introduction and certification of management system of the regulatory activity.

The development of the SNRCU is demonstrated by increase of its annual budget and staff number. In particular during 2006-2008 the establishing of new regional offices was completed – eight regional State inspections on nuclear and radiation safety, which perform licensing of RS use and supervision over radiation safety at all objects of nuclear energy use in the provinces, except for the nuclear facilities.

Transfer into the development of regulatory requirement on systematic basis was done after analysis of the existing legislation and taking into account IAEA standards, EU legislation, recommendations of WENRA. The Strategic plan on development of regulatory requirements was developed based on this analysis. It foresees that in 2012 the system of regulatory requirements on nuclear and radiation safety will be hierarchical, manageable, performance oriented, not connected to the facilities of certain type.

In 2008 after internal and external audits the SNRCU obtained a Certificate on correspondence of management system, which witnesses that the management system on granting regulatory services in the area of nuclear and radiation safety provision corresponds to the international standard ISO 9001:2000. The Certificate was registered in the Register of Management System Certification Authority "Multi-branch Quality Center "PRIROST" as of 12 August 2008 № OSP–0145/08 and valid until 11 August 2011.

Legislative and regulatory basis for safety provision of spent fuel and radwaste management is established in Ukraine and supported at the appropriate level according to the goals of the Joint Convention.

Section F. OTHER GENERAL SAFETY PROVISIONS

F.1. Responsibility of Licence Holder (Article 21)

Entrusting of the licensee with the responsibility for SF and radwaste management safety, safety of nuclear facilities and sources of ionizing radiation is set in Ukraine in the law.

According to Article 26 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" the use of nuclear facilities and sources of ionizing radiation at the territory of Ukraine is based on permissive principle. According to Article 11 of the Law of Ukraine "On

Radioactive Waste Management" the right for radwaste management have only natural and legal entities that obtained license of state nuclear and radiation safety regulatory authority within the established order. According to Article 32 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" the licensee (operating organization) has full responsibility for radiation protection and safety of nuclear facilities, sources of ionizing radiation, safety of personnel, population and the environment and withdrawal of license does not release from responsibility for safety of nuclear facility and sources of ionizing radiation until the moment of transfer to other entities or obtaining a new license.

Specific obligations of the licensee are established in Articles 32, 33 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" and Article 11 of the Law of Ukraine "On Radioactive Waste Management", in particular:

– licensee must submit to the regulatory authority annual report on radiation safety analysis and provide for generation of radwaste at minimal possible level;

– in case of an accident, licensee must perform non-stop monitoring and prognosis of radioactive substances release and inform about that relevant authorities and organizations within the established order;

– operating organization within the established order submits timely the full information about cases of violation of operation of nuclear and radwaste facilities;

– the licensee has an obligation to inform the public, national authorities and the public organizations about nuclear safety and radiation protection status.

Also the obligations of licensee are established in the special license conditions.

F.2. Human and Financial Resources (Article 22)

F.2.1. Qualified Staff Needed for Safety-Related Activities During Operational Lifetime of Spent Fuel and Radioactive Waste Management Facility

The system of training and upgrading of qualification of personnel in the area of SF and radwaste management (described in NRU-2003 and NRU-2005) is based on recommended by the IAEA systematic approach, generalized experience and practices of other countries.

Requirements to the qualification of personnel and knowledge examination are established in relevant instructions, provisions and licenses for operation of radwaste management objects. Organizations that perform SF and radwaste management are staffed with personnel of corresponding qualification and necessary quantity.

In Ukraine the following high education institutions perform training and upgrading of qualification of experts to work in the area of nuclear energy use:

– Taras Schevchenko Kyiv National University;
– National Technical University of Ukraine "Kyiv Polytechnic Institute";
– Odessa National Polytechnic Institute;
– Odessa State Ecology University;
– Sevastopol National University of Nuclear Energy and Industry;
– Kharkiv National University;
– Kharkiv Polytechnic Institute " National Technical University ".

The development of NPPs training centers continues. These centers are basis of training system. Technical training means are being improved. NPPs training centers use simulators for personnel training purposes.

Systematic work with personnel is directed at formation of safety culture, provision of necessary qualification and constant readiness to perform its professional duties.

F.2.2. Financial Resources to Support Safety of Facilities for Spent Fuel and Radioactive Waste Management During Their Operating Lifetime and for Decommissioning

Financial resources to support safety of facilities for SF and radwaste management during their operating lifetime

According to Article 33 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" the operating organization (operator) – is a state nominated legal entity, which perform activity related to the site selection, design, construction, commissioning, operation and decommissioning of nuclear facility or depository. Operator must obtain license for performing activities at separate stages of lifecycle of nuclear facility or depository, develops and implements measures on safety enhancement, provides for radiation protection of personnel, population and the environment.

License for operation of nuclear facility (in our case means SF storage facility or depository and facility for radwaste management - is given under condition that the applicant proved its ability to safely perform the declared type of activity, including financial sufficiency.

The financing of works on SF and radwaste management of research reactors at the operation stage (including future decommissioning) is performed out of the state budget.

Financing of activities on radwaste management at SISP UkrDO "Radon" (operation and following decommissioning) is performed by the cost of enterprises that move radwaste for storage to SISP on a contractual basis and out of the state budget.

Financing of works on SF and radwaste management at sites of NPPs is performed by the cost included in the rate for electricity and heat energy.

Financial resources to support safety of facilities for SF and radwaste management during decommissioning

According to Articles 33 and 39 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" the operating organization (NNEGC ENERGOATOM) includes to the prime cost of energy production expenses for SF storage processing, radwaste storage and disposal, decommissioning of nuclear facilities.

The Law of Ukraine"On Settlement of Issues Related to the Nuclear Safety Provision" defines legal and organizational basis for financial provision of activities on operation termination and decommissioning of nuclear facilities.

Mentioned Law states that the money should be accumulated at special account in the State Treasury. According to Article 10 of this Law money from financial reserve are used only to finance the development of nuclear facility decommissioning plan, measures related to termination of operation and decommissioning of nuclear facility foreseen in the plan. With the purpose to protect money from financial reserve from inflation and receiving additional source these money could be put up by the authorized central executive authority into securities that are emitted by the State.

Non-purposeful use of the money from special account is prohibited as well as the imposing of any penalties over the money from financial reserve. Operations with special account can not be stopped.

In 2005 and 2006 NNEGC ENERGOATOM transferred 566,8 billion hryvnas (more than 100 billion US dollars) to the special fund of State budget.

In the development of the mentioned Law the following documents were prepared and approved by the Cabinet of Ministers of Ukraine:

- Procedure for review and approval of plan on nuclear facility decommissioning;
- Provisions on special account of the operating organization (operator);

– Procedures for establishing the amount of deductions of the operating organization (operator) to special account;

– Procedure for establishing of the supervisory council on control of the use and investing of money from the financial reserve.

Control over the use and investing of money from financial reserve should be performed by the Supervisory Council, which consists of 7 experts – authorized representatives of Ministry of Finance of Ukraine, Ministry of Economy of Ukraine, Ministry for Fuel and Energy, SNRCU, National Commission on regulation of electroenergetics, State Commission on Securities and Stock Market and operating organization (operator). The composition of the Supervisory Council is approved by the Cabinet of Ministers of Ukraine.

Financing of works on radwaste and SF management at ChNPP and radwaste management from the Exclusion Zone, generated as a result of Chornobyl accident, is done out of the State budget. At the site of the ChNPP and Complex "Vector" of SSE Technocenter in Exclusion Zone a number of international technical assistance projects is implemented for construction of infrastructure objects on SF, liquid and solid radwaste of ChNPP management.

F.2.3. Financial Provision for Appropriate Institutional Controls and Monitoring Arrangements for Period Following Closure of Disposal Facility

Financing of activity on institutional control and supervision during period after closure of radwaste depositories of SSE Complex and SSE Technocenter is performed out of the State budget. Financing of activity on institutional control and supervision of UkrDO "Radon" storages up to the time of radwaste removal and storage decommissioning is performed out of the state budget.

F.3. Quality Assurance (Article 23)

Development and implementation of quality assurance program on safety of SF and radwaste management is one of the conditions to obtain a license.

General information on functioning of management systems in the operating organization is given in sub-section F.3 of the NRU-2003.

Management system functioning of the licensees must correspond to the requirements of the national standard ISO 9000-2001. Compliance is examined by the regulatory authority during planned inspections -ups and when license is extended.

Management system at SSE ChNPP

Management system of ChNPP was developed in 2003 and is functioning. It is described in "General quality manual of ChNPP" and processes procedures as required by the standard ISO 9000.

According to the requirements of legal acts, norms, rules and standards on nuclear and radiation safety the following was developed: "Manual for radioactive waste management", "Manual for spent fuel management", and manuals for each stage of lifecycle of facilities of:

Interim storage facility for spent nuclear fuel (SFSF-2);

Liquid radwaste treatment plant of ChNPP (LRTP);

Industrial complex on solid radwaste management of ChNPP (ICSRM).

To assess the efficiency of the management system, reveal non-correspondence of procedures, processes, services to the established requirements, define grounds for revealed non-correspondences, check-up and estimate the effectiveness of corrective measures and reporting to

the management of the enterprise on quality issues at SSE ChNPP an independent assessment (internal audits) is performed on a regular basis according to the standard of the enterprise "Internal audit. Methodology".

Based on the procedures in forces at SSE ChNPP management system is constantly approved.

Management system for operation of research reactors.

During 2005-2008 in SUNEI (Sevastopol) and NASU INR (Kyiv) basic documents of the management system were developed and introduced, they correspond to the requirements of ISO 9000, basic regulatory requirements and the recommendations of the IAEA.

State specialized enterprises for radioactive waste management – SSE Technocnter, SSE Complex, SISP UkrDO "Radon" developed and introduced corresponding systems of quality management to provide for safety of licensing activities. These management systems: correspond to the ISO 9000 standard; take into account all necessary processes influencing radiation safety; define functions and responsibilities; contain necessary provisions, procedures and instructions; outline internal mechanisms that provide for constant improvement of management system and safety enhancement.

NNEGC ENERGOATOM forms policy in the area of quality management based on its own experience and experience of operating organizations, which perform activities in the area of radwaste management in other countries.

The structure of management system documentation consist of: General Quality Manual of SE NPP; guiding documents – standards of the enterprise, provisions on quality assurance; working documents that define performance procedures (regalements, instructions on operation, maintenance, technical support, testing programs, methodologies and other); records with information on implemented work, results of revealed non-correspondences and their elimination (radwaste logbook, measurement protocols, defects register, operation log book etc.)

Based on the results of audit at SE RNPP, performed by company TUV, corresponding certificate was issued in 2007.

F.4. Operational Radiation Protection (Article 24)

F.4.1. Radiation Protection of Workers and Public

State hygienic normative "Norms of Radiation Safety in Ukraine (NRBU-97)", which is obligatory, establish the following limits of the individual effective dose:

Table F.4.1. Dose limits (mSv·per year^{-1})

	Category of exposed persons		
	А [а) б)]	Б [а)]	В [а)]
DL_E (limit of an effective dose)	20 [в)]	2	1
Limits of an equivalent dose of external exposure:			
- DL_{lens} (for lens)	150	15	15
- DL_{skin} (for skin)	500	50	50
- DL_{extrim} (for hands and feet)	500	50	-

Notes:

a) - the distribution of dose during a calendar year is not regulated;
b) - for the women childbearing age (till 45 years) and for the pregnant women the limitations of article 5.6 of NRBU-97 are in force;
c) - average for any successive 5 years, but no more than 50 mSv for separate year.

With the purpose of radiation protection of population, the quote of population exposure dose limits are established for releases and discharges, which constitute for nuclear facilities 80 μSv/year and 40 μSv/year for operating radwaste management facilities. Based on the quote of dose limits for each facility, permissible discharges and releases are determined, exceeding of which is not permitted in normal operation.

Dynamics of releases and discharges from NPPs of Ukraine during the reported period is shown on pictures L.8.3 – L.8.12 of the Annex 8 to this Report.

At the facilities for SF and radwaste management the radiation-dosimetry control is carried out, which includes individual dosimetry control and is based on the regulations in force.

Based on the data of radiation-dosimetry control at NPPs of NNEGC ENERGOATOM, objects of SUNEI and NASU INR for the period 2005-2007 the following conclusions could be made:

– the reference levels of individual equivalent doses for personnel of categories A and B were not exceeded in the reporting period;

– the reference levels of radionuclide concentrations in the air of working areas were not exceeded at any enterprise;

– the radiation safety of individuals (the public) living nearby the associated enterprises met the standards and rules in force.

Based on the data of radiation-dosimetry control at the enterprises of the Exclusion Zone during 2005-2007 there were no cases of exceeding dose limits of personnel exposure.

Analysis of distribution of individual personnel doses, who participate in activities with radwaste management shows that considerable part of the personnel incur doses less than 10 μSv/year.

The dynamics of average annual individual doses of personnel of NNEGC ENERGOATOM (during 2001-2007), SSE Complex (during 2001-2007), SSE ChNPP (during 2005-2007) is shown on the picture L.8.1 of the Annex 8 to this Report.

The figures of collective doses of personnel while implementing works on SF storage in SFSF of SE ZNPP are shown on the picture L.8.2 of Annex 8 to this Report.

F.4.1.1. Application of ALARA Principle

The Law of Ukraine “On the Use of Nuclear Energy and Radiation Safety” and norms on radiation safety in Ukraine define principle of optimization as one of the key principles of radiation protection. The principle of optimization obliges the licensee to reduce doses of current exposure of population and personnel, including collective doses, as well as the probability of critical events and doses of potential exposure, to the as low as achievable level taking into account social and economic factors.

Key instruments on optimization of radiation protection in Ukraine are:

– application of reference levels (RL) of personnel exposure and RL of releases and discharges;

– application of administrative-technological levels of releases and discharges (investigation levels) at the level two-three times lower than reference levels (for additional control of technological regimes of equipment at each NPP);

– upgrading of monitoring systems devices, as well as the methodological, metrological software;

– introduction of management system in the area of radiation protection.

The values of RL are established by the licensees based on the achieved level of radiation protection and should be reduced if safety is improved. The SNRCU controls management of RL, meaning establishing RL at the level close to the analogue practices, as well as the compliance with the established RL. Any case of exceeding of RL is investigated by the licensee, report and corrective measures are analyzed by the SNRCU.

Application of optimization principle allows to hold individual personnel doses at the reasonable lowest level (usual annual doses constitute 3-4 μSv), constantly reduce collective dose (see Annex 8 to this Report) and maintain levels of NPPs discharges and releases at percentage portion level of established limits.

Adherence to the optimization principle by licensee is checked in the process of supervisory activity and in particular through analysis of annual reports.

With the purpose to assess the efficiency of application of optimization principle in Ukraine the dose registers are functioning at each NPPs, for workers of the Exclusion Zone and medical personnel.

F 4.1.2. Observation of Basic Dose Limits

One of the key principles of radiation protection in Ukraine is a principle of non-exceeding the established dose limits (see table F.4.1. in sub-section F.4.1. of this Report).

Analysis of individual doses distribution of Ukrainian NPPs personnel shows that the most part of NPP personnel have doses lower than 10 μSv/year, and percentage ratio of number of individuals at NPP who have doses higher than 15 μSv/year not-exceeds 0,5 %.

The personnel of SISP UkrDO "Radon" have doses lower than 5 μSv/year.

The average annual individual dose at SSE Complex, which is located in the Exclusion Zone did not exceed during last three years 2 μSv/year (the dynamics of average annual individual doses of SSE Complex personnel for the period 2001-2007 is shown on picture L.8.1 of the Annex 8 to this Report).

Based on the data of the Ministry of Health in Ukraine there are almost 42 000 subjects of individual dosimetry monitoring among them: 14 650 – employees of the NNEGC ENERGOATOM; more than 9 000 medical workers (radiologists); staff of the enterprises of the Exclusion Zone, including ChNPP and Shelter; other industrial and scientific institutions.

With the purpose to obtain, accumulate and unify the information on actual exposure doses of any individual during certain period of time to solve issues of social protection, compensatory payments, health improvement measures, prevention of professional diseases and others the State Program on Safety Enhancement, Work Hygiene and Industrial Environment for 2008-2012 foresees measures connected with the establishment of the Unified State System for account and control of personnel exposure doses aimed at provision and guaranteeing according to the legislation on force of appropriate level of radiation protection of workers in different areas and at the enterprises despite the type of ownership.

F.4.1.3. Prevention of Unplanned and Uncontrolled Releases of Radioactive Materials into Environment

To prevent the unplanned and uncontrolled releases and discharges of radioactive materials into the environment there are technical means at NPPs and relevant operational procedures are introduced. To control the technological regimes of the equipment there is a multi-level system for prevention of emergency situations at each NPP:

1 level: the administration of each NPP established administrative-technological levels of releases and discharges so called "investigation levels" (see sub-section F.4.1.1). The exceeding of these levels is investigated by the commission of SE NPP with involvement of representatives from directorate of NNEGC ENERGOATOM and based on the results of investigation corrective measures can be applied, if necessary.

2 level: establishment of reference levels, quantitative indexes, which reflect achieved level of radiation safety at NPP. Reference levels are to be agreed regulatory authorities. In case of their exceeding the Administration of NPP conduct an investigation and its results are submitted to the regulatory authorities for making relevant decision. .

3 level: establishment of limits of discharges and releases based on the dose limit quote. The exceeding of admissible levels under normal operation is not allowed.

The order of radiation monitoring, which is performed by SSE Ecocenter in the Exclusion Zone, foresees the control of discharges and releases into the environment by the enterprises that perform radwaste management.

F.4.2. Limitation of Discharges and Releases

Based on the quote of population exposure dose limits (for nuclear facilities 80 μSv/year and for operating points for radwaste management – 40 μSv/year) for each separate object permissible discharges and releases are determined, exceeding of which is not permitted in normal operation.

Based on the results of radiation monitoring, in the reported period there were no cases of exceeding the reference levels of discharges and releases at the operating nuclear facilities including SF storage facilities and radwaste incineration facilities. At the enterprises on radwaste management the discharges and releases of radioactive materials into the environment are not foreseen in the technology of radwaste storage and disposal.

The dynamics of discharges and releases at NPPs of Ukraine during the reported period is shown on pictures L.8.3 – L.8.12 of Annex 8 to this Report.

F.4.3. Corrective Measures to Control Unplanned or Uncontrolled Release of Radioactive Materials into Environment and Mitigation of Its Effects

Requirements and approaches on protection of personnel and the population in case of unplanned or uncontrolled release of radioactive materials did not change in the reported period.

The protection of personnel and the population in case of unplanned or uncontrolled release of radioactive materials is regulated by Articles 7 and 8 of the Law of Ukraine "On Human Protection Against Impact of Ionizing Radiation" and norms on radiation safety of Ukraine.

When planning and fulfilling the intervention in case of unplanned or uncontrolled release of radioactive material the principles of justification, limitation and optimization are applied. The regulations establish quantitative criteria – intervention levels and action levels; the definitions of unjustified, justified and unconditionally justified intervention and the procedure for intervention stoppage.

To provide for personnel and population protection in case of unplanned or uncontrolled release of radioactive materials into the environment the operating organizations developed, introduced and provide constant readiness to implement Action plans on protection of personnel and the population aimed at return to the controlled NPP status and reduction of accident consequences. The Action plan foresees relevant actions, intervention levels, response procedures, forces and means for its implementation, organization and procedure for monitoring of the emergency situation development.

Regional authorities on response in case of emergencies introduce and secure constant readiness to implement Action plan on population protection, which is aimed at protection of population in case of radioactive exposure danger. It foresees organization and procedure for all services and organizations of the region, means for protection of population, elimination of accident consequences and monitoring of situation development and accident consequences.

To support constant readiness in case of an accident or other emergency situation the Action plans are periodically reviewed and are corrected if necessary. Technical means of personnel notification are periodically checked and tested for efficiency.

To prepare for actions under emergency circumstances the emergency trainings at all managerial levels are conducted.

Around each NPP site within 30 kilometers radius and in the Exclusion Zone the measures of radiation monitoring of the environment are performed and threshold detectors of exposure dose rate are installed.

F.5. Emergency Preparedness (Article 25)

F.5.1. On-site and Off-site Emergency Plans. Testing of Emergency Plans

The system of emergency preparedness and response in case of a nuclear or radiation accidents in Ukraine is an integral component of the Unified State System for Prevention of and Response to Man-Induced and Natural Emergencies (hereinafter - USSE). This system covers facilities on SE and radwaste management, use of ionizing radiation sources and transport of radioactive substances. Detailed information on the USSE structure, tasks and operating modes is given in NRU-2003.

The system improvement was continued during the reported period.

With the purpose of further improvement of cooperation between the Ministry of Emergencies and the SNRCU in the area of informing on emergencies, the Procedure for interaction between the SNRCU and the Ministry of Emergencies in the abovementioned area was updated and approved by the joint Order in 2006. This procedure is developed pursuant to the Resolution of the Cabinet of Ministers of Ukraine "On Designation of the National Competent Authorities on Fulfilling the Obligations under International Conventions in the Area of Nuclear Energy Use".

According to the Resolution of the Cabinet of Ministers of Ukraine "On Approval of Measures for Implementation of Action Plan Ukraine-EU in 2007" and under the sub-task 3.2 of the TACIS UK/RA/06 project "Further development of the Regulatory Authority of Ukraine transferring Western European regulatory methodology and practices", the Provisions on training of experts, who participate in the SNRCU emergency response in case of a radiation accident or threat of a radiation accident or other dangerous event was developed and approved by the SNRCU order. In the frame of mentioned TACIS project the training materials were developed, which were used in 2007-2008 for conducting training workshops for staff involved in work of the SNCRU Information and Emergency Center (hereinafter - IEC). List of issues on emergency

preparedness and response was included to the individual programs for special training of state inspectors on nuclear and radiation safety.

Requirements to the on-site emergency plans of any facilities, where practice with involvement of radiation-nuclear technologies are performed, including facilities for SF and radwaste management, are set in the Norms on Radiation Safety of Ukraine and "Radiation Accident Response Plan", that was put into force by the joint Order of the SNRCU and the Ministry of Emergencies in 2004. Information on contents of emergency facilities` on-site emergency plans, procedure of their development and testing during emergency exercises is given in NRU-2003.

