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**INTEGRATED
REGULATORY
REVIEW SERVICE
(IRRS)
TO
UKRAINE**

Kiev, Ukraine

9 to 20 June 2008

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY

INTEGRATED REGULATORY REVIEW SERVICE IRRS

Under the terms of Article III of its statute, the International Atomic Energy Agency (IAEA) has the mandate to establish or adopt, in consultation and, where appropriate, in collaboration with competent organizations, standards of safety for protection of health and minimization of danger to life and property (including such standards for labour conditions), and to provide for the application of these standards to its own operations as well as to assisted operations and, at the request of the parties, to operations under bilateral or multilateral arrangements or, at the request of a State, to any of that State's activities concerning peaceful nuclear and radiation activities. This includes the publication of a set of Safety Standards, whose effective implementation is essential for ensuring a high level of safety. As part of its providing for the application of safety standards, the IAEA provides Safety Review and Appraisal Services, at the request of Member States, which are directly based on its Safety Standards.

In the regulatory framework and activities of the regulatory bodies, the IAEA has been offering, for many years, several peer review and appraisal services. These include: (a) the International Regulatory Review Team (IRRT) programme that provides advice and assistance to Member States to strengthen and enhance the effectiveness of their legal and governmental infrastructure for nuclear safety; (b) the Radiation Safety and Security Infrastructure Appraisal (RaSSIA) that assesses the effectiveness of the national regulatory infrastructure for radiation safety including the safety and security of radioactive sources; (c) the Transport Safety Appraisal Service (TranSAS) that appraises the implementation of the IAEA's Transport Regulations; (d) the Emergency Preparedness Review (EPREV) that is conducted to review both preparedness in the case of nuclear accidents and radiological emergencies and the appropriate legislation; and (e) the International Physical Protection Advisory Service (IPPAS) that is conducted to review the effectiveness of State systems of physical protection and to provide advice and assistance to strengthen and enhance these systems.

The IAEA recognized that these services and appraisals had many areas in common, particularly concerning the requirements on a State to establish a comprehensive regulatory framework within its legal and governmental infrastructure and on a State's regulatory activities. Consequently, the IAEA's Department of Nuclear Safety and Security has developed an integrated approach to the conduct of missions on legal and governmental infrastructure to improve their efficiency, effectiveness and consistency and to provide greater flexibility in defining the scope of the review, taking into account the regulatory technical and policy issues.

The new IAEA peer review and appraisal service is called the Integrated Regulatory Review Service (IRRS). The IRRS is intended to strengthen and enhance the effectiveness of the State's regulatory infrastructure in nuclear, radiation, radioactive waste, transport safety and nuclear security, whilst recognizing the ultimate responsibility of each State to ensure the safety of nuclear facilities, the protection against ionizing radiation, the safety of radioactive sources, the safe management of radioactive waste, the safe transport of radioactive material and nuclear security. The IRRS is carried out by comparisons against IAEA regulatory safety standards and against international legal instruments and IAEA guidance on nuclear security with consideration of regulatory technical and policy issues.

The new regulatory service is structured in modules that cover general requirements for the establishment an effective regulatory framework, regulatory activities and management systems for the regulation and control in nuclear safety, radiation safety, waste safety, transport safety, emergency preparedness and response and nuclear security. The aim is to make the IAEA services more consistent, to enable flexibility in defining the scope of the missions, to promote self-assessment and continuous self-improvement, and to improve the feedback on the use and application of the IAEA Safety Standards. The modular structure also enables tailoring the service

to meet the needs and priorities of the Member State. The IRRS is neither an inspection nor an audit but is a mutual learning mechanism that accepts different approaches to the organization and practices of a national regulatory body, considering the regulatory technical and policy issues, and that contributes to ensuring a strong nuclear safety regime. In this context, considering the international regulatory issues, trends and challenges, and to support effective regulation, the IRRS missions provide:

- a balance between technical and policy discussions among senior regulators;
- sharing of regulatory experiences;
- harmonization of the regulatory approaches among Member States; and
- mutual learning opportunities among regulators.

Regulatory technical and policy discussions that are conducted during IRRS missions take into account the newly identified issues coming from the self-assessment made by the host organization, visits to installations to observe inspections and interviews with the counterparts.

Other legally non-binding instruments can also be included upon request of the Member States, such as the Code of Conduct (CoC) on the Safety and Security of Radioactive Sources, which was adopted by the IAEA Board of Governors in 2004 and for which more than 85 Member States have written to the Director General of the IAEA committing themselves to implementing its guidance, and the Code of Conduct on the Safety of Research Reactors, which was adopted by the IAEA Board of Governors in 2005.

The IRRS concept was developed at the IAEA Department of Nuclear Safety and Security and then discussed at the 3rd review meeting of the Contracting Parties of the Convention on Nuclear Safety in 2005. The meeting acknowledged the importance of the IAEA regulatory peer reviews now recognized as a good opportunity to exchange professional experience and to share lessons learned and good practices. The self-assessment performed prior to the IAEA peer review mission is an opportunity for Member States to assess their regulatory practices against the IAEA safety standards. These IAEA peer review benefits were further discussed at the International Conference on 'Effective Nuclear Regulatory Systems' in Moscow in 2006, at which note was taken of the value of IRRS support for the development of the global nuclear safety regime, by providing for the sharing of good regulatory practices and policies for the development and harmonization of safety standards, and by supporting the application of the continuous improvement process. All findings coming from the Convention on Nuclear Safety review meetings and from the Moscow conference are inputs for the IRRS to consider when reviewing the regulatory technical and policy issues.

The first IRRS missions were held in Romania and the United Kingdom in 2006. The first full scope mission was held in November 2006 in France. In March 2007, the French Nuclear Safety Authority (ASN) organized an international workshop in Paris, France, to disseminate the lessons learned from the first full scope IRRS mission, to share experiences from the 2006 missions and to provide information to Member States interested in availing of this service. The workshop, which was attended by more than 100 participants representing 35 countries, emphasized the importance of IRRS missions as a key tool in enhancing the effectiveness of a regulatory body and noted that such IRRS missions have begun a positive process for nuclear and radiation safety throughout the world.

In addition, the results of the IRRS missions will also be used as effective feedback for the improvement of existing safety standards and security guidance and the development of new ones, and to establish a knowledge base in the context of an integrated safety approach. Through the IRRS, the IAEA assists its Member States in strengthening an effective and sustainable national

regulatory infrastructure thus contributing towards achieving a strong and effective global nuclear safety and security regime.

The Global Nuclear Safety Regime has emerged over the last ten years, with international legal instruments such as safety Conventions and Codes of Conduct and significant work towards a suite of harmonized and internationally accepted IAEA safety standards. The IAEA will continue to support the promotion of the safety and security Conventions and Codes of Conduct, as well as the application of the IAEA safety standards and security guidance in order to prevent serious accidents and continuously improve global levels of safety.

REPORT
INTEGRATED REGULATORY REVIEW SERVICE (IRRS)
REPORT TO
THE GOVERNMENT OF UKRAINE
Kiev, Ukraine
9 to 20 June 2008



REPORT
INTEGRATED REGULATORY REVIEW SERVICE (IRRS)
REPORT TO
THE GOVERNMENT OF UKRAINE
Kiev, Ukraine

Mission date: 9 to 20 June 2008

Regulatory body: SNRCU

Location: SNRCU Headquarters, Kiev, Ukraine

Regulated facilities and practices: *Nuclear power plants, fuel cycle facilities, medical and industrial sources, research applications, waste management facilities, decommissioning, communication and public information.*

Organized by: International Atomic Energy Agency (IAEA)

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FOREWORD

by Mohamed ElBaradei
Director General

The General Conference Resolution of September 2006 related to the measures to strengthen international cooperation in nuclear, radiation and transport safety and waste management: “Recognizes the importance of an effective regulatory body as an essential element of national nuclear infrastructure, urges Member States to continue their efforts to increase regulatory effectiveness in the field of nuclear, radiation and transport safety and waste management, and consider availing themselves of the Secretariat’s new Integrated Regulatory Review Service (IRRS) and notes with satisfaction the increased interest of the Member States in the IRRS.”

At my opening speech of the fiftieth regular session of the General Conference in 2006, I stated that: “The Agency’s safety review services use the IAEA Safety Standards as a reference point, and play an important part in evaluating their effectiveness. This year we began offering, for the first time, an Integrated Regulatory Review Service (IRRS). This new service combines a number of previous services, on topics ranging from nuclear safety and radiation safety to emergency preparedness and nuclear security. The IRRS approach considers international regulatory issues and trends, and provides a balance between technical and policy discussions among senior regulators, to harmonize regulatory approaches and create mutual learning opportunities among regulators.”

“A reduced scope IRRS was conducted for the United Kingdom Nuclear Installations inspectorate in March of this year. A full scope service will be conducted in France in November. The Agency has also received requests for IRRS missions from Australia, Canada, and Spain, and other Member States have expressed interest in having such missions in the near future. I would request all countries to take advantage of this service. I remain convinced that transparency and introspection are essential ingredients of an effective nuclear safety culture.”

Statement to the Sixty-Second Regular Session of the United Nations General Assembly

by IAEA Director General Dr. Mohamed ElBaradei

29 October 2007

As the nuclear industry becomes increasingly international, IAEA Safety Standards are used as a reference point by an ever greater number of countries, and serve as a benchmark for IAEA safety review services. Last year we began offering, for the first time, an Integrated Regulatory Review Service (IRRS), which combined previous services ranging from nuclear safety and radiation safety to emergency preparedness and nuclear security. IRRS missions have been conducted in France, Australia and Japan over the past year. This is contributing towards a more active exchange of knowledge among senior regulators, and promoting harmonized nuclear regulatory approaches worldwide.

The number of recommendations, suggestions and good practices is in no way a measure of the status of the regulatory body. Comparisons of such numbers between IRRS reports from different countries should not be attempted.

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EXECUTIVE SUMMARY

At the request of the Government of Ukraine, an international team of experts in nuclear, radiation, transport and waste safety visited the State Nuclear Regulatory Committee of Ukraine (SNRCU) from 9 to 20 June 2008 to conduct an Integrated Regulatory Review Service (IRRS) mission to review the SNRCU framework and its effectiveness.

SNRCU is the competent authority in matters pertaining to nuclear safety and radiation protection in Ukraine. The purpose of this IRRS mission was to conduct a review, against the IAEA safety standards, of the SNRCU framework and regulatory oversight applied to regulated sources, facilities and activities. Furthermore, the mission reviewed the regulatory effectiveness of SNRCU and led to the exchange of information and experience in the areas covered by the IRRS.

It is expected that the IRRS mission will facilitate regulatory improvements in Ukraine through evaluation of the effectiveness of the SNRCU regulatory framework. The knowledge and experience gained may be shared among SNRCU, IRRS reviewers and worldwide.

The scope of the mission was to review the regulatory oversight of safety of nuclear power plants; safety and security of radioactive sources; radiation safety in industrial and medical practices; safety in the transport of radioactive material; safety of radioactive waste management (including spent fuel) and decommissioning; and emergency planning and preparedness. Decommissioning of the nuclear power plant at Chernobyl was not included in the scope of the IRRS mission.

This mission took place under the auspices of the EC-IAEA-Ukraine Joint Project on Safety Evaluation of Ukrainian NPPs and formed Task 4 of this project, this task being the key means of review of the Ukrainian governmental and regulatory infrastructure.

Regulatory technical and policy issues were addressed. The policy issues discussed were: application of risk informed decision making in the regulatory process and the regulatory process for authorizing new build NPPs.

The IRRS Review Team consisted of 13 senior regulatory experts from nine Member States, one representative from the Joint Research Centre of the European Community (EC JRC), one observer and five IAEA staff members, including an administrative assistant.

The IRRS team reviewed the SNRCU in all relevant areas: legislative and governmental responsibilities; responsibilities and functions of the regulatory body; organization of the regulatory body; activities of the regulatory body, including the authorization process, review and assessment, inspection and enforcement; the development of regulations and guides and special regulatory infrastructures.

The mission comprised interviews and discussions with key personnel at SNRCU and other organizations together with observation of regulatory activities. Interviews and discussions took place with: staff at the Ministries of Fuel and Energy; Emergency Situations; Environmental Protection and Health. In addition, there were discussions with NAEK Energoatom; plant managers and staff of the NPP in South Ukraine, with emphasis on nuclear and radiation safety and staff from the technical support organizations The State Scientific and Technical Centre for Nuclear and Radiation Safety (SSTC) and the Marzeev Institute. In Kharkiv, discussions were held with staff of industrial and medical facilities; a RADON pre-disposal waste management facility and decommissioning and remediation organizations. An emergency response drill at a research reactor was observed. The IRRS Team Leader and the IRRS Team Coordinator also met with the Head of the Parliamentary Committee for Energy Policy Making of Ukraine.

Prior to the mission, SNRCU provided the IRRS Review Team with supporting information and documentation as advance reference material, together with a comprehensive self-assessment, including a draft action plan based on the results of the self-assessment.

The IRRS Review Team appreciated the extensive preparation by SNRCU management and staff at all levels. Throughout the review the administrative and logistical support was outstanding and the team was extended full cooperation in technical regulatory and policy discussions.

The IRRS Review Team identified a number of good practices and made recommendations and suggestions where changes are necessary or desirable for the continuous improvement of the effectiveness of regulatory oversight.

The SNRCU is currently implementing a programme for change. Many of the recommendations and suggestions made by the IRRS team will support SNRCU in its efforts.

The IRRS team identified the following notable strengths of the SNRCU's policy, framework and regulatory oversight:

- SNRCU is effectively regulating nuclear safety and areas of radiation safety within its responsibility; a comprehensive legal infrastructure that addresses international requirements and includes all the relevant international conventions is in force.
- The legislation clearly specifies that regulatory requirements shall be developed with strict consideration of the recommendations of competent international organizations. This will inevitably support worldwide harmonization of nuclear and radiation safety requirements, as highlighted by INSAG-21.
- SNRCU is de facto an effectively independent regulatory body, however, to strengthen its de jure independence its status should be established in law.
- SNRCU management actions taken to establish advisory bodies, sometimes with involvement of internationally recognized safety experts from abroad, is seen as a demonstrated commitment to safety improvement.
- In recent times effective actions have been taken and commitment made towards achieving transparency and communication with the public and Parliament, including establishment of a Public Council to ensure transparency of SNRCU's decision making, as well as providing the public with direct access to SNRCU senior management through telephone hotlines.
- The Information and Emergency Centre of SNRCU operates highly effectively as the national crisis centre in the area of preparedness and response to nuclear and radiological emergencies.

The IRRS Review Team identified good practices and made recommendations and suggestions that indicate where improvements are necessary or desirable to further strengthen the effectiveness of regulatory oversight. These recommendations and suggestions will support SNRCU in improving its regulatory performance, and some of them are related to areas in which SNRCU has already initiated actions to address them.

The most relevant good practices identified were:

- The SNRCU formal training programme is well developed and based on Systematic Approach to Training (SAT) principles, and succession planning for key technical staff, workforce ageing and knowledge management are taken into account. The programme makes effective use of training at the international level.

- The application of the ‘pilot-concept’ in the authorization of similar modifications in several plants is an effective method if it is performed with due attention paid to differences between the plants.
- The guidelines for submission of a safety analysis report (SAR) for the use of ionizing radiation sources and the format and content of the Annual Report are examples of clear and comprehensive documentation that can enhance the safety and security of sources through their application.
- SNRCU has prepared a reference book containing images of radioactive material commonly found in scrap. The book has been distributed to scrap dealers. This is a good practice to help scrap dealers with identifying such abandoned radioactive material and to keep the public informed.
- Although the operation of a national geological repository will not begin for several decades, SNRCU has already prepared a regulatory document with the safety requirements for geological repositories. This document will be periodically updated and provides a regulatory framework for the development of this kind of facility.

The IRRS Review Team believes that consideration of the following recommendations and suggestions should be given high priority either because they were identified in several areas of the review or because the experts considered they will contribute significantly to the enhancement of the overall performance of the regulatory system:

- The Government of Ukraine should define and guarantee the statute of the SNRCU in law.
- At the earliest opportunity the Government should approve the “National Programme on Radioactive Waste Management” and the funding mechanism necessary to guarantee its implementation.
- The Government should consider enacting legislation that assigns responsibility to SNRCU for the authorization of the siting and design of new reactor units.
- The Government should take steps to allocate funds to ensure the methodological unity of dose monitoring in Ukraine, as well as to establish a national dose registry.
- SNRCU and the Ministry of Health should agree a memorandum of understanding clarifying the responsibilities of each of the authorities as well as the mechanisms for implementation of effective cooperation in regulating and controlling radiation protection, waste safety and other common activities that arise.
- The existing trend of continuous increase of SNRCU budget and expert salaries should be preserved in order to retain staff and be able to achieve the level of financing of the SNRCU in accordance with the best international practice and to be able to cover on its own involvement in international activities, training, review and assessment, public communications, etc.
- In order to provide an organizational framework for the safe management of disposed radioactive waste, cognizant of the safety of future generations, it is recommended that a specialized governmental/State agency be given executive responsibility to deal with the long-term management of radioactive waste.
- The practice by which utilities make direct payments to the technical support organization for ‘State safety expertise’ might be seen as affecting the independence of judgment of safety assessors. The safety assessment process should be fully transparent and effectively regulated by SNRCU, including the financial aspects. The SNRCU should seek and apply

arrangements that demonstrate in an unambiguous and transparent manner, the effective independence of its technical support organizations and consultants.

- The Government should at the earliest opportunity take steps to substitute sanctions against individuals with sanctions against legal entities. The policy of fining individuals may discourage the staff of nuclear facilities from reporting on deficiencies related to safety.
- SNRCU should continue its efforts to address human and organizational resources for effective regulatory oversight taking into account the need to cover the broad range of activities and future retirements of senior staff, as it still faces staffing challenges, especially high staff turnover.
- SNRCU should have the authority to approve the operator's organizational changes. Due consideration should be given to the assessment of the impact of such changes on safety. Conditions and requirements of such an authorization should be elaborated.

The IRRS Review Team findings are summarized in Appendix V.

IAEA regulatory review missions and services are intended to support IAEA Member States in their improvement of the regulation of nuclear, radiation, transport and waste safety and nuclear security worldwide. The IRRS mission in Ukraine has contributed significantly to this objective, through the exchange of knowledge and experience of international reviewers and their Ukrainian counterparts.

I. INTRODUCTION

At the request of the Government of Ukraine, an international team of experts in nuclear, radiation, transport and waste safety and nuclear security visited the State Nuclear Regulatory Committee of Ukraine (SNRCU) from 9 to 20 June 2008 to conduct an Integrated Regulatory Review Service (IRRS) mission to review the SNRCU regulatory framework and its effectiveness. During a preparatory mission in Kiev in October 2007, the objectives, purpose and scope of the review were agreed.

The review addressed the SNRCU framework and its effectiveness in the following areas: legislative and governmental responsibilities; responsibilities and functions of the regulatory body; organization of the regulatory body; activities of the regulatory body, including the authorization process, review and assessment, inspection and enforcement; the development of regulations and guides and special regulatory infrastructures. Regulatory technical and policy issues were discussed to gain a greater understanding of regulatory issues that may have international implications and assist in addressing specific issues relevant to the regulation of nuclear, radiation, radioactive waste and transport safety. Regulatory technical and policy issues were identified as a result of the SNRCU self-assessment and took into account insights resulting from the meetings of the Convention on Nuclear Safety, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, international conferences and forums and previous IAEA safety review services.

Prior to the mission, SNRCU provided supporting information and documentation for review by the IRRS team members. This material consisted of legal, regulatory and internal documents, in particular the report on self-assessment, including the responses to the IAEA questionnaires.

A systematic review of all areas was performed through interviews with SNRCU staff and through direct observation of working practices during SNRCU inspections. In addition the IRRS team visited other organizations and facilities in order to discuss and observe associated aspects of regulatory processes and interaction with stakeholders.

II. OBJECTIVE AND SCOPE

The purpose of the IRRS mission was to review the legal and governmental infrastructure for nuclear, radiation, radioactive waste and transport safety of nuclear installations in Ukraine and the effectiveness of the Ukrainian regulatory body (SNRCU) and to exchange information and experience between SNRCU and the IRRS team with a view to contributing to harmonizing regulatory approaches and creating mutual learning opportunities among senior regulators.

The key objectives of this mission were to enhance safety by:

- ✓ Providing Ukraine (SNRCU and governmental authorities) with a review of their regulatory technical and policy issues relating to nuclear and radiation safety;
- ✓ Providing Ukraine (SNRCU and governmental authorities) with an objective evaluation of their nuclear and radiation safety regulatory activities with respect to international safety standards;
- ✓ Contributing to the harmonization of regulatory approaches among Member States;
- ✓ Promoting sharing of experience and exchange of lessons learned;
- ✓ Providing key staff (SNRCU and governmental authorities) with an opportunity to discuss their practices with reviewers who have experience of practices in the same field;
- ✓ Providing Ukraine (SNRCU and governmental authorities) with recommendations and suggestions for improvement;
- ✓ Providing other States with information regarding good practices identified in the course of the review;
- ✓ Providing reviewers from States and the IAEA staff with opportunities to broaden their experience and knowledge of their own field;
- ✓ Providing SNRCU through completion of the IRRS questionnaire with an opportunity for self-assessment of its activities against international safety standards.

III. BASIS FOR THE REVIEW

A) PREPARATORY WORK AND IAEA REVIEW TEAM

At the request of the Ukrainian government authorities, an IAEA team of two IAEA staff members visited the SNRCU in October 2007 to conduct a preparatory mission for the Integrated Regulatory Review Service (IRRS). The preparatory mission included:

- Discussions on the scope of the mission, the subject areas to be reviewed and the material that the regulatory body needs to provide;
- Explanation of the importance of the regulatory preparation for the self-assessment to be made by the SNRCU prior to the conduct of the IRRS mission;
- Explanation of the IRRS process, roles and responsibilities of the IRRS team members and their interaction with the regulatory body, other organizations and facility representatives;
- Discussions on organizational and logistical issues related to the conduct of the mission;
- Explanation of the role of the liaison officer and the counterparts before and during the review; and
- Explanation of IAEA policies, e.g. funding, contact with the mass media.

The IAEA staff had extensive discussions with the SNRCU Chairperson, Ms. Olena Mykolaichuk, SNRCU senior management and the liaison officers for the IRRS mission.

As a result of these discussions, the scope of the mission was confirmed to cover the safety of nuclear power plants; safety and security of radioactive sources; radiation safety in industrial and medical practices; safety of transport of radioactive material; safety of radioactive waste management (including spent fuel) and decommissioning; and emergency planning and preparedness. Decommissioning of the Chernobyl nuclear power plant was not included in the scope of the IRRS mission.

In addition, the documentation to be provided by SNRCU by April 1st, 2008, was agreed. This would include: a self-assessment (completed questionnaires; detailed analysis and draft action plan), national reports of Nuclear Safety Convention and Joint Convention together with related questions and answers; SNRCU Annual Reports; relevant Ukrainian legislation and regulations; SNRCU policy on communication and information; management system documentation describing relevant policy and procedures and the regulatory strategy.

During the preparatory meeting, it was also agreed that IAEA would support SNRCU in its preparation for the IRRS mission, including the conduct of the self-assessment.

Two self-assessment missions were conducted. During the first mission in December 2007 the self-assessment methodology and its application, based on the agreed IRRS scope, were discussed. The second self-assessment mission took place in March 2008 and focused on the analysis phase of the self-assessment. In addition, an expert mission was conducted in February 2008 to support the SNRCU specialists in clarifying the provisions of the following IAEA documents: Fundamental Safety Principles (SF-1), Code of Conduct on the Safety and Security of Radioactive Sources, Guidance on the Import and Export of Radioactive Sources, Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety (GS-R-1), Regulations for the Safe Transport of Radioactive Material (TS-R-1) and other relevant IAEA safety standards.

The objectives of the preparatory phase of the IRRS mission were to:

- Identify the main issues to be focused on during the IRRS mission

- Clarify the answers provided to the IRRS questionnaires
- Identify additional information and material to be prepared for the IRRS mission
- Agree the team composition (senior regulators from Member States and observers), logistics, counterpart identification, visits and observations.

In accordance with the request from SNRCU, and taking into account the agreed IRRS scope, it was agreed that the IAEA review team would comprise 13 external experts from nine Member States, one observer and one representative from EC-JRC (see Appendix I). The working areas and the SNRCU counterparts were determined according to Appendix IV.

During the preparatory phase of the IRRS mission the advance reference material received from SNRCU was distributed to the experts. A preliminary assessment of this material was conducted systematically by the review team against the relevant IAEA safety standards. The purpose of the assessment was to prepare initial impressions of the advance reference material (ARM), to review the answers to the questionnaires sent by SNRCU, to prepare for the interviews and observations and to identify additional material required for the mission

A list of the advance reference material is included in Appendix VI.

The Team Leader Ms Dana Drabova, Chairperson, State Office for Nuclear Safety (SÚJB), Czech Republic, Deputy Team Leader, Mr. Mark Satorius, Acting Regional Administrator, Region III, U.S. Nuclear Regulatory Commission and IAEA staff, in particular the IAEA Team Coordinator, Ms Adriana Nicic, Division of Nuclear Installation Safety and the IAEA Deputy Team Coordinator, Mr. Stephen Evans, Division of Radiation, Transport and Waste Safety performed a significant amount of work prior to the mission.

B) REFERENCES FOR THE REVIEW

The most relevant IAEA safety standards and reference documents used for the preliminary assessment were: GS-R-1, Safety Requirements on Legal and Governmental Infrastructure; GS-R-2 Safety Requirements on Preparedness and Response for a Nuclear or Radiological Emergency; GS-R-3, Safety Requirements on The Management System for Facilities and Activities; the International Basic Safety Standards for Protection against ionizing Radiation and for the Safety of Radiation Sources (the BSS); TS-R-1, Regulations for the Safe Transport of Radioactive Material; and the Code of Conduct for Safety and Security of Radioactive Sources.

C) CONDUCT OF THE REVIEW

On the 8th June 2008 in Kiev, an opening team meeting was conducted to discuss the specifics of the mission, to clarify the basis for the review and the background, context and objectives of the IRRS and to confirm the methodology for the review and evaluation. The reviewers also reported their first impressions of the advance reference material.

At the opening team meeting, the review team was welcomed by Mr. Sergey Bozhko, Deputy SNRCU Chairperson, Ms. Olga Makarovska and the liaison officer.

The IRRS entrance meeting with SNRCU senior management was held on Monday, 9th June 2008. Opening remarks were made by Ms. Olena Mykolaichuk, SNRCU Chairperson, Mr. Sergey Bozhko, SNRCU Deputy Chairperson, the IRRS Team Leader and the IRRS Deputy Team Leader and the IAEA Team Coordinator.

During the mission, a systematic review was conducted for all the review areas based on the mission programme given in Appendix II.

The review was conducted through meetings, interviews and discussions, review of documentation, visits to relevant organizations and direct observations of regulatory activities.

The IRRS Review Team identified a number of good practices and made recommendations and suggestions where changes are necessary or desirable for the continuous improvement of the effectiveness of regulatory oversight.

The IRRS exit meeting was held on Friday, 20th June 2008, with the SNRCU Chairperson, senior management and staff of SNRCU. Mr. Phillippe Jamet, Director of the Division of Nuclear Installation Safety, IAEA was also present.

The opening remarks of the exit meeting were presented by Ms. Olena Mykolaichuk and Mr. Sergey Bozhko. The results of the IRRS mission were presented by Ms Dana Drabova and Mr. Mark Satorius. The closing remarks were made by Mr. Philippe Jamet.

A copy of the draft technical notes of the IRRS mission was presented to SNRCU at the end of the exit meeting.

1. LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES

1.1. GENERAL

Governmental structure

Ukraine received its independence in 1991, when the country separated from the Union of Soviet Socialist Republics (USSR). The State Constitution adopted in June 1996 is the supreme law of the country. The Constitution specifies the exclusive competencies of Parliament and the President.

Legislative power is executed by the Parliament, which adopts the laws and also decides on the structure and composition of the Government.

All ministers form the Government, called the Cabinet of Ministers, which is the highest executive body of the country. The Cabinet of Ministers is headed by the Prime Minister, supported by four Vice-Prime Ministers.

Nuclear facilities and activities

Before independence, all nuclear facilities located in Ukraine were property of the USSR and regulated by the respective USSR legislation. In 1991, the ownership of nuclear facilities was transferred to Ukraine. Currently Ukraine has one of the largest nuclear programmes in Europe, with 15 operating NPPs with the respective radioactive waste and spent fuel management facilities. Additionally, plans are in place for construction of new nuclear facilities: nuclear power plants; Centralized dry spent fuel storage facility for WWER-440 and WWER-1000 spent fuel; National Geological Disposal Facility, etc. It should also be noted that a lot of effort is spent by Ukraine for dealing with the Chernobyl site. In the area of use of radiation sources, there are more than 4000 sites in operation in the country.

1.2 LEGISLATIVE

Legislative system

As in many countries, the Ukrainian legislation is hierarchically structured: the top tier consists of the laws and the supreme law - the Constitution. This level also includes international conventions and agreements ratified by Ukraine. The second tier includes legislative acts approved by the Cabinet of Ministers and the President and the third tier consists of the legal acts of the ministries and the other authorities with executive power, including the regulatory authority in nuclear and radiation safety, the State Nuclear Regulatory Committee of Ukraine (SNRCU). The legislative pyramid is schematically shown in Section 4.3.

Laws are adopted by the Parliament. The President has the power to sign or veto laws proposed by the Parliament. In case of a veto laws are brought back for discussion at the Parliament.

Ukraine has ratified almost all international treaties and conventions in the nuclear field. According to the Constitution, when ratified by the Parliament, International Treaties take precedence over national legislation in the case of contradiction or gaps. Ukraine also signed the Amendments to the Convention on Physical Protection of Nuclear Material. The process of ratification is ongoing. The ratification will require changes to some of the national laws. Changes are being developed to the Law on Nuclear Energy Use and Radiation Safety and the Law on Physical Protection of Nuclear Facilities, Nuclear Material, Radioactive Waste, and Other Sources of Ionizing Radiation.

Pursuant to and for implementation of the laws, the Cabinet of Ministers adopts Decrees and Decisions (second tier), which refer to implementation of provisions specified by a legislative act of higher priority (such as a law), regulating matters not covered by the laws, clarifying issues related

to organization of activities of central or local authorities, etc. Decrees and Directives issued by the President within his/her powers, as established by the Constitution, are part of the same tier.

All legislative acts are registered by the Ministry of Justice and promulgated in an Official Journal. All acts that are part of the one of the first three tiers of documents are legally binding.

Technical Regulations (obligatory technical requirements) are adopted by the Cabinet of Ministers and include a list of applicable standards. Technical Regulations are published in the Official Journal and the standards listed in them are legally binding.

Guidelines and standards supplement the nuclear legislation at the lowest level, however these are non-legally binding. Standards are developed by the State Committee of Ukraine for Technical Regulation and Consignee Policy, hereinafter referred to as the State Standards Committee.

The development of standards is based on three laws. Standards are obligatory in some area – for safety they are obligatory. If other standards are used they shall be more conservative and not in contradiction with the existing ones. International and regional standards may be adopted directly or adapted.

Nuclear legislation

The nuclear legislative framework is governed by a set of laws; the main one is the Law on Use of Nuclear Energy and Radiation Safety– hereinafter referred to as the Nuclear Law. The Law defines bases of the state safety regulation of nuclear energy use and basic principles of the state policy in the field of use of nuclear energy and radiation sources. The Nuclear Law sets out the main principles for nuclear safety and radiation protection as described in IAEA Safety Fundamentals. This law also specifies the main responsibilities of a regulatory authority to ensure nuclear and radiation safety, as well as some of the other main functions of a regulatory authority.

Some regulatory functions, which are specified in the IAEA Safety Standards, are contained in other laws, such as:

- Law on Physical Protection of Nuclear Facilities, Nuclear Material, Radioactive Waste, and Other Sources of Ionizing Radiation – hereinafter referred to as Law on Physical Protection;
- Law on Authorization Activity in Nuclear Energy Use – hereinafter referred to as Law on Authorization;
- Law on Human Protection against Impact of Ionizing Radiation - – hereinafter referred to as Law on Human Protection;
- Law on Radioactive Management;
- Law on Decision Making Procedure on Siting, Design, Construction of Nuclear and RAW Facilities of National Importance - hereinafter referred to as Law on Decision Making;
- Law on Uranium Mining and Milling;
- Law on State Supervision;
- Law on Environmental Protection; etc.

The team noticed that almost all Laws in nuclear and radiation safety are frequently modified. It was explained that the changes mainly refer to the adoption of new laws, ratification of conventions, etc.

Nuclear related Laws

Nuclear Law

The Nuclear Law defines the bases of state regulation of nuclear use, as well as the fundamental principles of the state policy in the field of use of nuclear energy and radiation protection.

The Law establishes the principle of priority of safety and the legal basis for Ukraine international commitments with respect to the use of nuclear energy.

It should be noted that the term “**use of nuclear energy**” includes all practical activities at nuclear and radiation facilities. The Nuclear Law includes all areas described in the international standards, such as nuclear safety, physical protection, radiation protection, licensing, emergency preparedness, etc.

Article 6 of the Nuclear Law stipulates the principle of separation of state promotion and regulatory functions as one of the main principles of the state policy. Articles 22 and 24 define the responsibilities of the state with respect to the establishment of legislative criteria and requirements, the development of regulations and standards in the field of nuclear and radiation safety, issuing authorizations for activities and facilities, carrying out of state supervision, imposition of penalties and sanctions in case of non-compliance with the state requirements. Article 23 of the Law specifies that State Regulatory Authorities shall be independent from the state bodies and officials having responsibilities for the use of nuclear energy.

Law on Human Protection against Impact of Ionizing Radiation

The Law was adopted in 1998 and is intended to provide protection of human life, health and property against negative impact of ionizing radiation caused by particular activities, and in case of radiation accidents, by performing preventive and rescue measures as well as by providing compensation for damage.

Law on Authorization Activities in Nuclear Energy Use

This Law defines legal and organizational arrangements for issuing authorizations (permits, licenses, etc.) in the use nuclear energy, as well as the basic provisions for regulating social relationship occurring in the conduct of the activity, as an exception to the provisions set forth in the Law of Ukraine “On Entrepreneurship”.

Law on Solving Issues Related to Ensuring Nuclear Safety

This Law defines legal and organizational status of financial guarantee of termination of operation and decommissioning of nuclear facilities. It defines the legal and organizational arrangements for accumulation of funds for the safe decommissioning of nuclear facilities, as well as ensuring appropriate and effective use of collected funds.

Law on Radioactive Waste Management

This Law is issued with the aim to ensure protection of the public and the environment against harmful impact of radioactive waste at present and in the future. The Law covers all activities on radioactive waste management.

The Team did not look in detail in all laws to identify any overlapping or collisions. The overall impression is that the system of laws in the area of nuclear and radiation safety is complicated.

Secondary Nuclear Legislation

The second and third tiers of the pyramid, generalized hereinafter in the term “Regulations”, form the secondary legislation in the nuclear field. Those include decisions of the Cabinet of Ministers, regulations approved by the SNRCU and respective Technical Regulations. The development of new Ukrainian regulations started right after the independence, as by that time all of the regulations used were common for all countries part of the former USSR. The State policy and respective decision adopted at that time included the use of existing Soviet regulations until the creation of respective Ukrainian legislation is being developed. The decision stated that all those regulations shall be applied to the extent that they do not contradict the new Ukrainian secondary legislation.

Some of the USSR documents are still in force for Ukraine (see Annex VI – List of laws and regulations in force).

Large efforts are being allocated by the Ukrainian regulatory authority to prepare its own set of regulations that reflect the new primary legislation and internationally accepted best practices. A large part of this secondary legislation has already been developed, but many old Soviet regulations are still used. Regulations are developed based on annual plans, agreed by the SNRCU Working Commission on Normative Regulation and approved by an order of the Chairperson.

A complete list of the current regulations has been presented to the team, showing that there are more than 200 regulations. Those regulations cover:

- General issues– mainly procedural in development and establishment of regulatory requirements – 15;
- General nuclear safety - 18;
- Safety of nuclear installations – 71;
- Safety of sources of ionizing radiation – 30;
- Safety in transport – 16;
- Safety of RAW management – 22;
- Safety in mining and milling – 15;
- Non-proliferation and safeguards – 17;
- Physical protection – 12;
- Emergency preparedness and response – 23.

Currently, the existing regulatory requirements represent a combination of very detailed and prescriptive USSR requirements and less prescriptive ones applied in most of the European countries. However, on the basis of the review of the existing set of regulations, the IRRS team understood that the transfer from the former system towards a less-prescriptive regulatory approach would be completed by the end of 2011.

The most important Laws and secondary legislation applicable to regulation of nuclear and radiation facilities and activities in Ukraine are listed in Appendix VI.

State Institutions in the Nuclear Field

State executive authorities with responsibilities for nuclear and radiation safety and promotion of nuclear energy utilization

As in many countries there are a number of State institutions that have responsibilities concerning the development and implementation of country nuclear program and having responsibilities for safety. For Ukraine the main players are:

State Nuclear Regulatory Committee of Ukraine (SNRCU)

SNRCU was established by the Decree of the Cabinet of Ministers of Ukraine 1830 in 2006 as the central executive authority to implement state policy in the area of nuclear energy utilization and to ensure compliance with the nuclear and radiation safety requirements.

Ministry of Environmental Protection (MPENS)

The Ministry of Environmental Protection (MPENS) implements the policy of the Government in the areas of environmental protection in general and protection of the public and environment

against adverse effects of ionizing radiation in particular. The MPENS has also responsibilities to coordinate the state radiation monitoring system.

Ministry of Health (MH)

The Ministry of Health (MH) has responsibilities, amongst others, to develop, approve and put in force radiation safety requirements, to take part in the state regulation of radiation safety jointly with other central and local authorities, in drawing up conclusions regarding categorization of radiation contamination territories, as well as to carry out sampling of water, soil and foodstuffs to monitor radioactive contamination. MH experts make their own assessment and agree on dose constraints and give consent to radiation documents and emergency plans.