During the reported period the operating organization NNEGC ENERGOATOM updated the "Model Emergency Plan for Ukrainian NPPs", " NNEGC ENERGOATOM Response Plan in Case of an Accident and Emergency at NPPs of Ukraine" and NPPs` On-site Emergency Plans to meet requirements of the "Radiation Accident Response Plan" as well as the "Main Sanitary Rules on Radiation Safety in Ukraine" and "Main Provisions of the Organization of Preparedness and Response System of NNEGC NERGOATOM in Case of an Accident and Emergency at NPPs of Ukraine". In particular, these requirements are applied to emergency classification procedure in the plans and actions to be performed depending on announced emergency class.

In 2008, according to the requirements of the "Radiation Accident Response Plan", the Ministry of Emergencies approved the "Model Response Plan to Radiation Accidents of Territorial Sub-systems of the Unified State System of Civil Protection of Population and Territories", all or a part of territory of which belong to NPP Observation Zone. The objective of the model plan is to provide territorial sub-systems of regional and local level with the same requirements to the structure, content and format of the response plans that correspond to the requirements of the legislation in force in the area of civil protection and radiation safety.

F.5.2. Preparation and Testing of Emergency Plans in Ukraine As Can Be Affected in Radiological Emergency at Spent Fuel or Radioactive Waste Management Facility in Vicinity of Its Territory

"Radiation Accident Response Plan" establishes requirements on conduct of planned emergency exercises at all USSE levels with the purpose to test coordination of on-site emergency plans of enterprises with response plans of other structural USSE units and work out personnel actions in case of accident.

To train NPP personnel to act in emergency circumstances, improve knowledge and skills on accident localization and mitigation of its consequences as well as the testing of emergency response plans, full-scale NPP emergency exercises are conducted periodically.

In November 2006 such an exercise was held at ZNPP, in March 2008 - at KhNPP. During these exercises the SNRCU`s IEC was activated and SNRCU resident on-site inspectors participated in exercises directly at NPP sites.

In 2007-2008, SNRCU participated in two full-scale emergency exercises at the research reactor WWR-M of the NASU INR with full activation of its IEC. SNRCU representatives observed exercises directly on the NASU INR site.

During the reported period the representatives of the state inspectorates on nuclear and radiation safety at NPPs participated in NPPs` emergency exercises with the aim of regulatory assessment of personnel actions and NPP emergency response system as a whole. 481 emergency exercises were attended in 2006, 39 of which are plant level exercises. During the year of 2007 356 emergency exercises were attended, including 41 plant level exercises. Since the beginning of 2008, 55 emergency exercises were attended, including 28 plant level exercises.

Resources of the emergency response system may be used to respond to emergencies in other countries with potential radiological impact on the territory of Ukraine.

Detailed information on SNRCU activities as a competent national authority and point of contact in terms of the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency as well as international agreements with other countries, that envisage mutual early notification and follow-up information exchange in case of a nuclear accident or radiation emergency is given in NRU-2005.

As of 1 January 2008, Ukraine signed 13 intergovernmental agreements with other countries, which envisage mutual early notification and follow up information exchange in case of a nuclear accident or radiation emergency. Such agreements were signed with Sweden, Republic of Turkey, Republic of Belarus, Slovak Republic, Hungary, Finland, Norway, Poland, Latvia, Germany, Austria, Bulgaria and Romania.

According to these agreements regular communication tests with relevant competent points of contacts of these countries were carried out during 2006-2008. Additional communication tests with Poland, Latvia and Hungary were performed in the course of the IEC emergency exercises.

During the reported period the SNRCU participated in the IAEA emergency exercises ConvEx 1a, 2a, 2b, 2c, 3, which were conducted by the IAEA to test emergency communications between the IAEA incident and emergency center and national competent authorities under the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.

F.6. Decommissioning (Article 26)

Decommissioning of ChNPP Units

Decommissioning of ChNPP Units 1,2,3 with RBMK type reactors is performed by ChNPP in the frame of SNRCU license issued for the activity "decommissioning of nuclear facilities".

This license grants the right to the operating organization to perform the complex activities and operations connected with decommissioning of nuclear facilities including activities for operation termination stage.

This license sets the requirements to obtain for the SNRCU separate written permissions for:

– each next stage of decommissioning;

– performing of particular activities or operations connected with designing, constructing, commissioning and operation of facilities, designed for radwaste management and performing the complex activities aimed at release the existing facilities from spent and fresh nuclear fuel, liquid and solid radwaste, accumulated during the operational period of ChNPP.

At the time of issuing license for performing the activity "decommissioning of nuclear facilities" it was foreseen to decommission the following nuclear facilities, spent nuclear fuel and radwaste management facilities situated on the ChNPP site:

1. NPP Units – 1, 2, and 3.
2. SFSF-1

It was planned to decommission SFSF-1 after transferring from it the spent nuclear fuel to the SFSF-2, which should have been constructed by 2004. But the completion of SFSF-2 project is delayed and its construction will be completed not earlier than 2013. Taking into account that transferring of spent nuclear fuel to SFSF-2 will require ~ 8÷9 years, it is necessary to provide the operational safety of SFSF-1 at least during 15 next years.

Due to this, in June 2008 the SNRCU Board accepted the decision to withdraw operational conditions for SFSF-1 operation from the license for performing the activity "Decommissioning of ChNPP" and providing the SSE ChNPP with separate lifetime stage license "operation of nuclear facility SFSF-1". The licensing process of SFSF-1 is described in details in sub-section G.2.3 of this Report.

3. Temporary storages for liquid and solid radwaste.

Other objects of general plant purpose such as auxiliary, electro technical and hydro technical buildings, cooling pond are also subject to decommissioning.

Destroyed in the beyond design-basis accident ChNPP Unit 4 (Shelter) is situated on NPP site. Shelter by status is a nuclear-dangerous facility and temporary storage for disorganized radwaste. The Shelter activities are qualified as its transformation into an ecologically safe system. These activities are regulated by the separate license –for operation of Shelter.

Spent nuclear fuel and radwaste management facilities have not being yet commissioned at the SSE ChNPP site. (see sub-section B 4.2 of this Report). SSR ChNPP still remains at the preparation stage: the SF that is out loaded from all three NPP units remains in the SF cooling ponds until the SFSF-2 commissioning.

The activities at the SSE ChNPP site are planed and performed in accordance with "Complex decommissioning program of ChNPP" (further - "Decommissioning Program"). The objective of Decommissioning Program is the solution of all problems in complex: operation termination, decommissioning of ChNPP and transformation of Shelter into an ecologically safe system, including related social aspects.

Existing Decommissioning Program contains detailed description of activities for the period till 2012. The specified amount of activities and funding substantiation is provided in Annual action programs, approved by the state managing authority - Ministry of Emergencies.

The main objectives of SSE ChNPP activity within the last 3 years were and still remain:

- support NPP units in safe conditions;
- constructing of facilities for decommissioning;
- out loading of SF (the main activity, which defines the duration of preparation stage for decommissioning);
- the final stop of systems and elements;
- reconstruction of life support system for decommissioning purposes;
- complex engineering and radiation expertise;
- development of documentation for decommissioning;
- dismantling of external reactor equipment;
- removal of accumulated radwaste from power units .

In March 2008 SSE ChNPP completed the development and agreement with SNRCU of "Decommissioning program of ChNPP" prepared on the basis of "Concept on ChNPP decommissioning", which:

- contains the detailed description and substantiation of chosen decommissioning strategy of ChNPP Units – "the delayed dismantling", which foresees the following stages:
    - final closure and conservation of reactor units – 2013-2022;
    - preservation of reactor units - 2022-2045;
    - dismantling of reactor units - 2046-2064,
- defines the sequence, duration and general content of stages with the description of qualitative condition of the facility after each stage,
- contains the information necessary for applying of this document as a Manual for decommissioning of ChNPP Units,

- sets the hierarchical system of documentation (from general to detailed), which should be developed in the frame of decommissioning:
    - Concept on ChNPP decommissioning (developed),
    - Program on ChNPP decommissioning (developed),
    - Project(s) on decommissioning and development within these projects 1) documents justification the safety of activities in frames of decommissioning and 2) Action program for each stage,
    - working documentation (will be developed if necessary),
    - separate Action implementation projects (will be developed if necessary).

The main objective of Decommissioning Program – to provide the strategic level of activity planning, expenses and human recourses estimation including all necessary substantiations with sufficient detailed elaboration, which will allow to develop the Project of decommissioning. The "Program of ChNPP decommissioning" can be periodically specified after performing expertises and accumulating information and data during the units decommissioning.

In the frame of realization of Technical Cooperation Program with the IAEA SSE ChNPP organized in Ukraine in 2008 the Expert mission for review and discussion of SSE ChNPP proposals to the structure and content of the document "Project of decommissioning. The stage of final close and conservation of ChNPP Units 1,2 and 3". As a result of the mission the IAEA experts provided the report with recommendations. It is planned to develop this Project in the period till 2011.

Planning of decommissioning of the operating NPPs in Ukraine

The design life-time of the first three power units at the Ukrainian NPPs will expire after 2010:

- RNPP-1, WWER-420/213 – December 2010;
- RNPP-2, WWER-420/213 – December 2011,
- SUNPP-1, WWER-1000/302 – December 2012.

The design life-time of other 10 WWER-1000 units will expire within 2014-2025. The design life-time of two new WWER-1000 units (KhNPP Unit 2 and RNPP Unit 4) will expire in 2034.

The Law of Ukraine “On Settlement of Issues Related to the Nuclear Safety Provision” defines the necessity to develop the following documents in the area of nuclear facilities decommissioning:

- Concept for Decommissioning of Nuclear Facilities,
- Projects for Decommissioning of Nuclear Facilities.

As a part of developing the existing “Concept for Decommissioning of Operating Nuclear Power Plants of Ukraine” (2004) NNEGC ENERGOATOM within the last three years developed and agreed with SNRCU “Concept for Decommissioning of SUNPP Units". The state expertise of nuclear and radiation safety of the Concepts for Decommissioning of ZNPP, KhNPP and RNPP is under way.

On 18 February 2008 the regulatory document of Ministry of Fuel and Energy "The Project of decommissioning of the NPP Unit. Requirements to content and structure" entered into force. NNEGC ENERGOATOM started the development of the project for decommissioning the RNPP Units 1,2.

During 2008-2009 NNEGC ENERGOATOM plans to develop requirements to the program documents necessary for obtaining a license for the stage "decommissioning of nuclear installation", in particular:

– Requirements to the structure and content of the program for radwaste management while decommissioning the NPP Unit;

– Requirements to the structure and content of the program for radiation protection and monitoring of the environment while decommissioning the NPP Unit;

– Requirements to the structure and content of the Action plan in case of radiation accident;

– Requirements to the structure and content of the Program for quality management in the process of decommissioning of the NPP Unit

Planning of decommissioning of the research nuclear reactors of Ukraine

In Ukraine there are two research nuclear reactors: in Kyiv and Sevastopol.

NASU INR operates the research reactor WWR-M on the basis of SNRCU license. In 2007 according to the license conditions the Institute developed and submitted for approval to the SNRCU "The Program for decommissioning the research reactor WWR-M" (further - "Program"). It should be noted that in the frame of IAEA project RER/3/005 “Support in Planning the Decommissioning of Nuclear Power Plants and Research Reactors“ it is foreseen to perform IAEA Expert mission to review the Decommissioning program for research reactor WWR-M in Kiev.

The SUNEI operates the research reactor IR-100 on the basis of SNRCU license. According to the license conditions the University develops the Decommissioning program for research reactor IR-100. The approval and entering into force of the Program is planed for 2009.

Planning of decommissioning of radwaste management facilities – facilities for radwaste processing

According to the requirements of regulatory document "Requirements to the structure and content of SAR for radwaste processing facility" the SAR for radwaste processing facility must contain the chapter on decommissioning. According to the requirements of this document this chapter describes possible decommissioning options, estimates each of them from the point of safety and radiation protection. The chapter contains the estimations of radwaste amounts and characteristics, that can appear while facility decommissioning, results of radiation exposure calculations for personnel, scheme of radwaste management. The information on further site usage is also provided.

Planning of decommissioning of radwaste management facilities – radwaste storages

At the beginning of 2008 the SNRCU approved and registered in the Ministry of Justice the regulation "Requirements to the structure and content of SAR for radwaste storages". According to the requirements of this document the SAR for radwaste storage must contain the chapter on decommissioning. According to the requirements of this document the chapter must contain possible concepts of storage decommissioning, possible methods of radwaste retrieval from the storage modules, the amounts of dismantling and decontamination of technological equipment of auxiliary systems, buildings and constructions, that provided storage operation, treatment of storage site and tentative amount and characteristics of radwaste generated.

The results of personnel dose exposure calculations are provided, the optimal from safety, radiation protection and economic point of view scheme on radwaste management is described. The information on further storage site use is also provided.

It should be noted that SNRCU didn’t issue the separate licenses for liquid and solid radwaste storage operation, that operate at the NPP sites. Their safe operation is substantiated in

SARs and is performed in the frame of existing operational license of NPP Units. The decommissioning of these storages is described in Concepts on NPP decommissioning.

In case of new radwaste storage facility construction the SNRCU will require to include into the SAR specific part for decommissioning. Now SSE ChNPP developed the SAR for temporary storage facility of high, low and intermediate level long-lived radwaste as a part on industrial complex of solid radwaste processing at ChNPP, which contain chapter about future decommissioning of this storage facility (decommissioning activity description, management of radwaste generated during decommissioning, provision of personnel radiation protection that perform decommissioning activities are described).

F.6.1. Ensuring Qualified Staff and Adequate Financial Resources for Decommissioning

As it was mentioned in sub-section F.6. of this Report the only operating organization in Ukraine – SSE ChNPP – has the license to perform activities at stage of life cycle of the nuclear facility "decommissioning." One of the requirements of this license was to create and establish at the enterprise the effective structure management scheme, which would allow to realize the planned actions timely and in qualitative manner.

Taking in consideration that the decision on decommissioning of ChNPP Units was accepted before the end of designed life-time (so called "pre-schedule operation termination") beginning from 2000 the organizational structure of SSE ChNPP management changed several times.

In 2008 SSE ChNPP began the introduction of substantially new – design oriented organizational structure of enterprise management – which was developed taking into account the accumulated experience of management of practical activity, international experience on decommissioning, recommendations of the IAEA experts. The design oriented organizational structure of enterprise management is directed, first of all, at the effective planning and successive introduction of projects and activities within the framework of ChNPP Units 1,2,3 decommissioning and transformation of Shelter into ecologically safe system, including co-ordination and control after implementation of these projects and activities.

At this time, SSE ChNPP is provided with the necessary amount of skilled personnel, including personnel for SF and radwaste management (on 01. 06.2008 the number of personnel of SSE ChNPP constituted 3555 people), among them:

35,9% - with high education;

19,8% - with special education;

74,5% - with experience of work more than 10 years.

Professional training of personnel at SSE ChNPP is directed at forming high professionalism, modern economic way of thinking, ability to work in new economic conditions. Basic principle, which provides the level of qualification of personnel of SSE ChNPP is the principle of continuous professional training. A technical director (chief engineer) carries out the direct management of professional training and co-ordinates the support of personnel qualification at the enterprise.

During the last three years SSE ChNPP continued to carry out measures to provide the enterprise with properly qualified personnel. The training of SSE ChNPP personnel was conducted using available SSE ChNPP resources, and also within the framework of projects for construction of new radwaste management objects. This staff was involved in building of objects and will work on these facilities after their commissioning. Training was carried out and is carried out in two directions: theoretical training and practical mastering the special technologies

and skills of labour with working through on radwaste models and imitators, and also during conducting of individual and complex tests of installed equipment.

The upgrading of level of worker's skills was carried out by involving of new specialists into industry of radwaste management and radiation safety, re-qualification of personnel, studies in a training center and during the training courses.

Thus in accordance with SSE ChNPP regulations and procedures the verification of personnel skills was conducted periodically.

According to the Law of Ukraine "On General Principles of Further Operation and Decommissioning of ChNPP and Transformation of Destroyed NPP Unit 4 into the Ecologically Safe System", financings of preparation to the decommissioning and decommissioning of ChNPP units and providing of social protection of ChNPP personnel is carried out from the State budget of Ukraine, costs of the operating organization and also international technical assistance and voluntarily payments of legal or physical entities.

F.6.2. Operational Radiation Protection, Minimisation of Discharges, Unplanned and Uncontrolled Releases during decommissioning

According to the current regulatory framework the operating organization before the beginning of decommissioning activities must adapt the program of radiation protection to the new conditions. During decommissioning the radiation monitoring of individual doses of personnel exposure, radiation state of premises, discharge and release of radioactive materials into the environment must be provided.

The limits of radiation dangerous factors are administratively set at SSE ChNPP which include:

- reference levels of radiation safety for personnel;
- technological levels of radiation factors for separate territory zones and premises.

Reference levels of radiation safety determine:

- levels of effective doses of external and internal exposure;
- levels of exposure dose rate and radioactive contamination of surfaces in working area;
- levels of radioactive contamination of air and drinking-water;
- levels of radioactive discharges and releases.

Reference levels are set as low as it is practically achievable, taking into account controlled parameter level at normal operation and not exceeding 70% from the value of the correspondent limit.

Technological levels of radiation factors for the separate territory zones and premises are used for zoning of territories and premises aiming to optimize exposure of personnel while performing activities. These technological levels set average annual parameters:

- dose rate of gamma radiation;
- beta particles flux;
- specific activity of aerosols of alpha and beta long living radionuclides.

The set limits of control and technological levels are subject to the revision every three years taking into account the actual level and change of radiation situation.

Radiation protection of personnel and population at the SSE ChNPP site at the stages of operation termination and decommissioning is provided accordingly to the Radiation Control Manual, which sets the requirements to the volume and periodicity of radiation control using stationary automated systems, individual and portable equipment, laboratory methods.

Analysis of distributing of average individual doses of SSE ChNPP personnel participating in decommissioning activities at the stage of operation termination (see the sub-section F.4.1 of

this Report) demonstrates that overwhelming part of personnel have individual effective doses less than 10 μSv/year (the reference level of individual effective dose of personnel exposure is 17 μSv/year).

Permissible annual releases of radioactive materials to the atmosphere and permissible discharges to water bodies are set on the basis of effective dose limit quota for the Chornobyl NPP and the value of 40 μSv/year for inhalation intake and 10 μSv/year for ingestion intake. The reference levels for discharges of radionuclides with drain waters and releases to the atmosphere do not exceed 70% of the permissible levels.

Control of discharges and releases is carried out by the stationary systems.

Permissible levels of releases are set by the document "Permissible gas-aerosol releases of radioactive materials of SSE Chornobyl NPP".

Permissible levels of discharges are set by the document "Permissible water discharge of radioactive materials of SSE Chornobyl NPP".

In the reporting period, radioactive discharges to open water bodies were absent. Discharges of radioactive materials to the cooling pond constituted only residual accident contamination drains, which were discharged through the industrial storm sewage system with monitoring of activity concentration of radionuclides.

The dynamics of gas-aerosol releases to the atmosphere and permissible discharges to the cooling pond is shown on pictures L.8.11 – L.8.12, Annex 8 of this Report.

Thus, the analysis of annual radiation safety reports of SSE ChNPP shows that during the report period permissible reference levels were not exceeded.

F.6.3. Emergency Preparedness

With the purpose to minimize radiation influence on the personnel, population and environment in case of accident or emergency situation on SSE ChNPP site the "ChNPP Plan of Response to Accidents and Emergencies" is developed and entered into force. This document regulates organizational, technical, radiation-hygienic, evacuation and other activities in case of emergency.

The emergency brigades and groups are created at SSE ChNPP. The personnel of emergency brigades and groups is equipped with dosimetry devices and devices of chemical exploring, necessary for liquidation of emergencies, means of individual protection and medicines.

The basic types of SSE ChNPP personnel trainings in case of accident or emergency are trainings, accident exercise of operative personnel, emergency brigades personnel, self studies.

In the process of preparation and carrying out of trainings the issue of co-operation and co-ordination of actions is worked through, including issues of coordination and co-operation with forces of regional subsystem of the USSE.

Specialists of emergency preparedness and response division perform annual revision of preparedness ChNPP divisions to the actions in case of emergencies, availability and storage conditions of emergency-technical resources and emergency kits.

On CHNPP three protective buildings are supported in readiness with the automated stand alone systems of energy supply and ventilation.

SSE ChNPP carries out transmission to the SNRCU of operative and monthly reports about emergency situations, emergency readiness condition.

F.6.4. Records of Information Important to Decommissioning

Records of Information Important to Decommissioning of ChNPP Units 1,2,3

Creation of integrated data base of Shelter

The integrated data base of Shelter is introduced. One of its objectives is "Documentation and archives management" with the purpose of conducting the documentary account of information important for Shelter transformation, creation of lists and archives of important documents. These documents consist of technological, normatively technical, legislative documents, drafts, charts, pictures and other information.

Basic system functions:

– Storage of Shelter transformation documents and transforming them into electronic version with sorting by categories.

– Providing to system users any documents upon request in accordance with certain access rights.

– Document search by different criteria specified by users.

The system of informative support of ChNPP Units decommissioning

SSE ChNPP during next years plans to create the common informative system of decommissioning support. With the IAEA support (within the framework of project RER/3/005) the Technical and functional specifications for System of decommissioning informative support are developed. At present European Commission performs an international tender on creation of this system at ChNPP within the framework of international technical assistance.

In 2008 SSE ChNPP carried out activities within the framework of project “Inspection of critical elements of Units 1,2 to determine the remaining resource (hardware of reactors)”. This job is basis for decision making for reactors conservation and further long duration preservation.

Besides, SSE ChNPP actualizes data of complex engineer-radiation inspection, which will allow to specify the radiation condition of equipment and premises of ChNPP Units 1,2,3 and systematize information about engineering condition of equipment are carried out. Actualized data will give possibility to SSE ChNPP to define and/or specify the scope of activities at the stage of operation termination and the next stages of decommissioning.

Records of Information Important to Decommissioning of Ukraine’s NPPs operated by NNEGC ENERGOATOM.

NNEGC ENERGOATOM developed and approved an order "Decommissioning of NPP. Records of Information. Composition, order of collection, treatment and saving of information“ (standard of enterprise), implementation of which is obligatory for NPPs which belong to NNEGC ENERGOATOM.

Implementing the requirements of mentioned standard in 2008 SU NPP commissioned the automated support system of conducting of complex engineer-radiation inspection of power units. The objective of this system is:

- collection and sorting of information acquired as a result of conducting of complex engineer-radiation inspection of power unit, in relation to descriptions of radiation contamination of equipment, pipelines, premises, constructive elements of power unit buildings and also bordering NPP site territory,
- saving of design and operational documents.

As a result, measures to fulfill obligations according to the safety provisions in part of a responsibility of license holder, human and financial resources, quality management, radiation protection, emergency preparedness and decommissioning are performed at national level as well as at the level of facility.

Section G. SAFETY OF SPENT FUEL MANAGEMENT

G.1. General Safety Requirements (Article 4)

As stated in the NRU-2003, general safety requirements at all stages of spent fuel management are established by the Laws of Ukraine "On the Use of Nuclear Energy and Radiation Safety" and "On Permissive Activity in the Area of Nuclear Energy Use".

Requirements and rules for SF management are established by the regulations that cover issues of spent fuel management at NPP sites and units, research reactors and interim SFSF, these documents are as follows:

- "General Provisions for Safety Assurance of Nuclear Power Plants";
- "Rules for Nuclear Safety of WWER type reactors";
- "Rules for Nuclear Safety of Research Reactors";
- "Safety Rules for Nuclear Fuel Storage and Transport at Nuclear Power Facilities";
- "Basic Safety Rules for Dry Interim Spent Fuel Storage Facilities";
- "Requirements for Modifications of Nuclear Facilities and Procedure of Their Safety Assessment".

G.1.1. Criticality and Residual Heat Removal

According to the requirements of the above regulations, the effective neutron multiplication factor in SF management shall not exceed 0.95 in normal operation and design-basis accidents to be ensured by appropriate characteristics of the facilities. Subcriticality in SF storage is ensured by limitation of the FA layout pitch; fuel burn-up control (if burn-up is used as a parameter in nuclear safety justification); use of heterogeneous and homogenous absorbers and control of their absorbing capabilities; monitoring of the presence, status and composition of the cooling media in dry storage facilities; monitoring of process parameters of the SF management systems. According to the document «Basic Safety Rules for Dry Interim Spent Fuel Storage Facilities», subcriticality in dry interim SFSF shall be mainly ensured by the SF location geometry.

The design of spent fuel management systems provides for systems for residual heat removal and appropriate chemical composition of the heat-removing media to prevent increase of fuel cladding temperature and uncontrolled level of corrosion greater than the design values for normal operation and design-basis accidents. For facilities where SF is stored in water (reactor cooling ponds Units 1,2,3 and ISF-1 ChNPP), devices and systems are provided for supply, treatment and cooling of water, ventilation, monitoring of radioactivity, temperature, level, chemical composition of water and, if necessary, hydrogen concentration.

G.1.2. Minimization of Radioactive Waste Generation

The requirements for minimization of radioactive waste generation associated with spent fuel management have not changed in the reporting period (see sub-section G.1.2 of the NRU-

2003). According to the current document «Basic Safety Rules for Dry Interim Spent Fuel Storage Facilities», the operating organization shall develop a radwaste management program to determine measures on minimization of radwaste generation and ensure safety during radwaste collection, sorting, processing, storage and transfer for disposal.

G.1.3. Interdependencies Among Different Steps in Spent Fuel Management

The interdependencies between different stages in SF management are taken into account beginning from the design stage. The technical specifications for supply of fresh nuclear fuel contain requirements to storage of SF in cooling ponds, to the temperature of fuel elements cladding and terms of storage in dry type storages. Taking into account that in Ukraine a policy on final stage of SF management is not defined, today two modes are being implemented:

- "deferred decision" while designing and construction of dry type storages with storage life of 50-100 years in Ukraine;
- return to Ukraine of high-level radwaste after processing of SF for a final disposal.

The requirements for account of interdependencies of the different stages of SF management have not changed in the reporting period.

G.1.4. Radiation Protection of Personnel, Public and Environment

The radiation protection system of Ukraine is described in Section F.4 of this Report. Effective protection of individuals, society and natural environment is provided though implementation of requirements of norms, rules and standards of nuclear and radiation safety. These requirements are developed in accordance with recommendations of the IAEA, ICRP and other international organizations involved in safety issues in the area of the nuclear energy use.

G.1.5. Biological, Chemical and Other Risks

Biological, chemical and other risks that can be associated with SF management shall be taken into account in safety analysis and assessment of SF management facilities. Information on such risks is provided in accordance with «Recommendations on the Structure and Content of the Safety Analysis Report on Spent Fuel Storage Facilities».

The assessment of biological, chemical and other risks is also carried out within the comprehensive state review of documents of main design stages (feasibility study, draft, working draft) of SF management facilities.

G.1.6. Avoiding Reasonably Predictable Impacts on Future Generations Greater Than Those for Current Generation

Protection of future generations is considered in the safety analysis reports for SF management facilities, which should demonstrate that future protection of the public and personnel will not be lower than that at the beginning of operation. If necessary, processes inside the containment and degradation of fuel elements and SFSF components are researched during operation with the purpose of taking timely corrective measures (if needed).

G.1.7. Avoiding Undue Burdens on Future Generations

The policy of avoiding undue burdens on future generations is implemented through:

– application of effective quality management systems for: operators at all life stages of nuclear facilities; for the authorities of state administration, nuclear and radiation safety regulation;

– improvement and development of regulations in the field of nuclear and radiation safety;

– implementation of high culture of safety with the strict compliance with the norms, rules and standards of nuclear and radiation safety for present generation, which performs site selection, design, commissioning and operation of nuclear facilities and radwaste disposal storages;

– introducing of methodologies of long-term safety providing of facilities for radwaste disposal for the whole period of potential danger.

The issue of timely preparation of operators for decommissioning of nuclear facilities such as SFSF is vital due to the need to reduce the financial burdens on future generations.

For today this question is being resolved by practical introduction of the Law of Ukraine "On Settlement of Issues, Related to Nuclear Safety Provision" (see the section F 2.2 of this Report), in particular by:

– planning of future decommissioning, beginning from the design stage of nuclear facility;

– developments of decommissioning concepts, beginning from issuing of license for nuclear installation construction, including their periodical revision due to improvement of legislation, development of technique and technologies, emergencies which took place on nuclear facilities during its operation;

– timely development of decommissioning projects on the basis of the noted concepts of nuclear installations decommissioning;

– timely creation of financial fund for decommissioning with the purpose of funds accumulation during operation, necessary for financing of complex activities, foreseen by decommissioning project of nuclear facility;

– organization and performance of activities during the nuclear facility lifetime, related to collection, treatment, documenting and saving of information about facility, which can substantially influence the process of decommissioning (creation of bases (archives) and other activities).

A question of creation in Ukraine of radwaste management Fund is in the stage of decision – the proper is accepted by Verhovna Rada of Ukraine. Creation and accumulation of financial funds in this Fund will allow to provide the proper financing of activities, related not only to the problems of managing the of accumulated radwaste on the territory of Ukraine (radwaste of NPP, industry, Exclusion Zone, object "Shelter"), but also to implement measures which will allow present and future generations to solve the issue of treatment of low and intermediate level long-lived radwaste, and also high-level radwaste by creation of geological disposals.

G.2. Existing Facilities (Article 5)

SF management in Ukraine is carried out at facilities listed in Annex 1.

G.2.1. Spent Fuel Management at Nuclear Power Plants

As stated in previous NRU-2005, principal shortcomings, which would require modernization of the SF management systems at NPP were not revealed in the safety assessment at the Ukrainian NPPs. However, measures associated with SF management safety were taken. Modernization of the fuel cladding integrity monitoring system was started at NPPs of Ukraine. This modernization is intended to implement a sipping system for efficient monitoring of fuel

cladding integrity. This monitoring will take place directly in the refueling process and will include sampling from the refueling machine rod. In the reporting period the sipping system is put into commercial operation on RNPP Units 1,2 and into trail operation on RNPP Unit 4.

G.2.2. ZNPP Dry Spent Fuel Storage Facility

In the reporting period, the first line of ZNPP SFSF is in commercial operation. The results of operation provided by the operating organization demonstrate that that the SFSF complies with safety criteria set forth in the SFSF SAR and licensing conditions for ZNPP SFSF. During the SFSF operation the compliance of the SFSF design with basic safety principles and standards and rules of nuclear and radiation safety was confirmed. SFSF trial operation showed that all SFSF systems properly perform their functions.

However, taking into account operating experience and considering components of domestic production, the ZNPP SFSF design was modified. At present, ventilation concrete casks and multiplace sealed baskets for SF storage are manufactured solely at the Ukrainian enterprises, using local materials and technologies. The safety of the ZNPP SFSF design changes was properly justified in appropriate technical decisions, which were reviewed and agreed by the SNRCU.

Starting from the 14th container, all subsequent ZNPP SFSF containers were loaded with use of the burn-up credit method. The method was tried and implemented in Ukraine for spent fuel management on the basis of the technical decision agreed by the SNRCU “On Use of WWER-1000 Nuclear Fuel Burn-up as Nuclear Safety Parameter in ZNPP SFSF VSB Fuel Loadings (Trial Commercial Operation)”, since 2005- commercial operation started.

G.2.3. ChNPP Spent Fuel Storage Facility

SFSF-1

The pond-type storage facility (SFSF-1) for RBMK-1000 spent fuel located on the Chornobyl NPP site has been in operation since 1986. Due to the unavailability of SFSF-2 and taking into account the future prospects of this project it was decided to withdraw SFSF-1 from the list of facilities, subject to decommissioning according to the license for decommissioning of ChNPP nuclear facilities to license of SFSF-1 operation.

After development of documents, substantiating the safety of SFSF-1 operation SSE ChNPP applied for license.

The main document on safe operation of SFSF-1 was "Safety Analysis Report of SFSF-1".

SNRCU verified completeness of applied documents, performed state expertise with SSTC NRS/Riscaudit involvement and two inspections.

SNRCU recognized the SFSF-1 safety level and ability of SSE ChNPP to execute all activities on providing of safe operation and decided to issue the license to operating organization for activities on the lifetime stage "operation of nuclear facility – SFSF-1 ChNPP".

According to the license terms the next safety assessment of SFSF-1 must be performed until 31 of December 2012.

SFSF-2

SFSF-2 construction started in June, 2000 (Contract on design, construction and commissioning of SFSF-2 was signed in July, 1999). Consortium “FRAMATOME ANP” France

(Contractor) performed the project activities (in 2006 Consortium changed its name to AREVA NP).

The SFSF-2 was mounted in accordance to the "Grant Agreement (Project of nuclear safety for ChNPP) between EBRD as NSA fund manager, Government of Ukraine and ChNPP" ratified by the Law of Ukraine in 18 of March 1997. The project is financed by EBRD Fund "Nuclear Safety Account" created by donor countries.

SFSF-2 is designed for long-term storage (100 years) of all ChNPP SF and is a necessary condition for decommissioning of ChNPP Units 1,2,3 and SFSF-1.

The design capacity of SFSF-2 is 25000 of spent fuel assemblies and 3000 of spent additional absorbers.

At the beginning of April, 2007 the agreement between SSE ChNPP and consortium “FRAMATOME ANP” was concluded “On break-off of contract”. On the basis of this agreement in 23.04.2007 the uncompleted object SFSF-2 was transmitted to the Customer in its current condition.

In the middle of 2007 SSE ChNPP sent to EBRD the document “Assessment and recommendation concerning contracting with company Holtec International for completion of SFSF-2”. The objective of this document was to be presented on meeting of Donors Assembly for decision-making concerning further financing of SFSF-2 project. During the next meeting of the Donors Assembly the decision was accepted on financing of SFSF-2 project completion.

In September, 2007 SSE ChNPP and Holtec International concluded the contract for completion of SFSF-2 project.

In the framework of the noted contract the documents "Conceptual decision for modification of SFSF-2 project" Rev.0 and "Program of comparative analysis of standards" are developed.

G.2.4. Spent Fuel Storage Facility of NASU INR

The safety of SF management on the NASU INR site is justified in the Technical Safety Substantiation for the research reactor WWR-M agreed by the SNRCU. SF is stored in the reactor pond with distilled water ensuring biological shielding and heat removal from the SFA by convection. The required water quality in the pond is maintained by the ion-exchange filter. The SFA are placed in the pond in two layers. The subcriticality is ensured by the SFA layout pitch in the pond and by boron carbide absorbers. Modernization of the spent fuel management system is underway at the research reactor site in order to make this system more flexible, reliable, safe and cost-efficient. A package of documents justifying the safety of the SF management system modernization at the research reactor was considered and agreed by the SNRCU. The double block SF storage system will be realized, broadening the technical storage capacity and rising of storage safety. Both storages are situated inside of reactor building. The general technical means are used for their maintenance.

For 2009 it is planned to send the SF from the research reactor WWR-M of NASU INR to Russian Federation for processing.

G.2.5. Spent Fuel Management at SUNEI

Spent fuel is currently absent on the site of the Sevastopol University. If spent fuel was present there it would have been stored in the wet type reactor storage facility for spent fuel.

G.3. Sitting of Proposed Facilities (Article 6)

G.3.1. Evaluation of Site-Related Factors Likely to Affect Safety of Facility During Its Operating Lifetime

In the reporting period, the requirements for site-related factors that can affect safety of the facility during its service life have not changed. The information provided in sub-section G.3.1 of the NRU-2003 and NRU-2005 is valid at the present moment.

While developing the Evaluation of impact on the environment (EIE) which is a part of Feasibility study for Centralized SFSF of Ukraine (CSFSF) for NPP with WWER type reactors the evaluation of site-related factors for CSFSF is performed.

The Feasibility study for CSFSF defines the Exclusion Zone to be the most optimal for sitting of the storage. The approval of site will be performed according to the legislation.

G.3.2. Evaluation of Likely Safety Impact of Facility on Individuals, Society and Environment

According to the Article 51 of the Law of Ukraine "On the Protection of the Environment" the projects of economical and other activity must contain the Evaluation of impact on the environment and people health. The requirements to the composition and structure of EIE materials are defined by the State Constructions Norms of Ukraine "Composition and structure of EIE materials while designing and construction of enterprises, buildings and constructions. Main design rules".

According to the Law of Ukraine "On Ecological Expertise" the design materials of SF management facilities are subjected to the State ecological expertise, in particular EIE as a part of these design materials.

According to the requirements of the State Construction Norms of Ukraine the EIE contains Statement of ecological consequences. Statement presents the results of EIE and is a legal document for ecological consequences and guarantees of implementation ecological protection measures during all period of planned activities. The Statement should be made public through mass-media and submitted for following control to the local executive authorities.

To provide public with output information on the project activity the Customer of the CSFSF design – NNEGC ENERGOATOM and General contractor Kyiv Institute "Energoproekt" prepared “The Statement of ecological consequences of construction and operation of the Centralized storage of SF for RNPP, KhNPP and SUNPP of NNEGC ENERGOATOM”. The Statement is a resume of EIE materials. In accordance with Articles 8 and 10 of the Law of Ukraine “On Ecological Expertise” and Construction Norms, the Statement declares about performing of complex state expertise, including ecological expertise and expertise of nuclear and radiation safety, and also about performing the additional (non-governmental) expertise with participation of international experts. On 7 of March, 2007 this statement was published in a newspaper “The Governmental courier“.

The preliminary evaluation of impact on personnel, population and environment is performed as a part of feasibility study for CSFSF. The executed evaluation demonstrated the low level of impact and compliance with the requirements of legislation.

In accordance with current legislation the complex state expertise of feasibility study of CSFSF construction was performed, which is composed of state sanitary epidemiology expertise, state expertise on nuclear and radiation safety and ecological expertise.

Except for state expertise the Hungarian company TS ENERCON organized and performed alternative (non-governmental) expertise of CSFSF feasibility study materials on tender basis.

G.3.3. Making Information on Facility Safety Available to Members of Public

As stated in the NRU-2003, legislation provides for public hearings devoted to nuclear energy use and radiation safety. The public hearings procedure is determined by the Resolution of the Cabinet of Ministers of Ukraine. The main objective of the public hearings on nuclear energy use and radiation safety is to respect the rights of citizens and public organizations for involvement in the discussion on sitting, design, construction, operation and decommissioning of nuclear facilities, enterprises for uranium ore mining and milling and facilities for management of radioactive waste, radiation sources etc.

For informing the public on ZNPP SFSF safety:

– regular publications on the SFSF are issued in regional mass media and regular information is provided on the local TV channel;

– lectures and visits are regularly arranged for students and inhabitants of the 30-km zone: Nikopol, Marganets, Kamianka-Dniprovska etc.;

– a booklet on the SFSF has been prepared, copied and distributed. Each visitor of the ZNPP information centre receives a booklet and brochure titled «Zaporizhzhya NPP and the Environment».

In order to establish and maintain a systematic dialogue with the public and increase the role of the public opinion in the decision-making process and coordination of measures related to public consultations as to formation and implementation of the state policy in nuclear and radiations safety, the Public Board was established by the SNRCU. The Public Board includes representatives of ecological public organizations, political parties, mass media, professional bodies, scientific establishments and institutions.

Provision of participation of citizens and their associations in forming of public policy in the area of nuclear energy use, in accordance to the Article 3 of the Law of Ukraine «On the Use of Nuclear Eenergy and Radiation Safety» is one of basic tasks of nuclear legislation. The Article 11 of this Law proclaimes:

"Citizens and their associations have a right for participating in the discussion of draft legislative acts and programs in the area of nuclear energy use and also for participating in the discussion of questions, related to sitting, design, construction, operation and decommissioning of nuclear facilities, sources of ionizing radiation.

With the purpose to involve citizens and their associations into consideration of issues, related to the nuclear energy use, local authorities can organize the hearings on issues of projects of sitting, design, construction, operation and decommissioning of nuclear facilities and objects for radwaste management".

Such public discussions gained a special role after adoption in 2005 of the Law of Ukraine "On Decision Making Procedure for Sitting, Design, Construction of Nuclear Facilities and Radioactive Waste Management Objects of National Importance". In accordance with Article 2 of this Law, Verhovna Rada of Ukraine approves the law on sitting, design, construction, operation and decommissioning of nuclear facilities of national importance, which CSFSF belongs to, only in the case of agreement of sitting by the local authorities. And according to the Article 3 of this Law, the local authorities "accept the decision on agreement after conducting of local advisory questioning of citizens of Ukraine (advisory referendum) on this issue".

Co-operation with public concerning the creation of CSFSF included:

– development, agreement and publication of action plan on consultations with public concerning the CSFSF project;

– drafting of previous list of public associations and interested legal entities involved in consultations;

– drafting of previous list of mass media, which will be provided with information;

– preparation of output informative materials about CSFSF project;

– preparation of coordination and technical support of briefings, conferences and meetings with public;

– publication and distribution of statement on the activities ecological consequences;

– briefing aiming to inform the mass media representatives about beginning of consultations;

– informing about possible impact on population and environment in a transboundary context;

– organization of office functioning for consultations with public.

The discussion of CSFSF construction with public took place in a form of:

– round tables with the representatives of public associations and mass medias in Slavutich town and Kyiv;

– public hearings in Slavutich and Polissja region village councils, initiated by local councils, with publications of results in mass medias and Internet.

The results were documented and published at the web-sites of NNEGC ENERGOATOM and concerned executive authorities.

G.3.4. Consulting Contracting Parties in Vicinity of Facility

In the reporting period, the requirements for the procedures for consulting the neighboring states have not changed. The information provided in Section G.3.4 of the NRU-2003 and NRU-2005 is still valid. Information on the site for the centralized storage facility for WWER spent fuel will be provided to any Contracting Party to the Convention upon request.

During consultations with Republic of Belarus concerning the offered site of centralized SFSF for NPP with WWER type reactors in the Chernobyl Exclusion Zone the authorized bodies of this Republic were provided with information on EIE for centralized SFSF. Answers for the question of Belarusian specialists were provided.

After consideration of these materials the Ministry of natural resources and environmental protection of Republic of Belarus noted their sufficiency and informed about the absence of necessity for further consultations on this issue.

G.4. Design and Construction of Facilities (Article 7)

G.4.1. Limitation of Possible Radiological Impact of Spent Fuel Management Facilities

In the reporting period, the requirements for limitation of possible radiological impact on SF management facilities have not changed (see Section G.4.1 of the NRU-2003 and NRU-2005). In order to limit possible radiological impact from the ZNPP DSFSF, a protective wall is constructed for the DSFSF first line. Protective wall construction is under completion for the second line DSFSF.

G.4.2. Conceptual Plans and Technical Provisions for Decommissioning of Spent Fuel Management Facilities

Requirements to the necessity of conceptual decommissioning plans development of nuclear facilities including SF storages are foreseen by the Law of Ukraine "On Settlement of Issues Related to the Nuclear Safety Provision". According to this Law the Operating organization must develop the Conceptual plan of decommissioning (Concept) and after this on its basis – the Project on facility decommissioning.

The project on decommissioning is developed by the Operating organization no later than 18 months prior to the termination of operation of nuclear facility – end of license term at the stage of life cycle "operation of nuclear installation" and provided for state expertise.

The abovementioned project under condition of positive expertise's conclusions, foreseen by the legislation of Ukraine for the investment programs and building projects, and after passing of all necessary agreements with the government authorities, is provided for consideration and approval to the Cabinet of Ministers of Ukraine 6 months prior to the term of termination of nuclear facility operation.

Requirements concerning future decommissioning of nuclear facilities, including SFSF, beginning from the design stage, are formulated in the Article 42 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" and in regulation the "Main regulations of safety provision for Dry Type Interim Spent Fuel Storage Facilities".

In accordance with requirements of indicated regulation the operating organization during the different stages of DSFSF life cycle must prepare to the future decommissioning. Besides, the operating organization during all life cycle of DSFSF must organize and perform collection, processing, documenting and saving of information about DSFSF, necessary for development of documentation concerning the DSFSF decommissioning.

Thus, issues of decommissioning of nuclear facilities, represented by SFSF, are a part of documents substantiating safety within the framework of every stage of licensing process in accordance to the document "Recommendations to the structure and content of SAR for SF storage facilities".

In relation to the availability of conceptual plans for decommissioning of SF storages in Ukraine:

– for DSFSF of Z NPP the operating organization developed and approved conceptual plan of this SFSF decommissioning, namely: The program of out-loading and decommissioning of SFSF mentioned in the sub-section G.4.2. NRU–2003.