Ministry of Internal Affairs (MIA)

The Ministry of Internal Affairs (MIA) has responsibilities mostly in the area of physical protection of nuclear facilities and nuclear material and take part in the response to events with sources.

Ministry of Fuel and Energy (MFE)

The Ministry of Fuel and Energy is the governmental executive authority in the field of nuclear energy. The national energy generating company NAEK Energoatom has been created at the MFE to carry out the function of a utility. MFE also operates a research reactor.

Ministry of Emergency Situations and Public Protection against Chernobyl Accident Consequences (MESPPCAC) – hereinafter referred to as the Ministry of Emergencies

The Ministry of Emergency Situations and Public Protection against Chernobyl Accident Consequences, is responsible for the protection of the population from the consequences of the Chernobyl accident, development of national policy and State management of radioactive waste in Ukraine, including the Chernobyl site, coordinates emergency arrangements.

National Academy of Science

The National Academy of Science of Ukraine operates a research reactor.

The Governmental Structure with the respective reporting lines cannot be shown on a diagram as coordination functions of the Deputy-Vice Premier Ministers have not been established yet. However, Governmental Committees have already been established for coordination of different areas of State responsibilities.

In specific cases, where there are issues of common interest, a Memorandum of Understanding may be signed between governmental authorities. This is done to ensure more efficient interaction between authorities. Existing Memorandum of Understanding are:

- Protocol between the SNRCU and the Ministry of Environmental Protection on cooperation on issues of protection from the impact of ionizing irradiation of nuclear facilities personnel, RAW management facilities, uranium facilities, and radiation sources, population and the environment. (June 2004);
- Protocol between the SNRCU and the Ministry of Emergencies on interaction in fire safety provision in the area of nuclear energy use (February 2004);
- Protocol between the SNRCU and the State Committee of Ukraine on Construction and Architecture on interaction on provision of nuclear and radiation safety in the area of nuclear energy use during construction works (January 2004);
- Memorandum between the SNRCU and the Marzeev Institute, Academy of Medical Sciences of Ukraine on cooperation, partnership and interaction in the area of radiation safety and radiation protection (February 2008).

Establishment of the regulatory authority

The Law on Use of Nuclear Energy and Radiation Safety establishes the MPENS and the Ministry of Health as the primary regulatory authorities on nuclear and radiation safety. The Law also established the state position Chief Inspector of the Main State Inspectorate of Nuclear Safety (MSI) with the respective responsibilities. A Nuclear Regulatory Administration (NRA) was created, by a Cabinet of Ministers Decree, as a MPENS department with the responsibilities to carry out the regulatory functions.

In December 2000 the Presidential Decree 1303/2000 “On State Regulation of Nuclear and Radiation Safety” established the State Nuclear Regulatory Committee of Ukraine (SNRCU) as the central executive authority with the responsibilities to determine safety criteria, requirements, and conditions, to issue authorizations, to carry out the state supervision and enforcement, and to carry out other regulatory functions in the field of nuclear and radiation safety. The Presidential Decree 155/2001 “On Statute of the State Nuclear Regulatory Committee of Ukraine” supplemented and clarified the responsibilities and functions of the SNRCU.

After the changes in the Constitution in 2005, the Decree 1830 of the Cabinet of Ministers of Ukraine, dated 27 December 2006 approves the latest “Provisions on the State Nuclear Regulatory Committee of Ukraine”, which have been in force since 25 January 2007.

Findings (review)

Legislation

The newly established SNRCU together with the complementary statutory framework represents a good basis for the creation of an independent and sustainable Ukrainian nuclear regulatory system. The team acknowledges the large efforts by Ukraine to establish a legislative system covering all aspects of the safety of nuclear and radiation facilities and activities. The peer review team identified difficulties to follow all legal provisions specified in the numerous laws regulating all nuclear and radiation activities and facilities. It should be noted that the same aspects of state regulation are covered by different laws, which may lead to inconsistencies and contradictory requirements. However, as explained by the Ukrainian counterparts this did not cause any problems up to now. It should be stressed that most of the arrangements already established by the laws have proved to be effective and in line with the international practices.

The team discussed the plans of the Parliament and the Cabinet of Ministers to establish a common legal Law or Codex, which should incorporate all aspects on the use of nuclear energy, including responsibilities of the State and the respective State institutions. However, it appears that this Codex will incorporate aspects related to both nuclear promotion and nuclear safety.

Existing laws have been developed with consideration of the International conventions and the available international documents. Furthermore, the Nuclear Law in its Article 8 “Regulations, Rules and Standards on Nuclear and Radiation Safety” specifies that the requirements of regulatory requirements, regulations and standards shall be adopted with consideration of the recommendations of the competent international organizations. This principle is also specified in the Law on Licensing, Article 4 Licensing Objectives, which states; “... use of only those nuclear facilities, sources of ionizing radiation, and radioactive waste management facilities, the safety of which is complying with internationally accepted requirements”.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 2.2 states that “*There are certain prerequisites for the safety of facilities and activities. These give rise to the following requirements for the legislative and governmental mechanisms of States:*
(1) A legislative and statutory framework shall be established to regulate the safety of facilities and activities”
- G1 **Good Practice:** The legislation clearly specifies that regulatory requirements shall be developed with strict consideration of the recommendations of the competent international organizations. This will inevitably support the worldwide harmonization of nuclear and radiation safety requirements, as highlighted by INSAG-21.
- R1 **Recommendation:** When further developing the legal system, the Government should ensure that all nuclear and radiation safety legislation is consistent and that established practices that have proved to be effective are preserved unchanged.

Regulatory Authority

Establishment and statute

The regulatory authority of Ukraine in the field of nuclear and radiation safety and security is the SNRCU, which is vested with the responsibilities and powers specified by the Nuclear Law, Articles 22-24. However, some inconsistencies were identified throughout the laws and the latest Provisions on SNRCU, namely:

- Nuclear Law - Article 23 specifies, “The State regulation of the safety in the use of nuclear energy is carried out by the Ministry for Protection of the Environment and Nuclear Safety of Ukraine, the Ministry of Public Health of Ukraine and other State authorities in accordance with the law of Ukraine”.
- The Nuclear Law specifies that the State Chief Inspector is appointed by the MPENS, while in the Provisions of SNRCU it is clearly stated that he/she is appointed by the Chairperson of the SNRCU.
- Law on Radioactive Waste Management - Article 8 specifies that “The state regulation of the safety in the area of radioactive waste management is carried out by the Ministry of Environmental Protection and Nuclear Safety, the Ministry of Health Protection, the Ministry of Internal Affairs, and other bodies of the state executive power according to the legislation”.

The peer review team found out that Ukrainian counterparts are well aware of those inconsistencies and changes have been prepared to address them.

Additionally, the team observed that most of the laws refer to the State Regulatory Authority for Nuclear and Radiation Safety, as for example:

- Article 24 of the nuclear law – Officials of State nuclear and radiation safety regulatory agencies shall undergo qualification attestation, and a special medical examination
- Article 25 of the nuclear law State regulatory body for nuclear and radiation safety creates the State inspectorates which are responsible for the State supervision

- Article 42 of the nuclear law - The State regulatory body for nuclear and radiation safety issues permits (licenses) for the construction of nuclear installations and radioactive waste management facilities, etc.
- Additional examples could be found in Law on Radioactive Waste Management, Law on Licensing, etc.

The Provisions of the SNRCU do not directly identify SNRCU as the State Regulatory Authority for Nuclear and Radiation Safety but they state that “The State Nuclear Regulatory Committee of Ukraine implements within its powers the state policy on the nuclear energy use and observance of the nuclear and radiation safety requirements”. However, in Article 3 of the Provisions it is stated that the main tasks of the State Nuclear Regulatory Committee of Ukraine are:

- To take part in development and implementation of the state policy on the nuclear energy use, and observance of rules and standards on nuclear and radiation safety;
- To provide the state regulation of the safe use of nuclear energy within the framework of the Committee’s powers;
- To provide the state supervision on observance of the laws, rules, and standards on nuclear and radiation safety, and nuclear and radiation safety requirements;
- To coordinate the activity of central and local executive authorities, which according to the laws regulate nuclear and radiation safety.

Those responsibilities of the SNRCU lead the team to the conclusion that “de jure” and “de facto” SNRCU is the State Regulatory Authority for Nuclear and Radiation Safety, if no Ministry for Protection of the Environment and Nuclear Safety exists. It was also confirmed by the Ukrainian counterparts that the system is really working in practice and no practical problems exist. However, amendments to the respective laws have been prepared by SNRCU to make the issue more visible and transparent.

Finally, it should be stressed that the operation of nuclear facilities is a continuous process involving high risk, even with a very low likelihood of occurrence. Those activities require continuous monitoring and assessment by a state competent regulatory authority. The statute and responsibilities of such an authority shall be guaranteed by the laws of the country operating nuclear installations and other facilities in order to achieve stability and sustainability.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1) **BASIS:** GS-R-1 § 2.2 (2) states that *“A regulatory body shall be established and maintained which shall be effectively independent of organizations or bodies charged with the promotion of nuclear technologies or responsible for facilities or activities. This is so that regulatory judgments can be made, and enforcement actions taken, without pressure from interests that may conflict with safety.”*

R2 **Recommendation:** The Government of Ukraine should define and guarantee the statute of the SNRCU in Law.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- S1 **Suggestion:** The Parliament and the Government are presently establishing common requirements and processes for the functioning of the state administration. In this context they should take into account the specific functions, responsibilities, characteristics and needs of a regulatory authority, in particular for the current case the SNRCU. In doing so the practices and legal arrangements in European countries may be of support and the draft law prepared by SNRCU may be used as a basis.

Reporting line

The SNRCU Chairperson is appointed by the Cabinet of Ministers on the basis of a proposal by the Prime Minister. It should be noted that the SNRCU Chairperson is given the opportunity to form her/his own team. Deputies are proposed by the SNRCU Chairperson and approved by the Cabinet of Ministers. SNRCU has established a succession policy inside the authority, as most of the Chairpersons are former deputies with large experience in regulation of nuclear and radiation facilities. No attempts of political influence have been identified. Specific responsibilities of the Leading and the other three deputy-chairpersons are assigned to them by an order of the Chairperson. One of the Deputies is the State Chief Inspector.

The head of the regulatory authority SNRCU is not part of the Cabinet of Ministers, which provides for not being considered as a political figure. By law the SNRCU Chairperson shall report directly to the Prime Minister through a delegated Vice-Prime Minister independently of Ministries. As explained to the team, because of the fact that there is still no allocation of responsibilities among the Vice-Prime Ministers, the SNRCU Chairperson reports directly to the Prime Minister. However, such a reporting line will be established in the near future by a decree of the Cabinet of Ministers. SNRCU has access to the meetings of the Parliament Commissions and the meetings of the Government when topics within their competence are discussed.

At present, there are no specific qualification requirements to the SNRCU Chairperson but there is an initiative of the President to create such requirements for the Chairperson and the Deputies. Such requirements, if covering professional experience, knowledge and skills will further strengthen the independence of the SNRCU.

A real concern to the team was caused by a new Law of the Cabinet of Ministers, which establishes new additional coordination functions to ministers in respect of all state executive authorities that are not ministries. By the new Law on Cabinet of Ministers, the SNRCU will report to a Minister as designated by the Government. Additionally, as written in the Law, the minister will have the functions to coordinate and manage the work of the State Executive Authority, in this case SNRCU. Until the new Law is issued, SNRCU will continue to report directly to the Cabinet of Ministers through a designated Deputy Prime Minister. As specified in the international documents, the state regulatory authority on nuclear and radiation safety shall report and have access to the highest levels of the Government. The reporting of SNRCU to a minister significantly reduces its status and may cause conflict of interests in reporting to a ministry that has promotion functions. The decisions of the SNRCU shall not be subjected to any influence, by the minister or by the Government, otherwise those decisions could not be trusted internationally, respectively there will be doubts about the safety of the nuclear and radiation facilities and activities. If such Law applies to SNRCU, the already achieved level of independence will be significantly challenged and possibilities exist for conflict of interests as well as attempts of political influence of regulatory decisions (see recommendation R2).

Budget

The Decree of the Cabinet of Ministers on the SNRCU Provisions grants the SNRCU the authority to have its own line in the State Budget, which allows the organization to directly communicate its budget with the Ministry of finance. Those arrangements ensure the SNRCU the same budgetary statute as ministries.

The procedure for development, discussion and approval of the budget is well established and transparent. The process starts with the development by the SNRCU of plans for the next year, as well as plans for the upcoming 2-4 years. Based on the limiting conditions received from MF, SNRCU establish priorities and it develops its updated budget. In case the SNRCU assessment shows that the funds are not sufficient it has the right to ask for additional funds. Some of the priorities are specified by the Law on State Budget, for example, the priority that State civil servants salaries are protected by law and shall be at any case covered by the Budget.

Budget is guaranteed and is transferred every month to the bank account of the SNRCU. If at the end of the year, there are savings, the SNRCU is allowed after agreement of the MF to distribute those funds according to the priorities of the authority. The system allows the SNRCU to ask the government for additional funds. The grant of additional financial resources is done through the system of changes to the Law on State Budget.

During last few years the communication between the MF and the SNRCU has dramatically improved, which leads to improved discussions and better outcomes.

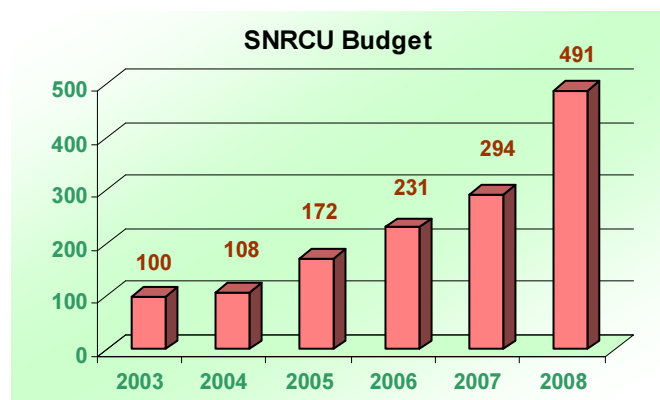
The peer review team identified and verified that the SNRCU budget is continuously improving through the years. A dramatic improvement has been done to the SNRCU in the last several years, as the budget has been multiplied by a factor of almost 5 since 2003 (see fig. 1 SNRCU Budget, where the budget is taken to be 100% in 2003).

It was apparent that the budgetary provisions are adequate and allow SNRCU to cover all areas of legal responsibility. Furthermore, the experts understand that these funding and the available recruitment mechanisms provide means for the SNRCU to perform its regulatory functions independently of resource allocation.

Going in details in the SNRCU budget it was found out that there are still main areas of the SNRCU activities that need further improvement, for example regulatory review

and assessment, training and retraining of expert staff and international cooperation. The current budget does not ensure sufficient funding of active involvement of SNRCU in the large international activities in the field of nuclear and radiation safety, as well as the training of regulatory staff on best international practices. This does not mean that those activities are not done, as they are done under the programs for technical cooperation of the IAEA and the European Commission (e.g. TACIS). It is important to note that those instruments are going to gradually fade away and the SNRCU should be prepared to face such a challenge. For example the training budget of SNRCU for 2008, being the largest up to now, represents around 6000 EUR, which in general may cover 1 to 3 experts being trained for 1 week in Europe.

Currently regulatory review and assessment is performed by the technical support organizations and funded by the licensee. Thus SNRCU does not presently require funds for this purpose. However, in the coming years SNRCU wishes to change the existing practice. In this case SNRCU proposes to



seek adequate financial resources to directly cover these expenses, which are related to the number and type of regulated facilities and activities.

The Law on State Budget establishes as a first priority the assurance of the salaries of the State officials. The salaries of the SNRCU staff have been continuously increased during the last years. In comparison with the regulatory staff salaries in 2004, the respective salaries in 2008 are between 5 and 6 times higher. In general, the average salary of SNRCU is about 3 times the average for the country and the level of salaries in SNRCU is above the average in the governmental sector. Additionally, it should be stressed that regulatory staff working at the NPP sites get the respective salary of the corresponding positions of the operating organization (NPP), as specified by law.

Finally, the team could find no reason to doubt the continued financial well being of the SNRCU which could affect its ability to fulfil assigned functions.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 2.2 (4) states that *“The regulatory body shall be provided with adequate authority and power, and it shall be ensured that it has adequate staffing and financial resources to discharge its assigned responsibilities.”*

- S2 **Suggestion:** The existing trend of continuous increase of budget and expert salaries should be preserved in order to retain staff, to allow SNRCU to achieve a level of financing in accordance with best international practice and to allow SNRCU to fund its involvement in international activities, training, review and assessment, public communications, etc.

2. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

Regulatory body - fulfilling statutory obligations

The principal functions to be performed by the SNRCU are the development of regulations and guides; review and assessment; authorization; and inspection and enforcement. The regulatory body also has functions and responsibilities in respect of emergency preparedness and providing adequate public information.

The responsibilities and functions of the SNRCU in relation to establishment and approval of regulations are specified by the requirements of the Articles 22 and 24 of the Law on "Use of Nuclear Energy and Radiation Safety", Section 4 of the SNRCU Provisions and Section 3 of the Governmental Order of Licensing of Particular Types of Activities.

The SNRCU as the Regulatory Body defines policies, safety principles and associated criteria as a basis for its regulatory actions set out in regulations and guides.

The SNRCU is empowered to establish, promote or adapt regulations and guides upon which its regulatory actions are based. All regulations and guides are available to applicants or licensees via the website of the SNRCU. The SNRCU has a Commission on Regulations that carries out analysis of the current regulations' effectiveness. IAEA standards are considered into this process to the extent possible, given the current national legislation system. A review is being carried out against the Western European Nuclear Regulators Association (WENRA) reference levels.

In accordance with Article 24 of the Law on "Use of Nuclear Energy and Radiation Safety" SNRCU performs review and assessment of operators' submissions on safety both prior to authorization and periodically during operation as required. The regulatory reviews are based on assessments of safety reports and justifications provided by applicants/licensees. According to the requirements of Article 33 of the same law, an operating organization is obliged to conduct periodic safety reassessment of a nuclear facility and to provide its results to the SNRCU. A safety reassessment is also carried out by licensees in case of any safety related modification.

In discharging its obligations and responsibilities related to the review and assessment of licensee submissions SNRCU is supported by the State Scientific and Technical Centre for Nuclear and Radiation Safety. This organization acts as a technical support organization to the SNRCU and its functioning and role in regulatory review activities are described in chapter 3 and 5. Findings and recommendations in this field are also formulated in chapter 3 and 5.

In accordance with Article 8 of the Law on "Use of Nuclear Energy and Radiation Safety", and Articles 14, 15, 15 and 17 on the "Law on Activity Authorization", the SNRCU issues, amends, suspends or revokes authorizations, subject to any necessary conditions which may specify:

- the facility, activity or inventory of sources covered by the authorization;
- the obligation of the operator in respect of its facility, equipment, radiation sources and personnel; conditions and limits of operation;
- criteria for radioactive waste processing, where applicable
- requirements for incident reporting;
- requirements for emergency preparedness arrangements

In addition, for a facility in operation, some additional operator obligations may be determined by the SNRCU on implementation of necessary measures removing deviations from safety

requirements or implementing compensatory measures. The period of validity of issued authorizations is also usually specified.

The SNRCU carries out regulatory inspections, ensures that corrective actions are taken if any unsafe conditions are detected, and takes the necessary enforcement actions in the case of violations of safety requirements. In accordance with Article 25 of the Law on "Use of Nuclear Energy and Radiation Safety", SNRCU may enforce financial sanctions against individuals in case of safety requirements violations. However it is recognized by SNRCU management that financial sanctions, if any, should be applied at utilities level. This is to be implemented in the future revisions of the relevant legislation in Ukraine.

Discharging of Regulatory responsibility

The SNRCU has established a formal process for dealing with applications for issuing regulatory authorizations. The process is based on requirements of laws and regulations being in force. During discharging its licensing responsibility, the SNRCU staff uses an internal Administrative Regalement on Licensing Activities. This guidance is a part of the quality management system implemented at the SNRCU.

Within the framework of the authorization process, a SNRCU Licensing Commission works, which was created according to requirements of Section 3 of the governmental Order of Licensing of Particular Types of Activities. The Licensing Commission is a permanent collective board of SNRCU that develops proposals for consideration by the SNRCU chairperson, on making decisions about issuing, re-issuing, prolongation, or cancellation of licenses. While conducting its actions, the Licensing Commission uses the Provision on Licensing Commission (approved by the SNRCU chairperson, the Order of 12.09.04p No. 147) specifying its responsibilities and functions.

If a licensing application is rejected, SNRCU provides a written justification of the rejection. Also, the SNRCU provides guidance to operators on developing and presenting both safety assessments and other information related to safety, and ensures that proprietary information is protected.

The SNRCU communicates with, and provides information to other competent governmental bodies and the public. It provides extensive information on its criteria and decisions on its website. The SNRCU prepares an annual national report on nuclear and radiation safety in Ukraine, and provides them to the Parliament, President of Ukraine, other interested state bodies, as well as to the local governmental bodies and public.

The SNRCU takes part in the fulfilment of international treaty obligations of Ukraine on nuclear and radiation safety, analyses the state of implementation of such obligations, coordinates measures on realization of Agreement between Ukraine and International Atomic Energy Agency on the application of safeguards in connection with the Non-proliferation Treaty of nuclear weapons.

Ukrainian regulations require the operator to notify and assess events relating to safety, radiation protection and the environment. Event analysis reports for nuclear facilities are reviewed and assessed by the Department of evaluation of safety of nuclear installations of the SNRCU together with State Scientific and Technical Centre for Nuclear and Radiation Safety and by SNRCU Departments for other facilities and activities.

Implementation of corrective actions or performance of additional analysis can be required from the licensee. Implementation of corrective actions is checked during SNRCU inspections, as is the effectiveness of the detection, analysis and feedback process of the licensee's organization.

There are legal requirements for maintaining records relating to the safety of facilities and activities which have to be complied with to ensure that such records are appropriately retained and easily retrievable. SNRCU inspects these aspects as part of its inspection activities.

The SNRCU determines the safety principles and criteria, on which its regulatory decisions are based. Prior to issuing any new regulation, SNRCU consults various stakeholders, including licensees, and also seek advice from technical support organizations to ensure the adequacy of regulatory principles and criteria. The SNRCU takes into consideration international standards and recommendations and information about scientific and technical achievements in the area of the use of nuclear energy.

The SNRCU establishes requirements to operator for systematic and periodic safety reviews (based on the Article of the 33 of the Law on "Use of Nuclear Energy and Radiation Safety"), including items to be analysed regarding the changes to regulations or guides, operating experience feedback and management of ageing.

Licensees provide the safety reassessment by preparation of appropriate reports. If needed, safety reassessments are carried out by the licensee on requests of the SNRCU for some specific cases (e.g. identified shortcomings of preliminary reassessment, change of technologies and others).

The SNRCU prepares and submits proposals to the Government relating to the state policy in the area of the safety of nuclear energy use.

The SNRCU confirms the competence of personnel that is responsible for the safe operation of a facility or activity. Qualification requirements for "licensed personnel" are approved by the SNRCU (in accordance with the requirements of Article 32 of the Law on "Use of Nuclear Energy and Radiation Safety"). In addition, SNRCU assesses operating procedures used by operational personnel, including procedures for accident management, through regulatory inspections and during the authorization process. Confirmation of personnel knowledge of safety requirements is the ultimate aim of such evaluations.

Regulatory body – cooperation with other relevant authorities

The SNRCU cooperates with other State Bodies and Authorities, advises them and provides appropriate information and explanation in all the areas of its legislative functions, as necessary.

Co-operation with MPENS and MH is required to discharge some of the regulatory responsibilities. During the IRRS mission a number of cases were identified where the co-operation with the MH was not found to be very effective (see findings and recommendations on this issue in chapter 7). It is important to reinforce this co-operation to provide for effective implementations of actions where both SNRCU and MH consent are needed.

Regulatory body – additional functions

The SNRCU does not have additional functions such as independent radiological monitoring in and around nuclear facilities, or independent testing and quality control measurements, or providing personnel monitoring services, or conducting medical examinations, or any regulatory control of industrial safety. However, SNRCU has an additional function to initiating safety related research in support of its regulatory functions or as it may be needed to address particular safety issues.

In general, the responsibilities assigned to SNRCU enable the regulatory authority to fulfil its functions and obligations. Recommendations concerning the organization of the regulatory review and assessment functions and use of technical support organizations are given in chapter 3 and 4. As concerns, the co-operation between SNRCU and Ministry of Health in discharging responsibility of common competence, further efforts should be made to reinforce this process.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** **GS-R-1** § 2.5. states that *“If other authorities, which may fail to meet the requirement of independence set out in item (2) of para. 2.2, are involved in the granting of authorizations, it shall be ensured that the safety requirements of the regulatory body remain in force and are not modified in the regulatory process.”*
 - (2) **BASIS:** **GS-R-1** § 2.6. states that *“The regulatory body shall have the authority: ... (13) to liaise and co-ordinate with other governmental or non-governmental bodies having competence in such areas as health and safety, environmental protection, security, and transport of dangerous goods; and...”*
- R3 **Recommendation:** SNRCU and the Ministry of Health should agree a memorandum of understanding clarifying the responsibilities of each of the authorities as well as the mechanisms for implementation of effective cooperation in regulating and controlling radiation protection, waste safety and other common activities that could arise.

3. ORGANIZATION OF THE REGULATORY BODY

3.1. GENERAL ORGANIZATION

The Ukraine law on “Use of Nuclear Energy and Radiation Safety” allocates responsibility for state safety regulation on the use of nuclear energy to the State Regulatory Agencies for Nuclear and Radiation Safety. The State Nuclear Regulatory Committee of Ukraine was created in 2001 with reference to this law and as it was described above with an act No 1830 of the Cabinet of Ministers of 27 December 2006, new Provisions on SNRCU were approved. Following this act the SNRCU has been last reorganized in April 2008 to take into consideration that the responsibility for the regional radiation inspections has been finally transferred from the Ministry of Health to the SNRCU in 2008.

Within SNRCU there are currently five branches including 15 divisions at the SNRCU headquarters in Kiev, 5 resident site inspectorates at the NPP sites and 8 regional radiation protection inspections, responsible for:

- planning, co-ordination and development
- administration and legal support
- regulation of nuclear installations
- regulation of radiation sources and technologies
- regulation of radioactive waste management
- regulation of transport of radioactive and radioactive waste material
- monitoring and emergency response
- safeguards
- inspection co-ordination
- assessment of nuclear and radiation safety
- resident site inspection, plus
- physical protection regulation

The current organizational structure of the SNRCU allows the regulatory body to discharge its responsibility and fulfil its function in accordance with its responsibilities. The SNRCU organizational structure and size are determined by many factors, including the extent and nature of the facilities and activities it must regulate. The organizational structure of SNRCU is shown at Appendix VIII.

SNRCU discharges some of its regulatory responsibilities in co-operation with other state administrative bodies as described in chapter 2. The organizational structures and staffing of those organizations are commented, if needed, in the respective parts of the report addressing areas of common activities.

In addition to these bodies there are a number of technical support organizations that provide further support to SNRCU regulatory responsibilities. The State Scientific and Technical Centre for Nuclear and Radiation Safety (SSTC) is the most significant. It is a self-funding State enterprise established to provide technical support to SNRCU to enable the requirements of Section 40 of the Ukraine law on “Use of Nuclear Energy and Radiation Safety” regarding "state safety expertise" to

be met. SSTC, however also provides in some cases technical support for other organizations including NPPs and utility organizations.

3.2. STAFFING AND TRAINING

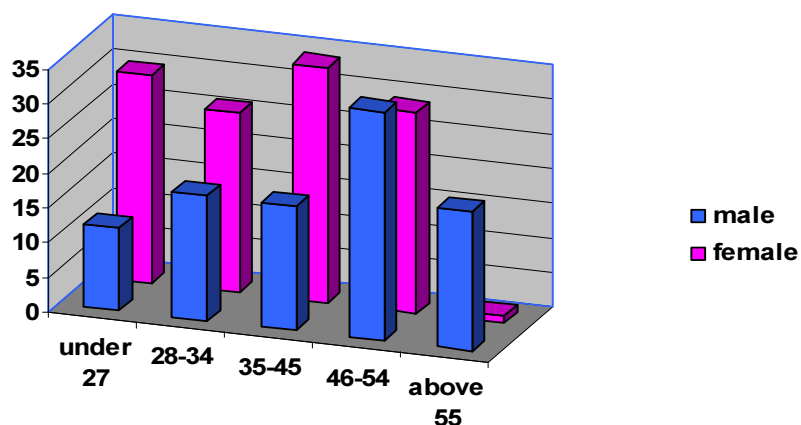
Staffing

For past several years the SNRCU has been very successful in development, justification and implementation of its human resources management policy. This fact is of particular value, given the dynamic nature of the processes in Ukraine related to state administration reorganizations and limited resources of the national administration budget.

The regulatory body currently employs a reasonable number of personnel with the necessary qualifications, experience and expertise to undertake its functions and responsibilities. The staff has good academic qualifications and operational experience of the regulated activities and facilities. The regulatory body as a whole, as well as individual staff members has undergone a significant learning process from the time of its establishment. Furthermore, in the recent years the regulatory body has reinforced its recruitment policy, with particular attention being paid to succession planning for key technical staff, workforce aging and knowledge management. For this purpose a systematic review of the regulatory body functions, activities and competence of the available staff is performed to determine the size and composition necessary for the regulatory body to be able to fulfil its obligations and identify areas where technical expertise still needs to be acquired. The SNRCU human resources management regularly analyses how best to fill the vacant posts, having determined which skills and knowledge are lacking in its personnel and which are available on the labour market. The process for advertising job vacancies, examination of professional competence and selection of new recruits is well organized and is part of the new Quality Management System developed by the SNRCU.

In addition to working in an appropriate legal framework and employing staff with suitable qualifications and expertise, the effectiveness of the regulatory body depends also on the status of its staff in comparison with that of the staffs of both the operator and the other organizations involved. Members of the regulatory body staff should therefore be appointed at such grades and with such salaries and conditions of service as would facilitate their regulatory relationships and reinforce their authority. It is evident that significant progress has been achieved in this direction by SNRCU (see chapter 1 on funding of the SNRCU), however further efforts are needed to sustain the achieved results.

The SNRCU has a staff manning table level determined by its Chairman within the State budgetary allocation. This staffing level was relatively stable over the last several years. In April 2008 the number of SNRCU employees was increased when regional radiation inspectorates were created and staffed. Currently there are 292 posts including 189 state inspectors. 161 positions are in Kiev headquarters, 35 at NPP regional inspectorates and 96 in local radiation protection inspectorates. The staff gender and age profile is as follows:



At the time of the IRRS mission there were 68 vacancies. Most of them are in the department for safety assessment of nuclear installations, central nuclear inspectorate and regional radiation inspectorates. There is some lack of competence in civil and seismic engineering, I&C, electrical systems, NPP chemistry. Although the SNRCU policy for recruitment of personal has been reinforced recently there is still some staff turn over, for example in 2007 53 positions were newly filled but 21 persons resigned at the same time (the same statistics for 2008 was 12 and 11 respectively). There is a trend that some of the young recruits leave after a couple of years of work with SNRCU for more attractive positions within the Ukrainian private economy sector.

In general, the SNRCU has experienced staff to be able to do basic regulatory work and to evaluate the quality and results of the work performed for it by consultants, however further effort is needed to fill the outstanding vacancies and ensure long term staff stability. The Governmental support in this field is of particular importance.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 §4.6 states that “...*The regulatory body shall employ a sufficient number of personnel with the necessary qualifications, experience and expertise to undertake its functions and responsibilities*”.
- S3 **Suggestion:** The SNRCU should continue its efforts to attract suitable qualified staff and fill the outstanding vacancies at the earliest opportunity commensurate with its human resource management policy. Measures should be identified to reduce the high staff turn-over in some fields.

Training

The regulatory body staff members are appointed according to SNRCU special procedures for recruitment. Staff competence is achieved through a combination of recruiting of an experienced and/or adequately educated employees and then providing sufficient further training. Technical staff members of SNRCU are required to pass initial examinations designed to evaluate the level of their competence in nuclear and radiation safety and their ability to exercise regulatory judgment. New recruits are assigned only limited tasks and work under supervision until they have completed the initial period of their training and an evaluation of their performance has been made (usually from 3 up to 6 months).

In order to ensure that the proper skills are acquired and that adequate levels of competence are achieved and maintained, the SNRCU makes sure that its staff members participate in well defined training programmes. In order to apply a systematic approach to training which takes into consideration the organizational and individual needs the SNRCU has developed:

- a training policy;
- a formal training programme, in which the operational needs and the long term need for specialists and managers are taken into account, with designated personnel responsible for the operation and evaluation of the programme;
- a training plan for each employee which is tailored to the employee’s needs and function in the regulatory body;
- procedures for periodic review and updating of the training programme to take into account the changing needs of the individual and of the organization (usually performed once in three years).

These arrangements were reinforced as concerns the state inspectors in 2006 when a new act of the Ukrainian Cabinet of Ministers was enforced requiring formal initial and periodical evaluation of inspector's skills and competence. During the IRRS mission the SNRCU staff responsible for development and implementation of the training programmes demonstrated good commitment, awareness of its strength and limitations and willingness to consider further improvements.

Training of SNRCU personnel needs substantial resources in terms of both staff and monetary costs. In the recent years the SNRCU management was very successful in using international co-operation to fulfil many of its training needs. Significant training support was received under EC TACIS projects for nuclear safety, IAEA Technical Co-operation Department projects and bilateral agreements with a number of regulatory authorities (e.g. US NRC). For example, under TACIS projects programmes for initial training of NPP resident inspectors, as well as for inspectors in the headquarters were developed. The residence inspectors training includes also training at NPP simulators performed in agreement with the respective NPP training programmes.

Currently most of the financial resources needed for training are coming mainly from external international sources. In 2007 only 40 000 Grivni (equal to approximately 6000 Euro) for training came from the budget. Although negligible, this amount is well above the average for the rest of the Ukrainian administration. The SNRCU should seek internal and external mechanisms to ensure long-term sustainability of its training activities.

The SNRCU should seek in long term perspective additional financial sources to maintain the sustainability of its training activities (See suggestion on this subject in chapter 1).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 4.7 states that *“In order to ensure that the proper skills are acquired and that adequate levels of competence are achieved and maintained, the regulatory body shall ensure that its staff members participate in well defined training programmes. This training should ensure that staff are aware of technological developments and new safety principles and concepts.”*
- G2 **Good practice:** The SNRCU formal training programme is well developed and based on Systematic Approach to Training principles, and succession planning for key technical staff, workforce aging and knowledge management are taken into account. SNRCU makes effective use of training at international level.

3.3. ADVISORY BODIES AND RESEARCH ORGANIZATIONS

Technical support organization (TSO)

In some countries, regulatory bodies are rather large and are self sufficient in technical staff. In other countries, regulatory bodies may be relatively small but they are technically supported by other organizations (TSOs). Such a difference is not a problem if all the regulatory decisions are made independently, based on sound technical knowledge.

In the case of Ukraine, SNRCU, the regulator, is supported by the State Scientific and Technical Centre for Nuclear and Radiation Safety (SSTC).

SSTC was established by Decree of the Cabinet of Ministers of Ukraine # 52 of February 3, 1992 and started its work on 19 March 1992. Till 2001 SSTC conducted its activity for the nuclear regulator within the State system for protection of the environment. When in 2001 an independent State Nuclear Regulatory Committee of Ukraine (SNRCU) was established the SSTC was formally appointed to act as a technical support organization to the SNRCU. The SSTC has a status of a

specialized self-funded scientific and technical organization. Most of the work performed by the SSTC is to support the SNRCU licensing decision making and is done at a direct request of the SNRCU.

SSTC has 9 scientific departments located in Kiev and two local offices in Kharkiv and Slavutich respectively. It has well qualified professional staff and possesses expertise in broad field of nuclear safety, radiation protection, radioactive waste and transport safety. Currently it has 228 employees, from which 143 are staff members with technical competence. The professional profile of the SSTC represents good balance between young and experienced; research and operational experienced; as well as technical and non-technical staff. In some cases, the SSTC can hire external consultants. The SSTC management system is certified according to ISO 9001.

The head of the SSTC is formally appointed by the SNRCU chairperson, but there are no financial implications attached to this appointment. The financial support for the SSTC comes from three main sources:

- projects paid by utilities – major part of the SSTC annual budget (for "state safety expertise" requested by the SNRCU and for direct work on request of the utility);
- projects paid by SNRCU on research and scientific issues not related to the "state safety expertise"; and
- international projects.

It appears that the SSTC in general, has prime responsibility to perform "state safety expertise" in the licensing field as requested by the Ukrainian law. In this respect the SSTC is fulfilling the role of a technical support organization; however in a number of cases the SSTC does perform technical work for the utility, too. In addition, according to the current legislative arrangements the SSTC is paid directly from the utility for all the assessment. In past several years the management of the centre dedicated efforts to develop and apply a controlled mechanism to ensure the independence from the utility of its safety judgements. A special "Council" was established internally to evaluate whether a conflict of interest could exist and prevent such cases, however the SNRCU does not have control over this process. SNRCU may wish to implement further mechanisms which will enable it to demonstrate full transparency and independence of its licensing process.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1) **BASIS:** GS-R-1 § 4.3 states that *“If the regulatory body is not entirely self-sufficient in all the technical or functional areas necessary to discharge its responsibilities for review and assessment or inspection, it shall seek advice or assistance, as appropriate, from consultants. Whoever may provide such advice or assistance (such as a dedicated support organization, universities or private consultants), arrangements shall be made to ensure that the consultants are effectively independent of the operator.”*

R4 **Recommendation:** The practice of direct payment for ‘state safety expertise’ to technical support organization by utilities might be seen as affecting the independence of judgement of safety assessors. Safety assessment process should be fully transparent and effectively regulated, including financial aspects, by SNRCU. The SNRCU should seek and apply arrangements that demonstrate in an unambiguous and transparent manner the effective independence of its technical support organizations and consultants.