– Development of Decommissioning Concept of Wet Type SFSF (SFSF-1) is foreseen by the terms of SNRCU license, issued in 2008 to SSE ChNPP with the right for operation of SFSF-1. The noted document must be developed till the end of 2012.

– regarding the conceptual plans on decommissioning of DSFSF (SFSF-2), such plans must be represented in the SFSF-2 project, which will be developed by a company Holtec International on the basis of "Conceptual decision on performing the project modification of nuclear facility SFSF-2 at Chornobyl NPP".

G.4.3. Support of Technologies Incorporated in Design by Experience, Testing or Analysis

Pursuant to the document "Basic Safety Rules for Dry Interim Spent Fuel Storage Facilities" entered into force in the reporting period, the SF storage technologies shall be the proven technologies. Such proven technologies were used in developing the ZNPP SFSF and

ChNPP SFSF-2, information on which is provided in sub-section G.4.3 of NRU-2003. The same approach will be used for construction of Centralized SFSF for WWER type reactors spent fuel.

G.5. Assessment of Safety of Facilities (Article 8)

G.5.1. Safety Assessment and Environmental Assessment

The requirements for safety assessment and environmental assessment of facilities have been improving on the basis of practical activities. The entered into force document «Basic Safety Rules for Dry Interim Spent Fuel Storage Facilities» for dry interim SFSF establishes the main safety principles and criteria for dry interim SFSF, classification of systems and components of interim SFSF and safety requirements for the following life stages of interim SFSF: sitting, design, construction, commissioning, operation and decommissioning. The structure and content of the safety analysis report for spent fuel storage facilities shall comply with the document «Recommendations on the Structure and Content of the Safety Analysis Report for Spent Fuel Storage Facilities»

G.5.2. Safety Reassessment in Construction and Commissioning

Pursuant to the document «Recommendations on the Structure and Content of the Safety Analysis Report for Spent Fuel Storage Facilities», to obtain a license for a specific life stage of the SFSF (construction, commissioning, operation, decommissioning), appropriate SAR is submitted to the SNRCU (preliminary, interim, final and for decommissioning). The structure and content of SAR is arranged according to the terms of "Recommendations on the Structure and Content of the Safety Analysis Report for Spent Fuel Storage Facilities "

Upon completion of the construction, it shall be proved that the safety level of the SFSF as constructed complies with the design safety level. The interim SAR submitted to the SNRCU for a commissioning license shall contain the indicated data and also justification of the safety of changes, modifications and amendments to the design made in construction, pre-commissioning inspections and tests of the SFSF. The final SAR as revised on the basis of the commissioning results is added by the applicant to the license application for SFSF operation.

G.6. Operation of Facilities (Article 9)

G.6.1. Licensing of Operation of Facilities

In the reporting period, the procedure for licensing of operation has not changed. As required by document "Basic Safety Rules for Dry Interim Spent Fuel Storage Facilities", entered into force in the reporting period, the operating organization, prior to the SFSF operation, shall submit the final SFSF SAR to justify the safety of the DSFSF operation and duly approved operating procedure for the DSFSF.

G.6.2. Definition and Revision of Operational Limits and Conditions

Information on the establishment and revision of operational limits and conditions of nuclear facilities is provided in sub-section G.6.2 of the NRU-2003. As required by the entered into force document «Basic Safety Rules for Dry Interim Spent Fuel Storage Facilities», the

design shall provide operational limits and conditions to be revised by the operating organization with the periodicity determined by the SNRCU.

Ukraine has been now operating only DSFSF for WWER-1000 SF at the ZNPP and ChNPP SFSF-1.

The first safety assessment of the ZNPP DSFSF was conducted in 2006. Following its results in March 2006 the "SAR for Dry Interim Spent Fuel Storage Facility of ZNPP. Revision 3.01.1" was approved.

Further periodicity of the safety assessment in the operational stage will be determined by the SNRCU separately.

The ChNPP SFSF-1 for SF of RBMK-1000.

The safety assessment of ChNPP SFSF-1 was performed in 2007. According to the terms of SNRCU license "Operation of nuclear facility – Spent Nuclear Fuel Storage (SFSF-1)" the next safety assessment of SFSF-1 must be conducted until 31 of December 2012.

G.6.3. Operating Procedures

Pursuant to the Law of Ukraine "On Permissive Activity in the Area of Nuclear Energy Use", the operating license, in particular, determines conditions of the operation, which are largely based on operational and technical documentation submitted by the applicant. The documentation establishes operating procedures, procedures for maintenance, monitoring, inspection and testing of equipment of the facility, limits and conditions of its operation.

Operation of nuclear facilities is carried out according to specific operating regulations and procedures developed according to the SAR and operating procedure of safe operation and agreed with the SNRCU.

There are the following examples of such documents:

For ZNPP DSFSF

- DSFSF operating instruction;
- nuclear safety procedure for transport, reloading and storage of nuclear fuel;
- procedure for maintenance and monitoring of spent fuel condition and storage containers at DSFSF site;
- procedure for management of spent fuel in its transfer to ZNPP DSFSF for storage;
- emergency operating procedure for DSFSF;

For ChNPP SFSF-1:

- emergency operating procedure for SFSF-1;
- operating instruction for transport and technological part of SFSF-1 equipment;
- operating instruction for bridge crane of SFSF-1 Central hall;
- procedure for organization and conducting of maintenance for safety important systems;
- operating instruction for cooling system and water purification in SFSF-1 cooling pond.

G.6.4. Engineering and Technical Support in Operation

The system of engineering and technical support to the operating organization has been in the process of improvement.

The Scientific and Technical Centre (SE STC) – which is a division of the NNEGC ENERGOATOM performs the functions of scientific and engineering support to operating organization.

For further development of fundamentals and applied research in NPP safety, the Institute for NPP Safety Issues of Ukraine was established. The main scientific activities of this institute are as follows:

- safety and effectiveness of NPP operation;
- technologies for radwaste disposal;
- technologies for decommissioning of NPP units and transformation of Shelter into the safe ecological system.

The NNEGC maintains permanent communication with organizations of the Russian Federation that participated in the NPP design and continue to provide engineering support for operating facilities.

In order to investigate conditions of safe storage of WWER-1000 spent fuel, the NNEGC ENERGOATOM has developed and continues implementing of the long-term "Program for Investigation of Spent Fuel Storage Conditions". The goal of the program is to obtain results confirming the sufficiency (or excessive conservatism) of DSFSF operational limits.

G.6.5. Reporting of Incidents Significant to Safety to Regulatory Body

Pursuant to the "General provisions for Safety Assurance at Nuclear Power Plants" entered into force in 2008, the operating organization is responsible for completeness and quality of investigation, timeliness of investigation results providing to the regulatory authority, and also development and implementation of activities to prevent the repetition of violation of normal operation and accidents.

The information on all violations of normal operation and accidents at NPPs is reported to the SNRCU. IEC staff member in SNRCU is 24 hours on duty. NPP events are regarded as violations of NPP operation if they caused deviations from limits and/or conditions of safe operation or deviations from normal operation and are characterized by certain consequences, also defined in this document. Violations are investigated in compliance with the "Provisions on Procedure for Investigation and Record of Operational Events at Nuclear Power Plants", which determines:

- categories of operational events;
- procedure for investigation of operational events (determination of their direct and root causes, assessment of their safety impact, development of corrective measures);
- procedure for record of operational events;
- form for notification on events to be submitted to the regulatory body.

The following is provided after each operational event:

- immediate notification on operational event (within an hour);
- preliminary notification on operational event (within a day);
- INES classification of operational event;
- report on event investigation (within 15 days from its occurrence).

If necessary, the commission on investigation of the operational event at the facility includes representatives and experts of the state regulatory body.

G.6.6. Analysis of Relevant Operating Experience

Analysis of operational data of the facility is performed during all periods of life cycle. On the basis of such analysis terms and safety operational limits are introduced.

The Nuclear Facility Safety Assessment Department of the SNRCU applies certain inspection procedures to inspect equipment, control and monitoring systems at nuclear facilities etc. in accordance with inspection directions, in particular for SF and radwaste management.

G.6.7. Decommissioning Plans

Information on the of legislative requirements of Ukraine in the area of decommissioning planning for nuclear facility, presented by SF storages, and also actual condition of decommissioning plan development is given in sub-section G.4.2 of this Report.

G.7. Disposal of Spent Fuel (Article 10)

According to Article 17 of the Law of Ukraine «On Radioactive Waste Management», high-level radwaste (including waste originating from processing of spent fuel from Ukrainian NPPs at Russian Federation enterprises and then returning to Ukraine according to contractual terms) is subject to long-term storage and/or disposal in deep geological formations. As mentioned in section B.1 of this Report now the "delayed" decision is accepted concerning SF – long-term SF storage with subsequent acceptance of final decision on its processing or disposal. The Strategy on SF management defines the plans for geological storage construction.

The protection of personnel, population and the environment from radiological danger at all stages of SF management is performed in Ukraine. The safety requirements, foreseen in the provisions of the Joint Convention are implemented in national documents and required by the regulatory body, performed in practice and supervised.

Section H. SAFETY OF RADIOACTIVE WASTE MANAGEMENT

H.1. General Safety Requirements (Article 11)

General Safety Requirements to the all stages of radwaste management are implemented:
in Laws of Ukraine:

- On the Use of Nuclear Energy and Radiation Safety;
- On Radioactive Waste Management;
- On Protection of Human Against Impact of Ionizing Radiation;
- On Decision Making Procedure for Sitting, Design, Construction of Nuclear Facilities and Objects for Radioactive Waste Management of State Importance;
- On Physical Protection of Nuclear Facilities, Nuclear Materials, Radioactive Waste and Other Sources of Ionizing Radiation;
- On Permissive Activity in the Area of Nuclear Energy Use;

in norms, regulations and standards of nuclear and radiation safety:

- Radioactive waste management. Requirements to the radwaste management until their disposal. General provisions;
- Radioactive waste management. Radioactive waste disposal in near surface storages. General radiation safety requirements;
- General provisions of safe disposal of radwaste in geological repositories;
- General provisions of NPP safety.

The licensees confirms the compliance with safety requirements for radwaste management by preparation and consideration of safety analysis reports and within the framework of annual

reports. Upon regulatory authority request the operating organization must carry out the periodic safety assessment.

Each NPP developed and approved the numerical reference levels of generation and receipt of liquid and solid radwaste to the station storages. These levels are periodically decreased on the base of actually achieved levels of radwaste generation as a result of radioactive wastes management program implementation.

Radioactive waste management program of operator of nuclear facilities is NNEGC ENERGOATOM defines activities for the planned period up to 2017 in such basic directions:

– improvement of NNEGC ENERGOATOM organizational management structure of radwaste management;
– radwaste management quality assurance;
– normative and technical and scientific support of activities in the field of radwaste management;
– the improvement of account and inventory system of radwaste;
– improvement of radwaste processing and minimization at NPPs;
– improvement of control and monitoring of radwaste;
– population and environment protection while radwaste management;
– international cooperation;
– public relations and information provision;
– financial provision of Program activities.

H.1.1. Subcriticality and Removal of Residual Heat

Requirements to complementary consideration and provision of proper subcriticality and residual heat removal while radwaste management are defined in "Main Sanitary Rules for Radiation Safety of Ukraine" and in regulation "Requirements to radwaste management and disposal". The Terms of reference of equipment development for radwaste treatment (that can include fissile materials) contain requirements to exclude criticality.

Requirements to provide subcriticality and residual heat removal are also included in Terms of reference of equipment development for radwaste treatment (mainly to development of radwaste containers with heat evolution). It is expected, that returning from Russian Federation of virtificated radwaste of processed SF from Ukrainian WWER-440 will have their considerable heat evolution that must be considered while designing and construction of storages.

H.1.2. Minimisation of Radioactive Waste Generation

Requirement to the minimisation of radwaste generation at possibly lower practically level is set in legislation (Article 3 of the Law of Ukraine “On Radioactive Waste Management”, Article 5 of the Law of Ukraine “On the Use of Nuclear Energy and Radiation Safety”).

A number of measures on minimization of radwaste generation at NPPs is set in Program on Radwaste Management of NNEGC ENERGOATOM. As of 1 July 2008 such program was approved for the period 2008-2017.

SSE Complex operates the decontamination facilities for radioactive contaminated metal equipment. As a result certain part of equipment cleared, disposal volumes diminish. Quarterly reports contain the information on the volumes of decontaminated materials.

H.1.3. Interdependencies between Different Steps of Radioactive Waste Management

The information on interdependencies between different steps of radwaste management was provided in the section H.1.3 NRU-2003 and sections B.4.1, H.2.1 of this Report. Besides according to section 1.2 of "Requirements to radwaste management and disposal" – "Radwaste management till its disposal is a part of all radwaste management process, which includes the disposal of radwaste as final objective. Mentioned method of disposal defines a primary objective of radwaste management till disposal as radwaste processing and conditioning as most proper method. If the method of disposal is not defined, the primary objective is providing of safe storage and forming of radwaste to most acceptable of any possible methods of disposal".

According to item 2.7 of General Provisions for Safety Provision of the Radwaste Storage in Geological Repositories "While radwaste management the interdependences between all of radwaste management stages must be considered: from their generation to disposal in geological repository. While decision-making about any of the radwaste management stages the consequences for safety provision of their disposal in geological repositories must be considered."

H.1.4. Effective Protection of Individuals, Society and Environment

The system of radiation protection of personnel, population and environment, activities for provision of radiation protection in Ukraine during radwaste management and actual status is provided in Section F. 4 of this Report.

H.1.5. Biological, Chemical and Other Risks

Biological, chemical and other risks connected with radwaste management are assessed according to «Requirements for radwaste management and disposal" (section 4.2), "Requirements for the Structure and Content of the Safety Analysis Report for Near-Surface Radwaste Repositories" (sections 3.3 and 3.6), «Requirements for the Structure and Content of the Safety Analysis Report for Radioactive Waste Processing»(item 3.9).

Requirements are applied in particular, to:

- transformation of biological substances and samples in stable condition;
- transformation of radwaste in explosive and the fire-hazardous state in safe condition;
- prohibition of common storage of radio-active and toxic radwaste.

The assessment of biological, chemical and other risks is carried out within the framework of complex state expertise of documents of the basic design stages (feasibility study, draft, detail working draft) of radwaste management facilities.

H.1.6. Avoiding Reasonably Predictable Impacts on Future Generations Greater Than Those for Current Generation

This principle is legislatively proclaimed as basic state policy principle in the field of nuclear energy use (Article 5 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety").

Practical realization of this principle is represented in Safety Analysis Reports of radwaste processing facilities, storages for storage and disposal of radwaste. SNRCU requires to provide evidences, that in the future a level of population and personnel protection will be not lower than at the beginning of operation. During operation of the radwaste processing, storage or disposal

systems the research of degradation of protective barriers and processes under them is conducted, with the purpose of correction, if needed, and also to foresee the radwaste facility decommissioning with subsequent radwaste disposal.

The detailed information is provided in section G1.6 of this Report.

H.1.7. Avoiding Undue Burdens on Future Generations

The legislative framework and the principle of avoiding undue burden on future generations are set in Section G.1.7 of this Report.

The issue of Radwaste management fund creation in Ukraine is under consideration – the correspondent law is adopted by Verhovna Rada of Ukraine. The creation and accumulation of funds in this Fund will provide the proper financing of activities not only for accumulated radwaste management on the territory of Ukraine (NPP radwaste, industrial, Exclusion Zone, Shelter) but also planned implementation of activities that will allow present and future generations to solve problems of low and intermediate-level long-lived radwaste management, and also high-level radwaste by creation of geological repository.

H.2. Existing Facilities and Past Practices (Article 12)

In the reporting period, radwaste management activities took place on the sites of operating NPPs, research nuclear reactors, SSE ChNPP, specialised enterprises of the Exclusion Zone and SISP UkrDO "Radon".

A list of the existing radwaste management facilities dated 01.07.2008 is provided in Annex 3 of this Report.

Regarding radwaste resulting from past practices – see D.4.3 of this Report.

H.2.1. Safety of Existing Facilities

The list of activities for improvement of safety level of existing radwaste management facilities is provided in the items B.4 and B.5 of this Report.

The following should be noted regarding the safety of radwaste storage at operating NPPs:

1. Liquid radwaste is stored in metal tanks of stainless steel. Liquid waste tanks are leak-tight, comply with all requirements of safe operation and are equipped with an automated leakage alarm system. Visual inspection of tanks is carried out monthly. In order to prevent emergency liquid waste leakage, all tanks of the LRSF system are located in leak-tight concrete rooms coated with stainless steel sheets. There were no leakages from the liquid waste tanks in the reporting period.

In the event of damage of any tank or its repair, the LRSF design permits the use of a free spare tank.

Additional safety monitoring of the tanks is ensured by monthly monitoring of groundwater contamination in boreholes located on the perimeter of the storage facility.

In addition, the KhNPP has a site for temporary storage of salt fusion in «BB-cube» containers, which is intended for storage of 100 containers.

The salt fusion is currently stored in KRO-200 containers that are located in special SFSF compartments. Regular selective monitoring (once per month) of the surface of these containers is carried out. For this purpose, some containers are removed from the compartments, and results of their visual expertise are recorded. It is determined that the external surface of the container does not corrode because of high inhibitory capability of the salt fusion.

All rooms for storage of containers with the salt fusion are equipped with a radioactive ventilation and drainage system.

2. The solid radwaste are stored in NPP storages, located in special and separated buildings. The Solid radwaste storage is reinforced concrete construction, compound of separate compartments equipped with fire alarm system, automated sprinklers and drawing ventilation with air filtering. Separate compartments are additionally equipped with detection and absorption moisture system.

Temporary storages of solid and liquid radwaste are controlled according to the requirements of Regulation of storages operation. The activities in the storages are performed with obligatory dosimetry control.

H.2.2. Past Practices

Appropriate information is set forth in Sections H.2.2.1 – H.2.2.3 of the NRU-2003.

H.3. Sitting of Proposed Facilities (Article 13)

Sufficiently complete information on assessment of site-related factors that can affect the safety of the facility during its service life and after its closure, probable impact of the facility on individuals, public and the environment and informing the public on safety of facilities and consulting the neighbouring states was provided in Sections H.3.1 – H.3.3.4 of the NRU-2003. The Requirements for sitting are provided in:

- document Disposal of radwaste in Near-Surface Radwaste Repositories. General radiation safety requirements;
- document General Provisions of Safety provision of radwaste in geological formations;
- draft document “Requirements to Site selection for radwaste disposal storage”.

The set requirements are applied both for new site search and safety reassessment of earlier selected sites, in particular “Vector” Complex site.

H.4. Design and Construction of Facilities (Article 14)

The requirements for restrictions of radiological impact of radwaste management facilities are given in Sections H.4.1 - H.4.4 of the NRU-2003 and taken into account in designs of ChNPP radwaste management facilities (LRTP, ICSRM), "Vector" Complex, in technical specifications of European Commission tendering for manufacturing and supply of retrieval, sorting and fragmentation, press and incineration facilities, that are being developed within the framework of TACIS projects U 1.01/ 01b and U1.03/04 for RNPP and ZNPP. Commissioning of NPP facilities is planned for 2012.

H.5. Assessment of Safety of Facilities (Article 15)

The legislation of Ukraine contain requirements for the assessment of radwaste management facility safety, including the state ecological expertise of documents of the basic design stages (feasibility study, design, detailed design). This was in detail explained in sections N.5.1– N.5.3 of NRU-2003.

Requirements for the structure and content of safety analysis report of the radwaste storages are developed on the basis of IAEA recommendations and entered into force in 2007.

Due to this the licensees operating the radwaste storages (SISP UkrDO "Radon") must perform the reassessment of safety for operating and temporarily closed down storages in defined by the SNRCU period. As a result of such assessment the regulatory decisions will be accepted concerning the allowed operational limits of these storages, order and volumes of radwaste transferring to the storages of "Vector" Complex.

Kharkiv SISP performed the safety assessment of well type storages №15 and №16 in 2008. The results of assessment are presented during IRRS-2008 Mission in Ukraine.

H.6. Operation of Facilities (Article 16)

Information on the operation of radwaste management facilities is given in Sections H.6.1 – H.6.3 of the NRU-2003 – namely, licensing of facility operation; revision of operational limits and conditions based on the safety assessment and pre-commissioning testing; compliance with procedures established during operation; maintenance, tests and inspections; engineering and technical support for operation; procedures for characterisation and segregation of radwaste; reporting to the regulatory body on violations of radiation safety standards and rules; incorporation of operational experience; update of plans for decommissioning and closure of radwaste storage facilities.

H.7. Institutional Measures after Closure (Article 17)

The institutional control after closure of radwaste disposal facility consists of active and passive control. Active control is monitoring, control of barriers integrity, performing of recovery activities. Passive control is a limitation of economic activity within the site boundaries of repository, saving of information about existing repository.

Active and passive institutional control is carried out by introduction of after-operational monitoring of repository. Requirement for the program on the after-operational monitoring are provided in regulations:

- Radio-active waste disposal in near surface storages. General radiation safety requirements;
- General Provisions for Safety Provision of the Radioactive Waste Storage in Geological Repositories.

Substantiation of long-term safety of repository after its closure is provided in safety analysis report in accordance with "Requirements to the Structure and Content of the Safety Analysis Report of Near Surface Radioactive Waste Storages".

The program of the after-operational monitoring is a part of radwaste repository closing project, which is subjected to obligatory state expertise of nuclear and radiation safety, ecological safety etc. according to legislation.

The Operating organization acquires separate SNRCU permission for implementation of activities for organization of performing of institutional control at the stage of closure of radwaste disposal facility.

Duration of active control must not exceed 100 years.

The procedure of interference during emergencies in the period of realization of active control is regulated by the Emergency plans which, in accordance with the requirements of Norms of radiation safety of Ukraine, are developed by radwaste disposal storage operating organization. These plans foresee the application of necessary organizational and technical intervention activities.

Today in Ukraine there are no radwaste disposal storages that according to the requirements of legislation would pass the stage of life cycle “closure”.

Ukraine introduced the safety requirements and applies the safety activities at all stages of radwaste management, including site selection for facilities, design, construction, operation and decommissioning/closure of facility.

The safety assessment and institutional control activities are improved with consideration of IAEA recommendations and best practice.

Section I. TRANSBOUNDARY MOVEMENT (Article 27)

The transboundary movement is related to sending of SF from Ukrainian NPPs to Russian Federation and with the transit through the territory of Ukraine of NPP "Kozloduy" SF from Republic Bulgaria to Russian Federation. Thus, Ukraine does not send the SF for storage or disposal to the destination place southward of latitude 60 degrees South (item 2 of Article 27 of Joint Convention).

Ukraine does not perform and is not involved in the transboundary movement of radwaste.

Taking into account item 1 of Article 27 of Joint Convention the transboundary movement of SF is carried out in accordance with intergovernmental agreements on transportation of nuclear materials:

– Russia – Ukraine,1996;
– Russia – Bulgaria-Ukraine, 2006.

These intergovernmental agreements define the international legislation, which is applied for SF transportation.

To observe the requirements of sub-item i) of item 1 Article 27 of Joint Convention SNRCU applies procedure of permission issuing for every transportation of SF. One of terms of permission issuing is the availability of permission of the authorized state authority of Russian Federation for the Russian consignee (operator) for the import of SF, which confirms the state consent. Preliminary notification about the transboundary movement is carried out in accordance with the contract between operators, which defines that the Ukrainian operator notifies the Russian operator not later than 7 days prior to sending of SF.

Another condition of permission issuing is the availability of correspondent license of Federal Service of Ecological, Technological and Nuclear Inspection of Russia for the Russian operator for nuclear materials management, that assures the availability of organizational and technical capabilities of the Russian operator, necessary for SF management (sub-item IV of item 1 Article 27 of Joint Convention).

The transboundary movement of NPP "Kozloduy" SF through the territory of Ukraine as a transit state is carried out by railway in accordance with the terms of “Agreement on international railway freight traffic" dated 1951, which is obligatory for railways, shippers and consignees of Ukraine, Republic of Bulgaria, Russian Federation (sub-item II of item 1 Article 27 of Joint Convention).

Section J. DISUSED SEALED RADIONUCLIDE SOURCES (Article 28)

The safety management of disused sealed radionuclide sources is provided through:

- introduction of licensing of production, use and storage of radionuclide sources;

- functioning of State register of ionizing radiation sources, accepted for operation on March, 29, 2007;
- realization of the State Programme for Safe Disposal of Spent High-Level Sources, ratified by the Government of Ukraine in August, 2006 with the term of realization in 2007-2009 and financing approximately 12 million UAH (or 2,5 million US Dollars, including the resources of the State budget of Ukraine and international technical assistance).

As a result of implementation of the first stage of this program the register of spent high-level radionuclide sources is arranged, the inspection of places and terms of their storage is performed, that serves as a basis for determination of priority of conditioning activities, containerisation or discharging of spent radionuclide sources. For the most difficult cases with considerable amount of sealed sources the radionuclide source retrieval projects are developed to be realized after the state expertise.

The noticed program is aimed at spent radionuclide sources which were produced before 1990 and used in irradiators, measuring and other facilities and devices. These sources were not transferred to the specialized enterprises as a result of bankruptcy or financial insolvency of enterprises-proprietors and other reasons. There are 14 organizations which poses 1297 spent radionuclide sources with general activity of 9,47E+15 Bq. Mainly these sources contain Co-60 and Cs-137 and are in containers. By the SNRCU request the proprietors of such radionuclide sources support the proper level of physical protection, including involvement of international technical assistance.

The information about radionuclide sources transferred to the category of radwaste and stored at SISP UkrDO “Radon” is provided in Annex 4 of this Report.

The feasibility study for the second stage of Complex “Vector” foresees construction of the centralized repository for spent radionuclide sources. Development of correspondent project is carried out by SSE Technocenter with governmental support of Great Britain within the framework of Global Partnership.

Taking into account item 24 of the Final Report of the Second Review Meeting of the Contracting Parties to the Joint convention (May, 2006), and consistently adhering to Guidance on export and import of radioactive sources within the framework of Code of Conduct for safety and security of radioactive sources the Government of Ukraine made the decision that permission on import to the territory of Ukraine of ionizing radiations sources belonging to the first category according to the IAEA document RS-G-1.9 "Categorization of radioactive sources", is issued under condition of returning of the noted sources after their use to the shipper (producer), that is noted in an import contract. In October, 2007 the proper changes were made to the Procedure of permission issuing for international transportations of radioactive materials. Also, this norm is confirmed in Technical Regulations of sealed radiation sources, approved by the Resolution of the Cabinet of Ministers of Ukraine on December, 5, 2007 № 1382.

Ukraine provides necessary activities for safety management of spent RS and builds its policy concerning safety of spent radionuclide sources on the system basis in accordance with part 1 of Article 28 of Joined Convention.

Ukraine is not a producer and supplier of the sealed radioactive sources. Under these circumstances part 2 of Article 28 is not currently applied in practical activity. The Ukrainian legislation does not contain regulations prohibiting the returning of radionuclide sources produced in Ukraine.

Section K. PLANNED ACTIVITIES TO IMPROVE SAFETY

K.1. Improvement of Safety in Spent Fuel and Radioactive Waste Management at Chornobyl NPP

The key project for ChNPP decommissioning is SFSF-2 construction and commissioning. Despite the beginning of construction of SFSF-2 in 2000, it is planned to commission this facility only in 2013 (detailed description of situation, related to realization of SFSF-2 project is given in the section G.2.3 of this Report).

Within the framework of Licensing plan of SFSF-2 the Contractor of a project – company Holtec International developed the documents "Conceptual decision for modifications of SFSF-2 project. Rev.0" and Program of standards comparative analysis.

A delay with completion of SFSF-2 project became a basis for consideration of the necessity of licensing of operation of SFSF-1 and exception of this object from a license for decommissioning of ChNPP nuclear installations. For today according to the procedure SSE ChNPP got the license for operation of SFSF-1. The term of next safety reassessment of SFSF-1 must be until December, 31, 2012.

The improvement of radwaste management system at SSE ChNPP is based on the analysis of compliance of existing radwaste management system with the requirements of regulations and is realized through:

– development of new or correction of valid operation documents;

– creations new and modernizations of the existing radwaste management systems and facilities;

– improvement of radwaste management radiation control system and radiation protection activities;

– improvement of radwaste account system (generation, transferring, etc.);

– improvement of radwaste quality management system.

During the first half of 2008 the SSE ChNPP performed preparatory activities for the beginning of planning process of new additional radwaste management objects. In particular it is planned to create the facility for transport protective containers and packages (tanks) production for the necessities of ChNPP radwaste processing objects, lines of fragmentation of high-level long fragments, areas of fragmentation of large-size equipment and radwaste, buffer repository for low and intermediate-level radwaste, storages for long term storage of long-lived and high-level radwaste, facility for purification of liquid radwaste of Shelter from organics and transuraniums, complex of contaminated metal processing.

Commissioning of LRTP and ICSRM facilities is planed for 2009-2010 (see item B.4.2 of this Report)

K.2. Shelter Safety Improvement

Information is provided in Annex 9 of this Report.

K.3. Improvement of Safety in Spent Fuel and Radioactive Waste Management at Operating NPPs

It is planned to improve the existing scheme for operational radwaste management at NPPs. The first-priority tasks in this area for the next 3 years are as follows:

– modernise the existing ones and install new equipment for preliminary and extensive processing of solid and liquid radwaste at NPPs;

– create retrieval and sorting systems of non-processed solid radwaste accumulated in solid radwaste storage facilities at NPPs;

– start retrieval from storage and processing of earlier accumulated radwaste at all NPPs;

– improve the radwaste on-site transport systems;

– develop and implement tools and methodologies for monitoring of radwaste physical characteristics;

– improve and complete a fleet of containers for radwaste collection, transport and storage.

K.4. Improvement of Radiation Protection of Personnel and Public

Basic information is provided in the section F.4 of this Report.

The storage/disposal container control systems are commissioned at ZNPP, RNPP and KhNPP for radwaste accounting and certification.

K.5. International Cooperation on Improvement of Safety in Spent Fuel and Radioactive Waste Management

In 2008 within the framework of TACIS project an international expert group prepared the Report on technical assistance assessment provided in the field of radwaste management in Ukraine for the period of TACIS Program from 1991 to 2006 in the following thematic projects categories:

A- preparation and development of national strategy;

B- support of regulatory authority;

C- improvement of NPP radwaste management;

D- radwaste management and control in the Exclusion Zone;

E- preparation to ChNPP decommissioning;

F- rehabilitation of territories and long-term radwaste storage.

Within the framework of the Instrument for Nuclear Safety Cooperation (INSC) it is suggested to concentrate effort on implementation of recommendations, formed in the process of realization of TACIS project U4.03/04 "Development of national strategy and radwaste management conception in Ukraine", including the radwaste management strategy in NNEGC ENERGOATOM, in particular concerning creation of the operation organization of radwaste disposal facilities and granting this organization with a status of national operator in the field of radwaste management.

UK/TS/35 Project (continuation of UK/TS/26) is directed to Support to the State Nuclear Regulatory Committee of Ukraine in Licensing Activities related to TACIS/NSA Financed Decommissioning Facilities of Chernobyl NNP-site, namely

– Liquid Radioactive Waste Treatment Plant

– Industrial Complex for Solid Radioactive Waste Management, consisting of:

- LOT-1 – Solid Radwaste Retrieval Facility;
- LOT -2 – Solid Radwaste Treatment Facility;
- LOT-3 – Specially equipped Near Surface Disposal for solid radwaste designed for disposal of low and intermediate-level short-lived radwaste received from LOT-1 and LOT-2.

In the frame of IAEA Technical cooperation program the national projects UKR/9/026 “Assessment of radwaste safety in Ukraine (classification, characteristics, impact on environment)” in connection with tasks of project UKR/3/002 “Decommissioning of ChNPP Units 1, 2 and 3 and radwaste management at Shelter" are implemented.

IAEA recommendations were implemented in regulatory practice concerning the safety assessment of radwaste disposal storages - methodology of ASAM – ISAM.

On the bilateral basis within the framework of Global Partnership Initiative a number of projects for safety improvement and storage of spent radionuclide sources were started (Britain – designing of centralized repository for spent radionuclide sources; the USA - improvement of protection and storage of radionuclide sources and radwaste management facilities; Germany – conditioning and containerization of spent radionuclide sources of enterprises-bankrupts). With the USA Department of energy the modernization of physical protection systems for radwaste storages of SISP UkrDO “Radon” is carried out.

Financing of the program for transformation of Shelter into the ecologically safe system – Shelter Implementation Plan (SIP) was prolonged due to the payments of donor countries of Chernobyl Shelter Fund. The details of realization of SIP are provided in Annex 9 of this Report.

Within the framework of Russian-Ukrainian governmental subcommittee the workgroup is created for issues of SF and radwaste management and working out of common methodological approaches to the assessment of quantitative characteristics of radwaste planned to return to Ukraine within the framework of contract obligations after processing of RNPP SF and also procedures of transportation of virtificated high-level radwaste. Agreement of methodical approaches is an important factor for provision of qualitative output information, which is a basis for further safety assessment of storages for storing and disposal of such radwaste.

International cooperation on issues of SF and radwaste safety management is the important factor of distribution of the best practice and positive experience and also lessons of management improvement.

CONCLUSIONS

Ukraine consistently fulfils the obligations resulted from the Joined Convention on safety management of spent nuclear fuel and safety management of radwaste and actively supports activities on the distribution of the Joined convention principles, namely in part of development and approval of national strategy for radwaste and spent fuel management.

Ukraine has created the effective legislative and regulatory framework for SF and radwaste safety management. The systematic actions are performed for its improvement, actualization and harmonization with the legislation of EC and IAEA recommendations.

In 2008 for the first time of Ukrainian independence, the construction of repository for disposal of ChNPP low and intermediate-level short-lived radwaste is completed, the long term assessment of its safety is performed. The best international practice is applied in licensing process.

The renewal of regional inspections on nuclear and radiation safety substantially increased the efficiency of state safety regulation in the area of radwaste management in part of observance of norms, rules and standards of nuclear and radiation safety, norms of discharges and releases, monitoring of environment in the affected area of radwaste management facilities.

Practical implementation of project on New Safe Confinement over the Shelter is started – important stage of SIP implementation on transformation of Shelter into the ecologically safe system.

In Ukraine the system of regulatory authority notification on accidents, important for safety, investigation of these accidents, application of corrective measures and control over their implementation is introduced.

SNRCU implements its functions and tasks on the basis of planning system of its activity within the framework of strategic actions plan and annual plans of basic activity in accordance with the management system, certificated with ISO–2001 standard.

Therefore, Ukraine successively performs the required measures to achieve the objectives of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and as a Contracting Party to the Joint Convention completely fulfills its obligations, which is confirmed by the information presented in this Report.

Section L. ANNEXES

Annex 1. List of Spent Fuel Management Facilities as of 01 July 2008

Facility	Location	Purpose	Note
Cooling pond of unit 1 at Zaporizhzhya NPP	SE "ZNPP", 71500, Energodar city, Zaporizhzhya Region.	Temporary storage to reduce heat releases	In operation
Cooling pond of unit 2 at Zaporizhzhya NPP	„	„	In operation
Cooling pond of unit 3 at Zaporizhzhya NPP	„	„	In operation
Cooling pond of unit 4 at Zaporizhzhya NPP	„	„	In operation
Cooling pond of unit 5 at Zaporizhzhya NPP	„	„	In operation
Cooling pond of unit 6 at Zaporizhzhya NPP	„	„	In operation
DSFSF at Zaporizhzhya NPP	„	Interim spent fuel storage	In operation
Cooling pond of unit 1 of Khmelnytsky NPP	SE KhNPP, 30100, Neteshin city, Khmelnytsky Region.	Temporary storage to reduce heat release	In operation
Cooling pond of unit 2 of Khmelnytsky NPP	„	„	In operation
Cooling pond of unit 1 of Rivne NPP	SE NPP, 34400, Kuznetsovsk city, Rivne Region.	Temporary storage to reduce heat release	In operation
Cooling pond of unit 2 of Rivne NPP	„	„	In operation
Cooling pond of unit 3 of Rivne NPP	„	„	In operation
Cooling pond of unit 4 of Rivne NPP	„	„	In operation
Cooling pond of unit 1 of South Ukraine NPP	SE SUNPP, 55000, Yuzhnoukrainsk city, Mykolaiyv Region.	Temporary storage to reduce heat release	In operation
Cooling pond of unit 2 of South Ukraine NPP	„	„	In operation
Cooling pond of unit 3 of South Ukraine NPP	„	„	In operation
Cooling pond of unit 1 of Chornobyl NPP	SSE ChNPP, 07100, Slavutich city , Kyiv Region.	Temporary storage to reduce heat release	Under decommissioning
Cooling pond of unit 2 of Chornobyl NPP	„	„	Under decommissioning
Cooling pond of unit 3 of Chornobyl NPP	„	„	Under decommissioning
SFSF-1 of Chornobyl NPP	„	Interim spent fuel storage	In operation
SFSF-2 of Chornobyl NPP	„	Interim spent fuel storage	Under design modification stage. Construction suspended
SFSF of the research reactor VVR-M	NASU INR, 03680, Kyiv,	Temporary storage to reduce heat release	In operation

Facility	Location	Purpose	Note
	Nauki Avenue, 47		
SFSF of the research reactor IR-100	SUNEI, 99033, Sevastopol, Gollandia village, Kurchatova str., 7	Temporary storage to reduce heat release	In operation
Centralized spent fuel storage facility		Interim spent fuel storage	Site selection

Annex 2. Inventory of Spent Fuel as of 01 July 2008

Material	Location	Number of SFA	Weight of heavy metal (t)
SFA of reactor WWER-1000	KhNPP Unit1	440	176,47
SFA of reactor WWER-1000	KhNPP Unit2	156	62,583
SFA of reactor WWER-440	RNPP Units 1,2	682	78,449
SFA of reactor WWER-1000	RNPP Unit 3	381	152,843
ВТВЗ реактора ВВЕР-1000	RNPP Unit 4	132	52,97
SFA of reactor WWER-1000	SUNPP Unit 1	237	107,8
SFA of reactor WWER-1000	SUNPP Unit 2	223	89,467
SFA of reactor WWER-1000	SUNPP Unit 3	434	174,086
SFA of reactor WWER-1000	ZNPP Unit 1	283	113,530
SFA of reactor WWER-1000	ZNPP Unit 2	356	142,794
SFA of reactor WWER-1000	ZNPP Unit 3	264	105,832
SFA of reactor WWER-1000	ZNPP Unit 4	282	113,089
SFA of reactor WWER-1000	ZNPP Unit 5	269	122,4
SFA of reactor WWER-1000	ZNPP Unit 6	324	129,925
SFA of reactor WWER-1000	ZNPP DSFSF	1578	632,878
SFA of reactor RBMK-1000	ChNPP Unit 1	1275	143,596
SFA of reactor RBMK-1000	ChNPP Unit 2	1057	119,433
SFA of reactor RBMK-1000	ChNPP Unit 3	1403	158,164
SFA of reactor RBMK-1000	ChNPP SFSF-1	17549	1974,861
SFA of research reactor VVR-M	NASU INR	332	0,0476
SFA of research reactor	SUNEI	0 *	0

Material	Location	Number of SFA	Weight of heavy metal (t)
IR-100			

* – Loaded fuel after commissioning of IR-100 is enough for operation of this reactor till the lifetime expiry.

Annex3. List of Radioactive Waste Management Facilities as of 01 July 2008

3.1. List of radioactive waste management facilities at operating NPPs

Facility	Location	Main purpose	Design capacity	Year of commissioning
UGV-1-500	SE ZNPP	Deep evaporation of bottoms	500 dm^3/hour	1987
UGV-1-500	SE ZNPP	Deep evaporation of bottoms	500 dm^3/hour	2000
UGV-1-500	SE KhNPP	Deep evaporation of bottoms	500 dm^3/hour	1990
UGV-1-500	SE RNPP	Deep evaporation of bottoms	500 dm^3/hour	2004
UGV-1-500	SE RNPP	Deep evaporation of bottoms	500 dm^3/hour	2007
Incineration facility	SE KhNPP	Incineration of radioactive oil	5 - 10 kg/hour	1994
Centrifuge	SE KhNPP	Treatment of floor drains	3-5 m^3/hour	2007
Bituminization facility*	SE RNPP	Bituminization of liquid radwaste	150 dm^3/hour	1995
Centrifuge	SE RNPP	Treatment of floor drains	3-5 m^3/hour	2004
Incineration facility	SE ZNPP	Incineration of low-level radwaste	40 kg/ hour – solid radwaste 12 kg/ hour – liquid radwaste	1992
Compaction facility VNR-500	SE ZNPP	Minimization of low-level radwaste	P = 500 кN Volume reduction factor = 5	1993
Compaction facility C-26	SE SUNPP	Minimization of low-level radwaste	P = 200 кN Volume reduction factor = 2,8	1997
Interim unit of liquid radwaste storage of special building 1	SE ZNPP	Acceptance and storage of liquid radwaste	3800 m^3	1984
Interim unit of liquid radwaste	SE ZNPP	Acceptance and storage of liquid radwaste	1000 m^3	1987

Facility	Location	Main purpose	Design capacity	Year of commissioning
storage of special building 2				
Storage of solid radwaste of special building 1	SE ZNPP	Acceptance and storage of solid radwaste	5910 m^3	1984
Storage of solid radwaste of special building 2	SE ZNPP	Acceptance and storage of solid radwaste	1906,7 m^3	1989
Storage of solid radwaste of processing building	SE ZNPP	Acceptance and storage of solid radwaste	11174 m^3	1986
Storage of liquid radwaste of special building 1	SE RNPP	Acceptance and storage of liquid radwaste	4590 m^3	1981
Storage of liquid radwaste of special building 2	SE RNPP	Acceptance and storage of liquid radwaste	3800 m^3	1986
Burial as a part of reactor shop of power units 1 and 2	SE RNPP	Storage of high-level solid radwaste	84,2 m^3	1981
Storage of solid radwaste of special building 1	SE RNPP	Acceptance and storage of solid radwaste	4180 m^3	1981
Storage of solid radwaste of special building 2	SE RNPP	Acceptance and storage of solid radwaste	6042 m^3	1986
Storage of solid radwaste in storage unit in the building on radwaste processing	SE RNPP	Acceptance and storage of solid radwaste	7756 m^3	2001
Storage of liquid radwaste (LRSF-1)	SE KhNPP	Acceptance and storage of liquid radwaste	800 m^3	1987
Storage of liquid radwaste (LRSF-2)	SE KhNPP	Acceptance and storage of liquid radwaste	2250 m^3	1987
Site “BB-cube”	SE KhNPP	Storage of liquid radwaste (containers with saline fusion)	240 m^3	1997
Storage unit of solid radwaste storage facility	SE KhNPP	Storage of liquid radwaste (containers with saline fusion)	718,3 m^3	2002
Storage of solid radwaste of special building	SE KhNPP	Acceptance and storage of solid radwaste	6369,16 m^3	1987
Storage unit of solid radwaste storage facility	SE KhNPP	Acceptance and storage of solid radwaste	3924 m^3	2002
Storage of liquid radwaste No.1	SE SUNPP	Acceptance and storage of liquid radwaste	2121m^3	1982
Storage of liquid radwaste No.2	SE SUNPP	Acceptance and storage of liquid radwaste	1969 m^3	1987
Storage of liquid radwaste No.3	SE SUNPP	Acceptance and storage of liquid radwaste	760 m^3	1989
Storage of	SE SUNPP	Acceptance and storage of	12000 m^3	1982

Facility	Location	Main purpose	Design capacity	Year of commissioning
intermediate level radwaste		solid radwaste		
Storage of solid radwaste No.1	SE SUNPP	Acceptance and storage of solid radwaste	1250 m^3	1982
Storage of solid radwaste No.2	SE SUNPP	Acceptance and storage of solid radwaste	3053 m^3	1989
Storage of solid radwaste No.3	SE SUNPP	Acceptance and storage of solid radwaste	10811 m^3	2002

* - preserved in 2002

3.2. List of radioactive waste management facilities at ChNPP

Facility	Location	Main purpose	Year of commissioning
Solid radwaste storage facility	ChNPP site	Temporary storage of solid radioactive radwaste in operation of power units and decommissioning	Acceptance of high-level solid radioactive waste was terminated on 09 May 2003
Storage facility for liquid and solid radwaste	ChNPP site	Temporary storage of liquid radioactive radwaste in operation of power units and decommissioning	Compartments for solid radwaste storage were not operated
Temporary storage facility for solid high-level radwaste	ChNPP site	Temporary storage of solid radioactive waste	2004
Liquid radwaste processing plant	ChNPP site	Management of liquid radwaste accumulated during the operation of the ChNPP and radwaste to be produced during decommissioning and implementation of SIP	Construction is completed. Equipment is being installed. Commissioning is planned in 2009.
Industrial complex for solid radwaste management consisting of: - solid radwaste retrieval; - solid radwaste treatment	ChNPP site	Management of radioactive waste accumulated during the operation of the ChNPP and radwaste to be produced during decommissioning of ChNPP and implementation of SIP	Under construction. Commissioning is planned in 2009.