Advisory Bodies

In 1999 a National Commission on Radiation Protection of Ukrainian Public was established to provide advice on radiation protection measures needed to ensure public health. Members of this commission are national experts with a proven competence in radiation protection. The commission has about 30 members and meets in general once in a month. The relatively high frequency of the Commission meetings is determined by the specificity of its discussions in relation to the post Chernobyl issues related to radiation protection in Ukraine.

In 2001 a formal advisory body, the “Collegium” has been established which is functioning at a regular basis. This Collegium currently comprises nine senior SNRCU staff members and six external members and provides policy advice to the SNRCU Chairperson. In 2007, the Collegium met nine times to discuss essential issues of nuclear and radiation safety, such as the safe management of radioactive waste at the Chernobyl NPP and Exclusion Zone, safety and security of ionizing radiation sources in Ukraine, etc.

Advisory functions are also performed by a Scientific Council which was created in accordance with the provisions establishing the SNRCU. The role of this Council is to provide advice on scientific and technical issues related to rule making, decision taking and regulation of nuclear installations and activities associated with the use of ionizing radiation sources. It is the task of the Council to discuss draft concepts, guidelines, standards and rules that are being developed or are to be implemented. In particular in 2007, representatives of this Council were involved in the discussion of the essential issues of external exposure survey of personnel at nuclear power plants, medical institutions and other industrial enterprises and a unified system for monitoring and record of individual doses. Around 66% on the Scientific Council members are from external organizations.

In 2008 an Advisory Council on Reactor Safety was established with an order of the SNRCU No 69 of April 8. The role of this Council will be to provide specific advice on issues related to reactor safety and in particular on decisions which SNRCU might need to take on the licensing procedures to be applied to new reactor builds. The procedures for the functioning of this Council are still to be elaborated.

The SNRCU advisory bodies have good records of activities and provide advice to the SNRCU chairperson and management which are found sound and helpful. The provision of such bodies is a good practice in meeting IAEA requirements in this field.

Further to these activities and in order to strengthen its capabilities the SNRCU management is currently taking actions to involve in its advisory body on reactor safety experts from abroad with well recognized competence in nuclear safety. Experienced experts from Russia, Germany, Czech Republic, Bulgaria and other countries have been contacted and relevant negotiations are well underway.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 4.9 states that *“The government or the regulatory body may choose to give formal structure to the processes by which expert opinion and advice are provided to the regulatory body; the need or otherwise for such formal advisory bodies is determined by many factors. When the establishment of advisory bodies is considered necessary, on a temporary or permanent basis, such bodies shall give independent advice. The advice given may be technical or non-technical (in advising, for example, on ethical issues in the use of radiation in medicine). Any advice offered shall not relieve the regulatory body of its responsibilities for making decisions and recommendations.”*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- G3 **Good Practice:** The proposal and actions taken by the SNRCU management to establish an advisory body with involvement of internationally recognized nuclear safety experts from abroad is seen as a demonstrated commitment to safety improvements.

3.4. INTERFACES AND LIAISON WITH LICENSEE'S AND OTHER ORGANIZATIONS

Relations with the operators

SNRCU aims at an open and frank relationship with the operators. In addition to professional regulatory contacts such as inspections, the management of the SNRCU meets the NPP management periodically. There are no formal agreements in place for the relationships or the schedule of meetings; however the practical arrangements have been working well.

Due to the significant NPP modernization programme which has been implemented in Ukraine past decades the contact between the regulator and the operator have been very active and constructive.

Public Communication

SNRCU developed and is implementing a well defined and transparent policy for public communication as one of its priorities. The main objectives are related to providing the public with timely, complete and understandable information on nuclear and radiation safety matters, as well as the SNRCU activities and results in regulating the safety of facilities and activities.

SNRCU has adopted a Communication Strategy document (part of the overall Strategic Plan, February 2008). The communication strategy establishes the objectives, methods and priorities in communicating information to the public, as well as related core values of communicating to public. SNRCU's effective dialogue with the public is maintained on the basis of continuous communication in all areas of public concern, and the principal role in the process is played by the Chairperson and his/her Deputies. The regulatory staff is actively involved in public communication depending on their competence and skills and in compliance with the established internal procedures. The process of public communication (called Informing our Customers) is formalized by the SNRCU Order 182 of December 2007. The process identifies continuous dialogue with the public and close relations with the media as essential for the organization.

To be able to address public interest, the SNRCU has established a system for public direct communication with the SNRCU top management. Twice a month, the Chairperson and the Deputies can be reached by phone (via hotlines) to answer questions raised by citizens. Additionally, on a weekly basis the SNRCU management is available for public consultations by individuals. Consulting hours and direct telephone lines are published at the SNRCU website.

The SNRCU issues annual reports on nuclear and radiation safety in Ukraine. The SNRCU website is a source of on-line information on nuclear and radiation safety (www.snrc.gov.ua). At its website SNRCU publishes daily information on the status of Ukrainian NPPs as well as on the operational events that occurred. Brief information on the operational safety of the NPPs is published on a weekly basis. The website also offers special news, action plans, reports, drafts of regulations, etc.

To ensure efficient dialogue with public, SNRCU holds regular outdoor meetings with the public and in 2006 established a Public Council. The Council (35 members) includes scientists, representatives of mass media, and people from the regions of Ukraine with nuclear facilities. Meetings of the Council are organized to discuss with the public and the media sensitive issues of

increased public interest. The Council also discusses regularly effectiveness and transparency of SNRCU communication with its stakeholders.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 3.3 (6) states that *“In order to discharge its main responsibilities, as outlined in para. 3.2, the regulatory body.... shall communicate with, and provide information to, other competent governmental bodies, international organizations and the public...”*
- G4 **Good Practice:** SNRCU applies a good system for communication with the public and other stakeholders, including the establishment of a Public Council to ensure transparency of its decision making, as well as providing the public with direct access to SNRCU senior management through telephone hotlines.

3.5. INTERNATIONAL CO-OPERATION

The SNRCU gives high priority to its participation in the international co-operation recognizing that safety of facilities and activities is of international concern. The Government of Ukraine has ratified several international conventions relating to various aspects of safety currently in force (see chapter 1). In accordance with its obligations under the Nuclear Safety Convention and Joint Convention on the Safety of Spent Fuel Management and Radioactive Waste Management Ukraine has prepared relevant national reports and participated actively in the review process. SNCRU chairperson chaired one of the group review meetings during the 4th review meeting of the Convention on Nuclear Safety, which took place in April 2008.

Co-operation with IAEA

SNRCU actively participates in the co-operation mechanisms maintained under the auspices of the IAEA. SNRCU contributes to the review and development of the draft IAEA safety standards, participates in safety review missions and promotes the implementation of best international practices identified by the IAEA. The cooperation between Ukraine and the IAEA under the Technical Cooperation Programme for 2007-2008 was based on 7 new national and 32 regional projects. The beneficiaries to these projects were the Ministry for Fuel and Energy, Ministry for Emergencies and Public Protection against Consequences of the Chernobyl Disaster, Ministry of Health, State Nuclear Regulatory Committee, NAEK Energoatom, Chernobyl NPP, State Frontier Service, and Ministry for Agrarian Policy, etc. Almost 150 representatives of the above ministries, state establishments and departments of Ukraine took part in IAEA technical meetings, working groups, workshops, conferences, training courses.

Co-operation with EC

Considerable technical assistance to Ukraine has been provided in the recent years also under the cooperation with the European Union, within the framework of the TACIS nuclear safety programme. This cooperation is based on the Memorandum of Understanding between the Government of Ukraine and the European Commission on technical assistance in nuclear safety of 23 October 1995, «General Regulations for Financial Memoranda» signed on 28 December 1994 between the Government of Ukraine and the European Commission and Grant Letters to TACIS Nuclear Safety Action Programmes. In 2007, 33 projects were implemented in Ukraine, including 7 assistance projects in the area of design safety, 16 projects relating to on-site assistance and 10 regulatory support projects. The technical cooperation with the European Commission in the area of nuclear safety will be conducted in future in the framework of the new EU Instrument for Nuclear Safety Cooperation (INSC) for 2007-2013.

Forum of WWER Regulators

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

Bilateral Co-operation

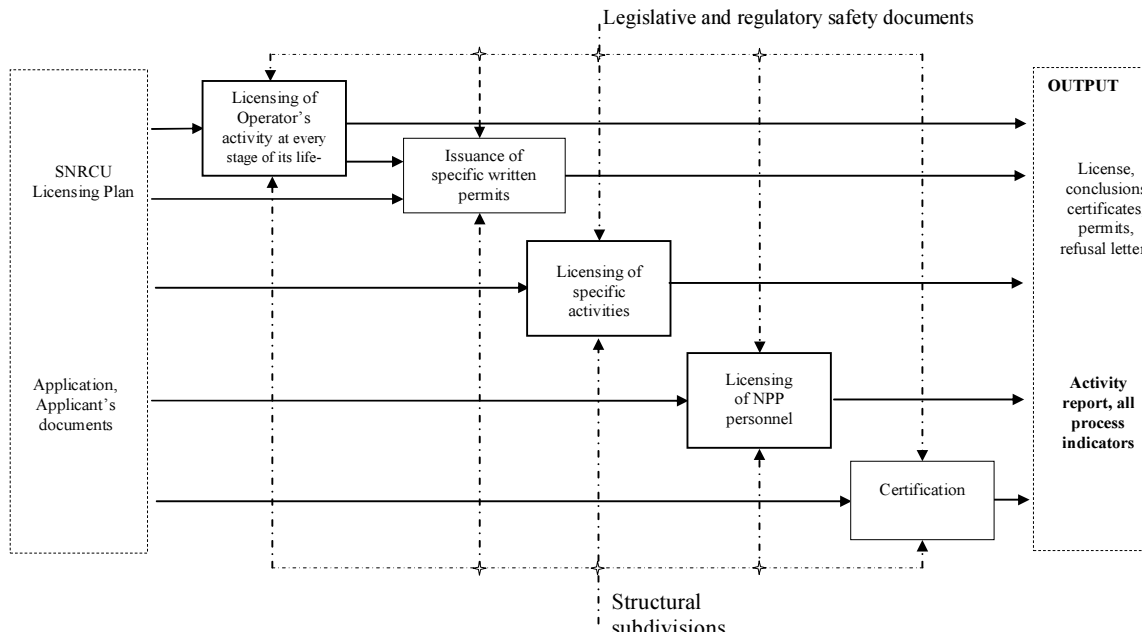
Ukraine has bilateral agreements for exchange of information on nuclear safety and radiation protection matters with Belarus, Bulgaria, Canada, Hungary, Latvia, Germany, Norway, Poland, Russia, Romania, Slovak Republic, Sweden, Turkey and USA.

SNRCU has established appropriate arrangements for the exchange of safety related information, bilaterally and regionally, with neighbouring States and other interested States, and with relevant intergovernmental organizations, both to fulfil safety obligations and to promote co-operation. SNRCU has used as a basis of its new regulations many of the IAEA safety standards and thus has promoted their application.

4. ACTIVITIES OF THE REGULATORY BODY

4.1. AUTHORIZATION

The types of licences issued by SNRCU are depicted in the figure below (taken from the SNRCU “Quality Manual for Licensing Activities”)

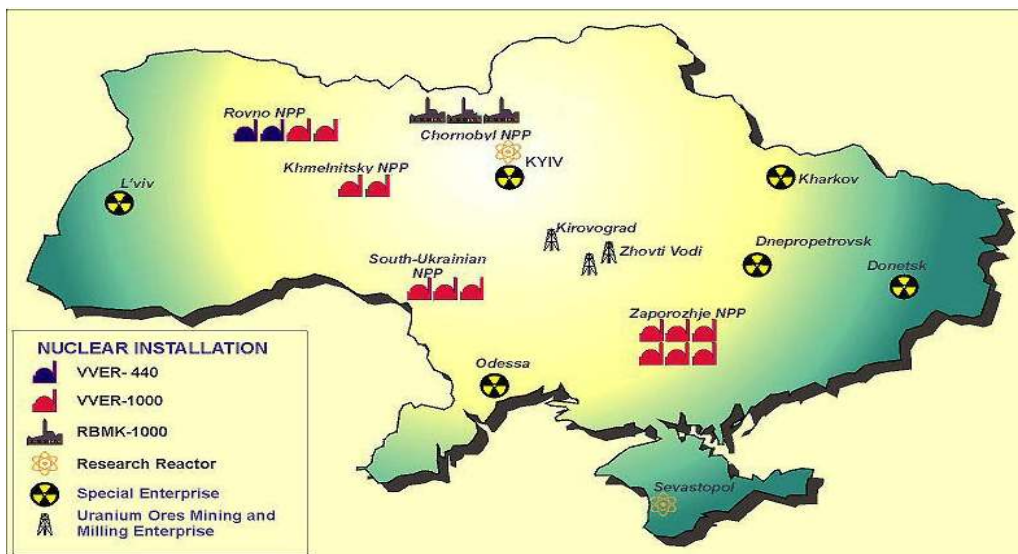


General flow-chart of authorization activity of SNRCU

The exact meaning of the various authorizations is given in the *Quality Manual*. Note, that licensing of an operating organization relates solely to nuclear facilities, while certification is needed in nuclear and radioactive material transport only.

4.1.1. Nuclear Facilities

Nuclear facilities in Ukraine include nuclear power plants, research reactors and radioactive waste treatment and storage facilities. The sites and types of such facilities are depicted in the figure below (courtesy of SNRCU).



Nuclear installations in Ukraine

Note that the Chernobyl NPP reactors are being decommissioned and contain no nuclear fuel, thus there remained 15 power plant units as nuclear facilities, all in operation. All nuclear power plants belong to the single operating utility NAEK Energoatom.

Legal Background of Authorization

The prior existence of an authorization (license or permit) for nuclear facilities and related activities is required by the *Law of Ukraine on the Use of Nuclear Energy and Radiation Safety*. SNRCU, as the responsible regulatory body **ensures the fulfilment of the requirements** set by the law.

The general terms of authorization are set by the *Law of Ukraine on Authorization Activity in Use of Nuclear Energy*. The law defines those activities for which authorization is mandatory, explicitly mentioning the:

- design;
- construction;
- commissioning;
- operation; and
- decommissioning.

of nuclear facilities as well as the training of personnel operating a nuclear facility. The same law empowers SNRCU to issue licenses for such activities and also to determine the list of and requirements on the documents to be submitted with an application for license. Conditions of denial, suspension and cancellation of a licence are given therein. Duties and conditions pertaining to SNRCU in the process of licensing are also set by the law.

In compliance with the law on authorization, the Cabinet of Ministers of Ukraine issued its *Decree No. 1782* (amended several times) on licensing of activities related to the use of nuclear energy. This Cabinet order **gives further details on the required contents of the licence applications** and on the obligations and time constraint pertaining to SNRCU in every stages of a licensing process.

In its *Decree No. 1830* the Cabinet of Ministers issued an order on the statute of SNRCU. This order reiterates the provisions set by the previous legal items as for the licensing activity of SNRCU.

SNRCU issued its standards and rules on the process of authorization of modifications in the document NP-36.2.106-2005 entitled *Requirements on Modifications of Nuclear Installations and their Safety Assessment Procedure* (in short NP-106). The document **defines the scopes of safety-significant and non safety-significant modifications**, respectively, and gives provisions for designing, approving and performing modification in nuclear installations. Further SNRCU document No.306.04.02/2.083-2003 details **conditions and process of authorization related to activities** during the various cycles of life of a NPP.

Recently SNRCU has issued the regulation OPB-AS-2007, entitled *General Provisions for Safety of Nuclear Power Plants* as a top level regulatory document summarizing criteria, principles and requirements related to siting, design, commissioning and operating of nuclear power plants. This document also contains provisions concerning authorization and licensing.

Note that the standards and rules issued by SNRCU are mandatory. This may be the reason why **no formal regulatory guides are in existence**. (Issuance of regulatory guides nevertheless recently is under consideration.)

The laws and enactments discussed above clearly define the **various licenses needed to accomplish various phases of the lifecycle** of a nuclear installation. Thus, according to the actual legislation separate licenses are needed for the successive steps in the realization of a nuclear power plant.

Furthermore, in a modification process of separate distinct steps, *separate authorization steps ensure hold points and differentiated licensing conditions.*

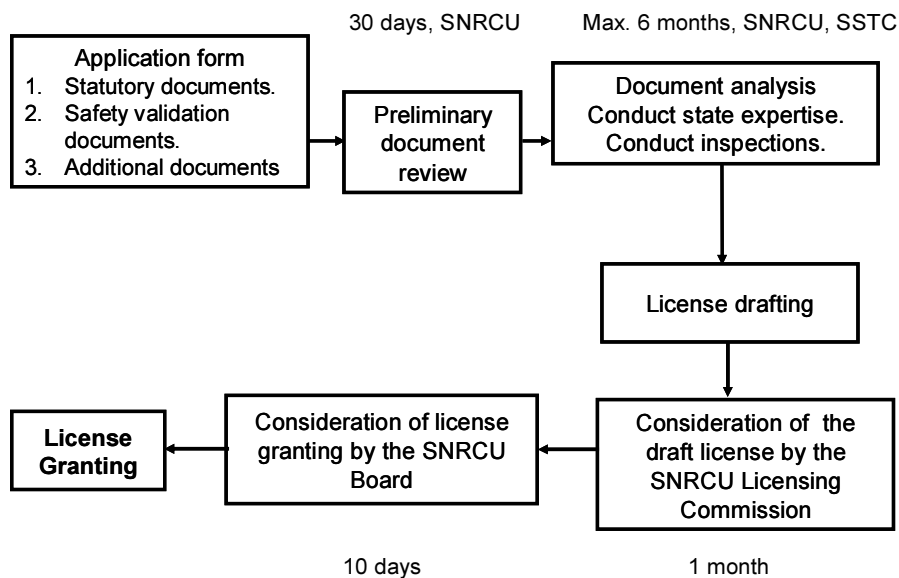
However, in the actual practice siting *does not require a formal authorization by SNRCU*, although its evaluation is taken into account in the decision process. Furthermore, in an amendment of the regulations foreseen in the nearest future *licensing of site selection and of the design of new units are expected to be removed from under the responsibilities of SNRCU.* Since these steps of the realization of newly built units have important safety aspects, the planned changes may raise concern.

Note that besides the law on authorization also the *Law on Use of Nuclear Energy and Radiation Safety* sets conditions and requirements related to the authorization process. It explicitly defines also the *conditions under which a licence is amended, suspended or revoked.*

According to the Law on Authorization and OPB-AS-2007, operating licenses of the NPPs are valid to the end of the designed lifetime (typically 30 years) with the provision that a Periodic Safety Review is performed every 10 years. Further SNRCU documents (306.4.138-2007) give more details on the *timing of licence amendment and renewal.* Licence amendment in case of formal changes (e.g. names) is administrative; in case of relevant technical changes the amendment process is similar to the original.

Process of Authorization

The process is summarized in the diagram below.



The process of issuance of a license

As it is seen from the figure (and also stipulated in the law on authorization) the application for a licence *need to contain a demonstration of the safety* of the facility, activity or practice involved in the form of a safety analysis (“Safety validation documents”).

The terms and notions in the figure are self-explanatory; perhaps the only item to be elaborated in more details is the “conduct of state expertise”.

The law on authorization requires assessment of the submitted documents by an independent expert organization. *The procedure of the assessment of the submittals is defined by high level legal documents* (law, order of the Cabinet of Ministers), no specific SNRCU document was thought to be necessary for further clarification.

The State Scientific and Technical Centre on Nuclear and Radiation Safety (SSTC NRS) is a

technical support organization to the SNRCU. Licence applications are usually (but not exclusively) assessed by SSTC NRS according to a well defined procedure.

The expert services performed by SSTC NRS on the request of SNRCU appear to be *well formalized, effectively organized, performed with proper expertise and duly documented*.

Note that the inspection listed in the diagram above is also a compulsory step in the licence assessment procedure in certain definite cases.

Process and requirements of authorization depend on the actual stage of the life-cycle of the nuclear facility as well as on the safety relevance of the activity or component involved in the authorization process. Separate legal instruments define the licensing process related to nuclear facilities and radioactive waste storage facilities, while OBP-AS-2007 *classifies the systems and system components (SSC) of an NPP according to their safety importance*. SSCs falling into the first three classes have safety relevance and need authorization from SNRCU whenever a change in their status is foreseen. SSC in safety class 4 have no safety importance and need no authorization from the regulatory body.

Introduction of the *categorization of modifications* based on their safety significance as proposed by IAEA is underway.

In the step “Preliminary document review” and “Conduct state expertise” the completeness and correctness of the documents and analyses submitted with the application are reviewed. In case of necessity, *the operator is required to submit additional information*. Such an obligation of the operator is clearly set by the relevant legal documents.

The Laws and Enactments briefly discussed in the previous paragraph duplicate (sometimes with alterations) the requirements and empowerments related to a licensing process. They also contain constraints as for the timing of the authorization process. As it is also shown in the figure, the time at SNRCU’s disposal for the preliminary review is 10 days, while the entire assessment process is to be performed within no more than 6 months.

The reviewers believe that SNRCU should *consider the issue of a unique and comprehensive regulation* on matters related to nuclear authorization instead of the present multiple coverage. For example this is particularly important in the context of new build (c.f. also Recommendation No. 1 in Chapter 1.2).

The timeframes at the disposal of SNRCU, as discussed above are questionable because of the pressure such limitations may put on the regulatory body. Licensing in complicated cases may need more time than what is allowed by the legal instruments (i.e. six months).

Licensing Capabilities

The Department of Nuclear Facilities Safety is responsible for the authorization procedures in SNRCU. The Department has as an approved staffing of 34 positions for inspectors, yet at the moment only 21 inspectors are effectively employed. (see also section 3.2) The great number of vacancies shows the *lack of the capacities necessary for the existing authorization needs*. The situation is somewhat alleviated by the recent developments: legal provisions ensure that inspectors *resident at NPPs are entitled to remuneration equal to that of the NPP staff*, whereas substantial increase of salaries of the SNRCU staff has been performed.

The expert organization SSTC NRS is in a somewhat opposite position as this institution is ready to take a considerable higher workload than it presently has. Note also here, that SSTC NRS (after thorough considerations of the feasibility and only via a dedicated organizational unit) offers its expert services also to the licensee, whereas *direct financing of a branch of the regulatory body by a licensee* may raise certain concerns (see also. Section 3.3).

The workload may be characterized by the number of expert assessments for the authorizations issued for the various nuclear power plants: These were 38, 113, 60 and 68 for the Zaporozhe, Rovno, Khmelnytsky and South-Ukrainian NPP, respectively, totalling 296 in 2007.

Licensing of Subcontractors

According to the present regulations subcontractors participating in the design of a nuclear facility need to obtain a licence from SNRCU. During the upcoming revision of the licensing regulations this requirement is planned to be omitted. According to OPB-AS-2007, any organization performing activity in an NPP *need to have a QA system* in place. ***The fulfilment of this requirement, however, is not controlled by SNRCU.***

Authorization of Modifications

Format and content of documents to be submitted with an application for authorization is generally and broadly defined (e.g. in NP-106), the actual requirements for a specific application are usually agreed upon by SNRCU and the licensee on a case-by-case basis. A formal document with more guidance on the specific cases might help in decreasing the workload of SNRCU, as well as for the orientation of the licensee.

In case of ***repeated modifications*** of the same type of system or system components in several nuclear power plants, **the concept of “Pilot-modification”** is used. The very essence of the concept is that the first, “pilot” modification is authorized and tested in full scope, whereas in subsequent similar modifications only the alterations from the original process are investigated (see also Section 4.2). This concept has the advantage of taking full use of the previously invested efforts.

Licensing Lifetime Extension

In the next three years extension of the operational lifetime of three reactors is expected (Rovno 1 and 2, South Ukrainian 1) and two more until 2015. According to OPB-AS-2007, the first step towards lifetime extension is a program to be submitted by the operator three years prior to the expiry of the designed lifetime. The program is assessed and approved by SNRCU.

SNRCU has compiled a regulation No. NP 306.2.099-2004, entitled “*General requirements for LTE of NPP over planned lifetime following a PSR*”. Accordingly, lifetime extension requires an overall licensing and the Periodic Safety Review prior to that.

Authorization of Organizational Changes

In document NP-106 SNRCU clearly declares the necessity and defines the process of authorization of any organizational change in the operating organization of a nuclear facility that may have effect on nuclear safety. This process does not give the right to SNRCU of approval of such changes, thus ***in practice the authorization process reduces to*** the possibility for SNRCU to express its views on the planned changes and on the nomination of candidates to certain leading positions. Since the efficiency and appropriateness of the operating organization is crucial in assuring safe operation, authorization of operational changes is an outstandingly important activity of a regulatory body.

Licensing of NPP Personnel

According to the legislation in force, a licence is needed only for those members of the nuclear power plant personnel, ***who may have direct influence on the functioning of the nuclear reactor.*** The list of the personal activities to be licensed is determined in a decree by the Cabinet of Ministers (1683-2000- П). Accordingly, the persons with the following duties are obliged to obtain a licence from the regulatory body: reactor operator, chief control room operator, unit shift supervisor. The present system of personnel licensing implicitly assumes that no other function may have considerable influence on nuclear safety, which does not necessarily correspond to the international practice.

On the other hand, SNRCU is entitled to authorize the training programme for ten positions having effect on nuclear safety, and also issues licenses for the training centre. It would seem logical that *positions needing authorization in the respective training programme should also be licensed* by SNRCU

Conditions and Limitations in Authorizations

Licences and other types of authorizations as a rule *contain conditions and/or limitations* under which the authorizations are granted. (E.g. an operational licence typically includes some 10-20 basic, general conditions) The various types of authorizations have well determined formats giving also place for conditions.

The conditions and limitations set in authorizations need to be based on either legal requirements or assessment results (or both) depending on the type and subject of the authorization. *The basis for such limitations is clearly described in the licence or authorization.*

In conclusion the authorization process applied by the SNRCU is basically conforming to the requirements in GS-R-1. In certain issues further development is recommended, whereas a number of good practices could also be identified.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 §5.3 states that *“Prior to the granting of an authorization, the applicant shall be required to submit a detailed demonstration of safety, which shall be reviewed and assessed by the regulatory body in accordance with clearly defined procedures.”*
- G5 **Good practice:** SNRCU utilizes its technical support organization in a well formalized, effectively organized, duly documented manner. SSTC NRS has the necessary expertise and experience.
- (1) **BASIS:** GS-R-1 §5.4 states that *“The regulatory body shall issue guidance on the format and content of documents to be submitted by the operator in support of applications for authorizations. The operator shall be required to submit or make available to the regulatory body, in accordance with agreed time-scales, all information that is specified or requested.”*
- (2) **BASIS:** GS-R-1 §5.3 states that *“The extent of the control applied shall be commensurate with the potential magnitude and nature of the hazard presented.”*
- S4 **Suggestion:** SNRCU should consider further development especially in the context of new build in exercising regulatory oversight over the existence of a suitable management system of organizations carrying out activities on the premises of NPPs for all stages in the lifetime of a facility.
- S5 **Suggestion:** SNRCU should consider the issuance of a formal document describing in detail what is expected to be included in the application for authorization for the most common specific cases of applications.
- S6 **Suggestion:** The Government should consider enacting legislation that assigns responsibility to SNRCU for the authorization of siting and design of new reactor units.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- G6 **Good practice:** Application of the ‘pilot concept’ in authorization of similar modifications in several plants is an effective method, if it is performed with due attention paid to differences between the plants.
- (1) **BASIS:** GS-R-1 §5.5 states: *“The regulatory review and assessment will lead to a series of regulatory decisions. At certain stages in the authorization process, the regulatory body shall take formal actions...”*
- (2) **BASIS:** GS-R-1 § 3.3 (12) states that *“In order to discharge its main responsibilities, as outlined in para. 3.2, the regulatory body: shall confirm the competence of personnel responsible for the safe operation of the facility or activity;...”*
- S7 **Suggestion:** In licensing operating personnel, the SNRCU should consider covering additional posts and activities that may have substantial influence on the safety of a nuclear power plant.
- (1) **BASIS:** GS-R-1 § 3.3 (13) states that *“In order to discharge its main responsibilities, as outlined in para. 3.2, the regulatory body..... shall confirm that safety is managed adequately by the operator....”*
- R5 **Recommendation:** SNRCU should have the authority to approve the operators’ organizational changes. Due consideration should be given to the assessment of the impact of such changes on safety. Conditions and requirements of such an authorization should be elaborated.
- (1) **BASIS:** GS-R-1 in § 3.2. (2) states that *“In fulfilling its statutory obligations, the regulatory body..... shall review and assess submissions on safety from the operators both prior to authorization and periodically during operation as required...”*
See also GS-G-1.2 § 2.6
- (2) **BASIS:** GS-G-1.2 § 2.6 states that *“The regulatory body should indicate to the operator the period of time that is considered necessary for the review and assessment process so as to facilitate the process and to minimize delays in the granting of any necessary authorizations. It is appropriate to reach agreement on an indicative schedule. In scheduling a review and assessment programme, the regulatory body should allow for the fact that the information initially submitted by the operator may be incomplete. In such cases, it will take time to obtain adequate information so that review and assessment in full can be initiated. In addition, important issues may arise, necessitating additional studies and leading to delays. Such factors may lead to large variations in the time necessary for review and assessment in a given stage of the lifetime of the facility. The operator should submit any additional information sought by the regulatory body within the stipulated time. The regulatory body should expend its best efforts to complete its review and assessment process in accordance with the agreed schedule, but this objective should in no way compromise the regulatory body’s responsibilities.*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S8 **Suggestion:** The current time constraints related to decision making by SNRCU during the licensing process should be revised in order to relieve undue pressure on SNRCU.

4.1.2. New Build

The Cabinet of Ministers in the framework of the Ukrainian energy policy has developed and issued a “*National Strategy of Nuclear Energy Development for long-term in Ukraine*” in which is given the number of new reactors to be constructed till 2030; the document also describes the roles and responsibilities of the various state organizations, including SNRCU.

As a first step in the establishment of the licensing process for a new build, SNRCU has elaborated the requirements on the site selection of a new unit. The document is essentially based on Safety Requirements NS-R-3 and the related Safety Guides. (Although these requirements have been elaborated by SNRCU, the nuclear regulatory body very likely shall not participate in the authorization of a new site, refer to Suggestion S6).

The new version of OBP-AS (*General Provisions for Safety of Nuclear Power Plants*) was compiled with consideration of the contemporary requirements (e.g. based on INSAG-12), on the siting selection and design of new NPP. Three major amendments were induced in these new requirements related to the new design: PSA application, core damage frequency and of radioactive releases

In 2008, one new unit (*Division of Safety Assessment of New Units*) has been established to deal with the related safety issues (however, the unit so far could not have been filled up to the planned staffing level; refer to the Suggestion in section 3.2).

Taking into account the increased demand of nuclear energy and the ambitious nuclear programme for the near future, SNRCU is striving for collecting international good practices in the regulatory oversight for the new built, that’s the reason why SNRCU requested to review the new built as one of the policy issues of IRRS mission.

POLICY DEBATE ISSUES

During the discussion, some practices were provided by the experts from Bulgaria and Finland for the purpose of information exchange and experience sharing. After thorough discussion with SNRCU counterparts, it was concluded that detailed guidance is needed for SNRCU to address the following issues:

- To which extent the SNRCU is going to be involved in the process of bidding new NPP, and subsequent siting and design;
- Requirements on the regulatory oversight on the possible suppliers from qualification point of views during design and construction stages;
- Application of newly published requirements from IAEA and WENRA in terms of new design;

Conclusions

It is urgently needed to assist SNRCU in elaborating a concrete action plan to address the above-mentioned issues with the help of International organizations and other experienced countries.

The IRRS team informed the Ukrainian counterpart of the following two international meetings on this topic which would provide useful information for SNRCU staff:

- International workshop to enhance the establishment of safety infrastructure for the countries of buyers and vendors; in Vienna, from 1st to 3rd July 2008;
- International workshop on the regulatory practice and oversight on the new built. In Helsinki, Finland, September 2008

4.1.3. Industrial and Research Practices

Ionizing radiation sources (IRS) are used in Ukraine in medicine, industry, scientific research. A dedicated department within SNRCU is responsible for registration, licensing and supervision of radioactive sources.

Generally the procedures for registration, authorization and supervision of radioactive sources **are well established and are in line with the IAEA requirements** and “Code of Conduct on the safety and Security of Radioactive Sources”. Ukraine **has taken appropriate measures** to ensure that the radioactive sources within its territory or under its jurisdiction or control **are safely managed and securely protected**.

Licensing requirements are set by Decree No.1782 (c.f. Chapter 4.1). The team noted that **requirement of submission of quality assurance guide** developed according to standards of DSTU ISO9000 series for all production and use of ionizing radiation sources facilities **is not in line with the graded approach** as described in GS-R-1 § 5.3. In this case a small dental practice will also have to submit a QA program according to ISO standards similarly to a large radiation generator.

Code of Conduct § 7(b) and § 13(b)

MPENS provides for radiation control of cargo and export of scrap metal. These requirements are established through the Cabinet of Ministers of Ukraine Decree N 999 on “Approval of Procedure of Environmental Control of Export of Ferrous and Non-Ferrous Metal by regional offices of Ministry of Environment and Natural Resources”. Enterprises that perform activities on stocking, processing, recycling of ferrous and non-ferrous scrap metals are required to provide for radiation control of scrap metal through a licensing conditions established by the Decree of State Committee on Regulatory Policy and Business Undertakings of Ministry of Industrial Policy, No.127/595. The review team was told that **in case radioactive material is found in the scrap yard** in spite of radiation control arrangements at the entrance the **scrap dealer is required to cover** the financial cost of managing and safe disposal of the material **This practice may have the potential to encourage scrap dealers to hide and/or dispose radioactive material** which has inadvertently entered the scrap yard.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 5.3 states that “Prior to the granting of an authorization, the applicant shall be required to submit a detailed demonstration of safety, which shall be reviewed and assessed by the regulatory body in accordance with clearly defined procedures. The extent of the control applied shall be commensurate with the potential magnitude and nature of the hazard presented. Thus, for example, a dental X ray machine may require only registration with the regulatory body, whereas for a radioactive waste repository a multistage authorization process may be required.”

- S9 **Suggestion:** As a matter of priority SNRCU should consider adopting a graded approach for licensing conditions and requirements for radiation sources commensurate with the magnitude and nature of the associated hazard.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** The Code of Conduct § 7(b) states that *“Every State should, in order to protect individuals, society and the environment, take the appropriate measures necessary to ensure..... the promotion of safety culture and of security culture with respect to radioactive sources.”*
- (2) **BASIS:** The Code of Conduct § 13 states that *“Every State should:*
(a) *promote awareness among industry, health professionals, the public, and government bodies of the safety and security hazards associated with orphan sources; and*
(b) *encourage bodies and persons likely to encounter orphan sources during the course of their operations (such as scrap metal recyclers and customs posts) to implement appropriate monitoring programmes to detect such sources.”*
- S10 **Suggestion:** The Government of Ukraine should enact legislation to ensure that the financial obligations for the management of orphan sources do not discourage the reporting of the discovery of such sources (including those identified by scrap dealers).
- (1) **BASIS:** Code of Conduct § 7 (b) states that *“Every State should, in order to protect individuals, society and the environment, take the appropriate measures necessary to ensure.....the promotion of safety culture and of security culture with respect to radioactive sources.”*
- G7 **Good practice:** SNRCU has prepared a reference book containing pictures of radioactive material that can be found in scrap. The book has been distributed to scrap dealers. This is a good practice to help scrap dealers in identifying abandoned radioactive material in scrap metal.

4.1.4. Radiation Facilities – Medical Practices, Radiation Protection and Dosimetry Services

GENERAL REQUIREMENTS FOR AUTHORIZATIONS AND NOTIFICATIONS

The current legislation of Ukraine (*Law of Ukraine on the Nuclear Energy and Radiation Safety*) clearly requires that ***production and use of all sources, unless exempted, be licensed.***

A great number of related legislative documents (laws, Cabinet of Ministry Decrees, SNRCU orders and ministerial orders) regulate the handling of ionizing radiation sources.

Licensing is not applied to activities connected with the use of those ionizing radiation sources, which are exempted from the requirements of the regulatory control due to their total or specific activity level or the use of which is exempted from licensing. The exemptions are not made by type of practice but specific equipment is exempted (e.g. dental radiological installations).

The application for authorization has to be submitted according to the Law of Ukraine *«On Authorization Activity in the Area of Nuclear Energy Use»* submitted to the respective SNRCU State Regional Nuclear and Radiation Safety Inspectorate who reviews and assesses the application.

Actually the regional inspectorates are not represented in the licensing commissions and after assessing the application they send the assessment protocol to SNRCU and the decision to issue a licence is made by the licensing commission of SNRCU.

Production of sources and new big installations are licensed by SNRCU exclusively.

In 2007 primary licensing of medical institutions – users of high-activity radiation sources and primary licensing of non-medical users of radiation sources was terminated.

The primary licensing of medical institutions and establishments that use radiation sources for diagnosis and treatment is under preparation and will take into account the potential magnitude and nature of the hazard related to the type of the practice.

The technical state, characteristics of the medical equipment and the doses are tested or verified by metrological bodies licensed according to the Law on Metrology by the State committee of Ukraine on technical regulation (standardization authority) through the National Scientific Centre – Institute of Metrology. The requirement for primary acceptance testing is in the legislative document of the Ministry of Health (State sanitary rules and norms, part 6.3 Radiation protection in medicine DSanPiN 6.6.3-150-2007). No periodical testing of X ray equipment is required. The equipment parameters are tested against the old USSR standards partly adopted as Ukrainian standards. The tests are conducted according to approved procedures. It is very probable, that a suggestion to implement IEC standards for testing will lead to problems with a not negligible amount of equipment not able to comply the IEC set of standards on safety of X ray equipment. SNRCU has developed a draft of an SNRCU order on quality assurance for the use of radiation sources in medicine. The criteria used for technical parameters in the annex of the draft are based on the document of the European Commission No.91 Criteria for acceptability of radiological (including radiotherapy) and nuclear medicine installations.