3.3. List of radioactive waste management facilities at SISP "UkrDO "Radon" and SSE "Complex"

Facility/ Location	Main purpose	Design capacity of storage facilities	Year of commissioning	Title of storage facility	Condition
Dnipropetrovsk SISP 23 km highway "Dnipropetrovsk–Zaporizhzhya"	Transport, processing and storage of radwaste	SRW – 450,0 m^3; LRW – 200,0 m^3; Spent RS – 50 kg-equiv. Ra	1961	SRW № 1	Abandoned
				SRW № 2	In operation
				BRW № 5	In operation
				RS № 3	In operation
				LRW № 4	In operation
Kyiv SISP Kyiv city, Komunalna street, 1	Transport, processing and storage of radwaste	SRW – 1800,0m^3; Hangar with containers – 219,0 m^3; LRW – 600,0 m^3; Spent RS – 120 kg-equiv. Ra	1962	SRW № 5-7	Not in operation
				SRW № 8-10	Abandoned
				Hangar-storage № 2	In operation
				RS № 1-5	Not in operation
				RS № 6	Abandoned
				LRW № 12-14	Not in operation
	Storage of decontamination radwaste, located in Kyiv, Zhytomyr and Chernigiv regions	SRW - 36090,0 $м^3$*	1987-1995 (elimination of ChNPP accident consequences)		Not in operation
Lviv SISP Yaroslavsk district. Lviv Region.	Transport, processing and storage of radwaste	SRW – 1140,0m^3; LRW – 200,0 m^3; Spent RS – 80 kg-equiv. Ra	1962	SRW № 1	Abandoned
				SRW № 2	In operation
				SRW № 3	Filled
				SRW № 4	Filled
				SRW № 5-8	In operation
				BRW	In operation
				RS № 1	Filled
				RS № 2	In operation
				RS	Filled
				LRW	In operation

Odessa SISP 75 km highway "Odessa –Kyiv"	Transport, processing and storage of radwaste	SRW – 583,0 m^3; LRW – 400,0 m^3; Spent RS– 50 kg-equiv. Ra; SRW-78 m^3 (Containers).	1961	SRW № 1-11	In operation
				RS № 13	In operation
				LRW № 1	Abandoned
				LRW № 2	Not in operation
				Containers № 14-16	In operation
				Container № 18	In operation
				Container № 21	In operation
Kharkiv SISP Dergachiv District, Kharkiv Region	Transport, processing and storage of radwaste	SRW – 2384,6 m^3**; LRW – 1000,0м^3; Spent RS– 60 kg-equiv. Ra	1962	SRW № 1-14	In operation
				SRW № 18-20	Abandoned
				RS № 15	In operation
				RS № 16	In operation
				RS № 17	Not in operation
				LRW № 21	In operation
				LRW№ 22-25	Reserve
			1993	Liquid radwaste cementation facility	In operation
SSE "Complex " Chornobyl Exclusion Zone	Transport, processing, storage and disposal of radwaste	RWDP „Buriakivka" – 690000 m^3	1986	RWDP „Buriakivka"	In operation
		RWDP „Pidlisnyy"***	(elimination of consequences of Chornobyl accident)	RWDP „Pidlisnyy"	Not in operation
		RWDP "III line ChNPP"***		RWDP "III line ChNPP "	Not in operation
		RICP***		RICP-9 pieces	Not in operation

* design capacity for storages in Chernigiv Region only, data for other storages are absent
** not tacking into accounting design capacity of the building for storage of tubing, which is 650 t
*** no design documentation

Annex 4. Inventory of Radioactive Waste as of 01 July 2008

4.1. Information on radioactive waste in storage at sites of operating NPPs

Material	Location	Amount, m3	Activity, Bq	Main radionuclides
Filtering materials	SE KhNPP	155,6	7,3E+11	^{134}Cs-29,6%, ^{137}Cs-70,2%, ^{60}Co-0,2%
Evaporation bottoms	SE KhNPP	448,6	8,1E+12	^{134}Cs-38,1%, ^{137}Cs-61,5%, ^{60}Co-0,4%
Salt fusion	SE KhNPP	776,0	3,29E+13	^{134}Cs-40,4%, ^{137}Cs-59,1%, ^{60}Co-0,5%
Low-level solid radioactive waste	SE KhNPP	3892,02	1,63E+9	^{58}Co-12,04%, ^{60}Co-38,48%, ^{134}Cs-12,74%, ^{137}Cs-24,36%. ^{54}Mn-0,02%
Intermediate-level solid radioactive waste	SE KhNPP	111,7	1,9E+10	^{58}Co-0,06%, ^{60}Co-99,91%, ^{134}Cs-0,01%, ^{54}Mn-0,02%
High-level solid radioactive waste	SE KhNPP	8,52	*	*
Filtering materials	SE ZNPP	350	1,14E+13	^{134}Cs-37,58%, ^{137}Cs-43,76%, ^{60}Co-16,18%, ^{58}Co-2,48%
Evaporation bottoms	SE ZNPP	2210,0	1,24E+10	^{134}Cs-38,63%, ^{137}Cs-53,9%, ^{60}Co-6,8%, ^{124}Sb-0,5%
Salt fusion	SE ZNPP	5402,1	5,73E+13	^{134}Cs-42,44%,^{137}Cs -56,77%, ^{60}Co-0,75%, ^{124}Sb-0,04%
Low-level solid radioactive waste	SE ZNPP	7617,05	1,15E+12	^{134}Cs, ^{137}Cs, ^{60}Co,^{54}Mn
Intermediate-level solid radioactive waste	SE ZNPP	617,56	3,94E+12	^{134}Cs, ^{137}Cs, ^{60}Co,^{54}Mn
High-level solid radioactive waste	SE ZNPP	86,51	*	*
Filtering materials	SE SUNPP	228,1	*	*
Evaporation bottoms	SE SUNPP	2850,0	1,14E+14	^{134}Cs-12,74%, ^{137}Cs-66,55%, ^{60} Co-15,88%, ^{58}Co-0,66%, ^{54}Mn-0,98%, ^{124}Sb-0,57%, ^{51}Cr-2.62%
Low-level solid radioactive waste	SE SUNPP	15980	2,57E+13	*
Intermediate-level solid radioactive waste	SE SUNPP	565,85	1,584E+15	*
High-level solid radioactive waste	SE SUNPP	13,27	0.889E+15	*
Filtering materials	SE RNPP	525,3	*	*
Evaporation bottoms	SE RNPP	5157	1,19E+10	^{134}Cs-16%, ^{137}Cs-80.3%, ^{60} Co-3.7%
Salt fusion	SE RNPP	770,16	7.32E+10	^{134}Cs-11%, ^{137}Cs-87%, ^{60} Co-2%
Low-level solid radioactive waste	SE RNPP	5776,57	*	*
Intermediate-level solid radioactive waste	SE RNPP	1022,7	*	*
High-level solid radioactive waste	SE RNPP	62.97	*	*

4.2. Information on radioactive waste in storage on site of ChNPP

Material	Location	Amount, m3	Activity, Bq	Main radionuclides
Low-level solid radioactive waste	SRSF	1069,00	1,1E+11	Mixture*: Cs, Sr, Co, Pu, Am
Intermediate-level solid radwaste	SRSF	926,50	4,11E+12	-//-
High-level solid radwaste	SRSF	506,93	1,2816E+14	-//-
High-level solid radwaste	Temporary storage of solid radwaste	0,81	4,67E+11	^{137}Cs, ^{134}Cs, ^{60}Co, ^{94}Nb, ^{154}Eu, ^{152}Eu, ^{241}Am, ^{243}Am, ^{108m}Ag,
Evaporation bottoms	SLSF	9285,50	2,66E+14	^{137}Cs, ^{134}Cs, ^{60}Co, ^{90}Sr
Ion-exchange resins	SLSF	2808,4	1,68E+12	^{137}Cs, ^{60}Co, ^{90}Sr, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am, ^{243}Am
Pulp	SLSF	1606,08	2,5E+12	^{137}Cs, ^{134}Cs, ^{60}Co, ^{90}Sr, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am
Evaporation bottoms	SLRSF	3900,00	1,09E+14	^{137}Cs, ^{134}Cs, ^{60}Co, ^{90}Sr
Ion-exchange resins	SLRSF	1245,90	5,44E+11	^{137}Cs, ^{134}Cs, ^{60}Co, ^{90}Sr, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am
Pulp	SLRSF	649,44	8,8E+11	^{137}Cs, ^{134}Cs, ^{60}Co, ^{90}Sr, ^{241}Am
Spent radioactive oil	Temporary storage	104,80	2,71E+07	^{137}Cs

* - waste radionuclide composition during storage facility loading was not determined due to absence of equipment, methodological and metrological basis.

4.3. Information on radioactive waste in storage on sites of research reactors

Material	Location	Amount, m3	Weight, T	Activity, Bq	Main radionuclides
NASU INR					
Intermediate-level solid radwaste	Storage № 8, № 9, № 10 № 11, № 12	- *	7,053	1,12E+11	^{137}Cs, ^{60}Co
Low-level liquid radwaste	Sewer tanks № 1 та № 2	347,0	- *	1,58E+10	^{137}Cs, ^{134}Cs, ^{60}Co
SUNEI					
Intermediate-level solid radwaste	Storage № 8	15	2,54	9,7E+10	^{60}Co, ^{137}Cs, ^{90}Sr, ^{90}Y, ^{119}Sn, ^{241}Am
Low-level solid radwaste	Storage № 8	10	1,69	3,7E+7	-//-
Low-level liquid radwaste	Storage № 3	10,3	- *	3,4E+6	^{137}Cs, ^{90}Sr+, ^{90}Y

* - activity and radionuclide composition is not determined due to the absence of methodology and/ or equipment.

4.4. Information on radioactive waste disposed in SSE "Complex" (evaluation data)

Title of radioactive waste	Waste category	Location	Weight, T	Amount, m^3	Activity, Bq	Main radionuclides
Solid rad-waste	Low and intermediate level	RWDP „Buriakivka"	1120000	590000	2,47E+15	Cs, Sr, Pu, Am

4.5. Information on radioactive waste stored in SSE "Complex" (evaluation data)

Title of radioactive waste	Waste category	Location	Weight, T	Amount, m^3	Activity, Bq	Main radionuclides
Solid radwaste	High-level and long-lived	RWDP " Pidlisnyy "	7920	3960	2,59 E+15	Unknown
	Low and intermediate-level and long-lived		14080	7040	2,5E+12	
	Low and intermediate-level	RWDP " III line ChNPP"	41900	26200	3,64E+14	Cs, Sr, Pu
		RICP "Nova Budbaza"	70000	150000	1,85E+14	Unknown
		RICP "Stara Budbaza"	316000	171000	1,10E+15	Unknown
		RICP "Naftobaza"	181000	102300	3,73E+13	Cs, Sr, Pu
		RICP "Chistogolivka"	150000	160000	3,70E+12	Unknown
		RICP "Stantsia Yaniv"	15000	30000	3,70E+13	Unknown
		RICP "Kopachi"	90000	110000	3,33E+13	Unknown
		RICP "Rudyy Lis"	250000	500000	3,74E+14	Unknown
		RICP "Pischane Plato"	91700	57300	6,4E+12	Cs, Sr, Pu
		RICP "Pripyat"	11000	16000	2,59E+13	Unknown

4.6. Information on radioactive waste stored in SISP of "UkrDo "Radon"

Material	Location	Amount*, m3	Weight*, t	Activity**, Bq	Main radionuclides
Low and intermediate level solid radwaste	Kyiv SISP	1994	2715	5,82E+15	Cs-137, Pu-239, Co-60, H-3,(Sr+Y)-90
	Dnipropetrovsk SISP	433,1	1101	6,03E+15	Cs-137, Ir-192, Pu-239, H-3, Ra-226
	Odessa SISP	403	314	5,10E+14	Co-60, Cs-137, Pu-239, H-3, (Sr+Y)-90
	Lviv SISP	640,1	1513	4,14 E+12	Cs-137, Pu-239, Co-60, H-3
	Kharkiv SISP	1633	2438	9,62E+12	Cs-137, Pu-239, Co-60, (Sr+Y)-90
Low and intermediate level liquid radwaste	Kyiv SISP	413	413	1,83E+12	Cs-137, Co-60, H-3, Ir-192
	Dnipropetrovsk SISP	60	60	1,7E+10	Cs-137, Co-60, H-3
	Odessa SISP	137,5	137,5	1,10E+11	C-14, H-3
	Kharkiv SISP	9,8	9,8	2,29E+08	Cs-137, Co-60, H-3
Spent sealed RS	Kyiv SISP	-	-	7,23E+14	Cs-137, Co-60, H-3, Ir-192
	Dnipropetrovsk SISP	-	-	4,46E+14	Cs-137, Ra-226, Co-60, Ir-192
	Odessa SISP	-	-	1,5 E+14	Cs-137, Ra-226, Co-60, Ir-192
	Lviv SISP		-	3,56E+14	Cs-137, Co-60, Ir-192
	Kharkiv SISP	-	-	3,52E+14	Cs-137, Co-60, Ir-192
Spent sealed RS of high power (RITEG)	Odessa SISP	-	-	2,99E+16	(Sr+Y)-90

* amount and weight of solid radwaste are given taking into account biological shielding of spent RS;
** activity is given taking into account radioactive decay of radionuclides.

Annex 5. List of Nuclear Facilities in Decommissioning as of 01 July 2008

Facility	No of power unit	Location	Type of reactor facility	Data of operation termination
Nuclear facility	№1	ChNPP	RBMK-1000 (modification RBM-K2)	30.11.1996
Nuclear facility	№ 2	ChNPP	RBMK-1000 (modification RBM-K2)	11.10.1991
Nuclear facility	№ 3	ChNPP	RBMK-1000 (modification RBM-K7)	15.12.2000

Annex 6. List of Ukrainian Regulations on Nuclear and Radiation Safety Adopted in the Reporting Period

6.1. Laws of Ukraine

1. On ratification of the Additional Protocol to the Agreement between Ukraine and the IAEA for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (adopted on 16 November 2005).
2. On National Program on Elimination of Consequences of Chornobyl Accident for the period 2006-2010 (Adopted on 14 March2006).
3. On Ratification of the Agreement among the Government of the Republic of Bulgaria, Government of the Russian Federation and the Cabinet of Ministers of Ukraine on transport of nuclear material between Russian Federation and Republic of Bulgaria through the territory of Ukraine (adopted on 27 July 2006).
4. On changes to the Article 11 of the Law of Ukraine "On Physical protection of nuclear facilities, nuclear material, radioactive waste and other sources of ionizing radiation" (adopted on 08 February 2007).

6.2. Resolutions of the Cabinet of Ministers of Ukraine

1. Resolution of the Cabinet of Ministers of Ukraine of 31 August 2005 № 845 "Issues of qualification check and stimulation of employees of the State Nuclear Regulatory Committee of Ukraine, who directly perform functions of state regulation of nuclear and radiation safety".
2. Resolution of the Cabinet of Ministers of Ukraine of 31 August 2005 № 846 "On changes to the Resolution of the Cabinet of Ministers of Ukraine № 847 of 4 August 1997"
3. Resolution of the Cabinet of Ministers of Ukraine of 24 September 2005 № 978 "On approval of the Agreement between the Cabinet of Ministers of Ukraine and Government of Romania on Early Notification in Case of Nuclear Accident and Exchange of Information in the Are of Nuclear and Radiation Safety".
4. Resolution of the Cabinet of Ministers of Ukraine of 15 March 2006 № 284 "On changes to the Resolution of the Cabinet of Ministers of Ukraine № 1471 of 25 December 1997".
5. Resolution of the Cabinet of Ministers of Ukraine of 27 April 2006 № 594 "Issues of Establishing and Use of Nuclear Facilities Decommissioning Fund".
6. Resolution of the Cabinet of Ministers of Ukraine of 4 May 2006 № 609 "On Approval of Order of Use in 2006 of Funds, allocated from the State Budget for Establishing of Sate Register of Ionizing Radiation Sources".
7. Resolution of the Cabinet of Ministers of Ukraine of 11 May 2006 № 628 "On changes to the Resolution of the Cabinet of Ministers of Ukraine of 5 April 1999 № 542 "Complex Program on Radioactive Waste Management".
8. Resolution of the Cabinet of Ministers of Ukraine of 17 May 2006 № 684 "Issues of Ukraine's Fee to the Chornobyl Fund "Shelter".
9. Resolution of the Cabinet of Ministers of Ukraine of 7 June 2006 № 796 "Issues of State Nuclear Regulatory Committee of Ukraine".
10. Resolution of the Cabinet of Ministers of Ukraine of 15 June 2006 № 834 "On Approval of the Procedure for Implementation of the Requirements Deriving from the Additional Protocol to the Agreement between Ukraine and the IAEA for the Application of

Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons".

11. Resolution of the Cabinet of Ministers of Ukraine of 19 June 2006 № 996 "On changes to the Resolutions of the Cabinet of Ministers of Ukraine of 23 June 2003 року № 953 and of 20 August 2003 № 1307".
12. Resolution of the Cabinet of ministers of Ukraine of 3 August № 1092 "On approval of State Program on Provision of Safe Storage of Spent High-Level Sources of Ionizing Radiation".
13. Resolution of the Cabinet of Ministers of Ukraine of 18 July 2007 № 939 "On Approval of Technical Regulations for Containers for Storage and Disposal of Radioactive Waste and Action Plan for its Application".
14. Resolution of the Cabinet of Ministers of Ukraine of 27 December 2006 № 1830 "On Approval of the Provisions of the State Nuclear Regulatory Committee of Ukraine".
15. Resolution of the Cabinet of Ministers of Ukraine of 3 October 2007 № 1196 "Some Issues of Transport of Radioactive Materials".
16. Resolution of Cabinet of Ministers of Ukraine of 24 October 2007 № 1253 "On Changes to Several Resolutions of the Cabinet of Ministers of Ukraine on Issues of State Registration of Ionizing Radiation Sources".
17. Resolution of the Cabinet of Ministers of Ukraine of 5 December 2007 № 1382 "On Approval of Technical Regulations for Sealed Sources of Ionizing Radiation".
18. Resolution of the Cabinet of Ministers of Ukraine of 2 July 2008 № 591 "On Amendments to Item 1 of the Resolution of the Cabinet of Ministers of Ukraine of 31 August 2005 № 845".
19. Resolution of the Cabinet of 1 August 2007 № 587-p "On Approval of State Ecological Program on Radioactive Waste Management".

6.3. Regulations and Other Documents

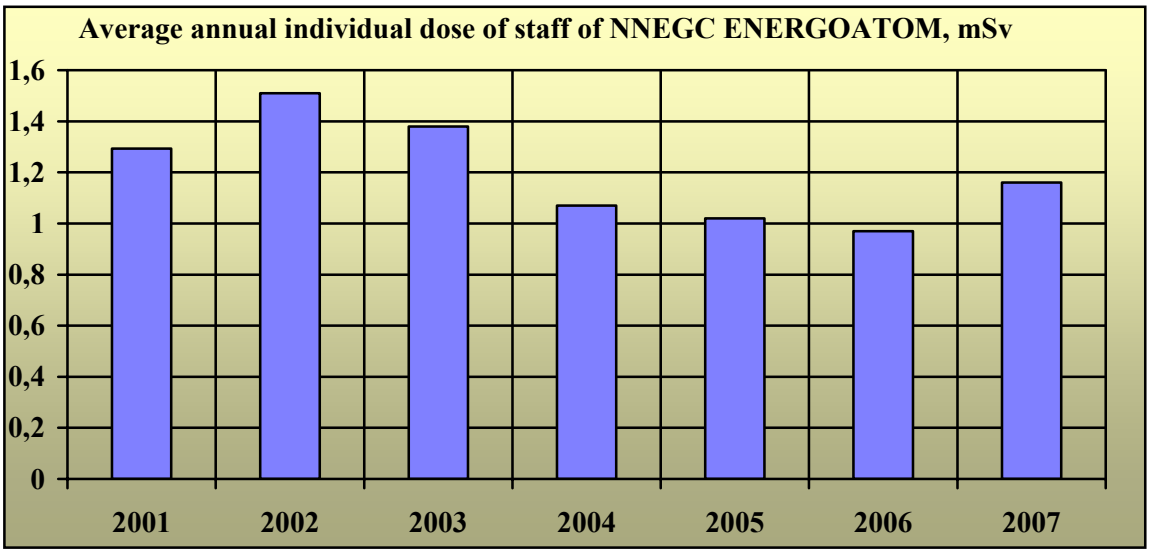
1. Procedure for State Expertise on Nuclear and Radiation Safety.
2. Provisions for Planning of Events and Actions in Case of an Accident during Transport of Radioactive Material.
3. Requirements to the Certification of NPP Pipelines and Equipment Non-destructive Control Systems.
4. Provisions for Knowledge Check of Management of the State Nuclear Regulatory Committee of Ukraine, Who Directly Perform Functions of State Regulation of Nuclear and Radiation Safety.
5. Provisions on Nuclear Materials Measurement System.
6. Rules for Account and Control of Nuclear Material.
7. Requirements to the Quality Management during Transport of Radioactive Material.
8. Rules for Physical Protection of Nuclear Facilities and Nuclear Material.
9. Rules on Nuclear and Radiation Safety During Transport of Radioactive Material (PBPRM-2006).
10. Requirements to the Periodicity and Content of the Reports, Submitted by the Licensees in the Area of Nuclear Energy Use.
11. Procedure for Personal Reception of Citizens and Participation in "hot" Lines of the Chairperson, First Deputy and the Deputies of the Chairperson of the State Nuclear Regulatory Committee of Ukraine.

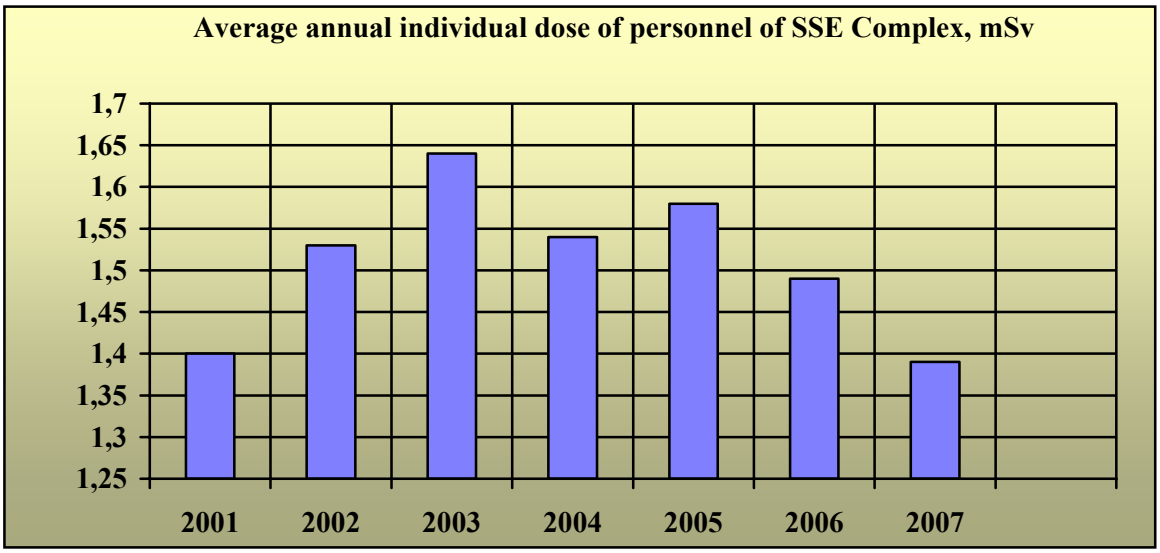
12. General Provisions for Safety Provision of the Radioactive Waste Storage in Geological Repositories.
13. Procedure for Issuance of Certificates for Safe Transport of Radioactive Material.
14. Provisions of the State Regional Inspection on Nuclear and Radiation Safety of the State Nuclear Regulatory Committee of Ukraine.
15. List of officials of the State Nuclear Regulatory Committee of Ukraine, Who Directly Perform Functions of Sate Regulation of Nuclear and Radiation Safety and are Subject to Knowledge Attestation, new version.
16. Conditions and Procedure for Issuance of Separate Written Permissions for Types of Work or Actions at Operational Stages and Closure of Storages for Disposal of Radioactive Waste.
17. Requirements and Conditions for Safety (Licensing Conditions) of Performing Activities on the Use of Ionizing Radiation Sources in Radiotherapy.
18. General Provisions of Safety of Nuclear Power Plants.
19. Requirements to the Structure and Content of the Safety Analysis Report of Radioactive Waste Storages.
20. Requirements and Rules for Long-term Storage of Long-lived and High-level Radioactive Waste Before Their Disposal in Deep Geological Formations.
21. Safety Requirements to the Site Selection for Nuclear Power Plant.
22. Nuclear Safety Rules for Reactor Facilities of Nuclear Power Plans with Water Reactors under Pressure.

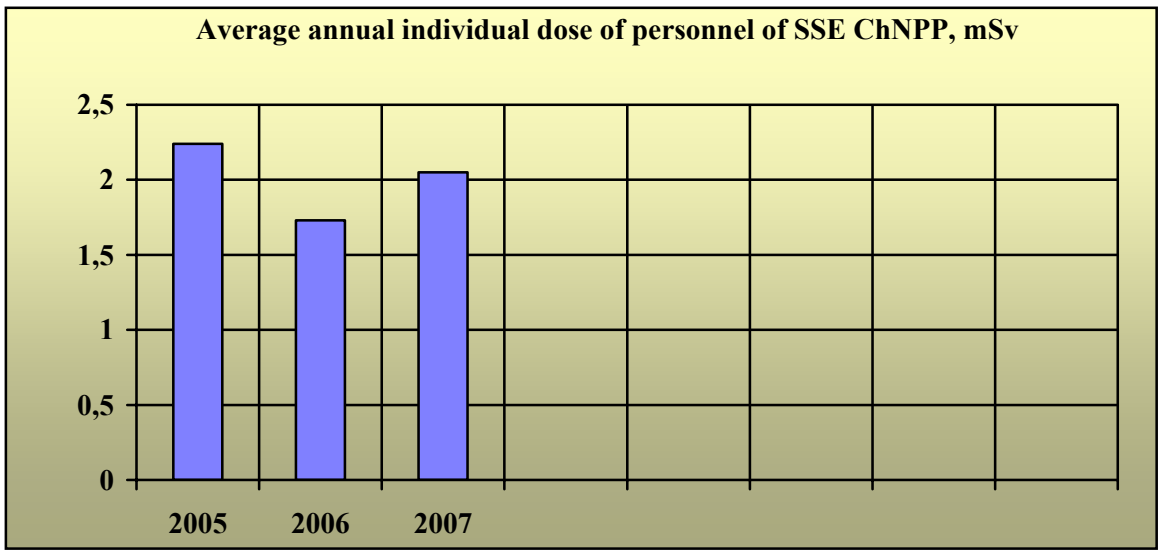
Annex 7. National and International Safety Reports Over a Reported Period

1. National Report of Ukraine on Compliance with the Obligations of the Convention on Nuclear Safety.
2. National Report of Ukraine “20 Years of Chornobyl Accident. Prospection.” (2005).
3. National Report on Sate of Man-caused and Natural Safety in Ukraine in 2005.
4. National Report on Sate of Man-caused and Natural Safety in Ukraine in 2006.
5. National Report on Sate of Man-caused and Natural Safety in Ukraine in 2007.
6. Annual National Report of Ukraine “On the State of Elimination of Consequences of Chornobyl Accident in Ukraine During the Period of 2006-2007”.
7. Annual Report on Nuclear and Radiation Safety in Ukraine in 2005.
8. Annual Report on Nuclear and Radiation Safety in Ukraine in 2006.
9. Annual Report on Nuclear and Radiation Safety in Ukraine in 2007.

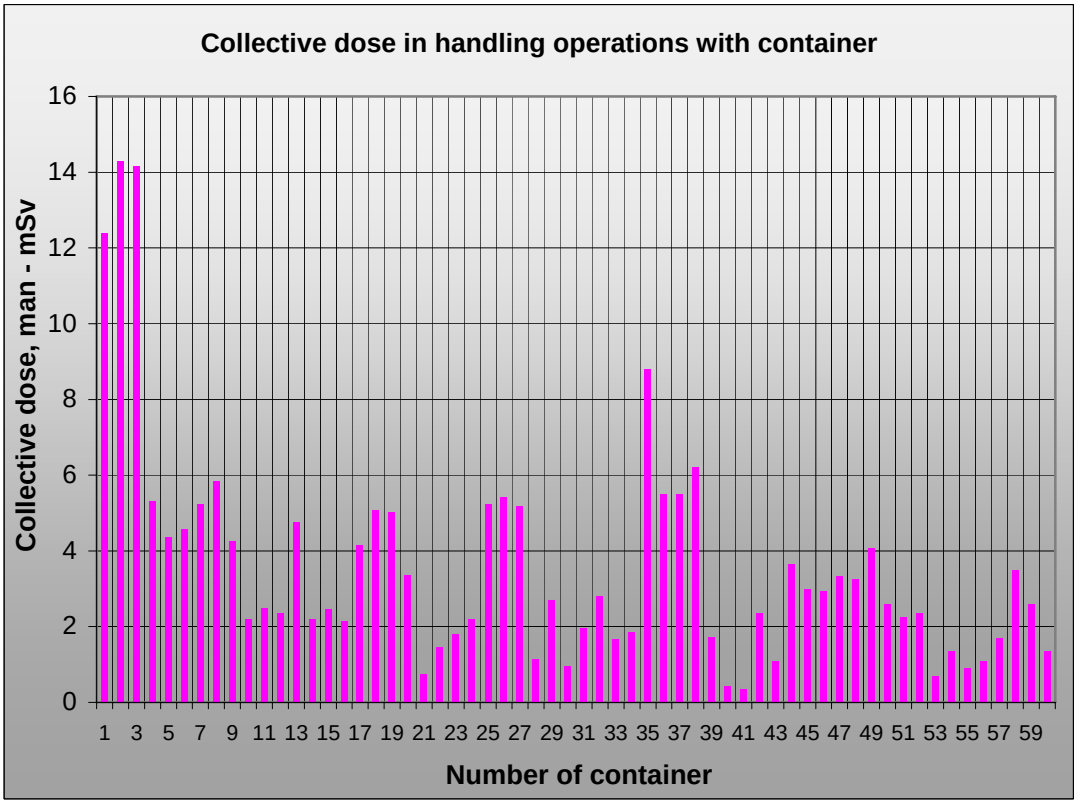
Annex 8. Radiation Protection of Personnel and Public



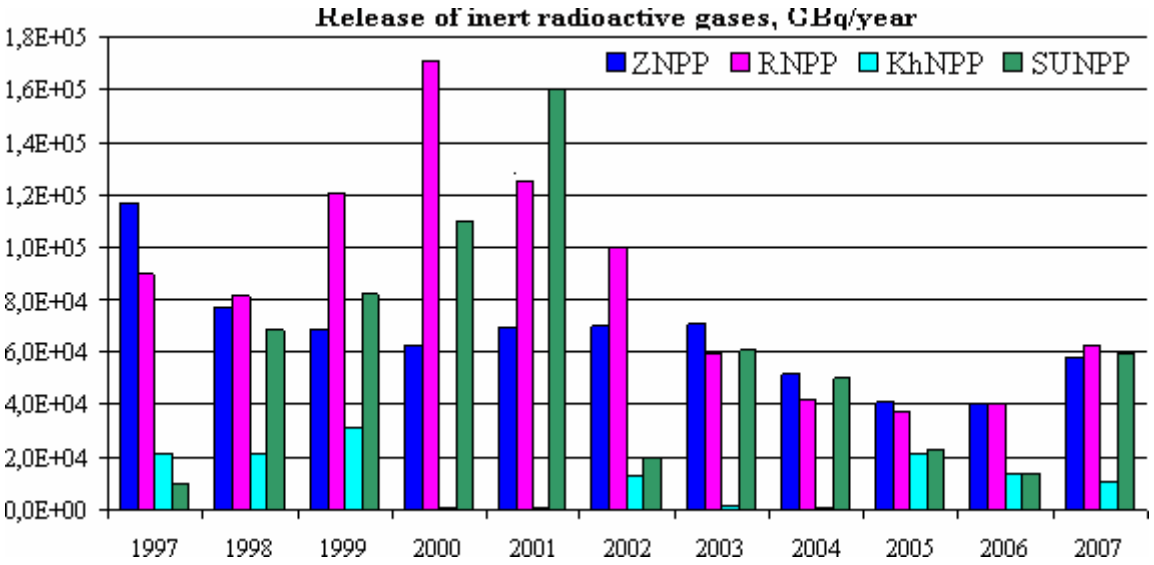




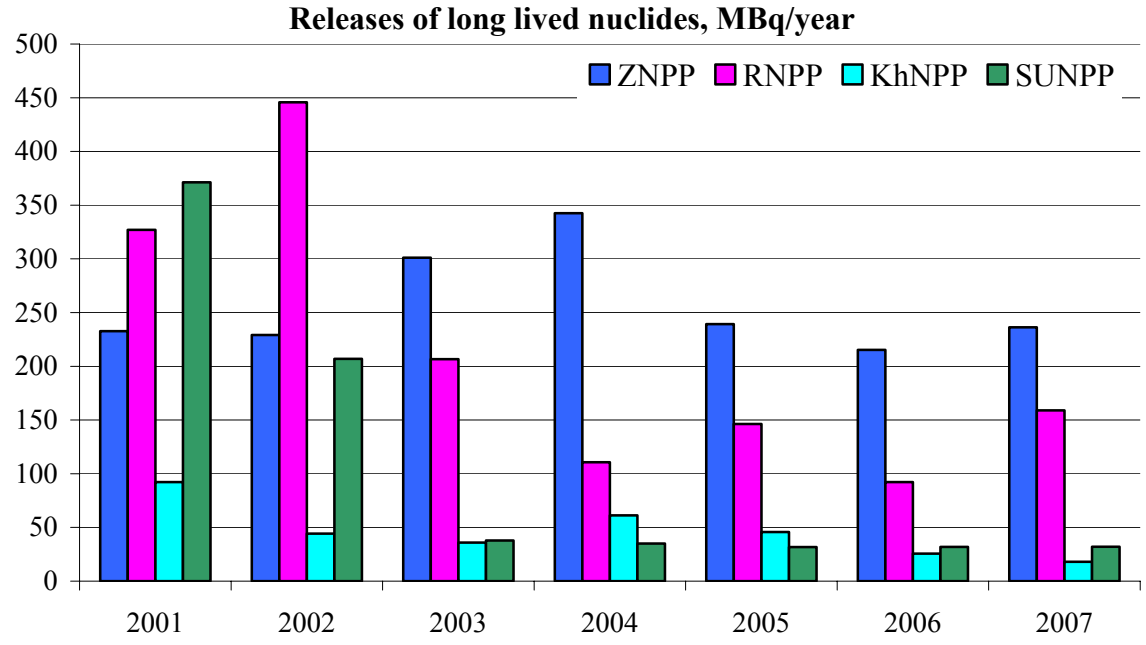
Picture L.8.1 – The dynamics of average annual individual doses
of personnel of NNEGC ENERGOATOM, SSE Complex and SSE ChNPP.



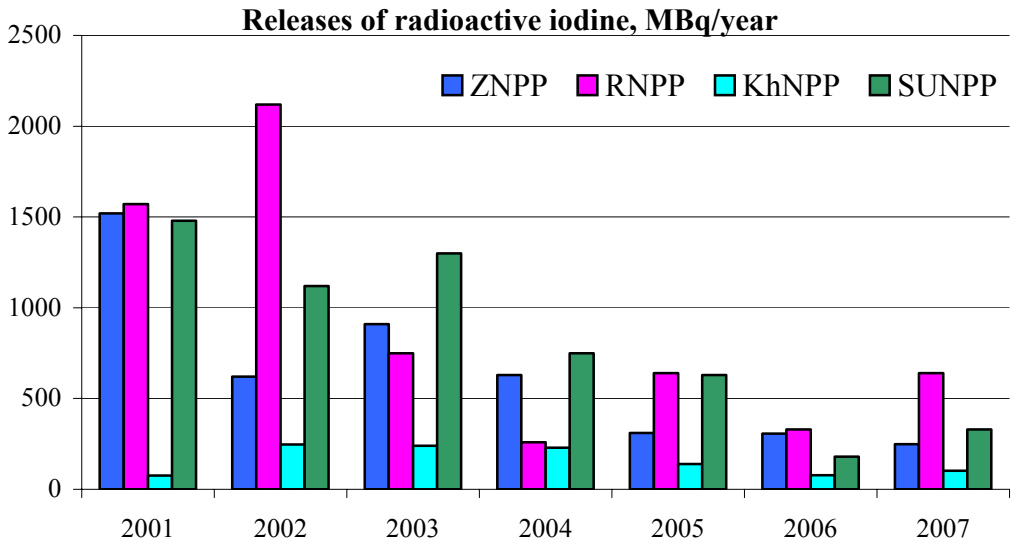
Picture L.8.2 – Collective dose of personnel of ZNPP
in handling operations with containers for SF storage.



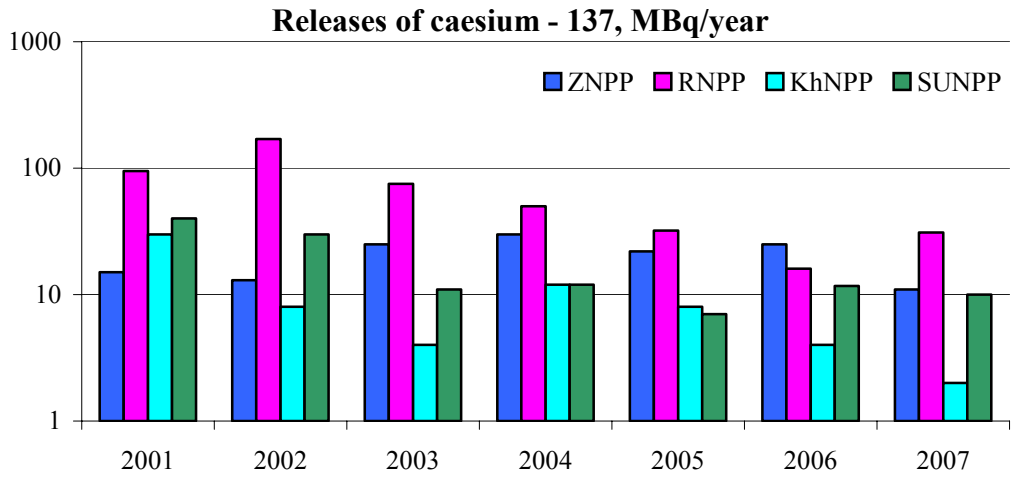
Picture L.8.3 Dynamics of releases of inert radioactive gases at NPPs of Ukraine.



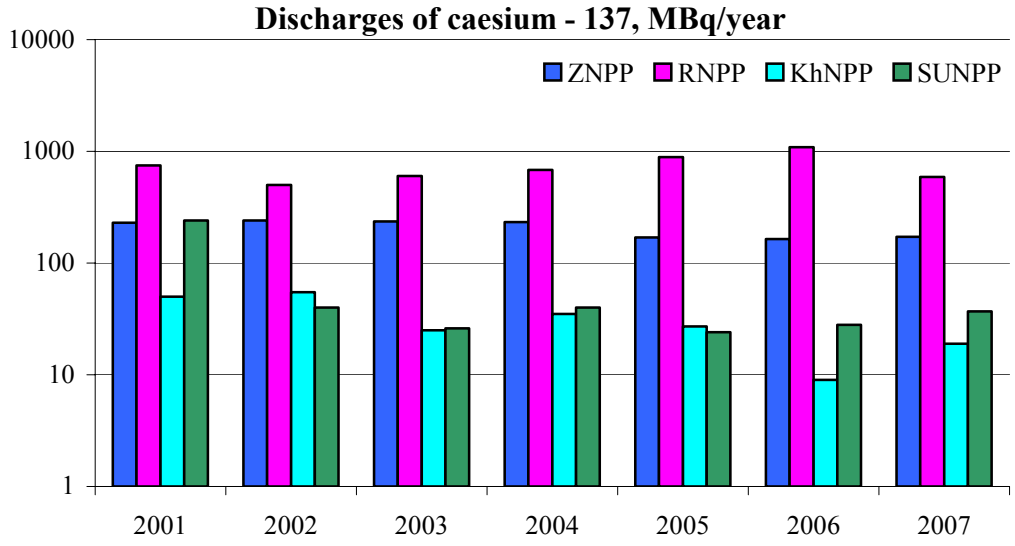
Picture L.8.4 Dynamics of releases of long-lived radionuclides from NPPs of Ukraine.



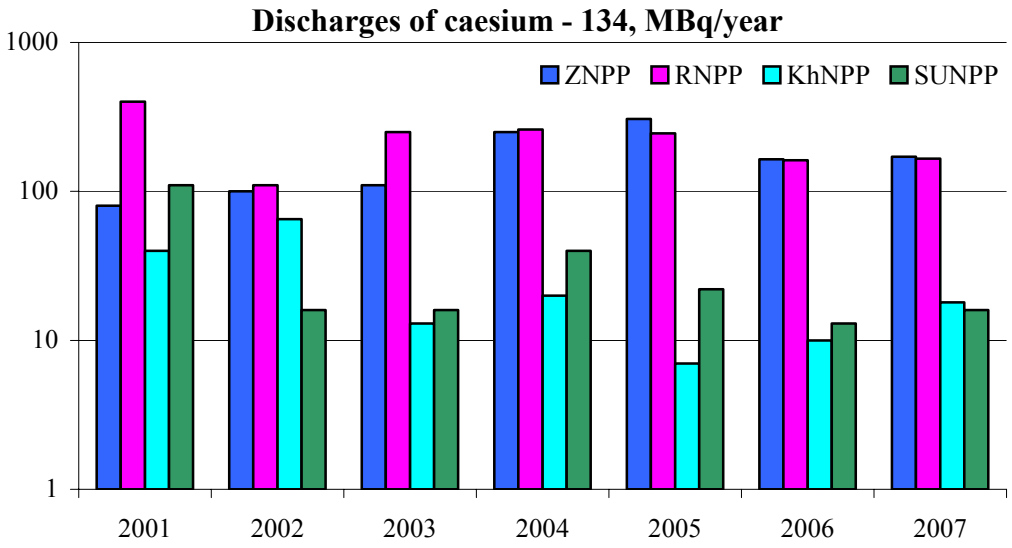
Picture L.8.5 Dynamics of releases of radioactive iodine from NPPs of Ukraine.



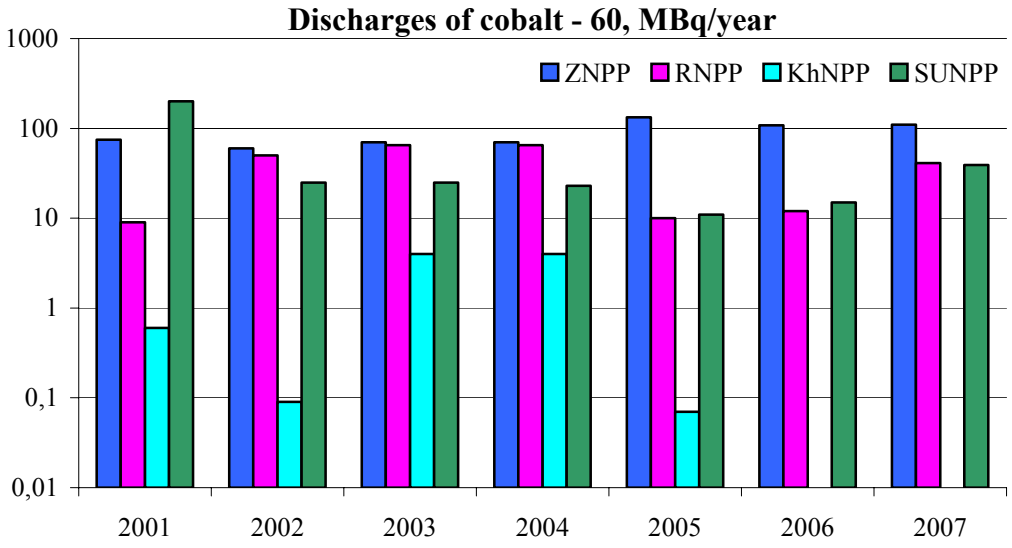
Picture L.8.6 Dynamics of releases of caesium -137 from NPPs of Ukraine.