According to the procedure approved by SNRCU facilities proposing to use ionizing radiation source must pass a process of state expertise conducted by the local authorities.

The legal basis for applying for the permission of the State Sanitary and Epidemiological Service (called “sanitary passport”) is given in the “*Law of Ukraine on Ensuring Sanitary and Epidemiological Welfare of Public*”. This law states that handling of radioactive substances and other sources of ionizing radiation is carried out upon permission of the State Sanitary and Epidemiological Service and other relevantly authorized bodies.

The acceptance protocol and approval document are required by the sanitary inspection in the framework of sanitary passport issuing process. Regarding the permits issued for sources of ionizing radiation in medical facilities, as well as inspection activities in medical facilities the independence of the sanitary supervision should be discussed, in fact the Ministry of Health is in the same time the manager and the regulator of medical facilities.

PROCEDURES FOR GRANTING AN AUTHORIZATION

Review by the SNRCU of the licence applications is carried out according to the procedures, established by the Decree No. 1782 and related documents, depending on the type of activity licensed (c.f. Chapter 4.1).

SNRCU has developed detailed internal procedures and standards for reviewing and assessing applications for authorization. Detailed internal guides for processing source or facility specific application files for authorization are under preparation. Many templates and checklists aimed to improve the licensing procedure are available to the staff in the SNRCU internal methodological documents.

The authorization procedure includes checking that other regulatory requirements are complied with. The copy of a valid sanitary passport is to be included in the application file; it means that the licence is not issued if the workplace has not a valid sanitary passport.

GUIDANCE FOR APPLICANTS

Sufficient guidance and criteria exist for applicants in the related legal instruments (refer to section 4.1). The licensing conditions and safety requirements are laid down in a normative document. The submission of a document declaring the safety status of a licensed source is required yearly, the details of the information required are given in the respective SNRCU documents. Source specific licensing conditions and safety requirements for external beam radiotherapy are laid down in an Order of SNRCU. The above documents provide details on the procedure and timing as well.

REGULATORY DECISIONS

Decision is reached according to the scheme presented in Section 4.1. The term of validity of the licence is established by the State regulatory body for nuclear and radiation safety or its territorial office, however this term shall not be less than three years, and in case of necessity it can be extended according to application of the licensee.

PROCEDURES FOR AMENDMENT, RENEWAL, SUSPENSION OR REVOCATION

All procedures for amendment, renewal, suspension or revocation, temporary termination and withhold are detailed in the Decree No. 1782. Review of an application of the operating organization (operator) to change the license, and re-licensing shall use the same procedure as for issuing a license. Any change in the conditions of the use of radiation for which the authorization was granted must result in an application for an amended authorization.

ASSESSMENT OF APPLICATIONS

The regulatory body reviews and assesses the application according to the regulations. To review a very complex application the support of technical assistance on a contractual basis is possible.

In performing the review and assessment of the application for an authorization to use radiation sources in a medical practice, it is necessary to verify if the elements of the IAEA Basic Safety Standards (BSS §II.1 – II.3 Responsibilities of the licensee) which are to be implemented to satisfy itself that the requirements of GS-R-1 §5.9 are met. This is under responsibility of Ministry of Health.

There are no guides or technical standards reflecting the technology development available.

SPECIFIC OBSERVATIONS

Although significant part of the dental installations is very old, this type of equipment was exempted from the licensing procedure without knowledge of the technical state of the equipment, techniques used and patient doses resulting from examinations. The SNRCU should consider surveying the technical state, techniques and patient doses with the aim to review the justification of exemption of dental installations from licensing.

There are no guides or technical standards reflecting the technology development, but there exists a procedure for directly adapting the international standards (IEC, ISO). The Decree № 1832 on “Technical regulation of sealed RS” also includes a provision for direct implementation of international standards.

Moreover based on the agreement signed between SNRCU and the State Centre of Delivery and Benefits Regulation a systematic review and harmonization preparation of the GOST standards with the relevant ISO and IEC standards is planned for 2008 – 2009.

In conclusion, SNRCU has implemented a functional authorization system based on general and specific legislative documents as well as on very comprehensive guidelines, giving details of

responsibilities, examination of individual authorizations and record keeping. Practices are likely to be safe and in compliance with regulatory requirements.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** The BSS § II.20(a) states that, “*Registrants and licensees shall ensure that the following items be determined and documented: in radiological examinations, representative values for typical sized adult patients of entrance surface doses, dose-area products, dose rates and exposure times, or organ doses*”.
- (2) **BASIS:** The BSS § 2.37 states that “*Safety assessments related to protection and safety measures for sources within practices shall be made at different stages, including siting, design, manufacture, construction, assembly, commissioning, operation, maintenance and decommissioning, as appropriate, in order: ... (c) to assess the quality and extent of the protection and safety provisions.*”
- (3) **BASIS:** The BSS § 2.38 states that “*Monitoring and measurements shall be conducted of the parameters necessary for verification of compliance with the requirements of the Standards.*”
- (4) **BASIS:** The BSS requires § II.19 requires that “*Registrants and licensees shall ensure that ... (a) the calibration of sources used for medical exposure be carried out and be traceable to a Standards dosimetry laboratory; [and] (e) the calibrations be carried out at the time of commissioning a unit, after any maintenance procedure that may have an effect on the dosimetry and at intervals approved by the Regulatory Authority.*”

- S11 **Suggestion:** For the licensing conditions for medical facilities SNRCU should consider:
- including a requirement for the licensee to submit within a determined period a statement concerning patient dose determination, including methodology and protocols on equipment testing
 - developing a formal strategy on the requirement for calibration of dosimetry systems.

During the primary licensing process SNRCU should consider developing a national strategy of replacement of the equipment not in compliance with the adopted standards, with a transition period based on social and economic factors.

- S12 **Suggestion:** The Ministry of Health should consider providing to SNRCU information on withdrawn sanitary passports, as withdrawing of the passport can be initial evidence of non-compliance of the practice licensed with the regulatory requirements.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** The BSS § I-2. states that *“The general principles for exemption are that:*
(a) the radiation risks to individuals caused by the exempted practice or source be sufficiently low as to be of no regulatory concern;
(b) the collective radiological impact of the exempted practice or source be sufficiently low as not to warrant regulatory control under the prevailing circumstances; and
(c) the exempted practices and sources be inherently safe, with no appreciable likelihood of scenarios that could lead to a failure to meet the criteria in (a) and (b).”

S13 **Suggestion:** The SNRCU should review the justification from exemption of dental radiology from licensing.

4.1.5. Source Registry

A great number of related legislative documents (laws, Cabinet of Ministry Decrees, SNRCU orders and ministerial orders) regulate the registration of ionizing radiation sources.

THE PROCESS OF REGISTRATION

The research and programming work was realized in the period 2003 – 2006. In 2006 the state inventory was carried out under the responsibility of the local authorities.

The process of the state registration of radiation sources started in 1997, since March 29, 2007 the State Register of ionizing Radiation Sources is in full operation. It is an independent institution, funded from the state budget via SNRCU, consists of the main registration centre located at the State Enterprise ISOTOPE and 8 regional registration centres located in the regions.

New data are acquired via a notification system, through which a legal person submits a registration card, the relevant information on the radiation sources and their users are validated and entered into the data base.

Registration centres collect data received from registrants on any change of the status of ionizing radiation sources in the form of registration cards, whose filling rules were approved jointly by SNRCU and MH.

The state custom service body informs the main registration centre on import (export) of sources through the Ukrainian borders, the executive authorities at whose territories an orphan source was found (detected) inform the registration centre and in the case of source disposal the Disposal Facility reports to the Register. An annual inventory of movable sources is required to be established by the registrants to confirm that the sources are in their assigned locations and are secure.

An enhanced version of the IAEA Regulatory Authority Information System (RAIS) is used. The regional registration centres are using a Microsoft Access application. In the regional registration centres only regional data are available.

Conclusion

The national inventory of sources in Ukraine is near to be complete and the State Register of ionizing Radiation Sources established is fully functional, with qualified, skilled and dedicated staff.

The procedure for state registration of ionizing radiation sources seems to be a reliable source of information for completing and continuous amending the collected data.

4.1.6. Occupational exposure

LEGAL BACKGROUND

The Law of Ukraine “*On Human Protection against Impact of Ionizing Radiation*” sets obligations on legal and natural persons who perform particular activities related to ionizing radiation. These obligations include monitoring, developing standards, taking protective measures, performing control and accounting occupational exposure, perform medical inspection, providing information, etc.

Further formal requirements are set in the Radiation Safety Standards of Ukraine (NRBU-97) and the Main Sanitary Rules of Ukraine (OSPU-2005).

According to the Ministry of Health survey from 2004, individual dose monitoring is needed for approximately 42,000 employees in Ukraine: among them 14,636 Energoatom employees, 9,100 medical staff and personnel of enterprises in the Exclusion Zone, including ChNPP and Shelter, and ca. 16,000 workers dealing with other sources of occupational exposure in industry and research.

The legislative basis for the establishment of a national registry of doses and improvement of the dosimetry service **is in place, but not implemented**.

DOSIMETRY CAPABILITIES

Dosimetry services operating in radiological departments of sanitary-epidemiological stations are currently functional only in 13 regions. Available dosimeters and survey instruments need to be upgraded. In 12 regions the services are absent or non-operational.

The dosimetry services for nuclear power plants are quite well equipped and performing individual dose monitoring for about 23,000 persons - Energoatom employees, medical staff and personnel of enterprises in the Exclusion Zone, including Chernobyl NPP and shelter.

Central personal dosimetry laboratory of medical personnel (Kharkiv) has been operating since 1979 within the Grigoriev Institute of Medical Radiology, performs individual dose monitoring of about 5,500 medical staff of 438 hospitals in 24 regions of Ukraine (all hospitals except Kiev area). The database has been upgraded but the laboratory has no automated readers, all measurements are conducted manually. The resources are limited because the service to hospitals is offered cost-free and to non-medical bodies on the basis of a contract. Current resource constraints mean the laboratory is unable to increase the number of persons monitored.

Dosimetry services in the Kiev area are performed by the very well equipped Scientific Centre of Radiation Medicine of the Academy of Medical Sciences of Ukraine.

The quality of the services offering individual dosimetry in Ukrainian regions is not uniform. The coverage of critical groups varies depending on the region. Available dosimeters and readers in some of the services need to be upgraded. The unification of technical approaches, information bases, analytical systems, independent dose audit, etc., remains very important.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** The BSS § I.32 states that: “*The employer of any worker, as well as self-employed individuals, and the registrants and licensees shall be responsible for arranging for the assessment of the occupational exposure of workers, on the basis of individual monitoring where appropriate, and shall ensure that adequate arrangements be made with appropriate dosimetry services under an adequate quality assurance programme.*” Quality assurance recommendations that apply to dosimetry services are discussed in the related Safety Guides on occupational exposure assessment.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- R6 **Recommendation:** The Government should ensure the methodological unity of dose monitoring in Ukraine as well as the establishment of a national dose registry.

4.1.7. Clearance Regime for Radioactive Waste and Discharge of Radioactive Materials

Introduction

The IAEA Basic Safety Standards (para. 2.17 and Schedule I) stipulate that practices and sources within a practice may be exempted from the requirements of the Standards, if the Regulatory Authority is satisfied that the sources meet the exemption criteria or the exemption levels specified in this Schedule or other exemption levels specified by the Regulatory Authority on the basis of these exemption criteria.

In para. 2.19 of the BSS, it is stated that sources, including substances, materials and objects, within notified or authorized practices may be released from further requirements of the Standards subject to complying with clearance levels approved by the Regulatory Authority. Such clearance levels shall take account of the exemption criteria specified in Schedule I and shall not be higher than the exemption levels specified in Schedule I or defined by the Regulatory Authority on the basis of the criteria specified in Schedule I, unless otherwise approved by the Regulatory.

Findings

In Ukraine there is a set of documents establishing the limits and conditions for the removal of controls from materials containing radionuclides when this is appropriate:

- Section 9 of the “**Norms of Radiation Safety in Ukraine (HPBY-97)**” and in the Section 4 of the “**Norms of Radiation Safety**”;
- Annex “**Radiation protection from potential radiation exposure sources**” (HPBY-97/Д-2000);
- “**Procedure of exemption of radioactive waste and radioactive materials from regulatory control**” (NP 306.3.04/2.002-97), approved by a common Order of the Ministry of Environmental Protection and Radiation Safety and Ministry of Health of Ukraine of 17.11.97 No 183/331”.

The majority of them are not consistent with each other, and those in NP 306.3.04/2002-97 are not consistent with the BSS. Only the term ‘exemption’ is used in the regulations; no distinction is made between ‘exemption’ and ‘clearance’.

It must be noticed that these documents were issued at different times and by different regulatory authorities. Probably this is the reason why the requirements established in these documents are misleading and difficult to understand. For example in NP 306.3.04/2.002-97 it is established that the main dose criteria determining the possibility for exemption of radioactive waste and by-materials from the regulatory control are a) individual equivalent dose for the critical group should not be in excess of 0.05 $\mu\text{Sv/y}$. Nevertheless in the same document it is established in par 1.5 “*The quantity of radioactive waste and by-materials exempted from the regulatory control is limited by the quantitative limit determined based on dose criteria in each specific case*”. In the main time the HPBY-97 in its art 9.4 established that “*Practical activity or sources of ionizing radiation within the practical activity can be exempted by the regulatory authority from the regulatory control without the subsequent consideration (complete exemption) provided they simultaneously meet under all the possible real circumstances the following exemption criteria: (a) annual individual*

effective dose for any individual due to exempted practical activity or source does not exceed 10 μSv per year.. ”

Other provisions for exemption/clearance are not in line with the BSS (e.g. exemption levels from schedule 1: not all levels for total activity comply with those in Schedule I, no levels in Bq/g are specified). The team also noted that another set of exemption values is given in the 2005 National report for the Joint Convention (**Sanitary Rules 6.177-2005-09-02**, item 15.1.6.).

Table B.5.2. Classification of solid radwaste by “exemption level” criterion

Radwaste group	Solid radwaste	Exemption level, kBq.kg ⁻¹
1	Transuranium alpha-emitting radionuclides	0,1
2	Alpha-emitting radionuclides (excluding transuranium)	1
3	Beta-, gamma-emitting radionuclides (excluding those from group 4)	10
4	H-3, C-14, Cl-36, Ca-45, Mn-53, Fe-55, Ni-59, Ni-63, Nb-93m, Tc-99, Cd-109, Cs-135, Pm-147, Sm-151, Tm-171, Tl-204	100

Note: if radwaste contains several radionuclides from one group, their specific activities are summed up.

NP 306.3.04/2002-97 is under revision (enter into force scheduled for the end of 2008): the radiological criteria in the current draft are in line with the BSS; a distinctive term is used for ‘clearance’.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** The BSS § 2.17 – 2.19 states: *Exemption Practices and sources within a practice may be exempted from the requirements of the Standards provided that such sources comply with: (a) the requirements on exemption specified in Schedule I, or (b) any exemption levels defined by the Regulatory Authority on the basis of the exemption criteria specified in Schedule I.*
Exemption shall not be granted for practices deemed not to be justified.
 - (2) **Clearance Sources, including substances, materials and objects, within notified or authorized practices may be released from further requirements of the Standards subject to complying with clearance levels approved by the Regulatory Authority. Such clearance levels shall take account of the exemption criteria specified in Schedule I and shall not be higher than the exemption levels specified in Schedule I or defined by the Regulatory Authority on the basis of the criteria specified in Schedule I, unless otherwise approved by the Regulatory Authority.**
 - (3) **BASIS:** RS-G-1.7 § 2.12 states that “*While exemption is used as part of a process to determine the nature and extent of application of the system of regulatory control, clearance is intended to establish which material under regulatory control can be removed from this control. As with exemption, a clearance may be granted by the regulatory body for the release of material from a practice.*”
- R7 **Recommendation:** It is recommended that the regulatory provisions dealing with exemption and clearance be reviewed and revised, where necessary, to bring them in line with the BSS. RS-G-1.7 (guidance on the application of the concepts of exclusion, exemption and clearance) should also be taken into account.

4.2. REVIEW AND ASSESSMENT

4.2.1. Nuclear Facilities

The *Law on Use of Nuclear Energy and Radiation Safety* **requires a state expert assessment** of all studies, projects for construction, decommissioning, safety assessment documents, and changes to safety requirements and limits related to nuclear installations or radioactive waste management facilities. State expert assessments shall be performed by the respective state authorities.

ORGANIZATION AND RESPONSIBILITIES FOR REVIEW AND ASSESSMENT FOR NPPS

The main activities of review and assessment with respect to NPPs are: review and assessment of design, modifications, general operating rules, fuel management, periodic safety review, ageing management, and operating experience feedback and also the review and assessment of NPP design/construction and manufacturing of pressurized nuclear equipment.

MANAGEMENT OF REVIEW AND ASSESSMENT FOR NPPS

A dedicated department of SNRCU provides the management of review and assessment for NPPs. Separate divisions therein are responsible for review and assessment of safety related to systems, components and lifetime-extension; for Technical Specifications, Emergency Operation Instructions, incident and accident investigation and fire safety; and for wider scope safety analyses such as SAR, PSA, PSR, respectively.

EVENT REPORT EVALUATION

The duties of the utility in case of an incident or accident are defined in detail in the document NP 306.2.100-2004. The NPP is obliged to provide a report within 15 days on root causes and measures to SNRCU, SSTC, Energoatom, WANO, and other Ukrainian NPPs. SSTC will give their evaluation on the report within one week. SNRCU decides whether the NPP report is satisfactory. At each NPP there is a department following the reports and considering whether measures are needed at their plant. SNRCU checks that the incident plant has taken the correct measures and that the other plants have preventive systems against corresponding incidents.

ASSESSMENT REPORTS

SSTC compiles two reports to SNRCU on the review and assessment work requested. One is an extensive and detailed report describing all the details and considerations. The other is a draft for the SNRCU decision on the issue. Based on this SNRCU formulates its decision.

ANNUAL PLANNING

SNRCU compiles annual programs for the three main activities: licensing, inspection, and normative documents. (In addition to the HQ inspection program the site inspectorates at NPPs have their own annual planning programs). The annual activities for the review and assessment function are linked to the licensing program: each licensing case involves safety substantiation material that has to be reviewed and assessed according to the schedule.

MAJOR REVIEW AND ASSESSMENT TASKS FOR NPPs

Safety Analysis Report SAR (including probabilistic safety assessment PSA)

The requirement for a SAR related to the reactor units in operation was raised by the regulator in 1995. It required the limited safety analysis that existed at that time to be complemented by DBA, BDBA, PSA and AMSA (Additional Material on Safety). Requirements for SAR that are related to new reactors (KND 306.302 -96) were compiled from scratch. For the moment a full revision of the Ukrainian SAR requirements is ongoing first of all to include the IAEA recommendations and all the gathered experience. The rules will mainly be applied for new build reactors except the PSA part that will apply for all units.

During 2000-2001 the regulator published five guidelines to establish procedures for expert review of the complementary chapters of SAR. Two of these guidelines (PSA and DBA) are now under revision.

In compiling full SARs Ukraine has adopted the concept of pilot units (c.f. also Chapter 4.1). For the non-pilot units so called adaptation of the pilot SAR is accepted. To consolidate this method the utility has compiled a guidance document which has been reviewed and accepted by SNRCU. In the adaptation process first the differences to the pilot are studied. In case the differences are non-important, the pilot can be used as such. In case some features fully differ from the pilot, a full-scope study is required on those features. When in-between, partial use of the pilot study may be possible.

Currently the full SAR has been compiled for the three pilot reactors and the newly commissioned ones (K2, R4). The analyses have been reviewed and accepted by the regulator except some open PSA comments whose elimination is ongoing. The non-pilot plants still operate based on the complemented original SARs. By the end of 2009 they are obliged to possess a SAR accepted based on the pilot SAR adaptation concept. Also all the measures of the on-going “Concept” safety enhancement program are expected to be included in the SAR. The international assistance programs offer support to the review work of the SARs in general and the PSA part especially.

Risk-informed methods

Ukraine is advanced in developing risk-informed regulation. The rapid progress is based on the US support through their International Nuclear Safety Program (INSP). A joint program for the SNRCU and utility was performed; the US industry has supported the Ukrainian utility and US NRC the Ukrainian regulator. In the regulatory program ten regulatory / methodology guides were identified to be developed, seven documents have been finished by now. In order to proceed SNRCU wish to receive advice and exchange of experience from other regulators as well.

The industrial program led by the US Department of Energy covers expansion and enhancing of plant-specific PSAs and realization of pilot projects on PSA application.

Periodic safety review

According to the respective law as well as to OPB-AS-2007 Periodic Safety Review (PSR) has to be conducted every ten years. The document NP 306.2.099-2004 “*General requirements for NPP’s life-extension beyond original life-time based on the results of Periodic Safety Review*” adopts the 14 safety factors stated essential for PSR in the IAEA safety guide NS-G-2.10 (Periodic Safety Review). The design lifetime of the oldest reactor, Rivne-1, expires in 2010. The first occasion when the PSR concept will be used is lifetime extension. For that purpose a guideline has been prepared by the utility and confirmed by SNRCU. In the near future SNRCU will issue a guideline for more general approach to PSR.

Conclusions

By this moment the principles and the associated criteria for review and assessment have been reasonably well defined in the Ukrainian regulatory framework. The regulatory pyramid may deserve systematization but the parts essential from this point of view are available.

The review and assessment capacity of SNRCU in the NPP safety issues is very thin. In most cases SNRCU has to rely on the TSO or on the international assistance. The minimum requirement on the capacity of the regulator’s own resources is to be able to verify the work done by the support organization / foreign supporters. Even when relying on TSO the regulator should have sufficient basic knowledge to cover each of the main technical areas.

The decision to adopt the pilot unit concept in connection with the main safety analyses for a fleet of nearly identical power units is reasonable. However, attention has to be paid to the conditions of

the concept: the differences need to be carefully identified and the impact of differences duly assessed. Special attention has to be paid to the unit modifications, which lead at least temporary differences.

At the moment the regulatory review and assessment process is partly based on the assistance contributions coming from several external sources. This situation poses a special challenge to the review and assessment function of SNRCU. The contributions from abroad come both in form of requirement and guideline drafts and in form of reviews and assessments of specific analyses. It is a demanding task for SNRCU to digest all the contributions and form of them an own Ukrainian concept, which can be consequently followed in the future work.

SNRCU is facing a period with high challenges as the reactors in operation start to reach the end of the design life-time and the life extension programmes need to be fulfilled. All units are also required to render the SARs on level of the present rules. Large quantities of analysis material will arrive for review and assessment. At the same time the plans for building new reactors get active when the draft energy strategy will be put into operation.

The Ukrainian way to utilize the TSO may contain certain peculiarities but this does not change the fact that the TSO (SSTC) demonstrates strong capacity and knowledge (c.f. the good practice brought up in section 4.1). When considering the starting phase in the 1990's the achievement is considerable.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 §4.4 states that *“the regulatory body’s responsibility for making decisions and recommendations shall not be delegated.”*
- (2) **BASIS:** GS-R-1 §4.6 states that *“The regulatory body shall employ a sufficient number of personnel with the necessary qualifications, experience and expertise to undertake its functions and responsibilities.”*
- (3) **BASIS:** GS-R-1 §4.8 states that *“the regulatory body shall have a full time staff capable of either performing regulatory reviews and assessments, or evaluating any assessments performed for it by consultants.”*

See Suggestion S3 in Chapter 3

- (1) **BASIS:** GS-R-1 §5.10 states that *“The regulatory body shall prepare its own programme of review and assessment of the facilities under scrutiny.”*
- S14 **Suggestion:** SNRCU should consider the enhancement of its review and assessment capacity and programme to ensure the most effective regulatory decisions are made taking into account the advice of its external consultants.
- (1) **BASIS:** GS-R-1 § 4.8 states that: *“In undertaking its own review and assessment of a safety submission presented by the operator, the regulatory body shall not rely solely on any safety assessment performed for it by consultants or on that conducted by the operator. Accordingly, the regulatory body shall have a full time staff capable of either performing regulatory reviews and assessments, or evaluating any assessments performed for it by consultants.”*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (2) **BASIS:** GS-G-1.1 § 3.28 states that *"If a regulatory body or its dedicated support organization does not have an adequate personnel or an adequate diversity of technical skills, or if the workload does not justify the recruitment of full time staff, consultants may be used to perform selected tasks. The technical qualification and experience of such consultants should be at the same level as or greater than those of the staff of the regulatory body who are performing similar tasks."*

S15 **Suggestion:** SNRCU should consider formalizing a process for ensuring that technical support organizations involved in the regulatory review have enough staff with appropriate competencies. This should include explicit understanding of SNRCU safety regulations and requirements and their application during regulatory review, as well as the quality management provisions foreseen for the review process. It is further suggested that SNRCU implements a formal procedure for the periodic evaluation of the competence of staff of technical support organizations involved in regulatory review activities. By this procedure, SNRCU experts would be directly involved in the implementation of the evaluation.

4.2.2. Industrial and Research Practices

SNRCU defines the review and assessment principles and associated criteria on which its judgement and decision are based. These principles and associated criteria are available to the operator of the installations and facilities. Based on these review and assessment principles and associated criteria SNRCU performs its review and assessment of licensee submittals including the modifications in compliance with GS-R-1.

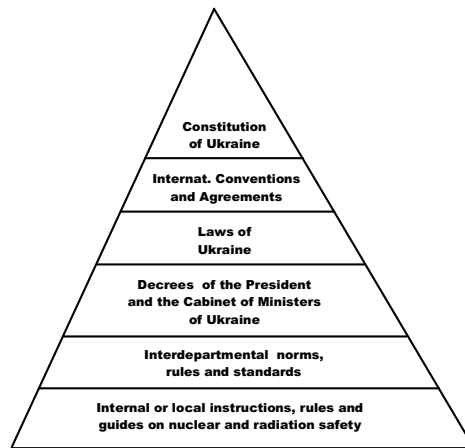
Decree No. 1782 (c.f. section 4.1) states that for production and use of ionizing radiation sources (IRS), the licensee need to have a Safety Analysis Report (SAR) on the required activity. The format and content of SAR is defined in SNRCU Order No. 125. The licensee is also required to submit an annual report on radiation safety to SNRCU as per the format and content defined in SNRCU Order No. 125. The SAR and the annual report on radiation safety are both reviewed by SNRCU before the annual licence is granted.

4.3. DEVELOPMENT OF REGULATIONS AND GUIDES

STRUCTURE OF LEGISLATION

The regulatory pyramid for nuclear safety and radiological protection is described in section 1.2.:

Legislative pyramid for the area of use of nuclear energy and radiation safety



The pyramid above includes for levels of legislative instruments:

- **Level I** - The constitution of Ukraine, the international Conventions and Agreements, and the Laws.
- **Level II** – Decrees of the President and of the Cabinet of Ministers, which complete or develop in more detail, the content of the Laws. Some of these Decrees are proposed by the SNRCU.
- **Level III** - SNRCU Ordinances or Orders (Rules, Norms and Standards) that are accepted and registered by the Minister of Justice. They are mandatory
- **Level IV** - Internal and local instructions, Rules and Guides issued by the SNRCU, being not mandatory.

Ukraine has inherited from the former USSR a prescriptive regulatory system. SNRCU faces the transition from this former prescriptive based regulation to a less prescriptive and more performance-based regulation. In this process the SNRCU is making extensive use of the IAEA Safety Standards and WENRA nuclear Safety reference levels.

RULE-MAKING BY SNRCU

At the State level, SNRCU participates in task force groups to prepare the laws that will be discussed by the parliament. The procedure for development of regulations and guides at SNRCU level is established by an internal SNRCU order and is supported in the “Quality Manual for Rule Making”. The documents are developed either by the SNRCU staff, its technical support organization (State Scientific and Technical Centre on Nuclear and Radiation Safety – SSTC-NRS), other external organizations or a combination of those.

Numbers illustrating the activity: for 2008, SNRCU planned to have reviewed or developed 36 documents, most of them to be done by SNRCU itself. From 1995 to 2006, SSTC-NRS developed or revised 70 documents.

The development of regulations and guides is one of the SNRCU activities which currently requires

a lot of resources and effort. The SNRCU management gives adequate priority to this activity, however, in some cases the priorities for development of particular regulations or guides are not well defined. Identifying the priorities of documents to be developed in each area: nuclear safety, radiation safety and radioactive waste safety may help to enhance the effectiveness of the rule making process in SNRCU.

The number of valid documents is large and duplications are not unlikely. The management of interfaces, the assurance of coherence and implementation seem difficult.

Conclusion

The organization set up by SNRCU for the development of regulations is rigorous, consistent and comprehensive. A large number of laws and regulations are in force.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 5.25 states that *“The system of regulations and guides shall be chosen so as to suit the legal system of the State, and the nature and extent of the facilities and activities to be regulated. Where regulations are not issued by the regulatory body, the legislative and governmental mechanisms shall ensure that such regulations are developed and approved in accordance with appropriate time-scales.”*

S16 **Suggestion:** SNRCU should give consideration to the order of priority when modifying regulatory documents.

4.3.1. Nuclear Facilities

The *“Law on the Use of Nuclear Energy and Radiation Safety”* and the *“General Provision on Nuclear Power Plants Safety”* (OPB AS-2007) are the most important comprehensive legislative documents dealing with the rules and requirements to be respected in the application of nuclear energy and radiation sources. Other documents complete OPB AS-2007 with implementations or explanations. SNRCU issues additional documents related to its regulatory competence in nuclear facilities.

Ukraine plans to build new units in the coming decade and the regulations developed (especially OPB AS-2007) support this objective. At the same time ***compliance of the existing plants to the new regulations is also required*** (e.g. article 2.5 in OPB AS-2007)

OPB AS-2007 contains prescriptions concerning periodic safety reassessment. The document *“General Requirement for life extension of Power Units based on the results of periodic safety reassessment report (PSRR)”* (NP 306-2-099-2004) implements these prescriptions. This document also defines how to utilize operating experience feedback (OEF). The *“Provisions of the procedure to investigate and record violation in the operation of NPP (NP 306-2-100-2004 level)”* explains the OEF method and fixes the threshold of event reporting. A document issued by the Ministry of Energy and Fuel (jointly with NAEK) explains the *“Requirements for the structure and content of periodic safety reassessment report for power units in operation”*. After analysing the PSRR, the identified “upgrading” can require new technical prescriptions. This means that SNRCU can impose additional safety prescriptions to licensees that already hold an authorization thereby increasing the safety level of the installation.

In conclusion Ukrainian legislation comprises the main documents needed to ensure safety of nuclear facilities. SNRCU carries on the development as well as the review of other necessary

documents, some of them inherited from the former USSR regulations.

4.3.2. Industrial Research Practices

SYSTEM OF REGULATIONS AND GUIDES FOR INDUSTRIAL AND RESEARCH PRACTICES

A system of regulations and guides is in place for industrial and research uses of radiation. SNRCU is preparing a draft of an amended version of the Decree No 1782 (c.f. section 4.1). In the domain of medical practices, industry and research, SNRCU is also in the process of issuing a number of guides;

The preparations of these draft regulations and guides are well advanced and once in force, these gaps in the regulatory role of SNRCU will be filled.

GUIDES WITH RESPECT TO INDUSTRIAL AND RESEARCH PRACTICES

A good example of guidance is the guide on “*Approval of Requirements and conditions of safety (licensing conditions) of implementation of activity with use of ionizing radiation sources, SNRCU Order of 22 December 2002 No. 125*”. This order provides detailed guidelines for submission of SAR in the use of ionizing radiation sources and format and content of annual report.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 §5.26 states “*The main purpose of regulations is to establish requirements with which all operators must comply. Such regulations shall provide a framework for more detailed conditions and requirements to be incorporated into individual authorizations.*”
 - (2) **BASIS:** GS-R-1 §5.27 states “*Guides, of a non-mandatory nature, on how to comply with the regulations shall be prepared, as necessary. These guides may also provide information on data and methods to be used in assessing the adequacy of the design and on analyses and documentation to be submitted to the regulatory body by the operator.*”
 - (3) **BASIS:** GS-R-1 §5.28 states “*In developing regulations and guides, the regulatory body shall take into consideration comments from interested parties and feedback of experience. Due account shall also be taken of internationally recognized standards and recommendations, such as IAEA safety standards.*”
- G8 **Good Practice:** Guidelines for submission of the safety analysis report (SAR) for the use of ionizing radiation sources and for the format and content of annual reports are examples of clear and comprehensive documentation that can enhance the safety and security of sources through their application.

4.4. INSPECTION AND ENFORCEMENT

This section considers inspection and enforcement for each of NPPs, medical practices, industrial and research practices and waste facilities, using the requirements of GS-R-1, listed here, as the basis. The text references GS-R-1 as applicable.

4.4.1 Basic Nuclear Installations

The inspection of NPPs is carried out by the SNRCU’s headquarters inspectors located in Kiev and the NPP assigned inspectors located at each of the five NPPs and by Regional SNRCU inspectorates.

The inspection and enforcement program ensures that facilities, equipment, and work performance meet all necessary requirements; that relevant documents and instructions are being complied with; persons employed by the operator are appropriately trained and qualified; non-compliances with operating authorizations are complied with within a reasonable time frame; lessons learned are identified and propagated to the regulatory body; and the operator is managing safety in a proper and responsible manner.

The basic regulatory framework for the inspection of NPPs is contained in Articles 22 and 25, “Nuclear Energy Law”; and SNRCU procedure (No.141 of 18 November 2003) titled, “Procedure for State Safety Supervision on Observance of Nuclear and Radiation Safety Requirements in Nuclear Energy Use”.

These inspection activities are undertaken in order to ensure compliance with the laws of Ukraine and the requirements of SNRCU such that there is assurance of safe operations of NPPs in Ukraine.

SNRCU is currently authorized 74 positions in the area of regulating the NPPs. 39 positions are in the Kiev headquarters office and 35 are stationed at the NPPs; there are 36 positions in headquarter which provide support for regulatory oversight activities for NPP and other facilities. The SNRCU regional inspectorates provide support at the NPPs on the management of radioactive sources.

The five Ukrainian NPPs are each staffed with 7 SNRCU inspectors. The current practice within SNRCU is that the NPP assigned inspectors are hired to perform their duties at a specific NPP, and continue to work at that same facility until they eventually retire or leave SNRCU for other employment. This practice of an inspector remaining at a specific NPP for long periods of time creates the potential for an erosion of the inspector’s objectivity for making unbiased and fully independent assessments of licensee performance. In order for inspector objectivity to remain strong, the NPP assigned inspector would benefit from time inspecting other NPPs and interacting with SNRCU inspectors at other NPPs and at the Kiev Headquarters office.

The current approach within SNRCU is that the NPP assigned inspectors are hired at mid-career and the vast majority (essentially all) of these inspectors are hired from the NPP operator. Following employment, these inspectors undergo a training program consisting of 8 - 24 weeks, which most is on-the-job training with minimal focus on providing these new inspectors a perspective of impartially judging the safety of facilities and activities from the regulatory body’s perspective. In addition, no formal technical training is performed and the extent of the remaining formal training consists of approximately 15 hours over 3 days of seminar-type discussion on various regulatory topics. Additional training in this area would strengthen new inspector’s perspective on the role of the regulatory body and the relationship between the SNRCU and the operator.

Of the positions in the headquarters office, 65 are designated state inspectors and all 35 of those stationed at the NPPs are state inspectors. SNCRU generally has little trouble staffing the inspector positions at the NPPs (nearly all are currently staffed); primarily because of the initiative of the Ukrainian government to pass legislation to ensure that the NPP assigned inspectors are compensated at a similar level (i.e.: Deputy Chief Engineer at the NPP is paid equivalent to the Head of the NPP assigned inspector) as those of the state-owned operators, Energoatom. While this compensation plan has been effective at staffing the NPP assigned inspectors, an unintended consequence is that pay for the headquarters office inspectors is lower than that of the NPP assigned inspectors and vacancies have developed. Current staffing of the inspectors in the headquarters office is approximately 60% of the authorized positions and there is a relatively high turnover rate of headquarters-assigned inspectors.

The basic regulatory framework for the enforcement of non-compliance with inspection of NPPs is contained in Articles 25 and 81 of the Nuclear Energy Law. That legislation is amplified by an order issued by the SNRCU (No.141 of 18 November 2003) titled, “Procedure for State Supervision

on Observation of Nuclear and Radiation Safety Requirements in Nuclear Energy Use”. This law clearly identifies that the licensee is fully responsible for radiation protection and the safety of a nuclear installation, and suppliers and products to the operator. In addition, SNRCU utilizes several technical support organizations, including the State Centre for Quality Regulation of Supplies and Services (CERATOM), which assesses vendor’s abilities to perform support and products to the operator.

In addition to CERATOM, SNRCU utilizes the State Scientific and Technical Centre for Nuclear and Radiation Safety (SSTC NRS) as a technical support organization to provide the regulatory body with scientific and technical support in the area of safety analysis and assessment of NPPs.

Visit to the South Ukraine NPP

The NPP assigned inspectors were all very experienced with a long background of working at the South Ukraine NPP. There is one inspector vacancy currently at the NPP. All inspectors have their dedicated special inspection areas, but based on their broad and deep experience, they are also able to substitute for each other in a wide extent. During the inspection activity observed, the inspector behaved in a very professional manner, was well prepared for the inspection activity and was very knowledgeable in the inspected area. The IRRS team members observed that the inspectors were highly respected by the NPP personnel and that a very appropriate and professional atmosphere existed between the operator’s staff and the inspectors. The inspectors have access to all the information in the NPP computer system and use that access often in their inspection duties. The chief inspector participates in daily telephone conferences conducted amongst the plant management. In addition the chief inspector meets with the Chief Engineer several times per week to discuss current NPP issues.

The inspectors have very close contacts with the Headquarters. The chief inspector at South Ukraine communicates twice a day (in the morning and in the evening) via telephone conversation with the Chief State Inspector in Kiev.