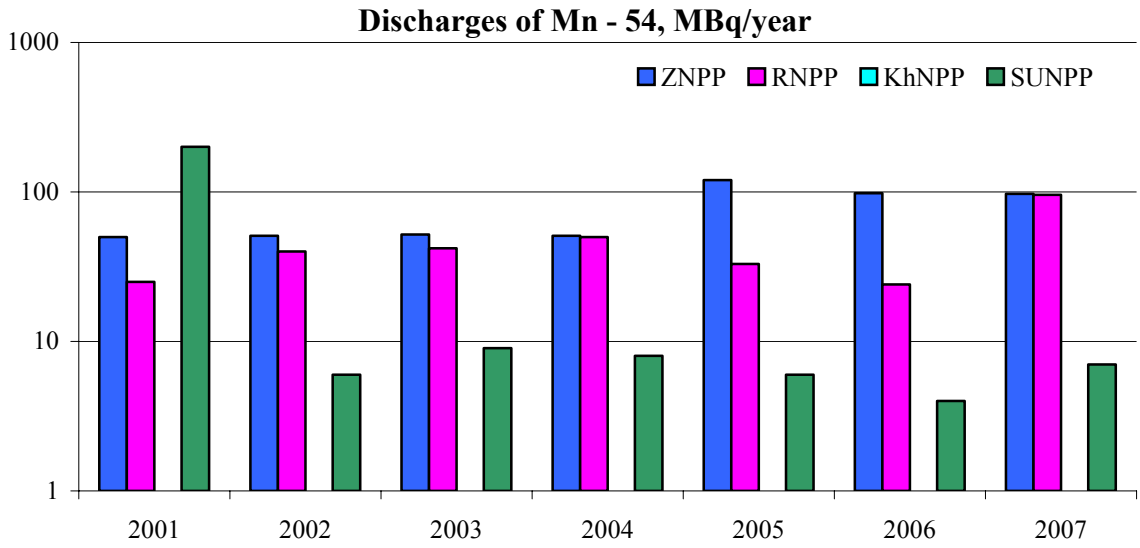
Picture L.8.7 Dynamics of discharges of caesium-137 from NPPs of Ukraine.



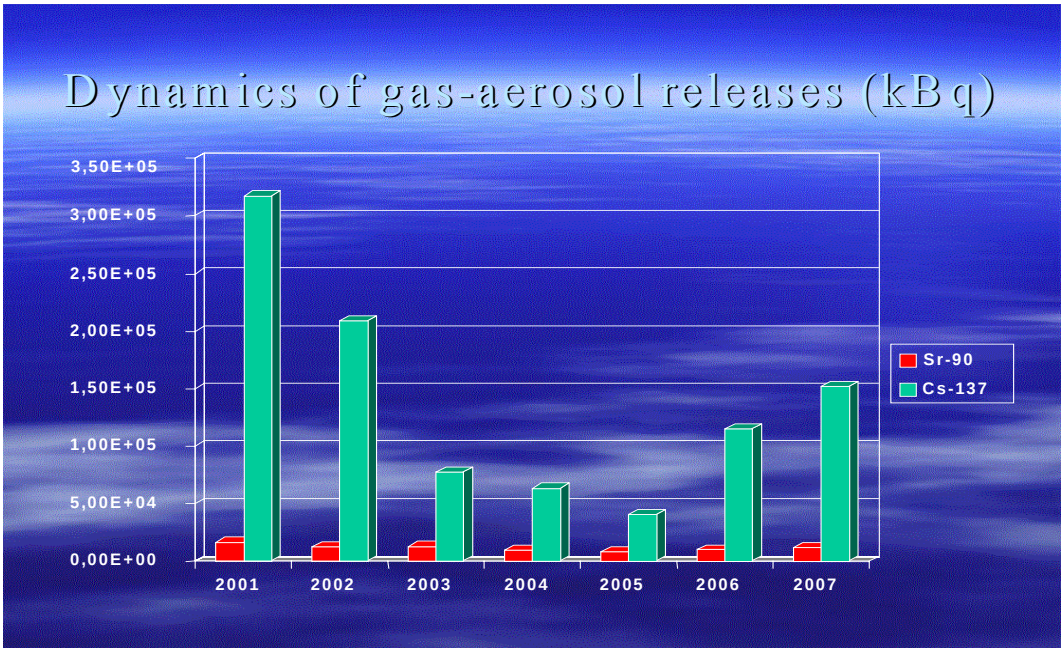
Picture L.8.8 Dynamics of discharges of caesium -134 from NPPs of Ukraine.



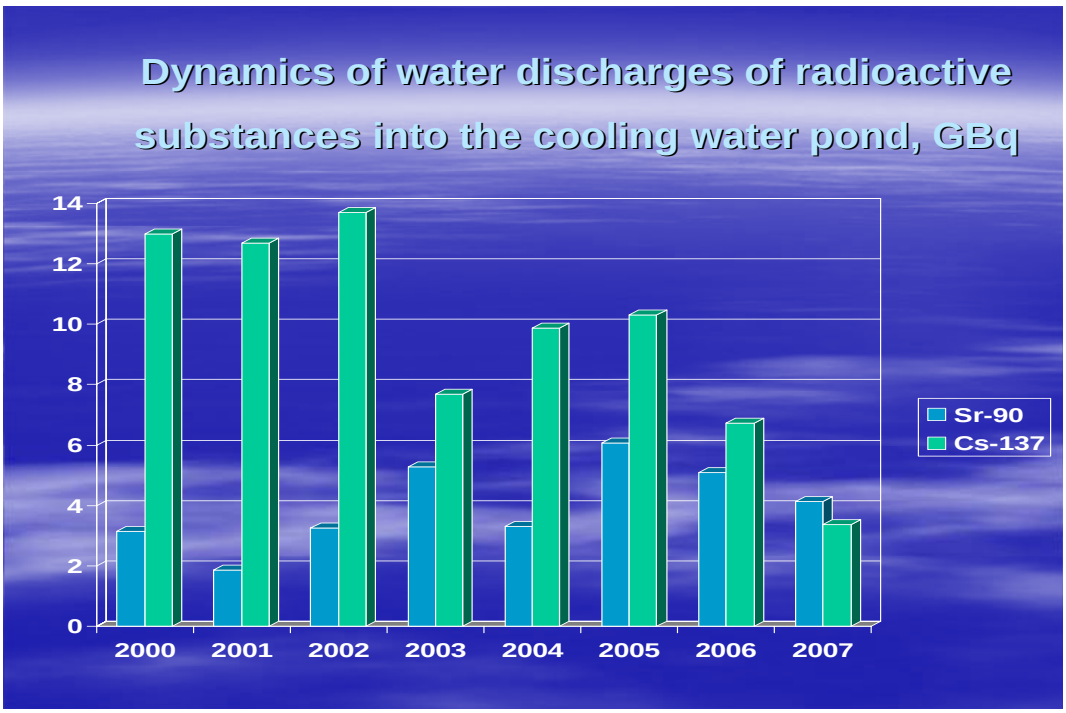
Picture L.8.9 Dynamics of discharges of cobalt-60 from NPPs of Ukraine.



Picture L.8.10 Dynamics of discharges of manganese -54 from NPPs of Ukraine.



Picture L.8.11 Dynamics of releases from ChNPP (kBq).



Picture L.8.12. Dynamics of water discharges of radioactive substances into the cooling water pond of SSE ChNPP, GBq.

Annex 9. Shelter

1. General Information.

Accident that took place at Chornobyl NPP on 26th of April 1986 became the biggest and the most severe accident in the history of nuclear energy. The explosion destroyed the reactor core, protective barriers and safety systems.

With the purpose to isolate the destroyed reactor within the shortest possible time (starting May till November 1986) the Unit 4 of the ChNPP was shut down and protective construction was build around it.

Preservation of the destroyed 4th Unit of ChNPP was directed at reducing its impact at the environment and protection of the destroyed reactor from external factors.

Shelter – a destroyed Unit 4 of the ChNPP as a consequence of beyond-design accident, which lost its functional characteristics of the power unit and where all primary measures were taken to reduce consequences of the accident and works to control Shelter status and provide nuclear and radiation safety continue.

Chief designer of the Shelter was Institute VNIPIET (St. Petersburg). The design was elaborated and altered in course of construction.

Shelter is not an object, which is constructed according to the rules and norms on site selection, design, construction, commissioning, operation and decommissioning of nuclear facilities (or storages for radioactive waste). Current condition of the Shelter does not correspond and can not correspond to the norms and safety rules in force in the area of nuclear energy and general industry requirements.

Part of the built in 1986 constructions are based on the destroyed elements of the building of ChNPP Unit 4 strength of these constructions was not assessed because of the complicated radiation conditions and obstructions. Application of remote methods of concreting resulted in spilling of concrete masses over the building coverings and overloading. Remote assembling in some cases did not provided for solid fitting of the constructions and firm joints of constructions with bearings.

According to the Law of Ukraine "On Ratification of the Convention on Nuclear Safety" Shelter does not fall under this Convention taking into account its uniqueness caused by global consequences of the Chornobyl accident and impossibility to achieve high safety level according to the requirements of the Convention.

All nuclear and radioactive materials located in Shelter are radioactive waste. According to the Norms of Radiation Safety in Ukraine Shelter is categorized as location for near-surface storage of uncoordinated radwaste (temporary storage of uncontrolled radwaste, which is in stabilization and reconstruction stage).

Radwaste of emergency origin, which are open sources of ionizing radiation and large amounts of which are located in the Shelter without reliable protective barriers create potential danger for personnel, population (including future generation) and the environment. Keeping under control of these danger sources and protection of human and the environment is a key mission of all activities at the Shelter.

2. License for operation of the Shelter.

Activities on operation of the Shelter are performed in frames of a license issued by the SNRCU. License establishes terms and the scope of activities. It also foresees activities on

Shelter transformation into ecologically safe system in frames of international project "Shelter Implementation Plan (SIP)".

According to the license terms the purpose of any activity at the Shelter is protection of personnel, population and the environment from hazard impact of radioactive material located at the object or its site. It is prohibited to implement activities at the Shelter for any other purposes.

License period of validity – until commissioning of new safe confinement of Shelter. Person responsible for performance of authorized type of activity - General Director of State Specialized Enterprise Chornobyl NPP.

License contain 23 terms for performing activities on Shelter operation.

At present SSE ChNPP fulfilled all special terms of license and continues to fulfill general terms for performance of activities. In particular, Licensee:

– submits half annual and annual reports on safety status of Shelter;

– provides for safe keeping of all data on account of radwaste that is transferred outside the Shelter;

– provides for physical protection of nuclear and radioactive materials;

– performs activities in frames of SIP based on separate permissions issued by the SNRCU;

– when performing activity that influences Shelter safety develops, substantiates and approves relevant technical decisions, which enter into force after agreement by the SNRCU.

Control over compliance with the license terms is performed by the State Inspection on nuclear safety at ChNPP and SNRCU headquarters of SNRCU.

Shelter is operated according to the Operational Regulations. This document regulates activities relative to constructions and systems (elements) of Shelter, which were taken into operation including technical maintenance, repair, modernization and other related activities directed at protection of personnel, population and the environment from radiological danger concerned with Shelter.

3. Shelter transformation into ecologically safe system.

Shelter transformation into ecologically safe system requires involvement of great financial resources and international support to solve this wide-ranging problem.

Important step to solve the problem of Shelter safety is interaction of Ukraine with countries of G-8 and European Commission.

As a result of joint efforts of experts from these countries an international program on Shelter transformation into ecologically safe system was developed in 1997 – Shelter Implementation Plan (SIP).

The implementation of this project is performed at the expense of the fees of countries-payers to the Chornobyl Fund "Shelter". The Manager of this Fund is European Bank for Reconstruction and Development.

SIP includes 22 tasks directed to meet 5 safety missions:

– reduce the possibility of Shelter crash down (stabilization of building constructions);

– mitigate consequences of accident with crash down;

– strengthen nuclear safety;

– increase safety of personnel and the environment;

– strategy of long-term measures related to transformation into ecologically safe system.

Activities on Shelter transformation into ecologically safe system (implementation of SIP) are structured according to the following groups of projects and tasks:

– development of programs and safety plans;
– creation of infrastructure for projects implementation;
– Shelter stabilization;
– Shelter equipment with systems;
– construction of new safe confinement (NSC);
– development of strategy on withdrawal of fuel-containing materials (FCM).

In frames of developed programs and safety plans the systems of organizational, methodological and technical measures were introduced to provide for safe implementation of SIP projects. The development of programs on radiation protection, radwaste management and emergency plans is completed. The last two documents constitute integral part of the general ChNPP documents.

Creation of additional infrastructure is necessary for safe implementation of SIP projects. Main implemented projects are the projects on sanitary inspection block for 1430 places, sanitary lock at the point +5.8 of Shelter, site for temporary store of technological material. The implementation of project on external engineering communications and subsidiary constructions is under completion.

During 2005-2008 the works on implementation of 7 urgent measures on stabilization of building constructions of the Shelter were completed. These constructions were unsafe and dangerous because of possible crash down. Main goal of stabilization of Shelter confinement is decrease the risk of its crash down that may involve potential release of radioactive dust to the atmosphere. The completed works were directed at stabilization of leaning zones of beams B1/B2 (shorting of west side of Shelter), skeleton of deaerator shelving, north and south shields, south shields – "sticks", leaning zones of beam "Mammoth". At present SSE ChNPP develops document "Final executive report on stabilization measures (report on safety analysis)". Its purpose is analysis of implemented stabilization measures, reliability and further operation of Shelter containment in general.

It is foreseen the implementation of the following projects for equipment of Shelter with systems:

– modernization of dust-suppression system (MDSS) – project is completed, MDSS is in regular operation;
– additional system of on-line radiation control of Shelter personnel (ASORC) – system is in operational test;
– integrated automated control system (IACS) – at the stage of development of working documentation and mounting works;
– modernization of physical protection system – at implementation stage;
– fire protection system – design is agreed, working documentation is under development.

One of the main projects of the SIP is construction of new safe confinement (NSC) of the Shelter.

Confinement – protective construction that includes all complex of technological equipment for withdrawal from destroyed ChNPP Unit 4 of fuel containing materials, radwaste management and other systems for performing activities on transformation of destroyed power unit into ecologically safe system and provision of safety of personnel, population and the environment.

According to conceptual design of NSC, the confinement will constitute of "arch" type shell with approximate geometric proportions: bay – 257 m., width – 150 m., height – 108m. Envisaged operational period of NSC constitutes 100 years.

At present working design of NSC is being developed. Preparatory works for construction of NSC are being performed: dismantling of Shelter pilot wall berm where south foundation of NSC will lie (works completed), cleaning of territory for NSC construction, preparing of documentation for construction of new ventilation pipe.

Monitoring of fuel-containing materials that are inside of the Shelter and their withdrawal for further controlled storage is an important task within Shelter transformation into ecologically safe system. In frames of SIP "Strategy for management with Shelter FCM and radioactive waste. Action plan." was developed. At present measures (system) for monitoring of FCM are developed. Based on the results of monitoring the final Strategy on FCM management will be prepared.

4. Radioactive Waste Management at Shelter.

According to the State Register of radioactive waste in 2007 the following radioactive waste is located inside Shelter and on its site:

№	Type of radwaste; (location)	Physical state	Category of activity	Volume, m^3	General activity, TBq	Nuclide composition %
1.	Solid radwaste[1], located inside Shelter and at Shelter industrial site, occurred as a result of accident and works on elimination of accident consequences	Fresh and spent fuel assemblies, lava-like FCM, dust, metal equipment, construction-and-assembly elements, etc.	Intermediate and high-level	530400 - 1737400	740000 (20 MCi)	Mix of radionuclides (uranium, caesium, strontium, cobalt, trans-uranium elements – plutonium, americium and others)
2.	After-accident waste[2] located inside Shelter	Liquid radwaste	Intermediate and low-level	2500-3000 [2]	12,4 (335 Ci)	Mix of radionuclides: uranium, caesium, strontium, plutonium and others.

Notes:

[1] Data in table is approximate and based on the results of research.

[2] Amount of liquid waste changes every year depending on atmospheric precipitation that fall inside Shelter.

While performing activities on transformation of Shelter into ecologically safe system liquid and solid radwaste are generated.

Radwaste management at Shelter is an integral component of radwaste management at SSE ChNPP.

Daily routine works directed at support of safe condition of Shelter and implementation of SIP are the main sources for generation of solid radwaste (soil, metal scrap, mixed construction waste, spent tools of individual protection).

Mostly these solid radwaste are low and intermediate- level waste, but high-level waste may also appear. Main nuclides that determine contamination are strontium, caesium and transuranium elements. Management of solid radwaste at Shelter is performed according to the documents of SSE ChNPP in force. Low and intermediate waste is collected, sorted (bulky

radwaste are fragmented if necessary) and forwarded to RWDP „Buriakivka" or stored in temporary storages at ChNPP site. Transfer of solid radwaste to RWDP „Buriakivka" is performed according to the criteria on radwaste acceptance at this storage (exposure dose up to 1 R/h over radwaste surface and permissible input of long-lived radionuclides to total activity up to 2%). Collection and fragmentation of high-level solid radwaste is performed with means of remote handling and is transferred to the temporary storage of high-level radwaste at ChNPP site.

Sources for generation of liquid radwaste at Shelter are decontamination of premises, equipment and instruments, dust suppression, operation of sanitary inspection rooms, natural factors – falling inside of atmospheric precipitation through leakages in building constructions of Shelter and condensation of humidity.

Collection of liquid radwaste at SSE ChNPP including Shelter is performed with application of ChNPP pipelines system.

Liquid radwaste inside Shelter is a result of uncontrolled leaking of water inside and performance of activities on dust suppression.

Radionuclide and chemical composition of such liquid radwaste depend on their location. Radionuclide composition of water inside Shelter premises is characterized with presence of Cs^{134}, Cs^{137}, Sr^{90}, $Pu^{239-240}$, Am^{241} and, organic and membrane-forming compounds.

Key shortcomings of the existing system on Shelter liquid radwaste management are:

- absence of organized collection of water from units "B" and "RSASU" (reactor shop auxiliary systems unit) and its transfer for purification;
- absence of liquid radwaste purification from transuranium elements, organic and membrane-forming compounds;
- absence of possibility of on-line defining of α–activity of liquid radwaste before their forwarding to chemical shop of ChNPP for further processing.

With the purpose to solve problems of liquid radwaste management at Shelter, ChNPP developed in 2006 and agreed with the SNRCU "Conceptual Technical Decision on Liquid Radwaste Management, which are Generated in the process of Shelter Transformation into Ecologically Safe System". To implement this Decision SSE ChNPP developed action plan. But the financing issue as well as the direct implementation of measures in full scope is still unsettled.

5. Documents of the regulatory authority on Shelter activities.

SNRCU in its activities as for Shelter is guided by the Laws of Ukraine, Resolutions of the Cabinet of Ministers, regulatory documents in the area of nuclear and radiation safety.

With the purpose to interpret policy on state regulation of nuclear and radiation safety as for Shelter, "Statement on policy on nuclear and radiation safety at Shelter of ChNPP" was approved in 1998. Statement defines main principles regarding nuclear and radiation safety provision as for Shelter in the process of its transformation into ecologically safe system and in particular:

– management principles;
– radiation protection;
– radwaste management;
– general technical principles.

In 2001 the SNRCU developed Requirements to the structure and content of safety analysis report on implementation of SIP projects. According to the requirements of this document, SSE ChNPP prepares reports on safety analyses of projects, which are submitted to the state authority on regulation of nuclear and radiation safety as a part of the package of documents for obtaining permission to perform certain works or activities at Shelter.

To organize coordinated activities of regulatory authorities involved in SIP implementation and to avoid duplication of activities, to reduce period of projects review, to approve mutually agreed regulatory decisions the "Protocol among state regulatory authorities of Ukraine on cooperation and allocation of functions in connection with implementation of SIP" was signed in 2003 by the SNRCU, Ministry of Health, Ministry of Emergencies, Ministry of Environmental Protection of Ukraine, Ministry for Regional Development and Construction of Ukraine, State Committee of Ukraine on Industrial Safety, Protection of Labor and Mining Supervision and State Department of Fire Safety of Ukraine.

Coordination of activities of state regulatory authorities on most topical issues is performed through Interagency working group on coordination of activities of regulatory authorities for activities at Shelter and ChNPP decommissioning.

During 2005-2006 the SNRCU with the involvement of foreign experts developed "Fundamental safety principles of activities in frames of SIP" and "Guideline on application of safety fundamentals in process of performing regulatory activities in frames of SIP".

Annex 10. Waste of Uranium Mining and Milling

Operating period	Tailings	Area, hectare	Volume of tailings, mln.t / mln. m^3	Total activity, 10^{12} Bq	Uranium content, mg/kg
Tailing pits of SE "SkhidGZK"					
1964- 1991	"KBZ"	55	15,94/12,4	93,3	20-100
1959- 1979	Scherbakivske Section 1	112	34,86/33,63	365,15	40-80
1979-till present	Scherbakivske Section 2	165			
Tailing pits of Industrial Association "PKhZ"					
1949- 1954	Western	4	0,77/0,35	180	630
1951 - 1954	Central Yar	2,4	0,22/0,13	104	630
1956- 1980	South-eastern	3,6	0,33/0,15	67	22
1968- 1983	Sukhachivske, Section 1	90	19,0/8,60	710	80
1983-till present	Sukhachivske, Section 2	70	9,60/5,50	270	80
1960- 1990	Base C	25	0,3/0,15	440	100-1000
1954- 1968	Dniprovske	73	12,0/5,84	1400	230
1982	Blast furnace № 6	0,2	0,04/0,015	-	-
1965- 1988	Lanthanum fraction	0,06	0,007/0,003	0,86	-