INSPECTION

SNRCU has implemented a planned and systematic inspection program for NPPs. The plan is implemented by the development of the annual inspection plan that is a document established to account for a year’s worth of inspection activities. Discussions amongst the SNRCU staff late in the calendar year at the annual SNRCU Board Meeting, culminates in a plan that lays out the detailed schedule of inspection for the next inspection year. This plan is compiled for all NPPs and is reviewed and approved by the Deputy Chairperson of the SNRCU, who is also the Chief State Inspector on nuclear and radiation safety in Ukraine. In addition to this planning and implementation document, monthly status and tracking documents are developed to reflect the actual completion [or rescheduling or cancellation] of planned inspection activities. This monthly report is also reviewed and approved by the Deputy Chairperson of the SNRCU. The IRRS team was able to review the annual inspection plan for all NPPs, as well as review the latest monthly status and tracking documents.

While the majority of the inspection activities performed by SNRCU inspectors are announced inspections, the inspection program does provide for the option of conducting unannounced inspections. The Procedure for State Supervision on Observation of Nuclear and Radiation Safety Requirements in Nuclear Energy Use, clearly indicates that announced inspections are carried out according to the annual inspection plan as discussed in section ***GS-R-1-1 §5.14***. Within the scope of planned inspections, SNRCU inspectors perform the following types of inspection:

- **Comprehensive inspections:** The inspections are performed regularly in order to confirm compliance with regulatory and safety requirements by the operator. These inspections are

mainly performed by teams consisting of state inspectors from the SNRCU headquarters office.

- **Target inspections:** The inspections are performed regularly with a specified periodicity that provides for detailed analysis of one of a few issues (areas) of safety assurance and/or Licensee activity.
- **On-line inspections:** The inspections are performed primarily by the NPP assigned inspectors and perform detailed analyses of site-specific issues. These inspections are conducted routinely and many on a daily basis.

The following represents an unannounced inspection used by SNRCU:

- **Ad Hoc/Special inspection:** The inspections are performed to respond to an event at a NPP, where it is necessary to gather information and verify that the NPP continues safe operation, or remains in a safe shutdown condition. These inspections are meant to review and understand the causes of the event. The IRRS team was unable to identify any guidance procedures on decision-making criteria for consistent initiation of these Ad Hoc inspections.

During the performance of both announced and unannounced inspection, the Procedure for State Supervision on Observation of Nuclear and Radiation Safety Requirements in Nuclear Energy Use, clearly provides guidance on the use of consultants (in the case of SNRCU, technical consultants, when determined to be needed, are requested from other regulatory bodies and organizations such as SSTC NRS or CERATOM).

The results of inspection findings are communicated with the operator at the conclusion of the inspection activity in an exit meeting. This exit meeting includes the operator's staff whose areas were inspected, as well as the plant manager for the NPP. Discussions are held on the findings and any immediate corrective actions that are considered necessary by the inspectors. If immediate corrective actions are prescribed by the inspectors, in order to bring the NPP back into compliance, the plant manager for the NPP must acknowledge that these actions will be promptly taken. Notwithstanding whether the operator agrees or disagrees with the finding, the prescribed corrective actions must be completed. An operator, who disagrees with the finding, may appeal to the Chief State Inspector, who will decide the matter. If the Chief State Inspector sustains the finding, the operator may request a hearing. A written report is drafted and provided to the operators not more than two weeks following the completion of the inspection.

SNRCU performs periodic reviews of inspection findings to determine if certain negative performance trends are developing at a specific NPP or organization-wide throughout all the operator's NPPs. A database for recording findings is used; however, there is not wide and easy access to this database and the NPP assigned inspectors do not have access. While not having access to the finding data, events and significant issues are routinely shared with all the NPP assigned inspectors for follow-up and review. Additionally, during the annual SNRCU Board Meeting, inputs from inspection findings are received from staff, discussions are undertaken on necessary inspection focuses in the coming year, and decisions made on the inspection plan.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 4.6 states that *“The regulatory body shall employ a sufficient number of personnel with the necessary qualifications, experience and expertise to undertake its functions and responsibilities.... The regulatory body shall acquire and maintain the competence to judge, on an overall basis, the safety of facilities and activities and to make the necessary decisions.”*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- G9 **Good Practice:** The Legislature’s initiative (Article 25 of Law of Ukraine “On the Use of Nuclear Energy and Radiation Safety,” 1995) to provide inspectors assigned to NPPs with compensation competitive with or equal to the compensation paid to the staff of the NPP has resulted in higher retention rates and more experienced SNRCU inspectors available to perform high quality inspections.
- S17 **Suggestion:** SNRCU should consider developing a programme to optimize the objectivity of NPP inspectors to ensure continuing unbiased and fully independent assessments of the operator’s safety performance.
- S18 **Suggestion:** SNRCU should consider actions to balance the compensation of inspectors assigned to headquarters with that of inspectors assigned to NPPs, in order to attract and retain high quality inspectors for assignment to headquarters.
- (1) **BASIS:** GS-R-1 § 4.7 states that *“In order to ensure that the proper skills are acquired and that adequate levels of competence are achieved and maintained, the regulatory body shall ensure that its staff members participate in well defined training programmes. This training should ensure that staff are aware of technological developments and new safety principles and concepts.”*
- S19 **Suggestion:** SNRCU should consider enhancing its existing training programme for newly hired inspectors with extensive utility experience to include instruction, guidance and coaching to provide insights for the inspectors on the SNRCU’s role as a regulator at a level that ensures sufficient preparedness for serving as an effective inspector.
- (1) **BASIS:** GS-R-1 § 5.14 states that *“The regulatory body shall establish a planned and systematic inspection programme. The extent to which inspection is performed in the regulatory process will depend on the potential magnitude and nature of the hazard associated with the facility ore activity.”*
- (2) **BASIS:** GS-R-1 § 5.16 states that *“In addition to routine inspection activities, the regulatory body shall carry out inspections at short notice if an abnormal occurrence warrants immediate investigation. Such regulatory inspections shall not diminish the responsibility of the operator to investigate any such occurrence immediately.”*
- R8 **Recommendation:** SNRCU’s current regulations do not provide guidance on the criteria used for initiating an ‘ad hoc’ or short notice inspection after being made aware of an abnormal occurrence that warrants immediate investigation. SNRCU should supply criteria for this decision-making procedure so that such short notice inspections may be initiated in a consistent and repeatable manner.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 5.13 states that *“The main purposes of regulatory inspection and enforcement are to ensure that:*
- (1) facilities, equipment and work performance meet all necessary requirements;*
 - (2) relevant documents and instructions are valid and are being complied with;*
 - (3) persons employed by the operator (including contractors) possess the necessary competence for the effective performance of their functions;*
 - (4) deficiencies and deviations are identified and are corrected or justified without undue delay;*
 - (5) any lessons learned are identified and propagated to other operators and suppliers and to the regulatory body as appropriate; and*
 - (6) the operator is managing safety in a proper manner.*
- Regulatory inspections shall not diminish the operator’s prime responsibility for safety or substitute for the control, supervision and verification activities that the operator must carry out.*
- S20 **Suggestion:** SNRCU should consider improving access for all inspectors to the database system for the tracking and trending of inspection findings and should make it available for use as a trending tool for individual NPPs and for assisting in inspection planning.

ENFORCEMENT

The SNRCU has the authority to take enforcement actions against the operator as a result of identifying violations of requirements. The basic legislation for taking action is contained in Article 25 of the Law of Ukraine, “On Nuclear Power Use and Radiation Safety”. More specific guidance is contained in Section 6 of SNRCU regulation, “Procedure for State Safety Supervision on Observance of Nuclear and Radiation Safety Requirements in Nuclear Energy Use”. Within its regulatory function, SNRCU has the authority to issue enforcement actions that are designed to require the operator to respond to the non-compliances in an immediate manner, where immediate compliance is necessary to assure safety. These include the consent to the use of prescriptive corrective actions that necessitate the operator act within a short time in order to restore compliance. Prescriptive corrective actions are issued by inspectors during the actual inspection process. For enforcement actions that do not require the prescriptive immediacy, SNRCU utilizes limiting; suspending, or terminating operation of the NPP or work connected with the use of the NPP through the revoking or partial revoking of the facility’s authorization, impose fines on the individuals responsible for the violations. Historically, this latter sanction has demonstrated limited success, and SNRCU should consider whether the use of individual sanctions by the issuance of fines represents the most effective manner to lead to improvements in safety performance. Further, the practice of issuing individual fines has the potential to dissuade NPP staff from bringing forth safety issues and from raising safety concerns.

Following the identification of the violation or non-compliance, informing the operator at the inspection exit meeting, and documenting in the written inspection report, the operator is required by SNRCU NP 306.2.01/1.81-2003 to correct the violation, perform an analysis of the cause of the violation, and take action to preclude recurrence. This information is required to be submitted in writing to SNRCU. In addition, SNRCU performs a follow-up analysis into the quality of the operators’ action to respond to the violation.

Once SNRCU inspectors have determined that a violation of requirements has occurred, regardless of the issue's safety significance, the operator is informed and the issue is documented in the inspection report. Based on SNRCU guidance contained in SNRCU NP 306.2.01/1.81-2003, all violations are reported to the operator. Only the enforcement sanction and the period of time that the operator is permitted to correct the violation are subjects that are open for consideration.

Under Article 25 of the Law of Ukraine, "On Nuclear Power Use and Radiation Safety", SNRCU has the authority to restrict, suspend or terminate the operations of operators in the event of a violation of nuclear and radiation safety. Further, "Procedure for State Safety Supervision on Observance of Nuclear and Radiation Safety Requirements in Nuclear Energy Use", provides that, in part, SNRCU has the authority to direct operators to eliminate violations in the use of nuclear energy and ensure that safety requirements are met such that an adequate level of safety is attained. In the same manner, for those violations that persist without correction or for those violations that constitute an extremely serious non-compliance or safety matter, "Procedure for State Safety Supervision on Observance of Nuclear and Radiation Safety Requirements in Nuclear Energy Use", provides for suspensions or revocations of the authorization, limiting of the operation of the NPP, and directing the operator to correct the violation and any unsafe condition.

All SNRCU inspectors have the authority to take on the spot enforcement actions. This is accomplished by the inspectors' use of a prescription, or inspector directed steps that are necessary for the operator to take in response to an identified violation of SNRCU requirements.

Article 25 of the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety," 1995, provides the authorization for SNRCU to issue sanctions against the operator as a method of enforcement for violations of safety requirements, which includes fining individuals. This sanction is currently being used by SNRCU.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 5.18 states that "*Enforcement actions are designed to respond to non-compliance with specified conditions and requirements. The action shall be commensurate with the seriousness of the non-compliance.*"
 - (2) **BASIS:** GS-G-1.3 § 5.13 states that "*The regulatory body should have the authority to impose or recommend penalties, such as fines on the operator as a corporate body or on individuals, or to institute prosecution through the legal process, depending upon the legal system and authorization practices in the State concerned. The use of penalties is usually reserved for serious violations, for repeated violations of a less serious nature or for deliberate and wilful non-compliance. Experience in some States shows that imposing penalties on the organization rather than on individuals is preferable and is more likely to lead to improvements in safety performance.*"
- R9 **Recommendation:** The Government should, at the earliest opportunity, take steps to reconsider substituting sanctions against individuals with sanctions against legal entities. The policy of fining individuals may discourage the staff of nuclear facilities from reporting on deficiencies related to safety.

4.4.2. Radiation Facilities – Industrial and Medical Practices, Radiation Protection and Dosimetry Services

4.4.2.1. Industrial and Research Practices

This section considers inspection and enforcement for medical practices, industrial and research practices and waste management facilities, using the requirements of GS-R-1, listed here, as the basis. The text references GS-R-1 as applicable.

Scope of inspection and enforcement for industrial and research practices

SNRCU Order No. 141 of 18 November 2003 “Procedure for state supervision on observation on nuclear and radiation safety requirements in nuclear energy use” clearly defines the scope of inspection and enforcement for industrial and research practices. As a result of documentation seen, discussions held with personnel of the SNRCU and participation as an observer in one regulatory inspection¹, the IRRS team concluded that SNRCU complies with this section of GS-R-1. The purpose of inspection is to verify the compliance with requirement and licensing conditions in all phases of the installations and facilities.

The conduct of inspections of industrial and research practices

Inspection is the responsibility of SNRCU and its territorial bodies. Clear and unambiguous principles have been laid down in SNRCU Order No. 141. The SNRCU and all its territorial bodies complied with this section of GS-R-1. Inspection and enforcement activities verify and ensure compliance with all requirements.

The inspectors inform the operator's counterpart at the end of the inspection of any identified good practices and corrections required for detected deficiencies and deviations. After the inspection a follow-up letter is sent setting out generally a time period of one month is given within which the licensee must respond with a proposed corrective action plan for the items of non-compliance. For urgent issues of non-compliance, SNRCU requests immediate action, plus post-inspection verification at the site (*NP 306.5.101-2004 “Inspection Program of Enterprises, Institution and Organization Dealing with Ionizing Radiation”*).

Lessons learned are disseminated inside SNRCU and to operators by means of the internet, e-mails and letters. The prime responsibility for safety of the operator is not diminished by the regulatory inspections carried out by the SNRCU.

The inspection programme for industrial and research practices

Annual plan of inspection are prepared and inspections are conducted accordingly. The IRRS team found that SNRCU complied with this requirement.

Types of inspections of industrial and research practices

The IRRS team found that SNRCU complied with these requirements.

SNRCU performs both scheduled and unscheduled inspections. Scheduled inspections can be comprehensive, target and on-line. Comprehensive inspections are carried out to establish compliance of licensee’s activity with safety requirements. Target inspections are carried out regularly with specified periodicity and provide detailed analysis of one of few issues (areas) of safety assurance and/or licensee’s activity. On-line inspections provides for detailed analysis of specific issues on safety assurance directly at work places. SNRCU also performs special inspections in the event of violation of safety requirement. However, it was informed by SNRCU that current legislation do not allow them to perform inspections without announcing in advance,

¹ Participated in inspection of a radiotherapy department of a large medical facility in Kharkiv.

which is a major departure from GR-R-1 § 5.16 but during discussions with the inspectors in Kharkiv, it was informed that unannounced inspections can be conducted as well based on article 25 of Law “On Authorization Activity of Nuclear Energy Use”. It seems that this article of law is still not completely understood by inspectors at headquarters level.

Depending on the complexity of inspection, experts of SNRCU and its territorial bodies can engage experts from SSTC NRS, SQC and other regulatory bodies and technical support organization as well as independent experts for comprehensive, target and unscheduled inspections but regulatory responsibility is maintained by SNRCU.

Reports of inspections of industrial and research practices

The IRRS team found that these regional inspectorates of SNRCU complied with these requirements.

Enforcement actions with respect to non-compliance in industrial and research practices

As noted above, after the inspection the SNRCU sends a follow-up letter setting out a time period which is generally of one month, within which the licensee must respond with a proposed corrective action plan for the items of non-compliance. For urgent issues of non-compliance, the SNRCU requests immediate action.

All inspectors are authorized to use enforcements to physical persons. In cases when on the spot enforcement authority is not granted to individual inspectors, they inform SNRCU with all information and proposals to take necessary measures.

There is written guidance (“*Methodological Recommendations for Administrative Delinquency Cases in Nuclear and radiation Safety*”), however a more detailed guide or procedure for inspectors detailing how to proceed accordingly in case of serious violation is necessary.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1) **BASIS:** GS-R-1 §5.24, “*Where on the spot enforcement authority is not granted to individual inspectors, the transmission of information to the regulatory body shall be suited to the urgency of the situation so that necessary actions are taken in a timely manner; information shall be transmitted immediately if the inspectors judge that the health and safety of workers or the public are at risk, or the environment is endangered.*”

R10 **Recommendation:** SNRCU should prepare more detailed guidance or procedures for enforcement (e.g.: stop work, limiting actions) to radiation safety inspectors establishing in writing how they must proceed.

4.4.2.2. Medical Practices

Legislation

- Law of Ukraine “On Authorization Activity in the field of Nuclear Energy Use”
- Law of Ukraine “On Human Protection against Impact of Ionizing Radiation” 1998
- Order of the State Nuclear Regulatory Committee of Ukraine No.141 of 18 November 2003 Procedure for State Supervision on Observation of Nuclear and Radiation Safety Requirements in Nuclear Energy Use
- Cabinet of Ministry of Ukraine Resolution “Procedure for Licensing Certain Activities in Nuclear Power Use” No.1782 dated 6 December 2000

- Radiation Safety Standards of Ukraine (NRBU-97)
- Main Sanitary Rules of Ukraine on ensuring radiation safety (OSPU-2005)
- Technical standards (listed in SNCRU internal documents NP 306.7.01/1.087-04 and NP 306.5.101-2004, very old)

Findings

SNRCU and the 8 independent SNRCU State Regional Nuclear and Radiation Safety Inspectorates carry out control over compliance with licensing conditions through inspections and radiation safety document analysis, submitted by the licensee; verify completeness and adequacy of operating organization applications carry out their assessment and appropriate inspection surveys of applicants.

Pre-licensing inspections

The state review procedure prior to issuing licenses and permissions for certain activities is determined by article 12 of the Law of Ukraine “On Authorization Activity in the field of Nuclear Energy Use” and article 9 of the Cabinet of Ministry of Ukraine Resolution “Procedure for Licensing Certain Activities in Nuclear Power Use” No.1782. Examination of completeness and authenticity of the documents submitted with application for licence is fulfilled by carrying out the appropriate state review of these documents and inspection survey of the applicant.

Follow-up inspections

According to article 34 of the Cabinet of Ministry of Ukraine Resolution No. 1782 SNCRU implements the control of observance of the licence conditions by implementation of the inspections and analysis of the state of nuclear and radiation safety according to the reports submitted by a licensee. The procedure for state supervision on Observation of Nuclear and Radiation Safety Requirements in Nuclear Energy Use Order of the State Nuclear Regulatory Committee of Ukraine No.141

Inspections are conducted in accordance with an approved annual plan of supervisory activity for the subsequent calendar year. Amendments and additions into annual and monthly plans of supervisory activity are entered according to internal procedures of SNRCU. In the case of a complex inspection with large scope of work to be performed it is possible to contract a consultant – expert from the State Scientific and Technical Centre of Nuclear and Radiation Safety or from the State Quality Centre for Supplies and Services. SNRCU has developed detailed internal procedures and methodology for inspections (NP 306.5.101-2004, NP 306.2.01/1.81-2003). In the list of reference documents of the methodological document NP 306.5.101-2004 five very old technical standards issued in former USSR are included.

According to the Order of the State Nuclear Regulatory Committee of Ukraine No.141 inspections are scheduled – depending on the scope comprehensive, targeted or on-line or unscheduled - ad-hoc and special, all these inspections are announced. In cases of substantive violations of radiation protection and safety requirements, ad hoc follow-up inspections are made to determine that corrective actions have been taken and are adequate. The licensee’s corrective actions in response to the enforcement action are carefully checked by the SNRCU staff.

Unannounced inspections aimed to inspect the facility operating under its normal working conditions can be conducted as well. Based on article 25 of the Law of Ukraine “On Authorization Activity in the field of Nuclear Energy Use” state inspectors have the right to visit enterprises, institutions and organizations, regardless of their form of ownership, without hindrance and at any time, to check compliance with legislation in the use of nuclear energy, and to obtain the necessary explanations, material or information on the posed questions from the licensee or owner. Most of

the inspections are announced but the team was informed that unannounced inspections were conducted because of the necessity to supervise industrial radiography workers in field conditions.

In planning the annual inspection program, consideration is given to particular identified needs. This may be for example from feedback from previous inspection program, or advice received from the State Regional Nuclear and Radiation Safety Inspectorates. The inspection findings are communicated to the user.

Findings (review)

The team had the possibility to observe an inspection in the radiotherapy department of the Grigoriev institute of medical radiology in Kharkiv. The inspection was conducted by the local inspector from the State Regional Nuclear and Radiation Safety Inspectorate and supervised by the inspector from SNRCU. The inspecting procedure was fully according to the legislation requirements and the approved internal guidance of SNRCU.

It should be mentioned that during the inspection it was observed, that adequate infrastructural arrangements were made for physical protection of the radiotherapy sources in the radiotherapy department inspected.

Conclusion (closing remarks)

SNRCU has established an effectively functioning inspection programme. The inspections in medical facilities except the high activity sources, are in the preparatory stage. Based on the fact that the Ministry of Health is an executive body regulating in the framework of the State Sanitary and Epidemiological Supervision radiation safety, the inspection activities of both bodies must in the future result in overlapping and probably in potential contradiction.

4.4.3. Decommissioning, and Waste Management

Visit to the Eastern State Inspectorate at Kharkiv

The IRRS team visited the Eastern State Regional Inspectorate on June 16-17, 2008. The regional State inspectorates were established by enactment of Cabinet of Ministers of 7 June 7, 2006.

Since April 1, 2008, the regional inspectorates have become independent legal persons decision of the board of SNRCU, 14 February 2008). It is scheduled to revise the quality manual on inspection accordingly by December 2008.

The Eastern regional inspectorates cover the regions of Kharkiv (3 million inhabitants), Poltava (1.2 million inhabitants) and Sumy (1.7 inhabitants). 695 companies use ionizing radiation sources: 520 medical institutions, 175 non medical institutions.

The Eastern regional inspectorate is structured as follows:

- head (1 individual);
- radiation safety (8 inspectors);
- radioactive waste and transport safety (3 inspectors); and
- accounting, staffing and monitoring (2 inspectors).

The inspection was a scheduled one (according to the annual inspection plan) performed jointly by regional and headquarters inspectors. The operators are notified in advance of such inspections. It must be noticed that article 25 of the law on the use of nuclear energy and radiation safety allows the inspectors “to visit enterprises, institutions and organizations, without hindrance and at any time, to check compliance with legislation in the use of nuclear energy...”. Such unannounced inspections give the inspectors the opportunity to see the facility under its usual, normal working conditions.

During the inspections, the inspectors verify compliance with the regulations and the licensing conditions. The frequency of the inspections depends on the hazards and risks involved.

The inspectors perform also inspections dealing with transport of radioactive materials and safeguards, although the licensing of transport activities is the responsibility of a department that is supervised by another deputy chairperson.

The inspectors are involved in the licensing of facilities: they review the application and propose their conclusions to the licensing commission (meets every two weeks in Kiev).

Inspection reports may give rise to a review/revision of the licensing conditions.

Issues:

- NORM-waste from oil and gas industry: not within the scope of the Joint Convention; limited storage capacity at RADON;
- recovery of sources from bankrupt enterprises (financial aspects, storage capacity).

Visit to the RADON facilities in Kharkiv

The enterprise operates two facilities, each at about 25 km from the centre of Kharkiv: one for decontamination activities, the other for storage of radioactive waste. The facilities were built in the beginning of the 1960's. The enterprise employs 64 persons. It is financed by the State budget.

The head of the radiation protection service accompanied the inspectors. The inspection was performed following a check list (according to NP 306.5.04/2.060-2002).

Optimization of protection: reference level for workers is set at 4 mSv/y. SNRCU would like to review this level and to justify the conclusion to change it or not to change it. Average dose in 2007 was 1.3 mSv, the maximum dose was 1.8 mSv. Data on dosimetry are mentioned in the annual report. The dosimeters are analysed in RADON headquarters in Kiev every three months.

Decontamination facility

Visit of the laundry and laboratory (analysis of samples): there is no physical barrier between the controlled area and the non-controlled area. Protective clothes and active dosimeters were available for the inspectors and the visitors.

The results of the analyses of samples are kept in a register (for 50 years).

Verification of compliance of release limit (20 Bq/l for I-131): no anomalies noticed.

Inspection of the quality management system: all processes have been described; internal orders are established according to a defined plan); job description of the head of the radiation protection service was available; the results of an internal audit were reviewed and the inspectors would like to have the corrective measures implemented more rapidly.

Storage facility

The storage facility is located in a desolate area: no people living within a distance of 1 km. Monitoring takes place within a distance of 5 km; the results are made available to the public.

Comments were made on the marking and labelling of the containers.

Physical protection: control of access at two gates; control for radioactivity at the exit of the site. Guards are in place 24/24 hrs. Storage tanks that are not in use are sealed. Transport routes are restricted information.

Conclusions

The inspections are well prepared in advance, in accordance with the SNRCU regulations. The inspectors are also seen as persons who can give guidance to the operator on how to comply with

the regulations. The inspections also allowed seeing how the regulations are applied by the facility operators (annual reports, internal order).

In order to better follow-up the compliance with the dose limits, the SNRCU might consider requesting the operator of RADON to increase the frequency of reading the dosimeters.

5. TRANSPORT OF RADIOACTIVE MATERIAL

In this section the specific terms are used as defined in the IAEA Safety Standard; “*Regulations for the Safe Transport of Radioactive Material*” (TS-R-1) 2005.

5.1. GENERAL

The transport of radioactive material (RAM) in Ukraine includes fissile and non-fissile material, of low and high activity, shipped in packages ranging through excepted packages to type B(M) packages.

Modes of transport used include road, rail, sea, air and inland waterways. To date there have been no shipments of RAM by post.

Accepted packages, Industrial packages of Types 1, 2 and 3 (IP-1, IP-2, and IP-3) and type A packages are produced in Ukraine. Types IP-1, IP-2, IP-3 and A packages are approved by SNRCU.

A single lot of type B(U) packages has been produced in three modifications. SNCRU approves the design of these packages during the process of their preparation.

The transport of non-fissile RAM is related to the following practices:

- Industry (radiography, radioactive sources for level meters, level alarms, thickness meters, density meters, humidity meters, radioisotope scales and static electricity neutralizers, Uranium ores and concentrates of such ores);
- Medicine (gamma therapy, diagnostics and nuclear medicine);
- Science and education (research with sources of ionizing radiation by means of sealed and open radioactive sources).

Excepted packages are in use mainly for shipments of samples from the Chernobyl area, types IP-1, IP-2, IP-3 and A packages are used for shipments of low specific activity material (LSA), Surface contaminated objects (SCO), special form radioactive material (sealed sources) and radioactive waste.

The transport of fissile RAM is connected to:

- Nuclear power plants: two nuclear power units, type WWER-440 and 13 nuclear power units, type WWER-1000 (Zaporizhzhya, South-Ukraine, Khmelnytsky, Rivne);
- Chernobyl power plant (three units under decommissioning);
- Two research nuclear reactors (type WWR-M, 10 MW and type DR-100, 200 kW).

Fresh fuel is shipped in Russian packages:

- TK-C4, - for the WWER-440 reactors and
- TK-C5, for WWER-1000 reactors.

Fresh fuel is imported from Russia or transits through Ukraine en route from Russia to Hungary, Slovakia and Bulgaria.

Spent fuel is shipped in Russian type B(U)F, packages (casks):

- TUK-13B and TUK-13/1B, for WWER-1000 reactors and;
- TUK-6, for WWER-440 reactors.

Spent fuel is exported to Russia or transits through Ukraine from Bulgaria to Russia. In 2007 spent fuel was transited through Ukraine to Russia from the research reactor in the Czech Republic.

The transport of nuclear fuel related to Ukraine nuclear research reactors has not been carried out in the last 10 years. At the end of 2008 there is expected to be a transport of fresh fuel from Russia to the WWR-M research nuclear reactor.

Various transports were and will be connected to waste management from nuclear installations as well as waste from other activities involving RAM.

In the last 10 years no accidents or other abnormal events have occurred during the transport of RAM within the territory of Ukraine.

5.2. LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES

Extensive Ukraine legislation regulating transport of RAM, is in force. It defines the responsibilities of the legislative and governmental bodies. A further development of legislation with regard to the safe transport of RAM is in progress, especially to meet the conditions of international agreements ratified by Ukraine and the requirements of the IAEA Safety Standards.

Responsibilities for the transport of RAM are shared by various governmental bodies: the Parliament of Ukraine, the Cabinet of Ministers of Ukraine, SNRCU and other government bodies in accordance with their competencies specified by the legislation.

1. Parliament has adopted the following laws and international agreements related to the transport of RAM:

- On use of nuclear energy and radiation safety;
- On permitted activity in the area of nuclear energy use;
- On transport of dangerous loads;
- On civil responsibility for nuclear damage and financial provisions;
- On state control of the international transfer of military and dual-use goods;
- On accession to the Vienna Convention on civil liability for nuclear damage;
- Convention on the physical protection of nuclear material;
- Agreement between the Government of the Republic of Bulgaria, the Government of the Russian Federation and the Cabinet of Ministers of Ukraine on the transport of nuclear materials between the Russian Federation and Republic of Bulgaria on the territory of Ukraine (2006).

The Law on use of nuclear energy and radiation safety is the main law in the field of nuclear energy and radiation safety, including the safe transport of RAM. Articles 17 and 18 define respectively the competence of the Parliament and of the Cabinet of Ministers of Ukraine in the field of the use of nuclear energy and radiation safety, including the safe transport of RAM.

2. The Cabinet of Ministers of Ukraine adopted the following Decrees related to the safe transport of RAM:

- of 27.12.2006 N 1830 « On approval of Statute of State Regulatory Committee of Ukraine»;
- of 6.12. 2000 N 1782 «On approval of Procedure on licensing of separate types of activity in the area of nuclear energy use»;
- of 6.12.2001 N 440 «On approval of Procedure on vindication and amount of paying for realization of permit procedures in the area of nuclear energy use»;

- of 15.10.2004 № 1373 "On approval of Statute on the Procedure of transport of radioactive materials on the territory of Ukraine";
- of 28.01.2004 №86 "On approval of Procedure on the state control on the international transfer of the dual-use goods»;
- of October, 3, 2007 № 1196 «Some questions of transport of radioactive materials» - the decree establish the procedure in force for granting permits for the international transport of RAM;
- of April, 26, 2003 N 625 "On approval of Procedure on determination of physical protection level of nuclear installations, nuclear materials, radioactive wastes, other ionizing radiation sources in accordance with their category";
- of December, 25, 1997 N 1471 "On approval of Procedure on special verification to obtain a clearance for the physical persons to execute the special works on nuclear installations, nuclear materials, radioactive wastes and other ionizing radiation sources"
- of June, 1, 2002 N 733 "On approval of Procedure and rules of conducting of obligatory insurance of responsibility of subjects of transport of dangerous goods in case of offensive of negative consequences during transport of dangerous goods".

The SNRCU is empowered through legislation (article 23 of the Law on the use of the nuclear energy and radiation safety) to regulate all aspects of the transport of RAM. In some cases regulatory responsibilities are shared between the following Ministries:

1. The Ministry of the Interior is in charge of:

- training and issuing of certificates for both the drivers of road vehicles and dangerous goods advisors for class 7 according to ADR;
- the issuing of certificates of approval for vehicles for the carriage of dangerous goods by road;
- physical protection during transport of fissile material;

2. The Ministry of Health is in charge of:

- individual monitoring of transport workers and regulatory control of the radiation safety of both the conveyance and the consignment (together with the SNRCU and the Ministry of Guard of the Natural Environment);
- specialised medical tests for transport workers;
- issuing sanitary passports for road and railway vehicles used to transport RAM.

Sanitary passports for road and railway vehicles used to transport RAM, are issued by the Ministry of Health. This administrative process may be unnecessary because it appears only to duplicate some of the information which the applicant is also required to submit to the SNRCU for the granting of a licence for transport of RAM according to the legislation in force.

3. The Ministry of Environmental Protection is in charge of:

- radiation control of both the conveyance and the consignment (together with the SNRCU and the Ministry of the Health);

4. The State Export Control Service.

The conclusions are granted by the SNRCU for the purposes of this specialised government body.

Additional authorization of the State Export Control Service is needed for all fissile material and radioactive sources, when their activity exceed 3,7TBq and their half-life is more than 5 years.

In some cases it appears that the different specialised government bodies grant administrative acts related to transport of RAM as an end in itself.

The SNRCU is provided with technical and scientific support by the "State Scientific and Technical Centre on Nuclear and Radiation Safety" (SSTC) in particular regarding the regulation of nuclear and radiation safety in accordance with 'Procedure on the state examination of nuclear and radiation safety', approved by the order of SNRCU on February, 21, 2005, N 21, registered in the Ministry of Justice of Ukraine on April, 7, 2005, N 372/10652.

During the last 15 years SSTC support has included the process of the approval of the design of type B(U) and type B(U)F transport packages, including fissile material.

In this way the administrative requirements, established in IAEA, Safety Standard. TS-R-1, Section VIII, concerning competent authority approval of the design of the type B(U), and type B(U)F packages appear to be fulfilled.

5.3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

In accordance with Article 23 of the Law on the use of the nuclear energy and radiation safety the SNRCU is the competent authority responsible for State regulation of all activities related to the safe use of nuclear energy and ionizing radiation, including the safe transport of RAM.

By the Decree of the Cabinet of Ministers of Ukraine of 27.12. 2006 N 1830 'On approving the Statute of State nuclear regulatory committee of Ukraine' the SNRCU is authorized to:

- develop and approve regulations and standards on nuclear and radiation safety during the transport of RAM;
- regulate transport of RAM;
- prepare conclusions relative to the requirements of nuclear and radiation safety in the case of export, import and transit of RAM;
- license the transport of RAM;
- grant permits on international transport of RAM;
- grant certificates according to international agreements and IAEA Safety Standards "Regulations for the Safe Transport of Radioactive Material" TS-R-1;
- supervise and control the transport of RAM;

In 2006 the SNRCU issued the Regulation of nuclear and radiation safety during transport of radioactive materials (PBPRM-2006), order of 30.08.2006 N 132, registered in the Ministry of Justice 18.09.2006 N 1056/12930. It is based almost entirely on the technical requirements set out in the TS-R-1.

The Regulation "Statute on Planning of Measures and Actions in Case of Accident during Transportation of Radioactive Materials (NP 306.6.108-2005)" based on the IAEA Safety Guide "Planning and Preparing for emergency Response to Transport Accidents Involving RAM", ST-3 was approved by the order of SNRCU on 07.04.2005 № 38, registered in the Ministry of Justice of Ukraine on 22.04.2005, N 431/10711;

The Regulation "Requirements to the programmes of quality of assurance on transport of radioactive materials" (NP 306.6.127-2006) based on both the IAEA Safety Guide "Quality Assurance", SS.113 and Annex IV of the IAEA Advisory Material for the Safe Transport of RAM", ST-2 was approved by the order of SNRCU on 25.07.2006 № 110, registered in the Ministry of Justice of Ukraine on 05.10.2006 № 1092/12966;

The procedure on issuing of certificates on approval of construction of packages and radioactive materials, special forms material and transport, based in part on IAEA Safety Guide “Compliance Assurance for the Safe Transport of RAM”, TS-G-1.4, was approved by the order of SNRCU on 06.09.2007 № 119 and registered in the Ministry of Justice of Ukraine on 20.09.2007 № 1079/14346.

International transport of radioactive materials is carried out in accordance with the IAEA Standards and international agreements which Ukraine has joined including:

- Convention on International Civil Aviation Organization (ICAO) (1992);
- Convention on International Maritime Organization (IMO) (1994);
- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) (2000);
- World Postal Convention (UPU) (2006);
- Convention on International Carriage of Dangerous Goods by Rail (RID) on 9 May, 1980 (applied to railways of narrow gauge. On other railways the ‘Agreement on railway loads transportations (SMGS)’ is used).

In the case of transport of fissile materials in accordance with agreements transportation is carried out in accordance with the legislation of Ukraine - notably the resolution of Cabinet of Ministers.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1) **BASIS:** TS-R-1, 2005 Edition, § 102 states that “*This Safety Standard is supplemented by a hierarchy of Safety Guides including “Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (1996 Edition)”, IAEA Safety Standards Series No. TS-G-1.1 (ST-2) [3], “Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material”, IAEA Safety Standards Series No. TS-G-1.2 (ST-3) [4], “Compliance Assurance for the Safe Transport of Radioactive Material”, IAEA Safety Standards Series No. TS-G-1.4 [5] and “Quality Assurance for the Safe Transport of Radioactive Material”, IAEA Safety Standards Series No. TS-G-1.3 [6].*

S21 **Suggestion:** The SNRCU should develop a guide on quality management systems for the safe transport of radioactive material taking into account the latest advice of the international organizations including the IAEA.

S22 **Suggestion:** The SNRCU should develop a guide (regulation) taking into account the IAEA Safety Guide “Compliance Assurance for the Safe Transport of Radioactive Material”, No. TS-G-1.5.

5.4. AUTHORIZATION PROCESS, REVIEW AND ASSESSMENT

Various authorizations for the transport of RAM are granted in accordance with various decrees and regulations (Annex to this chapter). The authorizations are as follow:

1. Licences are granted by the SNRCU for multiple transport of RAM within the territory of Ukraine.

Term of validity – minimum 3 years. In the legislation the maximum term of validity is not limited but in practice it is not more than 5 years. Licenses are granted within 2 months.

About 50 enterprises are licensed in this manner.

The procedures for granting licences does not entirely meet the requirements of the IAEA, TS-R-1.

2. Permits are granted by the SNRCU only for international transport of RAM.

Permits are for both single and multiple transport of RAM in cases where the transported radionuclides and their activities are the same for every shipment.

Term of validity – not more than 3 months.

3. A conclusion is made by the SNRCU for the purposes of the State Export Control Service – for the check-up of the dual use of fissile material and sources where their activity is more than 3,7TBq and half-life is more than 5 years.

Term of validity – not more than 1 year.

4. Certificates are granted by the SNRCU for approval of the design of packages. In practice, the design of the type IP and A packages and special arrangements during transport are approved.

The SNRCU has developed detailed procedures for issuing permits for the international transport of RAM. As a whole these procedures are based on TS-R-1 and on good practices in European countries.

SNRCU has developed a detailed programme for amendment of the relevant normative documents taking into account new or revised IAEA Standards and Requirements.

Some of the main documents necessary for granting a permit are:

- licence for use;
- contracts;
- approval certificates in accordance with TS-R-1;
- insurances;
- authorizations from the relevant competent authority - for nuclear fuel and radioactive waste, consent according to the Code of Conduct on the Safety and Security of Radioactive Sources 2004 – for Category 1 sources; and
- emergency plan.

ANNEX TO CHAPTER 5

1. LICENSES GRANTED IN ACCORDANCE WITH:

- Law of Ukraine «On permit activity in the area of nuclear energy use»;
- decree of KМУ of 6.12.2000 № 1782 «On approval of Procedure on licensing of separate types of activity in the area of nuclear energy use»;
- “Requirements and terms of safety (licensed terms) of realization of activity of transportation of radioactive materials”, order of SNRCU of 31.08.2004 №141, registered in Ministry of Justice of 9.09.2004 №1125/9724;
- “Requirements on the analysis safety report of realization of activity of transportation of radioactive materials, order of SNRCU of 31.08.2004 №141, registered in Ministry of Justice of 9.09.2004 № 1127/9726;

2. PERMITS GRANTED IN ACCORDANCE WITH:

- decree of CMU of 3.10.2007 N 1196 «Some questions of transportation of radioactive materials»;

3. CONCLUSIONS GRANTED IN ACCORDANCE WITH:

- decree of CMU of 28.01.2004 № 86 “On approval of Procedure on state control on international transfers of the dual-use goods»;
- the order of SNRCU of 26.08.2004 № 138 «Instruction on procedure on presentation of conclusions of the State nuclear regulatory committee of Ukraine during the international transfers of radioactive materials, registered in the Ministry of Justice of Ukraine of 08.09.2004 № 1119/9718.

4. CERTIFICATES GRANTED IN ACCORDANCE WITH:

- the order of SNRCU of 06.09.2007 № 119 «Procedure on issuing of certificates on approval of construction of packages and radioactive materials, special terms and some transportations», registered in Ministry of Justice of Ukraine of 20.09.2007 № 1079/14346.

6. EMERGENCY PREPAREDNESS

6.1. GENERAL REQUIREMENTS

6.1.1. *Basic Responsibilities*

For purposes of adequate protection of the public in case of emergency situations of man-caused and natural origin the special Law of Ukraine "On protection of population and territories against emergency situations of man-caused and natural origin" was issued in 2000. The Law defines the territorial executive bodies responsible for protection of the public at the territories they are responsible for.

On the state level the emergency response coordination is entrusted to the State Commission on matters of man-caused and environmental safety and emergency situations, chaired by the Vice Prime Minister of Ukraine. One of the main tasks of the Commission is coordination of activity of central and local executive bodies related to the functioning of the Integrated State System for Prevention and Response on Emergency Situations of Man-caused and Natural Origin (ISSES).

The functions of SNRCU in relation to emergency preparedness and response have been established by legal framework and legal requirements have been developed through different legislative instruments and SNRCU guidance. The legal basis assigns the responsibility to the SNRCU for setting up a State system of measures aimed at ensuring emergency preparedness for mitigation of accidents at nuclear installations, facilities intended for radioactive waste management, or at ionizing radiation sources. SNRCU also ensures prompt notification, via media, of radiological accidents on the territory of Ukraine and abroad in case of potential transboundary release, and performs functions of a competent authority and as a point of contact according to the Convention on Early Notification of a Nuclear Accident and bilateral agreements.

The Ministry for Emergencies of Ukraine has the responsibility protect the public in case of emergencies of any origin, to organize rescue forces and conducting the rescue operations, to mitigate of consequences of emergencies of any origin (off-site), including terrorist acts and to conduct territorial subsystems ISSES.

In the framework of the ISSES local offices of the government authorities and authorities within their competence:

- carry out monitoring to ensure the public safety and environmental protection within their territory, and preparedness of enterprises, institutions, organizations and citizens for actions in the event of a radiation accident;
- take part in eliminating the consequences of radiation accidents;
- ensure emergency preparedness for evacuation of the population, and if necessary, carry out such evacuation.

In the case of radiation or nuclear emergency licensees are responsible for:

- monitoring and predictions of radioactive releases and notification of the relevant authorities.
- the implementation of protection measures for personnel and the population.
- the implementation of measures for preparation of a special social infrastructure in the monitoring area to promptly respond to, and mitigation of the emergency.

Norms of Radiation Safety of Ukraine NRBU-97, (Section 7 “Intervention in case of radiation emergency” and Basic sanitary regulations of radiation safety assurance of Ukraine DSP-05, Section 13 “Prevention of radiation emergencies and mitigation of their consequences”, define detailed requirements to licensee concerning radiation protection and safety of workers and the public in case of radiation emergency.

6.1.2. Assessment of Threats

Assessment of threat categories of nuclear and radiation facilities is required by the “Plan of response on radiation accident, NP-306.5.01/3/083-2004” issued by SNRCU and is in accordance with GS-R-2.

The regulation introduces the five-threat category system identically to GS-R-2. Radiation emergencies are classified based on a system for classification warranting response activities. The licenses have to be periodically reviewed and the requirement to applicant or licensee is to evaluate the Threat category and update the emergency plan accordingly. SNRCU implements a graded approach to establishing and maintaining adequate arrangements for preparedness and response to radiological emergencies for practices belonged to Threat Category III (transportation of radioactive materials and use of radiation sources).

The Ministry of Health established in the Sanitary Regulation DSP-05 a classification of nuclear and radiation facilities based on the level of their radiation hazard and threat in case of emergency is established also. This categorization should be taken into account in site selection and construction of new facilities and for emergency preparedness at existing facilities as well. However, it is not fully in compliance with the threat categorization according to IAEA requirements GS-R-2 and SNRCU Regulation NP 083-2004. In DSP-05 there is no category that would be equivalent to Threat Categories IV and V. For these cases no special planning requirement exists in Sanitary Regulation.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-2 § 3.6 states “*For the purposes of the requirements nuclear and radiation related threats are grouped according to the threat categories shown in Table I. The five threat categories in Table I establish the basis for developing generically optimized arrangements for preparedness and response.*”
- R11 **Recommendation:** To meet the IAEA requirements on categorizations of threats the Ministry of Health should take the necessary steps in order to harmonize the Sanitary regulations (DSP-05 [VK#27]) with NP 083-2004 [VK#25].
- (1) **BASIS:** GS-R-2 § 3.7 states “*Threat categories are used in this Safety Requirements publication to implement a graded approach to establishing and maintaining adequate arrangements for preparedness and response by establishing requirements that are commensurate with the potential magnitude and nature of the hazard as identified in a threat assessment.*”
- G10 **Good practice:** The SNRCU has implemented a graded approach to emergency preparedness and response for facilities of Threat Category III.

6.2. FUNCTIONAL REQUIREMENTS

6.2.1. Establishing Emergency Management and Operations

Integrated State System for Prevention and Response on Emergency Situations of man-caused and natural origin (ISSES) was created as a framework for protecting the public and mitigating consequences of emergencies. Its structure integrates the territorial executive bodies at national level, at level of province, settlement and enterprise. The state bodies are also included in ISSES with their Functional subsystems and (or) Response plans. The State Emergency Commission and Regional Emergency Commissions are major executing bodies in case of national or regional emergencies. The framework of the ISSES corresponds completely to Integrated Planning Concept recommended by the IAEA.

In Decree 1567-01 the Cabinet of Ministers has defined “Plan of response on emergency situations of national level” which includes detailed description of communication between all institutions involved in emergency response at national level.

In the framework of the ISSES the SNRCU has its own Response plan defined by the SNRCU Order 04-06. It includes provisions for bilateral agreements and protocols concluded by the SNRCU under ISSES (with the Ukrainian Centre of Hydrometeorology, Ministry of Emergencies, The Marzeev Institute of Hygiene and Medical Ecology of Academy of Medical Sciences of Ukraine etc.)

Emergency management and operations meet the requirements of paragraphs 4.1-4.11 of GS-R-2

6.2.2. Identifying, Notifying and Activating

General obligations of the licensee on identifying emergency, notifying the regulators and activating the response are defined in Section 13 of Sanitary Regulation DSP-5 and Law 2379-II-01 The Appendix 5 to Sanitary Regulation NRBU-97 contains general requirements to Emergency plan which shall be met by any licensee.

Decree 0192-99 defines rules of notifying in case of emergencies, including radiation emergencies. The system was developed for notifying and mutual communication between central and local authorities, forces of MEU and civil defence, institutions and the public. It includes subsystems of different scale (local-regional-national) which have to be activated depending of the rank of emergency defined by NP 083-04.

Regulation NP 306.2.100-2004 “Provisions for Order of Investigating and Accounting Disturbances in Operation of Nuclear Power Plant” gives detailed rules of identifying events at NPP and activating the relevant segment of the ISSES depending on the event rank.

The classification of emergencies for purposes of activating the State Emergency Commission and Regional Emergency Commissions is given in Decree 0368-04. The classification is based on the level of existing or projected detriment to the public and national economy caused by the event itself and mitigation of its consequences. There are four levels of emergencies:

1. National level;
2. Regional level (provinces, Crimea Autonomic Republic, cities of Kiev and Sevastopol);
3. Municipal level;
4. Facility level.

The relevant classification of radiological emergencies is defined in the “Response plan to radiation accidents” jointly approved by MEU and SNRCU. This classification meets requirements of paragraph 4.19 of GS-R-2.

Sanitary Regulation NRBU-97 in Section 7 specifies classification of emergencies being in contradiction with the national classification given by Decree 0368-04 and NP 083-04 as well as with the IAEA requirements formulated in paragraph 4.19 of GS-R-2.

The provisions for identifying, notifying and activating in case of event at the facility are established in Emergency plan existing for all facilities of Threat Categories I and II. The On-duty Officer of the NPP shall activate the system of on-site and off-site notification (for 30-km supervised zone) in case of serious emergency at NPP. Provisions for classification of the on-site emergencies are given in the NPP Emergency plan.

The SNRCU has established a crisis centre based on Information and Emergency department. The Crisis centre serves as the national 24 hours a day contact point. In normal conditions it accumulates on-line and analyses the information on operation conditions of the facilities of Threat category I and operates as 24 hours a day contact point for the Convention on Early Notification and Convention of Assistance.

The crisis centre has to be notified about any violation at operation of the facilities of Threat categories I and II and has to be activated in case of emergency of regional or national level. When activated, the Crisis centre provides:

- the management of the SNRCU with information about the event;
- the IAEA with information in line with the framework of the Convention on Early Notification;
- the Government with independent expertise of the nature of emergency and prognosis of its development in time and space;
- the general public and mass media with information regarding public concerns related to the emergency.

To conduct these duties, the Centre has for each facility of Threat category I and II:

- Emergency facility plan;
- Reports of Safety Assessment for all entities;
- Detailed description of entities important for safety; etc.

The Informational and Emergency Centre of SNRCU operates highly effectively as the national crisis centre in the area of preparedness and response to nuclear and radiological emergencies.

The SNRCU made arrangements for promptly notifying and providing relevant information to, directly and through the IAEA, those States that may be affected by a transnational emergency. Arrangements for promptly responding to requests from other States or from the IAEA for information in respect of a transnational emergency are in place.

The time schedule for notification and activation in case of emergency at NPP met recommendations given in Appendix VI to GS-G-2.

6.2.3. Taking Urgent Protective Action

In accordance with Articles 2 and 25 of the Law “On State Local Administration” and Article 8 of the Law “On Civil Defence of Ukraine” the local administration is responsible for protection of the population in case of emergency.

National intervention levels for taking urgent protective actions in accordance with international standards are adopted and given in Appendix 6 to Sanitary Regulation NRBU-97. The Regulation

also contains dose criteria for thyroid protection. They correspond to internationally recommended levels given in Schedule IV of the BSS.

In case of emergency at NPP the operator takes all measures to protect on-site personnel and promptly inform the off-site officials to implement the urgent protective measures in 30-km zone (Supervised zone, the analogue UPAZ defined in GS-R-2.1).

The provisions for organization of thyroid blocking by stable iodine (in case of public exposure) are under the responsibility of off-site officials responsible for public protection in case of emergency. Local officials define the rules for preparedness for the distribution of iodine tablets in designated areas. Thyroid blocking prophylaxis planned as a precautionary measure to be implemented in case of emergency in all designated areas. Its implementation is directed by facility conditions. Dose assessment is not used in initial decision-making.

Emergency plan of facility of Threat Category II (Research reactor of Kiev Institute of Nuclear Research) contains provisions for thyroid blocking for on-site personnel and other persons being at the site at the time of the event.

Article 8 of Law 2379-II-01 defines the general reference levels (GRL) governing acute response in case of radiation accidents as follows:

- *Measures to shelter the people are used during the first ten days the expected integral effective dose can exceed 5 mSv.*
- *Temporary evacuation of people is also being implemented in a case when during more than one week the effective dose can reach 50 mSv.*
- *Iodine prophylaxis is used when the expected absorbed dose for thyroid from radioactive iodine accumulated there can exceed 50 mGy according to the regulatory standards established by the Ministry of Health of Ukraine.*

These levels are in contradiction with the requirements given in Appendix 7 (mandatory) to Sanitary Regulations NRBU-97 and do not fully correspond to Schedule V of the BSS and Annex III to GS-R-2.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1) **BASIS:** The BSS § V.4. states “*Emergency plans shall include, as appropriate: ... (b) intervention levels based on a consideration of the guidelines in Schedule V*”.

R12 **Recommendation:** The Ministry of Health should harmonize the Sanitary Regulations with the Law on Human Protection Against Impact of Ionizing Radiation to avoid misunderstanding in its use for decision making during the emergency response.

(1) **BASIS:** GS-R-2 § 4.42 states “*Urgent protective action, in accordance with international standards, shall be taken to prevent to the extent practicable the occurrence of severe deterministic health effects and to avert doses.*” GS-R-2 § 4.48 states “*arrangements shall include ... The specification of off-site emergency zones for which arrangements shall be made for taking urgent protective action ... (i) A precautionary action zone [(PAZ) and] An urgent protective action planning zone (UPZ).*”

S23 **Suggestion:** The Ministry of Health and SNRCU should jointly implement the PAZ/UPZ concept for taking urgent protective actions.

6.2.4. Protecting Emergency Workers

For emergency response purposes regulation of exposure exceeding limit follows requirements of Section 7 of Sanitary Regulation NRBU-97 and Section 13 of Sanitary Regulation DSP-05.

The emergency staff performing such work shall be volunteers passed medical inspection, each of them shall be clearly and comprehensively informed on the risk of such exposure for his health, pass preliminary training and sign the written agreement to take part in these operations. It is not allowed to plan such exposure for women of any age as well as for men younger than 30 years.

In case of intervention to prevent from severe health effects, high collective doses or such progressing of accident that can lead to disastrous consequences all the measures shall be undertaken for keeping exposure under 100 mSv (Level 1).

In life saving case all the possible measures shall be undertaken for keeping the equivalent dose into any organ (including uniform exposure of the whole body) below 500 mSv (Level 2).

Level 1 and Level 2 values are expressed in terms of different dosimetric quantities and cannot be numerically compared. Only in case of uniform external exposure of human body by the gamma-radiation the numerical values of the *equivalent dose in any particular organ or tissue* are equal to each other and numerically equal to the *effective dose* characterizing the exposure of the individual. In all other cases of exposure, including internal exposure, the numerical value of equivalent dose in the most exposed organ is higher than the numerical value of effective dose characterizing the same conditions of exposure of the individual. For instance, the thyroid is the most exposed organ in case of intake of I-131. The numerical value of equivalent dose in the thyroid characterizing the intake of a certain amount of I-131 is 20 times as high as the numerical value of the effective dose characterizing the same intake. In this condition 100 mSv of effective dose (Level 1) corresponds to 2000 mSv of equivalent dose in the thyroid (Level 2). So there may be cases of exposures lower than Level 1, but exceeding Level 2. Therefore use of Level 1 and Level 2 for limiting exposure of emergency workers would lead to confusion.

Section 7 of NRBU-97 and corresponding Section 13 of Sanitary Regulation DSP-05 do not set special permission for planned exposure of emergency workers above the dose limits. This is in line with the IAEA requirements to conduct urgent protective actions and to protection of the emergency workers. Contradictory to this, the Emergency plan of NPP requires getting the permission for elevated exposure of emergency workers from regional branch of MPH or from NPP headquarters depending on the level of planned exposure. This requirement would lead to delay in implementation of urgent protective actions, e.g. life saving operations. Lessons learned from emergency exercises performed by the SNRCU shows that the minimal time needed for receiving such permission is about 1 hour.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-2 § 4.41 states “*All appropriate measures shall be taken to save lives.*”
- (2) **BASIS:** GS-R-2 § 4.42 states “*Urgent protective action, in accordance with international standards, shall be taken to prevent to the extent practicable the occurrence of severe deterministic health effects and to avert doses.*”

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- R13 **Recommendation:** The SNRCU in cooperation with the Ministry of Health should establish requirements for the conduct of protective actions that will guarantee sufficient protection of responders and avoid delay in implementation of urgent protection actions, e.g. life saving. To avoid undue delay in implementing urgent protection actions, a procedure should be developed to ensure that authorizations that allow responders to receive doses above dose limits are issued promptly.
- S24 **Suggestion:** The Ministry of Health should consider harmonization of the system of intervention levels used for protection of emergency workers during response to emergencies with the BSS and GS-R-2.

6.2.5. Medical Response

There are two specialized medical facilities operating on the national level in Ukraine: both are dedicated to medical assistance to overexposed individuals:

- The Scientific Centre of Radioactive Medicine of the Academy of Medical Sciences of Ukraine, located in Kiev. This Centre is a member of the system of specialized medical assistance in case of radiation accidents REMPAN, that functions under the aegis of WHO;
- The Institute of Medical Radiology of the Academy of Medical Sciences of Ukraine, located in Kharkiv.

Each facility of Threat Category I (NPP) is served by special hospitals located in the -satellite towns of NPPs where staff live. As a rule these towns are located 3-5 kilometres from the NPP sites. During normal operations the hospital together with the special branch of the Sanitary and Epidemiological Supervision is controlling the health of the workers and working condition at workplaces. To do so the provisions of Sanitary Regulation are used. In case of emergency the hospital and staff of its on-site medical post provide first aid to people affected by the accident. It has capabilities to provide first aid to overexposed people also. The hospital is staffed with qualified personnel that regularly attend the emergency exercises conducted at the NPP site.

6.3. REQUIREMENTS FOR INFRASTRUCTURE

6.3.1. Organizations, Plans And Procedures

Emergency Plan is one of necessary documents for obtaining a licence for the use of sources of ionizing radiation. Requirements to the content of emergency plan and procedures for its agreement are set in Annex 5 of Sanitary Regulation NRB-97. During preparation of emergency plan analysis of accidents is carried out taking into account existing experience. Emergency plan establishes periodicity of regulatory reviews depending on Threat category, e.g. the Emergency plan of NPP shall be reviewed each 3 years.

A typical emergency plan should contain provisions on informing, responsibility, typical scenario of radiological accident, measures to establish emergency reserve, dosimetry equipment, and availability of emergency personnel, emergency exercises and other resources for emergency works.

6.3.2. Training, Drills and Exercises

Requirements on preparation and training in emergency preparedness are given in Article 8 of Response Plan to Radiological Accidents. Ministry of Emergencies with involvement of Ministry for Fuel and Energy, Ministry of Health, Ministry of Environment, SNRCU and other central executive authorities depending on the program of emergency training cooperate in this area. Based

on the results of assessment of the emergency training the respective corrections are made to the response plans and personnel instructions.

The Plan of response on radiation accident foresees conducting planned emergency training on all the levels of ISSES starting with on-site and up to national level. The periodicity of the emergency trainings is to be defined by emergency plans of facility, response plans of territorial and functional subsystems of ISSES. It is prescribed that on the national level, the training is to be conducted at least once per 5 years.

Sufficient numbers of qualified personnel are available at the SNRCU at all times in order that appropriate positions can be promptly staffed as necessary following the declaration and notification of a nuclear or radiological emergency. Personnel exercises are conducted regularly. The appropriate resources for the exercises are allocated in the SNRCU budget.

7. RADIOACTIVE WASTE MANAGEMENT AND DECOMMISSIONING

7.1. NATIONAL WASTE MANAGEMENT POLICY AND STRATEGY

Introduction

A policy for radioactive waste management with defined goals and requirements is needed:

- as a driver for the preparation of related legislation;
- to define roles and responsibilities for ensuring the safe management of radioactive waste;
- as a starting point for the development of national radioactive waste management programmes (strategies);
- as a starting point for further developments and modifications to the existing national practices;
- to provide for the safety and sustainability of radioactive waste management over generations and for the adequate allocation of financial and human resources over time; and
- to enhance public confidence in relation to the subject of radioactive waste management.

The set of declared national goals and requirements for the safe management of radioactive waste has to be translated into a more practical and operational form, or strategy, to provide for their implementation. A well defined policy and the associated strategies are useful in promoting consistency of emphasis and direction within all of the sectors involved in radioactive waste management. The absence of policy and strategy can lead to confusion or lack of co-ordination and direction.

Findings

SF-1 The main principles of the national policy for radioactive waste management are described in Article 3 of the Law of Ukraine “**On the Radioactive Waste Management**” and they are in line with the safety principles set forth in SF-1 (Vienna, 2006), international conventions and agreements ratified by Ukraine. It should be noticed that Ukraine ratified the Joint Convention in 2000.

National radioactive waste management policy is defined by the Programme on Radioactive Waste Management, approved by the Cabinet of Ministers of Ukraine (enactment No 480 of 29.04.1996, as amended by enactment No 2015 of 25.12.02). This programme is reviewed at least every 3 years. The recently reviewed and updated National Programme is under approval process by the Government. The Team was informed that it has already passed its first reading in the Parliament. Obligations of legal and physical persons involved in the radioactive waste management are set forth in Section V of the Law of Ukraine “**On the Radioactive Waste Management**”.

At the same time, the basis for the National Radioactive Waste Management Strategy was described in the Energy Strategy of Ukraine till the year 2030, approved by the Cabinet of Ministers of Ukraine (enactment No 145 of 15. 03. 2006). At present the National Radioactive Waste Management Strategy as a separate document is being developed in the framework of a TACIS project. The authority responsible for this project is the Ministry of Emergency Situations. The co-developers are the Ministry of Fuel and Energy, the Ministry of Health and the SNRCU.

One of the key issues to be decided in the National Strategy is the organization responsible for the disposal of the different types of waste in the country. In Ukraine there is only one facility for disposal – “Buryakivka” which is located in the exclusion zone of Chernobyl NPP. The 6 facilities of RADON enterprise are considered as long term storage facilities. Nevertheless some storage

facilities (boreholes) at RADON facilities were designed during the Soviet time as disposal facilities.

The Team was informed that spent fuel is not considered as radioactive waste and also that, according to the Energy Strategy till 2020, operational radioactive waste from NPPs should be transferred to other centralized facilities (storage facilities or disposal facilities). Till the end of 2008 operating NPPs should be modernized to process and condition its radioactive waste. The same document established that till 2010 technologies should be developed for the storage of HLW produced as a result of reprocessing of spent fuel in Russia.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** WS-R-5 § 3.3. states *“The government shall provide an appropriate national legal and organizational framework within which decommissioning, including management of resulting radioactive waste, can be planned and carried out safely. This shall include a clear allocation of responsibilities, provision of independent regulatory functions and requirements for funding mechanisms for decommissioning.”*
 - (2) **BASIS:** WS-R-5 § 3.4. states *“The responsibilities of the government include:*
 - *Defining the national policy for decommissioning and for management of the resulting radioactive waste;*
 - *Defining the legal, technical and financial responsibilities of organizations to be involved in decommissioning;*
 - *Ensuring that the necessary scientific and technical expertise remains available both for the operating organization and for the support of independent regulatory and other national review functions;*
 - *Establishing a mechanism to provide and ensure adequate financial resources for safe and timely decommissioning”.*
 - (3) **BASIS:** DS353 (Safety Requirements on Predisposal Management of Radioactive Waste) in Requirement 2 on national policy and strategy on radioactive waste management states *“To assure the effective management and control of radioactive waste, the government shall ensure that a national policy and strategy on radioactive waste management is established. The policy and strategy shall be appropriate for the nature and amount of radioactive waste in the State, shall indicate the regulatory control required, and shall consider relevant societal factors. The policy and strategy shall be compatible with the Fundamental Safety Principles and with international instruments, conventions and codes that have been ratified by the State. The national policy and strategy shall form the basis for decision making with respect to the management of radioactive waste.”*
- R14 **Recommendation:** The Government should approve as soon as possible the revised National Programme on Radioactive Waste Management and the funding mechanism necessary to guarantee its implementation.
- S25 **Suggestion:** The Strategy on Radioactive Waste Management under development by the Ministry of Emergency Situations in cooperation with other interested parties and in the frame of a TACIS Project should be finalized and approved as soon as possible by the Government.

The National Programme on Radioactive Waste Management, approved by enactment No 480 of 29.04.1996 of the Cabinet of Ministers (as amended by enactment No 2015 of 25.12.02) defines that the long-lived and high-level radioactive waste are subject to long-term storage and final deep geological disposal, and indicates the main sources of these wastes generation (section IV, radioactive waste disposal).

The National Programme of Radioactive Waste Management defines that the State policy is primarily oriented to the protection of the environment, life and health of the population from ionizing radiation effects.

The Team was informed that in accordance with the general strategy on radiation protection, which is regulated by **HPBY-97** issued by the Ministry of Health, measures to minimize the doses of personnel and population during all the radioactive waste management activities are implemented in two periods of time:

- during all the practical activities, which precede the radioactive waste clearance from regulatory control; and
- after the radioactive waste disposal facility has been released from the regulatory control.

While the sanitary supervision is being executed, operating instructions to limit the dose of potential radiation exposure to the public due to a critical event at a radioactive waste storage facility are established in the form of reference critical events and their probability of occurrence. The principle of protection of future generations from the exposure to potential radiation sources, related to radioactive waste disposal after the complete or partial release from regulatory control, is implemented, according to **HPBY-97/Д-2000** item 4.2.3, through establishing probabilistic and dose prescribed limits (probability of a critical event that may lead to the radiation exposure and reference dose levels).

There is a strategy document for the development of the SNRCU from 2008 to 2012. This strategy allows the consultation of other than SNRCU experts to the state expertise process. Mainly state expert assessment is performed by SNRCU staff and by the external technical support organizations (TSO) (**State Scientific Technical Centre for Nuclear and Radiation Safety – ГИТЦЯРБ**). This centre has its own budget and is financially independent of SNRCU. However the final decision on licensing is taken by the SNRCU.

According to par. 1.2 of the “**Requirements to the Radioactive Waste Pre-Disposal Management**”, “The radioactive waste pre-disposal management is a part of the entire radioactive waste management process, which includes the radioactive waste disposal as the final goal. After the disposal method has been selected, the main objective of radioactive waste pre-disposal management consists in radioactive waste treatment and conditioning in the most appropriate way. If the disposal method is not defined, the main objective is to ensure that the radioactive waste is safely stored and brought into a form, which would be the most acceptable for any possible disposal method”.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 6.7 states “*Radioactive waste generated in nuclear facilities and activities may necessitate special considerations, particularly in view of the long time-scales and different organizations which may be involved from its generation through to its final disposal and the closure of a repository. Continuity of responsibility between the organizations involved shall be ensured. Consequently, national policies and implementation strategies for the safe management of radioactive waste shall be*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

developed, in accordance with the objectives and principles set out in the IAEA Safety Fundamentals publication on The Principles of Radioactive Waste Management. These strategies shall take into account the diversity between types of radioactive waste and shall be commensurate with the radiological characteristics of the waste. The regulatory body shall ensure that an appropriate waste classification scheme is established accordingly.”

- R15 **Recommendation:** In order to provide an organizational framework for the safe management of disposed radioactive waste cognisant of the safety of future generations, it is recommended that Government assigns executive responsibility to a specialized agency to deal with the long-term management of radioactive waste.

Conclusion

There is a national policy (National Programme) developed in Ukraine and a national strategy is under development. Both documents are consistent with the IAEA safety fundamentals publication “The Principles of Radioactive Waste Management“ (Safety Series 111-F, 1995); and they clearly allocate responsibilities for all aspects of waste management and independent regulatory control, and should provide for adequate infrastructure and funding mechanism to ensure the safe management of radioactive waste and its sustainability.

7.2. NATIONAL WASTE MANAGEMENT AND DECOMMISSIONING LEGISLATIVE AND REGULATORY FRAMEWORK

Introduction

It is possible that predisposal management of radioactive waste will involve the transfer of the radioactive waste from one operator to another, or that the radioactive waste may even be processed in another country. Similarly, decommissioning may be carried out by an operator different from the operator responsible for the facility operation. Furthermore, decommissioning may be deferred or carried out in a series of discrete operations over time (phased decommissioning). The established legal framework shall contain provisions to ensure that there is clear and unequivocal allocation of responsibility for safety during the entire process of predisposal management of radioactive waste. This continuity of responsibility for safety shall be ensured through regulatory control, e.g. by a licence or a sequence of licences according to the national legal framework.

To protect human health and the environment, the regulatory body shall establish requirements and criteria pertaining to the safety of facilities, processes and operations for predisposal management of radioactive waste. These shall include requirements related to handling, transport and storage as well as requirements associated with the acceptance of waste packages for disposal.

Findings

As far as decommissioning is concerned, the State Decommissioning Fund was established. Its functioning is regulated by enactment by the Cabinet of Ministers of Ukraine “Issue of establishing and using the nuclear facility decommissioning financial reserve” of 27.04.06 No 594. The Team was informed that despite the creation of the decommissioning financial reserve, the funds were used by the Government with the promise to be returned.

According to Article 4 of the Law of Ukraine “**On the Radioactive Waste Management**”, the State radioactive waste management programme is financed from the special radioactive waste Management State Fund. The draft law on the mechanism of receipt of environmental pollution fees

from the radioactive waste owners was agreed in January 2008 by the Cabinet of Ministers of Ukraine and is being considered by Committees of the Parliament of Ukraine. Presently the financing is carried out from the State budget and branch-wise programmes. Sometimes the budget is insufficient for the implementation of the programme.

According to Article 53 of the Law of Ukraine “**On the Use of Nuclear Energy and Radiation Safety**”, radioactive waste transboundary movement to or through the territory of Ukraine is regulated by international agreements that Ukraine contracted to. Article 59 of the same law states that “In case of international and transit transport of radioactive waste materials through the territory of Ukraine, the State nuclear and radiation safety regulatory body will agree this transport with competent authorities of all the countries of transit”; “radioactive waste exportation from Ukraine to other countries is not allowed, if, according to the State nuclear and radiation safety regulatory body conclusion, these countries have no appropriate technical and other capacities for the radioactive waste safe management.” This requirement is in line with the European Directive 2006/117/Euratom.

According to Article 32 of the Law of Ukraine “**On the Use of Nuclear Energy and Radiation Safety**”, the licensee is fully responsible for the radiological protection and the safety of a nuclear facility or ionizing radiation source regardless of activities and responsibilities of suppliers and state nuclear and radiation safety regulatory bodies.

The generator of radioactive waste is licensed only if there is an agreement with a RADON facility to take over the waste. This requirement is based on **ЦІОПО-85** (chapter 3.4), which limits the maximal time for waste storage at the waste generator site for 6 months following agreement of the transfer the regulatory body. Then the waste has to be transferred to the specialized waste management organization. Within the licensing process of a waste generator or user of sealed sources, SNRCU requires that a valid contract with the waste management organization (e. g. RADON) is signed. It should be mentioned that the regulation **ЦІОПО-85** was developed by the Ministry of Health more than twenty years ago.

An example of contract between RADON Dnepropetrovsk and Southern Mining and Enrichment Enterprise was provided. The contract covers among others the transfer of solid radioactive waste and used sealed sources for further management to the RADON facility, details on record management based on **ЦІОПО-85** requirements (passport of radioactive waste packages), quality control of waste packages (10 % of drums should be controlled for the compliance with their passports), etc. Another example of a similar contract between RADON Kiev and Central Laboratory “Kirovgeologia” was provided as well.

According to the “**Safety Conditions and Requirements (licensing conditions) for Conducting Radioactive Waste Treatment, Storage and Disposal Activities**”, approved by Order of the State Nuclear Regulatory Committee of Ukraine of 22. 10. 2002 No 110 and registered at the Ministry of Justice of Ukraine on 06. 11. 2002, the licensee shall issue, by internal company orders, permits for work to the personnel, who have no medical contra-indications, and received the proper training and passed the examination on the occupational safety in accordance with the Standard Provisions on the Occupational Safety Training, approved by the Committee for Occupational Safety Supervision of Ukraine on 17. 02. 1999, No 27 and registered at the Ministry of Justice of Ukraine on 21. 04. 1999 as No 248/3541. According to item 3.8 of this document, the licensee shall continuously work on the professional development of personnel involved in the licensed activity.

The regulatory system contains comprehensive requirements on staff qualification and the implementation of these requirements was demonstrated by an example of activity licensing for Ukratomenergobud Construction Company (storage construction). Within the licensing process the future licensee had to demonstrate the results of the staff training process. The example covered protocols of exams, professional education and experience records, etc. The SNRCU inspector, who

is member of the examination commission, signs the examination protocols. Additionally the training manual of the Ukratomenergobud (management and staff training manual; list of legal documents, format of protocols of examinations) was submitted. The staffs have to pass the exams once in 3 years.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** WS-R-2 § 3.12 states *“In order to provide an adequate level of safety, the operator ... shall ensure that staff is trained, qualified and competent; ... as required by the regulatory body.”*
- G11 **Good practice:** The implemented regulations and procedures for staff qualification and its periodic control ensure that staff are trained, qualified and competent as required by the regulatory body.

A state inventory of radioactive waste has been established in Ukraine. According to the **“Provisions on the State Inventory of Radioactive Wastes”**, approved by enactment by the Cabinet of Ministers of Ukraine of 29. 04. 1996 No 480, the inventory is one of the elements of the unified national system of radioactive waste accounting and inventory-taking and represents a consecutive running recording of special forms on radioactive waste generation, physicochemical composition, volumes, properties, and radioactive waste transport, storage and disposal. The Ministry of Emergency Situations is responsible for establishing and keeping the national radioactive waste inventory. The radioactive waste inventory is maintained based on record cards filled in by radioactive waste manufacturers and sent by them quarterly to regional radioactive waste accounting centres.

Radioactive waste state inventory and national cadastre of radioactive waste repositories and interim storage facilities are established in Ukraine. **“Provisions on the state inventory of radioactive wastes and national cadastre of radioactive waste repositories and interim storage facilities”** were approved by the Cabinet of Ministers of Ukraine on 29.04.1996, No 480. The radioactive waste inventory is maintained based on record cards established by radioactive waste manufacturers and sent by them quarterly to regional radioactive waste accounting centres. National inventory-taking is undertaken on a regular basis to update properly the radioactive waste state inventory and national cadastre of radioactive waste repositories and interim storage facilities. The procedure of national inventory-taking, its scope and periodicity, and instructions on the inventory results collection and documenting are approved by SNRCU Order of 11.02.2003 No 27.

SNRCU has developed a regulation on data records and reporting (NP 306.1.129-2006, **“Requirements on the Frequency and Content of Reports Submitted by Licensees in the Area of Nuclear Energy Use”**), which contains among other detailed requirements on data related to the radioactive waste management and the respective reporting mechanism.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** WS-R-2 § 3.12 states *“In order to provide an adequate level of safety, the operator ... shall keep records as required by the regulatory body.”*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- G12 **Good practice:** The SNRCU and the Ministry of Emergency Situations responsible for the record keeping in the area of radioactive waste management have established a comprehensive record keeping system, requirements on which were elaborated in detail by SNRCU requirements on the content and format of data submitted on regular basis to the regulatory body.

The procedure of licensing specific activities in the field of use of nuclear energy requires the submission of the Emergency Response Plan according to the “**Norms on Radiation Safety of Ukraine**” (HPBY-97) (item 4.6. List of documents to confirm the capability of the registrant in the field of use of nuclear energy to fulfil conditions and rules established for the activity to be licensed). Annexes 6 and 7 to **HPBY-97** deal with urgent measures to be taken in case of emergency.

According to item 3.15 of the “Safety Conditions and Requirements (licensing conditions) for Conducting Radioactive Waste Treatment, Storage and Disposal Activities”, approved by Order of SNRCU of 22.10.2002 No 110: “In case of any situation or circumstances that led to violation of radiation safety norms and regulations, or in case of a radiation accident the licensee shall: notify, during one hour, the regulatory body, local authority representing the Ministry of Health of Ukraine and other institutions; start appropriate actions to address violations or, in case of an accident, actions provided for in the Emergency Response Plans; and conduct internal investigation of causes and circumstances that led to violations or an accident and submit a written report on the investigation results to the regulatory body”.

Examples on emergency preparedness and planning (RADON Facility in Kharkiv and of the UKRATOMENERGOBUD construction company) were presented.

According to the “**Requirements to the Radioactive Waste Pre-disposal Management**”, approved by Order of the Ministry of Environmental Protection and Radiation Safety of 01.06.95 No 87 (item 2.2), in order to ensure the safe radioactive waste management, the licensee is obliged, in particular, to develop and implement a quality assurance programme. The main requirements for the implementation of a Quality Assurance Programme are addressed in the document “**Requirements to the Quality Assurance Programme at all Stages of a Nuclear Facility Lifecycle**”, approved by Order of the Ministry of Environmental Protection and Radiation Safety of 07.05.1999 No 53 and registered at the Ministry of Justice of Ukraine on 07.05.1999 as No 294/3587.

Procedure of interaction between executive authorities and legal persons acting in the field of use of nuclear energy in case of identification of illegal radioactive waste circulation is regulated by the Enactment of the Cabinet of Ministers of Ukraine of 02.06.03 No 813.

Conclusion

The Team noticed that in Ukraine a developed legislative and regulatory framework for the management of radioactive waste exists. The radioactive waste management is regulated by a set of 26 national regulations at four levels. This framework includes safety requirements, financial provisions and regulations for activities (covering, for waste management, handling, treatment, transport - including transboundary transport of radioactive waste, storage and disposal) and clearly allocates responsibilities. An important part of this regulatory framework is the existence of an effectively independent Regulatory Body and adequate licensing; inspection and enforcement regimes are established for the regulation of the management of radioactive waste. Nevertheless some aspects such as the establishment of mechanisms for implementation and utilization of the

State Financial Fund for radioactive waste management still need to be elaborated. The regulation on decommissioning of nuclear and radioactive waste management facilities and its implementation still needs improvements.

7.3. GENERAL SAFETY PROVISIONS FOR RADIOACTIVE WASTE MANAGEMENT AND DECOMMISSIONING

Introduction

Licensees shall ensure that the activity and volume of any radioactive waste that results from the sources for which they are responsible be kept to the minimum practicable, and that the waste be managed, i.e. collected, handled, treated, conditioned, transported, stored and disposed of, in accordance with the requirements of the Basic Safety Standards and any other applicable standard in force in the country and segregate, and treat separately if appropriate, different types of radioactive waste where warranted by differences in factors such as radionuclide content, half-life, concentration, volume and physical and chemical properties, taking into account the available options for waste disposal.

Findings

In Ukraine the Ministry of Health develops the main regulatory documents defining the dose limits for occupational exposure. First of them, **HPBY-97**, together with its addendum **HPBY-97/Д2000**, include the system of principles, criteria, norms and rules providing provision for human radiation protection and radiation safety. **Governmental Sanitary Rules 6.177-2005-09-02** are applicable for planning, design and operation of nuclear and radiological facilities. The regulatory control of SNRCU is based on these documents as well.

The prescribed national dose limits for workers applicable in the field of radioactive waste management and decommissioning activities are established in section 5.1.4 of **HPBY-97** an average of 20 mSv/y in 5 consecutive years but not more than 50 mSv/y in one year.

According to Article 4 of the Law of Ukraine “**On the Use of Nuclear Energy and Radiation Safety**”, the basic principles underlying the radiation protection during the use of nuclear energy, including radioactive waste management activities, are the following:

- no activity involving ionizing radiation can be authorized, if the final benefit derived from this activity does not exceed the harm incurred;
- the magnitude of individual doses, the number of people exposed and the likelihood of incurring exposures shall be the lowest practically achievable, economic and social factors being taken into account; and
- exposure of individuals resulting from all the radiation sources and activities shall not exceed in total the established dose limits.

According to **HPBY-97** (subsection 5.2), limitation of the exposure dose for population is carried out by regulating and monitoring:

- gas and aerosol releases and effluent discharges in the process of operation of radiation and nuclear facilities;
- radionuclide content in the environment (i.e. in water, food, air etc.).

According to Requirements to the structure and contents of the Safety Analysis Report for near-surface radioactive waste disposal facilities, (item 1.3), the licensee shall substantiate the disposal facility compliance with safety requirements and prove that the established dose limit for public exposure will not be exceeded under normal operation conditions.

The dose constraints are applied for occupational exposure in all practices according to **HPBY-97** with the implementation of so called “control levels” included in the regulation. The correct answer for discharges is table 5.2 from **HPBY-97** (80 $\mu\text{Sv}/\text{y}$ for waste treatment facilities and 40 $\mu\text{Sv}/\text{y}$ during the operational phase of waste disposal facilities).

HPBY-97/Д2000 requirements for radioactive waste disposal facilities are based on the dose assessment from different exposure pathways (five “reference scenarios”). For long-lived waste the dose limit of “potential exposure for public” considering all reference scenarios is 50 mSv/y. Such radioactive waste is to be disposed of in deep geological formations only. Waste for which the dose is lower than 1 mSv/year may be disposed of in a near-surface disposal facility. If the potential dose is in the range 1-50 mSv/year, the waste should be disposed of in a near-surface disposal facility, but in this case the Ministry of Health defines “special conditions” for removal of the waste from regulatory control.

The Team had the opportunity to review examples of the implementation and control of the “control levels”. The Team noticed that well recorded information of the occupational exposure received by personnel in facilities such as RADON are periodically submitted to the regulatory body. Within their monitoring programme the “control levels” for one year and one shift (6 h) exposure are defined. Examples of two consecutive monitoring programmes for Kharkiv RADON facilities showed no modifications of these values even if the maximum staff doses were about 3 times lower than the “control levels”. This formal approach to dose optimization does not comply with the optimization principle defined in the BSS.

The Team was informed that the requirement to keep to the minimum the radioactive waste arising is implemented at the stage of feasibility studies of the nuclear and radiation facility construction, modernization and decommissioning projects, and of documents relating to separate activities, operations and procedures at a nuclear facility or radioactive waste storage facility lifecycle stage by the state expert assessment of nuclear and radiation safety (according to the “**Procedure of the State Expert Assessment of Nuclear and Radiation Safety**”, approved by Order of the State Nuclear Regulatory Committee of 21. 02. 2005 and registered at the Ministry of Justice on 07. 04. 2005).

“**Requirements to the Structure and Contents of the Safety Analysis Report for Near-Surface Radioactive Waste Disposal Facilities**“, approved by Order of the Ministry of Ecology and Natural Resources of Ukraine of 02. 10. 2000 No 154, envisage that a licensee shall develop a programme of radioactive waste generation minimization (item 3.4.6). The requirement to minimize the amount of secondary radioactive waste is also included in the “**Requirements to radioactive waste pre-disposal management**”, approved by Order of the Ministry of Environmental Protection and Radiation Safety of 01. 06. 1995 No 87.

The team was shown documentation of a radioactive waste management facility under construction in the Chernobyl exclusion zone where the minimization of radioactive waste is demonstrated.

In relation to the potential effects of the management of radioactive waste beyond national borders, item 2.3 of “**Basic Provisions on the Safety Ensuring during Radioactive Waste Geological Disposal**”, approved by Order of SNRCU No 81 of 29. 05. 2007, state that: “During the radioactive waste disposal it is necessary to ensure that the disposal facility possible effects on the health of population and environment beyond the Ukrainian borders are taken into account; and in case of occurrence of these effects all international obligations as to non-exceeding of transboundary effects shall be fulfilled in compliance with international conventions and agreements”. In addition, according to **item 1.3 of the “Requirements to Radioactive Waste Pre-Disposal Management”**, the radioactive waste management shall be based, among others, on the principle of protection that

consists in ensuring the level of public health protection beyond national borders not lower than that acceptable in a given country.

Occupational radiation protection is regulated by the “**Norms on Radiation Safety of Ukraine**” (**HPBY-97**) elaborated by the Ministry of Health. In the licensing process the applicant should present as part of the documentation the authorization received (Sanitary Passport) from the Ministry of Health. The SNRCU is responsible for the control of the operational occupational safety of the licensees.

The Team was informed that according to the “**Procedure of Licensing Specific Activities in the Field of use of Nuclear Energy**” approved by enactment No 1782 of 06. 12. 2000 by the Cabinet of Ministers of Ukraine, the following documents, among others, are to be submitted in order to obtain a licence for radioactive waste treatment, storage and disposal activities:

- safety analysis report on the radioactive waste treatment, storage and disposal activities;
- copies of lawfully drawn up conclusions of the expert assessment of the nuclear and radiation safety, of ecological and other expert assessments of the radioactive waste management site project.

On the other hand item 5.5.3 of **HPBY-97** defines that the dose limitation for members of the public is implemented by regulation and control of the releases and discharges in the process of a facility operation; and the radionuclide content in the environment.

According to items 4.4.5 and 4.4.6 of the “**Requirements to Radioactive Waste Pre-Disposal Management**”, a licensee shall develop and implement the environmental radiation monitoring programme and ensure that radiation safety requirements are fulfilled during the activities; and item 4.2.7 establishes that the design of a radioactive waste management facility shall comply with the established release and discharge limit. In addition Item 5 of the “**Requirements to the Quality Assurance Programme at All Stages of a Nuclear Facility Lifecycle**” sets requirements to documentation and records management.

The radioactive waste classification system is described in section 15 of **OCHY-2005**. Radioactive waste is classified depending on the purposes including criteria for acceptance in a near-surface disposal facility. Substantiation of radioactive waste classification based on the option of appropriate type of disposal facility is given in **HPBY-97/Д2000** (item 4.4.5). The Team noticed that the classification system for disposal purposes is not in agreement with the IAEA classification system.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 6.7 states “*These strategies shall take into account the diversity between types of radioactive waste and shall be commensurate with the radiological characteristics of the waste. The regulatory body shall ensure that an appropriate waste classification scheme is established accordingly.*”
- (1) **BASIS:** WS-R-2 § 3.5. states “*To facilitate effective and safe predisposal management of radioactive waste, the regulatory body shall ensure that an appropriate waste classification scheme is established in accordance with national programmes and requirements and international recommendations.*”

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (2) **BASIS:** SS No. 111-G-1.1 § 103. states *“The objective of this Safety Guide is to recommend a method of deriving a classification system and to suggest a general system for classifying radioactive waste that will facilitate communication and information exchange among Member States, and eliminate some of the ambiguity that now exists in classification schemes for radioactive waste.*

S26 **Suggestion:** The SNRCU should initiate a process to review and update the existing classification system for radioactive waste. It would be reasonable to classify radioactive waste on the basis of considerations of its long term safety, i.e. its disposal, so as to keep consistency among the different stages of radioactive waste management. Such a classification system would facilitate communication and information exchange among Member States, and eliminate some of the ambiguity that now exists in the Ukrainian classification schemes for radioactive waste.

Item 4.2.2 of the “Requirements to Radioactive Waste Pre-Disposal Management” establishes that waste acceptance criteria to radioactive waste shall be set at the stage of a treatment facility design; according to item 4.2.8 of this document, the design shall provide for radioactive waste packing at the final operation at treatment/conditioning stages, in accordance with acceptance criteria for transport, storage and disposal.

According to item 4 of annex 2 of the “**Procedure of Licensing Specific Activities in the Field of use of Nuclear Energy**”, approved by enactment No 1782 of 06. 12. 2000 by the Cabinet of Ministers of Ukraine, the document establishing waste acceptance criteria for radioactive waste treatment, storage and disposal shall be included in the package of documents submitted to the SNCRU for obtaining a licence for the radioactive waste treatment, storage and disposal activities.

Conclusion

Main general safety provisions and criteria for decommissioning activities and the management of radioactive waste, including interdependency are established in the regulatory framework and they are controlled by SCNRU. Nevertheless the established waste classification scheme is not coherent with the IAEA radioactive waste classification scheme. SCNRU is taking adequate measures aimed to ensure that all radioactive waste, including sealed sources, are kept to a minimum, adequately processed, stored or disposed of under regulatory control. SCNRU provisions require all radioactive waste management and decommissioning facilities and activities to be in compliance with established safety criteria and quality management systems.

7.4. PREDISPOSAL MANAGEMENT OF RADIOACTIVE WASTE INCLUDING STORAGE

Introduction

In the design of facilities and the planning of activities that have the potential to generate radioactive waste, measures are put in place to avoid or reduce, to the extent practicable, its generation. Waste and other residual materials are appropriately collected or segregated after collection, as necessary. They may be released from regulatory control if they do not require further consideration from the viewpoint of radiation safety. This includes the controlled discharge of effluents produced during predisposal operations. As far as reasonably practicable, the reuse and recycling of materials are applied as means of minimizing waste generation. The remaining waste is processed in accordance with the national strategy for radioactive waste management for storage or disposal.

Predisposal management of radioactive waste comprises all waste management steps prior to disposal. These include the processing of operational and decommissioning waste as well as that of waste from cleanup activities. The decommissioning of a nuclear facility at the end of its useful lifetime is included in this definition of predisposal waste management. In the sense that decommissioning is the management of nuclear facilities for which no further use is foreseen, it is considered to be a part of radioactive waste management.

Findings

General radiation safety requirements for the design, construction, commissioning, operation and decommissioning of facilities intended for pre-disposal radioactive waste management (including storage) are set forth in **НД 306.607.95 “Requirements to the Radioactive Waste Pre-Disposal Management”**, approved by Order of the Ministry of Environmental Protection and Radiation Safety of 01. 08. 95 No 87. Item 4.2.2 of this document establishes that the design criteria for a radioactive waste management facility shall include normal operation conditions and limits, including waste acceptance criteria for radioactive waste and limitations related to the treatment parameters, and limits and conditions related to the quality and safety. Item 4.4.6 obliges the licensee to meet the radiation safety requirements in its activities.

The safety of facilities shall be justified in the safety assessment report, which is a necessary document needed to obtain the license. The radiation safety report of radioactive waste management facilities shall be elaborated in accordance with the **“Requirements to the Structure and Contents of the Safety Analysis Report for a Radioactive Waste Treatment Facility”**.

Basic technical and organizational requirements pertaining to the nuclear and radiation safety during activities related to long-term storage of long-lived and high level radioactive waste are set forth in **НІА “Requirements and Rules for the Long-Term Storage of Long-Lived and High Level Radioactive Waste before their Deep-Geological Disposal”**, approved by SNRCU order No 169 of 07. 12. 2007.

НД 306.607.95 “Requirements to the Radioactive Waste Pre-Disposal Management”, approved by Order of the Ministry of Environmental Protection and Radiation Safety of 01. 08.95 No 87 and the **“Requirements and Rules for the Long-Term Storage of Long-Lived and High Level Radioactive Waste before their Deep-Geological Disposal”**, approved by SNRCU order No 169 of 07.12.07, establish requirements on:

- (1) the investigation of the proposed region to evaluate its present and foreseeable future characteristics, the distribution of the population and the present and future uses of land and water;
- (2) the determination of background environmental radioactivity in the region as a baseline for future investigations;
- (3) estimations of expected and potential releases of radioactive material over direct and indirect pathways;
- (4) assessment of the radiological exposure of the population in operational states of the facility as well as under accident conditions; and
- (5) assessment of potential effects from natural and human induced external events (e.g. seismic events, meteorological events, geotechnical impacts, aircrafts, and explosions).

According to Art. 7 of the Law of Ukraine **“On the licensing in the field of use of nuclear energy”**, the transport of radioactive materials, including radioactive waste, and radioactive waste treatment, storage and disposal are subject to the compulsory licensing. Licensing conditions for radioactive waste processing, storage and disposal activities are defined in regulation **“Safety conditions and requirements (licensing conditions) for conducting radioactive waste**

treatment, storage and disposal activities“, approved by Order of SNRCU of 22. 10. 2002 No 110.

The control over fulfilment of conditions and requirements is carried out within the framework of **“State Supervision of Fulfilment of Nuclear and Radiation Safety Requirements in the Use of Nuclear Energy”**, approved by Order of SNRCU of 19. 11. 2003 No 141.

According to item 5.6 **“Requirements to the Radioactive Waste Management and Disposal”**, the radioactive waste package quality assurance programme shall include:

- identification of all factors, which determine radioactive waste characteristics, including radionuclide composition, physical/ chemical properties and heat generation;
- confirmation that radioactive waste characteristics are within the set limits.

Item 3.3.3 of the **“Requirements to the Structure and Contents of the Safety Analysis Report for Radioactive Waste Treatment Facilities”** sets a requirement to indicate characteristics of radioactive waste processing products and information on their further management; and Item 3.4 sets requirements to the characterization of radioactive waste to be processed at a facility. Radioactive waste acceptance criteria for the processing include: physical form, chemical composition, size limitations, and radiological characteristics, presence of toxic, explosive, self-igniting, gas-generating and other hazardous components. Item 3.4 of the same document requires that **“The section on radioactive waste acceptance criteria”** shall provide information on the radioactive waste acceptance criteria for the storage, i.e. proper requirements to physical form, chemical composition (pH and salt solution concentration values are also indicated for rare radioactive waste), size limitations, radiological characteristics (group, type of radiation and exposure dose rate, radionuclide composition, specific activity, fissile material content, surface contamination level), presence of toxic, explosive, self-igniting, gas-generating and other hazardous components”.

Sanitary Rules for Radioactive Waste Management (CIIPO-85), elaborated by the Ministry of Health, establish radiation safety ensuring requirements for collection, interim storage, transport and processing of radioactive waste, which are produced in the process of use of radioactive substances and other ionizing radiation sources in different sectors of economics. This document provides for requirements as to taking into account radioactive waste characteristics in terms of its physical, radiological and biological state. In particular, according to item 3.1 of the mentioned document, radioactive waste collection at institutions and organizations shall take into consideration: physical state (solid or liquid); origin (organic, inorganic, or biological); half-life of radionuclides present in wastes (less than 15 days, or more than 15 days); explosion and fire hazard (explosion- or fire-hazardous or explosion- or fire-proof); radioactive waste processing methods used at specialized radioactive waste processing enterprises.

“Requirements to the Structure and Contents of the Safety Analysis Report for Radioactive Waste Treatment Facilities” also provide for the description of radioactive waste acceptance and control procedure. Methods, instruments and equipment used for this procedure should be indicated. It must be shown that the control procedure ensures incoming radioactive waste conformity to the established criteria. Description of the procedure of control of the accompanying documents must be provided. The procedure of managing radioactive waste that does not meet acceptance criteria must be described. When incoming radioactive waste is subject to sorting, the radioactive waste classification system to be applied must be described, as well as appropriate methods and procedures to use.

“Requirements to the Structure and Contents of the Safety Analysis Report for Radioactive Waste Treatment Facilities, radioactive waste storage facilities and near-surface disposal facilities” establishes requirements on: the facility’s structures, components and equipment (3.3);

the waste to be processed (3.3.1, 3.3.3.4); all associated operational work activities (3.5) and both normal operation and anticipated incidents and accidents (3.5.1). The licensee provides the corresponding requested facility description and information to the regulator.

The law “**On Radioactive Waste Management** in the glossary defines the radioactive waste storage facility as a facility for “holding of radioactive waste, in which it is provided their isolation from natural environment, their physical protection and radiation monitoring, with the possibility of subsequent removing, processing, transportation and disposal”.

In chapter 7.1 of the safety assessment report of the temporary storage facility for radioactive waste Class III and LILW-LL in SLWS Chernobyl NPP the technical approach of waste package retrieval is described. The radioactive waste is stored in 200 l drums. During the decommissioning process of the storage facility these drums are placed into a transport cask and are shipped to another waste management facility (storage or disposal).

According to item 4 of Annex 2 to the **Procedure of Licensing Specific Activities in the Field of Use of Nuclear Energy**, approved by enactment of 06.12.2000 No 1782 by the Cabinet of Ministers of Ukraine, the safety analysis report, which includes the safety assessment, shall be included in the package of documents submitted to obtain a licence for the radioactive waste treatment, storage and disposal activities.

“Safety conditions and requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities” (HP 306.5.04/2.060-02), approved by Order of SNRCU of 22.10.2002 No 110 established the main safety requirement in this area. According to item 3.13 of this document “The licensee shall submit yearly safety analysis reports on the radioactive waste treatment, storage and disposal activities, appropriate requirements to its contents and time of submission are set in items 3.1, 3.2 of the “**Periodicity and Contents Requirements to Reports Submitted by Licensees in the Field of Use of Nuclear Energy**”, approved by Order of SNRCU of 16.10.2006 No 162. The counterpart, upon request, showed two different annual reports from Kharkiv RADON Facility.

According to item 3.9 of the “Safety conditions and requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities”: “The Licensee shall undertake the safety re-assessment in case of changes in the licensed activity processes, which may influence on the safety level, or in cases when the licensed activity experience feedback shows the drawbacks in the previous assessment, and submit the corresponding report to the Regulator”. According to item 3.2 of this document “In the event that new standards, rules and regulations in the field of nuclear and radiation safety or physical protection are adopted, amended or updated, the Licensee shall review the licensed activity conditions and safety limits for compliance with new standards, rules and regulations; and, in case of non-compliance with new safety requirements, the Licensee shall develop and agree with the Regulator organizational and technical measures to address the discrepancies.”

Item 3.9.3. of the “**Requirements to the structure and contents of the Safety Analysis Report for radioactive waste storage facilities**” concerning accidents and emergencies requires to submit:

- a list and analysis of potential emergencies and accidents, their paths of development and possible consequences;
- a list of external and internal initiating events of technogenic and natural origin (fire, explosion, earthquake, extreme weather conditions, water table rise, soil settlement etc.), which may cause emergencies or accidents;

- the probability of the initiating event for each accident, method of determination of the probability, accident development scenario, forecast of possible consequences and measures to prevent an accident and mitigate the consequences.

Probability analysis of critical events and associated exposure shall be performed according to **HPBY-97** requirements.

According to the “**Requirements to radioactive waste Pre-Disposal Management**”, approved by Order of the Ministry of environmental protection and radiation safety of 01.08.95 No 87:

- item 4.4.2 (a): “Before start of operation, the licensee shall develop and approve operating instructions and rules to cover technical and administrative aspects required for the proper storage facility operation”
- item 4.4.3: “The Licensee shall ensure the fulfilment of all operating instructions and procedures and clear allocation of functions and responsibilities for all personnel at each operation phase“
- item 4.4.4: “The Licensee shall review operating instructions and procedures at regular intervals and propose how to improve them. Changes that may influence the safety cannot be introduced, unless agreed with regulatory bodies”.

In accordance with item 2.2 of the “**Safety conditions and requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities**”, the licensee is allowed to carry out the specified activities provided that:

- organization and technical measures to prevent radiation accidents and mitigate its consequences are implemented;
- regulatory requirements pertaining to the physical protection are fulfilled, in order to prevent unauthorized access to storage facilities and radioactive waste;
- radiological monitoring is conducted at an enterprise, by its own means or under a contract with other company. Measuring laboratories, according to Article 10 of the Law of Ukraine “**On the metrology and metrological activities**”, have to be properly accredited.

In accordance with “Requirements to radioactive waste pre-disposal management” approved by Order of the Ministry of environmental protection and radiation safety of 01.08.95 No 87, par. 4.4.7. “Licensee shall develop a plan of actions in case of abnormal operation conditions of the facility (emergency plan). The emergency plan is subject to approval in compliance with the established procedure. The licensee is responsible for the personnel knowledge of the emergency plan, periodical training and proper fulfilment of the actions planned in case of emergency.”

The Regulatory Body requires that, in processing waste, consideration is given to possible reactions within the waste form; possible reactions between the waste and the container and the stability of the container. Para 17 of the technical requirements to containers for radioactive waste storage and disposal, approved by enactment by the Cabinet of Ministers of Ukraine of 18.07.2007 No 939 states that materials used to manufacture containers shall have properties that meet the requirements formulated in a container specification, namely: radiation resistance; strength; corrosion resistance to radioactive contents, decontaminating solutions and environmental conditions; chemical resistance (to leaching); frost resistance; physical and chemical compatibility with each other and with radioactive wastes; water- and gas-tightness; diffusion conductivity; resistance to micro organisms, fungi etc. In addition, materials shall maintain these properties during the operational lifetime of the container. In para 9 it is established that the following shall be agreed: design and choice of structural materials- with characteristics of radioactive materials contained; container configuration and size – with transport and process arrangements to be used during radioactive

waste storage and disposal, and with structural elements of the storage facility, in which radioactive waste packages are expected to be placed.

According to item 21 of the **Technical Requirements to Containers for Radioactive Waste Storage and Disposal**, approved by enactment by the Cabinet of Ministers of Ukraine of 18.07.2007 No 939: “A double-purpose container (which also performs the function of a transport overpack) shall also meet the requirements of Rules of nuclear and radiation safety in the radioactive materials transport (ПБІРМ-2006)”.

In accordance with item **4.2.5 of НД 306.607.95 “Requirements to the Radioactive Waste Pre-Disposal Management”**, the design of facilities intended for radioactive waste management, which may contain fissile materials, shall take account of the requirement of criticality prevention.

In accordance with item 4.2.10 of НД 306.607.95, the design of facilities intended for long-term storage of conditioned radioactive waste shall consider the need to install additional systems of ventilation, cooling etc. for the storage of specific categories of waste. According to item 10.30 of the **Basic Sanitary Rules of the Radiation Safety in Ukraine (ОСІЙ-2005)**, a cooling system has to be provided for the storage of radioactive substances with high specific activity level. This document also mentions (in 10.31) that nuclear safety arrangements shall be provided for the storage of fissile materials.

In accordance with item 4.2.9 of НД 306.607.95 **“Requirements to the Radioactive Waste Pre-Disposal Management”**, the design of radioactive waste storage facilities shall take account of the requirement of multi-barrier system of radioactive waste isolation from the environment.

Basic physical protection requirements to activities in the field of use of nuclear energy are set in Art. 21 of the **Law of Ukraine “On the Physical Protection of Nuclear Facilities, Nuclear Materials, Radioactive Wastes and other Ionizing Radiation Sources”**.

In the **“Requirements and rules for the long-term storage of long-lived and high level radioactive waste before their deep-geological disposal”** item 4.3.20 establishes that “Storage facility physical protection system shall be defined after its siting, provided for in the facility design, systematically implemented from the beginning of construction and function till the end of facility decommissioning”.

“Requirements to the quality assurance programme at all stages of a nuclear facility lifecycle”, approved by Order of the Ministry of Environmental Protection and Radiation Safety of 07.05.1999 No 53 and registered at the Ministry of Justice of Ukraine on 07.05.1999 as No 294/3587 envisage that all works having influence on the safety and quality shall be identified, taken into account and described in documents (procedure, instructions, drawings etc.) and then implemented in compliance with these documents. These documents shall establish sequence of operations and hold-points in processes, scope of control in these points and assessment criteria. These documents should also identify the need for instruments, special and testing equipment. Measures shall be taken to prevent the unauthorized use of the documents.

Safety conditions and requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities (item 3.13) envisage that the licensee shall submit annually a safety report on its activities in compliance with requirements established by the Regulator. The annual report has to comply with requirements of the regulation **“Periodicity and contents requirements to reports submitted by licensees in the field of use of nuclear energy” НН 306.1.129-2006**.

Item 3.15 of the **“Safety Conditions and Requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities”** envisages that in case of any

situation or circumstances that led to violation of radiation safety norms and regulations or in case of a radiation accident the licensee shall:

- notify, within one hour, the regulatory body, the local authority representing the Ministry of Health of Ukraine and other institutions;
- start appropriate actions to address violations or, in case of an accident, actions provided for in the Emergency Response Plans;
- conduct internal investigation of causes and circumstances that led to violations or an accident and submit a written report on the investigation results to the regulatory body.

According to item 4.1. of the “**Requirements to the quality assurance programme at all stages of a nuclear facility lifecycle**”, which are also applicable to radioactive waste management activities “the quality assurance programme shall envisage measures to identify products and processes, which do not conform to the set requirements. The non-conformities shall be identified and documented. Arrangements shall be in place (such as marking, withdrawal, fencing etc.) to prevent unauthorized use of non-conforming products or processes and to maintain safety functions in case of a non-conformity. In accordance with item 4.5: “The Operator, in case of identification of a non-conformity that influences the safety, shall inform the state nuclear and radiation safety regulatory body about compensatory or corrective actions taken”.

General radiation safety requirements for the design, construction, commissioning, operation and decommissioning of facilities intended for radioactive waste pre-disposal management (radioactive waste processing and storage) are set forth in **НД 306.607.95 “Requirements to the Radioactive Waste Pre-Disposal Management”**, approved by Order of the Ministry of Environmental Protection and Radiation Safety of 01.08.95 No 87.

Basic technical and organizational requirements to ensure nuclear and radiation safety during activities related to long-term storage of long-lived and high level radioactive waste, in particular to the design, construction, commissioning, operation and decommissioning of facilities, are set forth in regulatory document “Requirements and rules for the long-term storage of long-lived and high level radioactive waste before their deep-geological disposal“, approved by SNRCU order No 169 of 07.12.07.

A Comprehensive Radioactive Waste Management Programme for 2002-2005 and for the period up to 2010 (revision approved by the Cabinet of Ministers of Ukraine, Decree No 2015 of December 25, 2002) envisages the following measures to be implemented at RADON facilities:

- Development of Feasibility Studies (FSs) and draft action plans for the purposes of re-specialization of state inter-regional specialized RADON enterprises into the interim radioactive waste storage facilities;
- Design, manufacture, and installation of specialized equipment for radioactive waste handling/management;
- Design, manufacture and installation of remote-controlled instrumentation for radioactive waste reload and recovery and storage in safe conditions;
- Elaboration of a technology and technical facilities for long-term storage of ionizing radiation sources.

The SNRCU is currently reviewing the Feasibility Studies (FSs) and draft action plans for the purposes of re-specialization of state inter-regional specialized RADON enterprises into interim radioactive waste storage facilities.

Upon demand of the Committee, the RADON enterprises are elaborating - in parallel with the design documentation – safety enhancement measures in the context of further operation of storage

facilities. Namely, the SNRCU is currently reviewing a technical decision on safety assessment and substantiation of further operation of borehole type disposal facilities for “interim storage” of spent ionizing radiation sources. The documents substantiate safety of decommissioning and remediation of the specified storage facilities are under development.

Thus, the steps taken demonstrate progress in implementation of the National Radioactive Waste Management Programme, namely in the area of radioactive waste retrieval for the purposes of their further disposal.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1) **BASIS:** DS353 (Safety Requirements on the Predisposal Management of Radioactive Waste) states in Requirement 22 on existing facilities “*The safety at existing facilities shall be reviewed to verify compliance with requirements. Safety related upgrades shall be made by the operator in line with national policies*”.

G13 **Good Practice:** The revision and review of the status and the safety assessment of RADON facilities with the intention to upgrade their technological characteristics and to enhance their safety features is considered as a good practice to be followed by other countries with the same type of facilities.

Normal operation conditions and criteria that characterise external or internal initiating events or their combination, which may disturb the normal operation of a storage facility or lead to emergencies and accidents, are determined in the design. “**Requirements and rules for the long-term storage of long-lived and high level radioactive waste before their deep-geological disposal**”, approved by SNRCU order No 169 of 07.12.07 states that:

- item 4.3.1. Storage facility design shall determine normal operation, emergency or accident conditions, and describe and substantiate safety-related systems and components. Design parameters have to be established to characterise external or internal initiating events or their combination, which may have an effect on the safety of the storage facility (i.e. may lead to emergencies or accidents). The design shall provide a list of these events and values of parameters, which characterise them.
- Item 4.3.2. When developing storage facility design solutions for normal operation, emergencies or accident, well-grounded engineering practices shall be used to ensure that the facility will not be seriously damaged and that radiation doses will remain within the set limits at a reasonably achievable low level.

The design is to be approved by the Regulator based on the results of compulsory state expert assessment of nuclear and radiation safety to be conducted in compliance with Art. 40 of the Law of Ukraine “**On the use of nuclear energy and radiation safety**”.

In the design and construction of a radioactive waste storage facility, the Regulatory Body requires that due account is taken of the likely period of storage, the preferable use of passive safety features, the potential for degradation during that period and with due consideration of natural site characteristics that could impact performance as geology, hydrology and climate. (Item 4.4.1 and 5.6 of **НД 306.607.95 “Requirements to the Radioactive Waste Pre-Disposal Management**”; and Item 5.5 of the “**Requirements and rules for the long-term storage of long-lived and high level radioactive waste before its deep-geological disposal**”).

In accordance with **НП 306.5.04/2.060-2002 “Safety conditions and requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities**”, the licensee shall submit an annual safety report on radioactive waste treatment, storage and disposal

activities to the Regulator. In accordance with item 3.9 of this document, the Licensee shall undertake the safety re-assessment in case of changes in processes, which may influence the safety level, or in cases where the licensed activity experience feedback shows drawbacks in the previous assessment, and submit the corresponding report to the Regulator.

Item 4.4.4 of the “**Requirements to radioactive waste pre-disposal management**” states that the licensee shall review operating instructions and procedures at regular intervals and propose how to improve them. Changes that may influence the safety can not be introduced, unless agreed with the regulatory body.

The licensee shall undertake the safety re-assessment in case of changes in the licensed activity processes, which may influence the safety level, or in cases where the licensed activity experience feedback shows drawbacks in the previous assessment, and submit the corresponding report to the Regulator.

According to item 2.2 of the “Safety Conditions and Requirements (licensing conditions) for Conducting Radioactive Waste Treatment, Storage and Disposal Activities”, the licensee is allowed to carry out the specified activities provided that:

- the licensee has financial capabilities to indemnify losses due to potential radiation accidents that may occur during the licensed activity with its own or insurance company resources; and
- the licensee’s personnel be insured against risks related to ionizing radiation effects.

According to item 3 of the “**Requirements to Radioactive Waste Pre-Disposal Management**”, radioactive waste management activities shall be carried out on the basis of a radioactive waste management programme approved by the regulatory body. The programme shall include, in particular, financial requirements and administrative procedures to ensure the necessary funding.

Conclusion

SCNRU has established requirements for the characterization and processing of, as well as requirements for handling, transport and storage of waste packages. Interdependency is taken into account, e.g. the processing of radioactive waste is performed such that the acceptance requirements for storage facilities are complied with. Adequate regulatory requirements have been established for safe storage of radioactive waste. Nevertheless attention should be paid to the retrievability of radioactive waste (e.g. when disposal is authorized or clearance is granted for disposal as ordinary waste). Regulatory provisions ensure an adequate evaluation of the safety of existing and of proposed new storage facilities including specific requirements for the design, construction, operation and decommissioning of these facilities. Periodic safety reviews, monitoring and inspections of existing storage facilities are undertaken and their safety is upgraded to the extent necessary.

7.5. CLEARANCE REGIME FOR RADIOACTIVE WASTE AND DISCHARGE OF RADIOACTIVE MATERIALS

Introduction

In para. 2.19 of the BSS, it is stated that sources, including substances, materials and objects, within notified or authorized practices may be released from further requirements of the Standards subject to complying with clearance levels approved by the Regulatory Authority. The regulations for clearance are set by the Ministry of Health, while the procedures for clearance are established and controlled by SNRCU and the Ministry of Health. The Ministry of Health is also responsible for the regulatory documents for discharges. Compliance with these requirements is verified by the SNRCU Inspectorates.

Findings

For releases, art. 5.5.5 of **HPBY-97** stipulates that “On the basis of dose limit quota for each separate engineering facility the permissible discharges (PD) and permissible releases (PR) are established in Table 5.2 – “Quotes of dose limit used to establish PR and PD”. The values of the Integral quota DL_E due to air and water pathways varies between 40 and 200 μSv per year depending on the type of facility.

The Team reviewed three cases where the discharges could be controlled: the medical applications (mainly in the work with I-131), the RADON facilities and the NPP. The Team received an explanation on how this activity is authorized and controlled in these three cases. It was noticed that the authorization, control and record of radioactive discharge in the medical practice is done not considering all the international recommendations in this regards. In the case of the NPP the authorization, control and record processes are organized in accordance with international standards. Actually the RADON facilities are not discharging radioactive materials to the environment due to the activities performed and approved by the regulatory body. Nevertheless the Ukrainian counterpart considered that some improvement is needed considering that RADON facilities have some installed capabilities for the decontamination of packaging and conveyances used in the transport of radioactive waste.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** The BSS § III. 10 states “*Registrants and licensees, before initiating the discharge to the environment of any solid, liquid or gaseous radioactive substance from sources under their responsibility, shall, as appropriate:*
 - (a) *determine the characteristics and activity of the material to be discharged, and the potential points and methods of discharge;*
 - (b) *determine by an appropriate pre-operational study all significant exposure pathways by which discharged radionuclides can deliver public exposure;*
 - (c) *assess the doses to the critical groups due to the planned discharges; and*
 - (d) *submit this information to the Regulatory Authority as an input to the establishment of authorized discharge limits and conditions for their implementation.”*

- (2) **BASIS:** The BSS § III. 11 states “*Registrants and licensees, during the operational stages of sources under their responsibility, shall:*
 - (a) *keep all radioactive discharges as far below the authorized discharge limits as is reasonably achievable;*
 - (b) *monitor the discharges of radionuclides with sufficient detail and accuracy to demonstrate compliance with the authorized discharge limits and to permit estimation of the exposure of critical groups;*
 - (c) *record the monitoring results and estimated exposures;*
 - (d) *report the monitoring results to the Regulatory Authority at approved intervals; and*
 - (e) *report promptly to the Regulatory Authority any discharges exceeding the authorized discharge limits in accordance with reporting criteria established by the Regulatory Authority.*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- R16 **Recommendation:** The SNRCU should initiate a process to review and update the procedures for the authorization, control and recording of radioactive discharges from medical practices. It should also request each RADON facility in the next review of its safety assessment report to develop or review the justification, safety assessment and procedures for the control and recording of radioactive discharges to the environment as needed and in accordance with international recommendations.

The procedure for clearance of radioactive waste and by materials from regulatory control (NP 306.3.04/2.002-97) stipulates that the legal person responsible for the radioactive waste and by-materials must apply for a clearance authorization. In the application the legal person must substantiate the possibility of clearance, in particular of compliance with the clearance levels. SNRCU authorizes clearance following a positive review of the application and the substantiating documents.

In accordance with item 3.2 of the “**Procedure of clearance of radioactive wastes and radioactive by-materials from regulatory control**”, in considering possible clearance of regulatory control, physical, chemical and other properties of radioactive waste should be taken into account in order to prevent cases of clearance of radioactive waste, non-radiation properties of which can increase the radiation hazard. Clearance of inflammable and volatile radioactive waste and radioactive by-materials is not allowed.

According to CIIPO-85, radioactive waste collection shall take place directly at the place of generation, separately from common garbage collection, and shall account for:

- physical state (solid or liquid);
- origin (organic, no organic, or biological);
- half-life of radionuclides present in wastes (less than 15 days, or more than 15 days);
- explosion and fire hazard;
- radioactive waste processing methods used at specialized radioactive waste processing enterprises.

Conclusion

The criteria and use of the terms “exemption” and “clearance” for the removal from control of radioactive materials are inconsistent in different regulatory documents and they are not in agreement with IAEA safety standards (see section 4.1.7). Nevertheless their application is controlled and enforced by the Regulatory Body. Established criteria for discharges are adequate. The evaluation of it in some practices as medical practice and in the RADON facilities need to be improved. For the NPPs there is an appropriate monitoring system in place such that releases are controlled and corrective measures are undertaken if needed.

7.6. NEAR-SURFACE DISPOSAL OF RADIOACTIVE WASTE

Introduction

In general, wastes suitable for disposal in near surface repositories are those containing short lived radionuclides and low concentrations of long lived radionuclides. For wastes of this type, disposal in near surface facilities has been practised in a number of countries for several decades. Experience has shown that this is a realistic and practical method for the safe isolation of such wastes and for achieving the protection of human health and the environment, subject to appropriate regulation.

There are three phases associated with the lifetime of a near surface repository: pre-operational, operational and post-closure. The pre-operational phase includes the necessary siting and design studies and the period of construction of the repository. The operational phase includes the period of operations at the repository and the closure of the repository. The post-closure phase includes any activities following closure of the repository (for example, periods of active or passive controls). Activities related to each of these phases should be carried out consistent with the requirements established by the regulatory body.

Findings

The para 1.2 of regulatory document **НД 306.604-96 “Radioactive waste disposal in near-surface disposal facilities”** requires, that “Radiation exposure of staff under operation of a storage facility shall not lead to exceeding of the dose limits established in **NRB 76/87**, item 3.2. Radiation exposure of staff shall be reduced as low as possible taking into account economical and social factors”. The repository facility general and specific requirements on siting, design, construction, operation, closure and post-closure period are listed in consecutive chapters of the above mentioned document.

The radiological safety criteria for the disposal facilities are defined in section 5 of NRBU-97 and in section 4.2 of **HPBY-97/Д-2000**. For the period up to release of regulatory control a dose constraint of 40 $\mu\text{Sv}/\text{y}$ for members of the public is applied and 10 $\mu\text{Sv}/\text{y}$ for the period after release of regulatory control. The value of 10 $\mu\text{Sv}/\text{year}$ has been set taking IAEA WS-G-5.1 (release of sites on termination of practices) into consideration. The Team noticed that this document does not apply to disposal facilities (para. 1.5). In addition, critical events likely to result in potential exposure of future generations must not exceed $1 \times 10^{-2} \text{ year}^{-1}$.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** WS-R-1 § 2.7 states “*For possible modes of evolution of the repository during the post-closure phase which are judged to be likely, the repository shall be designed so that projections of doses or risks to members of the public do not exceed an appropriate fraction of the dose limit, 1 mSv/a, or its risk equivalent. The appropriate fraction, termed the dose or risk constraint, shall be determined by the regulatory body. Recently the ICRP has recommended that a value of no more than about 0.3 mSv in a year would be appropriate in this context.*”
- S27 **Suggestion:** SNRCU might consider initiating the review of regulatory documents dealing with dose constraints applicable to different stages in the life time of a near-surface disposal facility, taking due account of the relevant IAEA safety standard.

Non-radiological environmental impacts of a disposal facility are considered in the requirements of **ДБН А.2.2-1-2003 “Structure and contents of the environmental impact assessment document for designing and construction of enterprises, buildings and structures. Basic provisions for designing”**. The environmental impact assessment shall include data on all expected environmental impacts (non-radioactive waste, effluents, in-plant noise and vibrations).

The overall process for the siting of disposal facilities systematically considering all relevant aspects is developed in item 3 of **НД 306.604-96 “Radioactive waste disposal in near-surface disposal facilities”**. The details of this process are further elaborated in document **НП 306.3.02/3.038-2000 “Structure and Content of Safety Assessment Report for Near-Surface Repository”**. The implementation of this process was exemplified with the safety documentation of the LOT 3

disposal facility at the Vektor site, which covers the siting aspects of the facility development process.

Assurance of compliance with safety criteria despite the uncertainties inherent in predicting future events shall be provided according to document **НП 306.3.02/3.038-2000 “Structure and Content of Safety Assessment Report for Near-Surface Repository”**.

Assessment of the likely and unlikely events and processes to be considered in safety assessments for disposal facilities is carried out during its review. This process is driven mainly by the item 3.6.4 of **НП 306.3.02/3.038-2000 “Structure and Content of Safety Assessment Report for Near-Surface Repository”**: “A list of external and internal initiating events of technogenic and natural origin (fire, explosion, earthquake, extreme weather conditions, water table rise, soil settlement, generation of toxic, corrosive or radioactive clouds etc.), which may cause emergencies or accidents, shall be provided. ... Calculation results for possible release of radioactive substances in different accident or emergency scenarios are to be presented. A chain “event – possible scenarios (accident development) – consequences” are to be described, with calculations of content, composition and concentration of radionuclides, which may be released beyond the facility borders under a conservative assessment of accident development. Scenarios of the disposal facility integrity disruption due to deliberate intervention are to be considered as well”.

Requirements for the safety assessment of near-surface radioactive waste disposal facilities are listed in regulation **НП 306.3.02/3.038-2000 “Structure and Content of Safety Assessment Report for Near-Surface Repository”**. According to this document, the objective of a SAR is to substantiate that during the facility operation and post-closure period the safety level ensured for personnel, population and environment will not be lower than that envisaged in nuclear and radiation safety regulations, rules and standards (item 1.2). In accordance with item 3.9 of “**Safety conditions and requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities**”, the licensee shall undertake the safety re-assessment in case of changes in processes, which may have an influence on the safety level, or in cases when the experience feedback has shown drawbacks in the previous assessment, and submit the corresponding report to the Regulator.

The SAR is developed based on results of an overall analysis of the facility safety for operation and post-closure periods. The SAR substantiates the facility compliance with the safety requirements and proves that the established dose limits will not be exceeded under normal operation conditions or in case of an accident. The SAR includes information on sources of information, input data, procedures, models and calculation codes used for the safety analysis.

The process of development of a safety assessment was demonstrated with the example of two near-surface disposal facilities SWR-1 and SWR-2 and the LOT 3 facility at the Vektor site. The safety assessment used for the issue of the construction licence of SWR-1 and SWR-2, does not contain the post-closure assessment of the facilities’ impact on the critical group and environment. On the other hand the safety assessment report for the LOT 3 repository includes this part, and based on ISAM methodology it defines normal evolution and intrusion scenarios which are then consecutively assessed. The results are then compared with all national dose limits. However for the final conclusions only results based on 10 µSv/y dose limit were considered.

According to item 3.7. of **НП 306.5.04/2.060-2002 “Safety conditions and requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities”**: “All changes to design and operation documents, any reconstruction, modernization or overhaul that may influence the safety of licensed activity are subject to compulsory state expert assessment of nuclear and radiation safety”. The implementation of this requirement was demonstrated with the example of the modification of the LOT 3 disposal facility at the Vektor site.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** WS-R-1 § 3.4 states “*A safety assessment consists of:*
(a) *an estimate of system performance for all the situations selected;*
(b) *an evaluation of the level of confidence in the estimated performance;*
(c) *an overall assessment of compliance with safety requirements.*”
- R17 **Recommendation:** The safety assessment for the near-surface disposal facilities SWR-1 and SWR-2 at the Vektor site does not fully comply with the requirements of WS-R-1, § 3.4 (a) and HII 306.3.02/3.038-2000. In respect of the post-closure safety of these two disposal facilities the SNRCU should request that a full scope safety assessment be performed.
- R18 **Recommendation:** The environmental assessment of neither the SWR-1 and SWR-2 facilities nor the LOT 3 facility, which are located at the same Vektor site, does not assess their joint impact on the members of the critical group and therefore the requirement on the overall safety assessment, as defined in WS-R-1, § 3.4 (c) is not completely fulfilled. Therefore the regulatory body should require the operator in the future licensing documentation to consider the possible integrated impact of all facilities at the Vektor site to people and the environment.

The procedure of the operator licensing at all stages of a nuclear facility or radioactive waste disposal facility lifecycle is established in section 3 of the “**Law of Ukraine “On the Licensing Activity”**” and in the **HII 306.5.04/2.060-2002 “Safety conditions and requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities”**.

Sections 3 to 8 of **HII 306.604.95 “Radioactive waste disposal in near-surface facilities. General radiation safety requirements”** complement the requirements for the safety of the waste disposal facility and set out the procedures for meeting the requirements for the various stages of the licensing process.

According to Art. 38 of the Law of Ukraine “**On the use of nuclear energy and radiation safety**“: “Acceptance of a nuclear facility or radioactive waste management facility for commissioning is carried out by state acceptance committees.“ A copy of the state acceptance committee report shall be included in the package of documents submitted to obtain a licence for the radioactive waste disposal facility operation (item 5.3 of **HII-306.2.02/3.037-2000 “Provisions on the list and requirements to the form and contents of documents to be submitted by the Operator to obtain a licence for an activity at a certain stage of a radioactive waste disposal facility lifecycle”**).

According to item 2.1 of **HII 306.5.04/2.060-2002 “Safety conditions and requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities”**: “The licensee carries out radioactive waste treatment, storage and disposal activities in compliance with:

- Laws of Ukraine, nuclear and radiation safety rules, regulations and standards in force;
- License conditions and requirements established

The practical implementation of the requested approach is described in chapter 7 of the safety assessment of the LOT 3 facility at the Vektor site.

In the SAR of the near-surface disposal facility, the operator shall describe an appropriate procedure for the management of incoming radioactive waste, which does not meet the acceptance criteria (item 3.4.1 of **НП 306.3.02./3.038-2000 “Structure and Content of Safety Assessment Report for Near-Surface Repository”**).

Interfaces between specialized enterprises and radioactive waste generators are described in Art. 12 of the Law of Ukraine **“On the Radioactive Waste Management”**.

Waste acceptance criteria (WAC) are developed by the operator and approved by SNRCU. WAC are included in the package of documents submitted to obtain a licence for the radioactive waste disposal facility operation (item 5.3 of **НП-306.2.02/3.037-2000 “Provisions on the list and requirements to the form and contents of documents to be submitted by the Operator to obtain a licence for an activity at a certain stage of a radioactive waste disposal facility lifecycle”**). Guidance on how to develop WAC is given in **ПД 306.4.098-2004 “Recommendations for establishing criteria for acceptance of conditioned radioactive waste for near-surface disposal facilities”**.

According to item 6.9 of **НД 306.604-96 “Radioactive waste disposal in near-surface disposal facilities”** the waste shall conform to criteria fully consistent with and derived from the safety assessment report. The detailed structure of WAC for the LOT 3 facility at the Vektor site is defined in chapter 3 of the facility safety assessment report. WAC document is under preparation and will be used as one of the licensing documents by the review of the operational licence application.

Requirements for radioactive waste disposal facility siting, design, construction, operation and closure, to on-site and environment radiation control and monitoring are described in items 3 to 10 of **НД 306.604-96 “Radioactive waste disposal in near-surface disposal facilities”**.

According to Art. 18 of the Law of Ukraine “On the Radioactive Waste Management” radioactive waste management activities can be authorized only if there are physical protection arrangements in place. Responsibility for physical protection ensuring during radioactive waste management activities lies with the licensees.

Physical protection during radioactive waste management activities is a set of organizational and technical measures to prevent unauthorized access to or use of radioactive waste, and to promptly identify and stop any actions aimed at infringement of radioactive waste inviolability. These measures are defined for near-surface disposal facilities in item 4.4 of **НД 306.604-96 “Radioactive waste disposal in near-surface disposal facilities”**.

According to Article 33 of the law of Ukraine **“On the use of Nuclear Energy and Radiation Safety”** “The Operator is obliged to re-assess on a regular basis, in accordance with nuclear and radiation safety rules, standards and regulations, the safety of a nuclear facility or radioactive waste disposal facility and submit a report on its results to the Regulator. A safety re-assessment can also be carried out upon a Regulator’s requirement in case of substantial changes in the facility design or when operation experience has shown drawbacks of the previous assessment.”

The procedure of the closure of radioactive waste disposal facilities is described in Art. 21 of the law of Ukraine **“On the radioactive waste management”**. Requirements to the disposal facility closure, post-operation maintenance and post-operation monitoring are further elaborated in **НП 306.604.95 “Radioactive waste disposal in near-surface facilities”**.

A facility closure plan, according to Art. 40 of the Law of Ukraine **“On the use of nuclear energy and radiation safety”** is subject to compulsory state expert assessment, which is carried out by the nuclear and radiation safety regulatory body.

The safety of a closed disposal facility should not rely on institutional controls that necessitate extensive and continuing active measures in accordance with item 1.4 and section 8 of **НД 306.604.95 “Radioactive waste disposal in near-surface facilities”**.

The post-closure monitoring programme, as a part of a facility closure project, is subject to compulsory state expert assessment, which is carried out by the nuclear and radiation safety regulatory body. Positive conclusion of the state expert assessment can be considered as the post-closure monitoring programme approval by the Regulator. The post-closure monitoring programme is to be implemented at the stage of active administrative control.

Detailed requirements for the post-closure monitoring programme for a disposal facility that deals with: (1) radiological and other monitoring of the facility and its surrounding area in order to verify the absence of unacceptable radiological impacts, and to confirm, as far as possible, the assumptions made in the safety assessment; and (2) other measurements of system parameters to confirm that the performance of the isolation system is as expected are described in the document: **НД 306.604.95 “radioactive waste disposal in near-surface facilities”**, items 10.1 to 10.7.

The document: **НД 306.604.95 “radioactive waste disposal in near-surface facilities”**, section 8, establishes requirements for the passive control measures to be implemented after closure of a disposal facility, including: (1) keeping records on the contents of the repository; and (2) maintaining knowledge of the site of the repository.

The regulatory requirements on the need for an appropriate level of supervision in order to protect and preserve the passive safety barriers to the extent that this is needed, in order to fulfil the functions that they are assigned in the post closure safety case, are described in sections 8 and 10 of **НД 306.604.95 “radioactive waste disposal in near-surface facilities”**.

According to Art. 32 of the **Law of Ukraine “On the use of nuclear energy and radiation safety”** “A Licensee shall establish requirements to personnel qualification according to their responsibility for the safe use of nuclear facilities, ionizing radiation sources and appropriate control over them, and for the proper operation of the equipment related to the safety ensuring. Qualification requirements to the personnel, whose work is regulated by an appropriate licence (i.e. licensed personnel), are subject to the approval by the appropriate nuclear and radiation safety regulatory body”.

According to the **“Safety conditions and requirements (licensing conditions) for conducting radioactive waste treatment, storage and disposal activities”**, approved by Order of SNRCU of 22.10.2002 No 110 and registered at the Ministry of Justice of Ukraine on 06.11.2002, the licensee shall issue, by internal company orders, permits for work to personnel, who have no medical contraindications, and received the proper training and passed the examination. The licensee shall also continuously work on the professional development of personnel involved in the licensed activity.

Conclusion

Near-surface disposal of radioactive waste is included in the national programme on radioactive waste management and in the national strategy under development. The main regulatory requirements are defined, and they address waste acceptance criteria, siting, design, construction, operation, closure, and post closure to the extent necessary. Nevertheless the criteria on dose constraints for post closure safety assessment should be reviewed. In addition, for some of the near-surface disposal facilities under construction safety assessment and environmental impact assessment should be reviewed and complemented.

7.7. GEOLOGICAL DISPOSAL OF RADIOACTIVE WASTE

Introduction

The term ‘geological disposal’ refers to the disposal of solid radioactive waste in a facility located underground in a stable geological formation (usually several hundred meters or more below the surface) so as to provide long term isolation of the radionuclides in the waste from the biosphere. Disposal means that there is no intention to retrieve the waste, although such a possibility is not ruled out. Geological disposal was conceived as a method for disposing of the more hazardous types of radioactive waste, including heat generating waste and long lived waste. Such waste includes spent nuclear fuel (if declared as waste under the national policy), high level waste (HLW) from the reprocessing of nuclear fuel, and other radioactive waste that generates significant amounts of heat or that contains concentrations of long lived radionuclides that are unsuitable for its disposal in near surface facilities. However, the actual types of waste to be disposed of in a particular geological disposal facility will be determined by the national policy and strategy for waste disposal. The defining characteristic of the waste concerned is that it could pose a significant radiological hazard for periods of time well in excess of those for which surveillance and maintenance of the site — as would be required if it were to remain in surface or near surface disposal facilities — can be guaranteed.

Findings

The draft of the document “**National, Task Orientated, Ecological Programme on the radioactive waste Management**”, which has already passed the first hearing in Parliament contains information on the development and the financing of the waste management activities including the development of a geological repository. The document provides a 10-step plan for activities in this area from 2008 till 2017, including the selection of three potential repository sites for further assessment. At the end of this period an initial project of the geological repository should be available. The scientific work related to the development of the geological repository will start soon.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1) **BASIS:** WS-R-4 § 1.9 states *“This publication establishes requirements for protecting people and the environment from the hazards associated with waste management activities related to disposal, i.e. hazards that could arise during the operational period and following closure. Assurance of this protection will be provided by the application of legal and regulatory requirements on the planning, development and assessment activities that are carried out during the pre-operational and operational periods.”*

G14 **Good practice:** Despite the fact that the operation of the national geological repository will commence only after several decades SNRCU has already prepared a regulatory document with the safety requirements for geological repositories. This document will be periodically updated and will provide the regulatory framework for the development of this kind of facility.

Item 1.1 of the regulatory document “**General Provisions on the Safety Ensuring during the Radioactive Waste Geological Disposal**“ provides the following definition: “Geological repository is a solid radioactive waste repository designed for its disposal in deep geological formations capable of ensuring reliable and long-term isolation to prevent their release into the biosphere“.

Item 3.3 of “Requirements to designing and construction of a geological repository“, in particular items 3.3.1 to 3.3.21, establishes requirements concerning the safety ensuring during geological repository design. Also, according to item 3.3.22, a geological repository shall be designed with

account taken of its closure in the future. A repository design shall include the repository closure programme, the contents of which are described in item 3.5.2. Item 2.8 should also be mentioned.

Item 3.1.4 of the “**General Provisions on the Safety Ensuring during the radioactive waste Geological Disposal**” is consistent with the aims formulated in item 1.6 of WS-R-4.

Item 3.3.4 of “**General Provisions on the Safety Ensuring during the radioactive waste Geological Disposal**” envisages that, during the design of a geological repository, conservative methods are to be applied, and, for the development of the design basis for the normal operation and design-basis accidents, justified engineering practices shall be used to ensure that a geological repository will not be seriously damaged and that doses will remain within the established limits at the lowest achievable level.

According to item 3.4.11 of “**General Provisions on the Safety Ensuring during the radioactive waste Geological Disposal**” to ensure radiation protection and monitoring of personnel and public radiation exposure levels during a geological repository operation, a Radiation Protection Programme is to be developed, which includes radiation survey programme and an environmental monitoring programme. According to item 3.4.14, Emergency Plan and Emergency Response Plans are to be developed for the protection of personnel and the public in case of a radiation accident.

According to 2.1.1. of “**General Provisions on the Safety Ensuring during the radioactive waste Geological Disposal**”, activities of geological disposal of waste shall comply with the basic principles of radiation protection in practice, set forth in **HPBY-97** and **HPBY-97/Д-2000**, namely:

- non-exceeding of the annual effective dose for the critical group of population of 0.01 mSv/y and collective annual effective dose of 1 man.year.
- potential radiation exposure – lower than 50 mSv/y for events with “reference” probability of 10^{-2} per year (see suggestion S30).

A need for and step-by-step establishment of a geological repository are envisaged in the Laws of Ukraine “**On the Radioactive Waste Management**”, “**On the Use of Nuclear Energy and Radiation Safety**”, and in the “**National Programme on Radioactive Waste Management**” approved by Enactment by the Cabinet of Ministers of Ukraine. Besides, the draft law “**On the State Programme of Radioactive Waste Management**” has already been developed and agreed at SNRCU early in 2008.

Art. 8 of the Law of Ukraine “On the Licensing in the Field of Use of Nuclear Energy“ identifies stages of a radioactive waste disposal facility lifecycle, which are subject to the licensing according to the established procedure. The Law of Ukraine “**On the Use of Nuclear Energy and Radiation Safety**” formulates provisions on the responsibilities of the Operator and Regulatory Body. Requirements of Art. 22 “Human and Financial Resources” of the “Joint Convention”, ratified by the Government of Ukraine on the 20.04.2000, should be mentioned as well. According to “Provisions on the State Regulatory Committee of Ukraine”, approved by the Cabinet of Ministers of Ukraine, SNRCU is an independent executive body subordinated to the Cabinet of Ministers of Ukraine.

The waste management fund was not established yet and therefore the operators do not contribute to it. At this moment the funding of all radioactive waste management activities is based on contributions from the Government and responsible ministries.

On the basis of the IAEA SS WS-R-4, SNRCU developed a regulatory document “**General Provisions on the Safety Ensuring during the radioactive waste Geological Disposal.**” Besides, in order to improve the regulatory basis concerning the safety during radioactive waste management, including a geological disposal (siting, design, construction, operation and closure), SNRCU plans to revise the existing regulations and develop new ones.

In the course of development of regulatory documents, SNRCU sends appropriate drafts for consideration and/or approval to the state administration bodies and, for consideration, to operating organizations. Comments received thereafter are discussed at meetings and during day-by-day work. Detailed description of this process is provided in Order of SNRCU of the 23. 05. 2003 No 66 “On the approval of a new revision of the Procedure of development and issuance of rules and standards in the field of nuclear and radiation safety by the State Nuclear Regulatory Committee of Ukraine, approved by SNRCU Order of 10. 07. 2002 No 83”. (see also section 4.3)

According to Art. 5 of Chapter V “**Final provisions**” of the Law of Ukraine “**On the Licensing in the field of Use of Nuclear Energy**”, “the Operator is a legal person appointed by the State, who carries out activities related to a radioactive waste disposal facility siting, design, construction, operation and closure; and ensures nuclear and radiation safety and bears responsibility for the nuclear damage. The Operator shall obtain a licence for activities at certain lifecycle stages of a radioactive waste disposal facility, develop and implement measures to enhance safety and provide radiological protection of personnel, public and environment.

According to item 3.1.5 “**General Provisions on the Safety Ensuring during the radioactive waste Geological Disposal**” the Operator of a geological disposal facility shall ensure its nuclear and radiation safety, develop and implement measures to enhance the facility safety in conformity with Art. 33 of the Law of Ukraine “On the Use of Nuclear Energy and Radiation Safety”.

According to Art. 12 of the Law of Ukraine “On the Licensing in the field of Use of Nuclear Energy”, the Operator, within the framework of obtaining a licence for activities at a separate stage of a radioactive waste disposal facility lifecycle, has to submit to the Regulatory Body an application and ... documents to witness the disposal safety level, the list of which is drawn up by the Regulatory Body. SNRCU plans revisions and development of regulatory documents concerning requirements for the documents that witness the geological disposal facility safety level, a basic document being the safety analysis report of a geological disposal facility.

Other requirements of the Law of Ukraine “**On the radioactive waste Management**” and of the Law of Ukraine “**On the Use of Nuclear Energy and Radiation Safety**” could also be mentioned here.

According to item 2.8 “**General Provisions on the Safety Ensuring during the radioactive waste Geological Disposal**”, the safety of a geological disposal facility is to be properly ensured during both operational and post-closure periods. A geological disposal facility meets the safety requirements at design, operation and post-closure stages, if doses to personnel and members of the public under normal and abnormal operation conditions and in case of design-basis accident do not lead to the exceeding of established dose limits. According to item 3.2.7, the analysis of social, political and economical aspects, which play an important role in the siting process, is conducted at the stage of regional investigation. Also, according to item 3.2.10, a site characterization stage results in a choice of one appropriate site, with consideration given to economical, environmental, social and political factors. And according to item 3.2.14, a site is chosen so as to obtain the most social and economical advantages from a disposal location, construction and operation on a given territory.

In consideration of the answer in item 10.16 concerning the responsibility of the Operator of a geological repository, it is worth mentioning that, according to item 2.5 of “General provisions on the safety ensuring during radioactive waste geological disposal”, after the closure of the repository, the geological disposal shall ensure long-term containment and isolation of the waste with the use of means, which will allow to exclude further actions of safety maintenance, protection of human health and the environment.

In accordance with the Ukrainian legislation, the Operator of a geological disposal facility is fully responsible for the facility safety ensuring at all lifecycle stages.

Also, according to item 2.5 after the closure of the facility, the geological disposal shall ensure long-term containment and isolation of the wastes with the use of means, which will allow to exclude further actions of safety maintenance, protection of human health and the environment; Item 2.8: states that a geological repository satisfies the safety requirements at design, operation and post-closure stages, if doses to personnel and members of the public under normal and abnormal operation conditions and in case of design-basis accident do not lead to the exceeding of established dose limits.

According to item 3.2.17 of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”, a site isolating characteristics are chosen based on a requirement to ensure that doses to people during operation and post-closure periods are kept at a level, which does not exceed the established dose limits. Requirements concerning the multi-barrier protection are formulated in items 2.4 (second paragraph), 2.8 (second and third paragraphs), and 3.1.2 to 3.1.3 of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”.

Requirements on the properties of engineered barriers, including the waste form and packaging and geological host rock are formulated in items 3.3.35 (containers) and 3.2.15 – 20 of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”.

According to item 3.3.3 of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”, depth and design of a repository and of its engineered barriers are chosen in such a way as to ensure a long-term isolation of radioactive waste from the biosphere. According to item 3.3.7, the underground part of a repository is to be designed so as to provide confinement of the consequences of emergencies or accidents, if any.

According to item 3.2.2 of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”, the selection of a site for a geological disposal facility is a step-by-step process based on a comprehensive approach, with a progressive enlargement of scale of studies and investigations, consideration of alternatives and use of the principle of conservation. According to item 3.2.3, the selection of a site for a geological repository includes the stages of: development of a repository concept, regional investigation and screening, site characterization, and confirmation of a site selection (items 3.2.4 to 3.2.11).

In accordance with the Ukrainian legislation, the establishment of a geological repository envisages implementation of siting, design, construction, operation and closure stages.

According to Art. 5 of Chapter V “Final provisions“ of the Law of Ukraine “**On the Licensing in the Field of Use of Nuclear Energy**”, the Operator’s responsibilities include regular re-assessment of the safety of a radioactive waste disposal facility and submission of appropriate reports to the Regulatory Body. Also, item 4.1.15 of the “**General provisions on the safety ensuring during radioactive waste geological disposal**” mentions that the geological disposal facility safety assessment results shall be documented and presented in the form of a safety analysis report. Safety analysis reports are subject to regular revision based on the operational experiences or changes in factors that influence the safety. The time interval for revision of safety analysis reports is established by SNRCU. Besides, item 3.5.5 sets a requirement that a geological disposal facility closure plan (project) shall include an updated safety analysis with account taken of changes in the design and of the site of a geological repository during its operation.

In the regulation in force it is not required by the Regulatory Body that the safety case and safety assessments be sufficiently detailed and comprehensive to provide a necessary technical contribution to the information for taking regulatory and other decisions required at each stage. The Team was informed that the requirements in par. 3.43 to 3.44 of standard WS-R-4 will be included

in the regulatory document “Requirements to the structure and contents of the safety analysis report for a geological repository at different lifecycle stages”, which is planned to be developed in the future.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** WS-R-4 § 3.42. states “*A safety case and supporting safety assessment shall be prepared and updated by the operator, as necessary, at each step in the development, operation and closure of the geological disposal facility. The safety case and safety assessment shall be sufficiently detailed and comprehensive to provide the necessary technical input for informing the regulatory and other decisions necessary at each step.*”
- (2) **BASIS:** WS-R-4 § 3.45. states “*The safety case for a geological disposal facility shall describe all the safety relevant aspects of the site, the design of the facility, and the managerial and regulatory controls. The safety case and its supporting assessments shall illustrate the level of protection provided and shall provide assurance that safety requirements will be met.*”
- (3) **BASIS:** WS-R-4 § 3.50 states “*The safety case and its supporting safety assessments shall be documented to a level of detail and quality sufficient to support decisions to be made at each step and to allow for their independent review.*”

S28 **Suggestion:** When developing the planned regulatory document “Requirements on the Structure and Contents of the Safety Analysis Report for a Geological Repository at Different Lifecycle Stages” the IAEA safety standards should be taken into consideration.

According to item 3.2.15 of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”, detailed and overall investigation of the site is undertaken to obtain data on its further evolution and probable development in the future in order to assess the impact on safety of characteristics, events and processes related to the site and repository; natural, social and technogenic characteristics and their impact on the safety of the geological disposal facility are also taken into consideration. The siting process for a geological repository includes several stages: development of a geological disposal concept, regional investigation and screening, site characterization, and confirmation of the site, including installation of an underground laboratory to obtain additional information required for detailed design, repository safety analysis and environmental impact assessment.

The Regulatory Body established requirements to the stage of site characterization for a geological disposal facility **in items 3.2.8 to 3.2.10** of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”. At this stage, the Operator establishes and the Regulatory Body assesses the conformity of prospective sites with radiation safety requirements, the disposal concept as whole and siting criteria, including the impact on the safety of specific features, events and processes. Site characterization stage results in a choice of one appropriate site with account taken of economical, environmental, social and political factors

According to **item 3.1.4** of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”, a geological disposal facility has to ensure: waste confinement till the moment of activity decay due to disintegration of most short-lived radionuclides; waste isolation from the biosphere and considerable decrease in probability of unintended human intrusion in the disposal structure; delay of any substantial migration of radionuclides into the biosphere until the moment in the distant future when most of the activity has decayed.

The mentioned requirement is described in detail in **items 3.2.17 to 3.2.22 “General provisions on the safety ensuring during radioactive waste geological disposal”**. Besides, it is required that, at every siting stage, a modelling assessment of environmental impact be performed to identify, coordinate and refine the data obtained (**3.2.23**). Also, the influence of chemical and physical processes (heat generation, ionizing radiation etc.) on the state of host rocks and stability of mines is to be taken into consideration in the safety assessments (**item 4.1.6**).

According to **item 3.4.2** of the **“General provisions on the safety ensuring during radioactive waste geological disposal”**: a geological disposal facility operation shall be planned and implemented in such a way that the doses to personnel, and members of the public do not exceed the established dose limits under normal and abnormal operating conditions and in case of a design-basis accident and be limited in case of a beyond-the-design-basis accident, and the amount of gas and aerosol releases and water discharges meet the defined levels.

Item 5.2 of the **“Provisions on the List and Requirements to the Form and Contents of Documents to be Submitted by the Operator to Obtain a Licence for an Activity at a Certain Stage of a Radioactive Waste Disposal Facility Lifecycle”** points out that, to obtain a licence for activities at the stage of construction of a radioactive waste disposal facility, the Operator shall submit to the Regulatory Body, in particular: a copy of conclusions of the comprehensive state expert assessment of the facility construction project, conducted in compliance with the **“Procedure of Approval of Investment Programmes and Construction Projects and of its Comprehensive State Expert Assessment”**, approved by enactment by the Cabinet of Ministers of Ukraine of 17.08.98 No. 1308; and the safety analysis report for the disposal facility at the stage of construction. It means that, after the construction licence is obtained, the Operator is obliged to construct the facility only in accordance with the project that received positive conclusions of the comprehensive state expert assessment including the state expert assessment of nuclear and radiation safety.

If, in the process of the facility construction, the Operator intends to introduce and implement any changes to the project (design), then, according to Art. 40 **“State expert assessment of nuclear and radiation safety”** of the Law of Ukraine **“On the Use of Nuclear Energy and Radiation Safety”**, the changes to the safety requirements and limits for radioactive waste management facilities are subject to a compulsory state expert assessment. This means that the Operator is allowed to implement a change to the design only after positive conclusions of this expert assessment have been received.

Art. 29 **“Responsibility for a Violation of the Legislation in the Field of radioactive waste Management”** envisages the responsibility for: violation of legislative requirements as to compulsory state expert assessments and for not taking into account its conclusions; and putting into operation radioactive waste facilities prior to completion of the whole complex of facilities envisaged in the project.

Item 3.3.22 of the **“General provisions on the safety ensuring during radioactive waste geological disposal”** points out that a disposal facility shall be designed with the account taken of the necessity of its closure in the future. According to **item 3.5.1**, a geological facility shall be closed in accordance with the licence conditions in such a way that the long-term safety functions, which depend on the repository backfilling and sealing processes, are provided. The programme of a geological disposal facility closure is developed during designing and is a component part of the design; the programme is revised during the facility operation. According to **item 3.5.3**, the system of sealing, which determines to a great extent the long-term safety of a geological repository, has to be operational after its closure during a period of time defined based on the safety analysis results. The plan of geological disposal facility closure is developed on the basis of the mentioned programme (**items 3.5.2, 3.5.4**).

It is stipulated in item **3.4.1** of the “**General provisions on the safety ensuring during radioactive waste geological disposal**” that the operation of a geological disposal facility is carried out by the Operator based on an appropriate licence issued by SNRCU in accordance with **Art. 43** of the Law of Ukraine “**On the Use of Nuclear Energy and Radiation Safety**”.

The facility operation, in particular, includes (**item 3.4.1**) ...radioactive waste emplacement in the disposal facility in conformity with the design requirements for safety during the operation and for long-term safety (the term “long-term safety of a disposal facility” means the safety, which has to be ensured after closure of the facility for the period, during which the waste is deemed hazardous).

It is stipulated in **item 3.3.22** of the “**General provisions on the safety ensuring during radioactive waste geological disposal**” that a geological disposal facility is designed taking into consideration the necessity of its closure in the future. The geological repository design includes the repository closure programme, the contents of which are defined in **item 3.5.2** of this document. The Law of Ukraine “On the Licensing in the Field of Use of Nuclear Energy” requires licensing of activities at each stage of a radioactive waste disposal lifecycle, including the closure stage.

According to **Art. 32** of the Law of Ukraine “**On the Licensing in the Field of Use of Nuclear Energy**” the Licensee shall have financial, material and other resources; as well as and appropriate organizational structure and personnel required for maintaining the safety level envisaged in regulations, rules, and in the conditions of the license.

According to item 3.3.31 of the “**General provisions on the safety ensuring during radioactive waste geological disposal**” the radioactive waste acceptance criteria have to be prepared by the future operator of the geological repository and approved by SNRCU. Article 3.3.33 of the above mentioned document states that radioactive waste accepted for disposal shall have been characterized to provide the full information on the conformity with the acceptance criteria.

According to item 3.3.5 of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”, the repository design includes as a component part and takes into account the programme of environmental monitoring during repository operation. Nevertheless no requirements for the structure and the contents of the “Programme of environmental monitoring during the repository operation” are established in effective regulations, e.g. that information required for confirmation of conditions necessary to ensure the safety of personnel, public and the environment throughout the period of the repository operation be collected and updated, and that absence of any conditions that can compromise the safety after the facility closure be confirmed.

According to **item 3.5.6** of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”, to ensure the monitoring of a place, where radioactive waste is disposed of, the active and passive administrative controls are executed within the framework of passive administrative control, long-term record keeping and transfer to future generations of the information related to the safety of a geological repository. At present the mentioned regulation does not require that plans must be prepared concerning the extent of the institutional control and concerning measures to ensure that the information on a geological repository be consistent with the passive safety requirements and be part of the safety case, based on which the licence for facility closure is issued.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** WS-R-4 § 3.73. states “*A programme of monitoring shall be defined and carried out prior to and during the construction and operation of a geological disposal facility. This programme shall be designed to collect and update the information needed to confirm the conditions necessary for the safety of workers and members of the public and the protection of the environment during the operation of*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

the facility, and to confirm the absence of any conditions that could reduce the post-closure safety of the facility.”

- (2) **BASIS:** WS-R-4 § 3.76. states “Plans shall be prepared for the post-closure period to address the issue of institutional control and the arrangements for maintaining the availability of information on the geological disposal facility. These plans shall be consistent with passive safety and shall form part of the safety case based on which authorization to close the facility is granted.

- S29 **Suggestion:** SNRCU should, when reviewing regulations, consider the possibility of including a requirement for a comprehensive monitoring programme covering all phases of the lifetime of a geological repository and on passive safety features during the post-closure period.

According to **item 3.3.5** of the “**General provisions on the safety ensuring during radioactive waste geological disposal**”, the disposal facility design shall provide for and take into account the quality assurance programme. According to **item 3.3.24**, the geological disposal facility design shall include quality assurance measures aimed at ensuring that the repository is designed, constructed and operated in conformity with the established safety requirements. It should be mentioned as well that requirements of the regulatory document “**Requirements to the Quality Assurance Programme at all Stages of a Nuclear Facility Lifecycle**” also apply to a geological disposal facility.

Conclusion

Geological disposal is an option that is included in the updated version of the National Programme, which is under review and approval by the Government at this moment. Regulatory requirements have been established ensuring an adequate site evaluation for new disposal facilities and containing specific safety requirements and criteria for the design and construction of such facility. Nevertheless there are specific requirements for the post-closure phase, addressing inter alia institutional controls that should be developed more in detail. More attention deserves also the development of the safety assessment report for geological disposal facilities.

7.8. DECOMMISSIONING OF NUCLEAR AND OTHER FACILITIES CONTAINING RADIOACTIVE MATERIALS

Introduction

The term ‘decommissioning’ refers to the administrative and technical actions taken to allow the removal of some or all of the regulatory requirements from a facility (except for a repository, for which the term ‘closed’ and not ‘decommissioned’ is used). A facility means a building and its associated land and equipment in which radioactive material is produced, processed, used, handled or stored on such a scale that consideration of safety is required. Decommissioning is increasingly becoming a major issue, since hundreds of facilities will end their operational lifetimes over the next 50 years. Decommissioning activities are performed with an optimized approach to achieving a progressive and systematic reduction of the radiological hazards, and are undertaken on the basis of planning and assessment to ensure the protection of workers, the public and the environment, both during and after decommissioning operations. A facility is considered decommissioned when an approved end state has been reached. Subject to national legal and regulatory requirements, this end

state encompasses partial or full decontamination and/or dismantlement, with or without restrictions on further use.

Findings

In accordance with Art. 6 of the Law of Ukraine "**On the Licensing Activity**", the decommissioning is a separate stage of a nuclear facility lifecycle and the Operator is obliged to obtain a licence for this stage. Art. 4 of the Law of Ukraine "**On the Use of Nuclear Energy**", and Art. 4 of the Law of Ukraine "**On the Licensing Activity**" establish basic principles of radiation protection during the use of nuclear energy including for decommissioning.

The SCNRU has issued regulations for protection against, and mitigation of, potential exposures that may result from an incident or accident during decommissioning. According to item 11.12. of the "**General Provisions on NPP Safety**" (ЗПБ АЕС-2007) before starting the NPP (or power unit) decommissioning activities, the Operator has to have adapted his emergency response plans to new conditions". Item 3.5.3 of the "**Requirements to Structure and Contents of the Safety Analysis Report for the Decommissioning of NPPs and Research Nuclear Reactors**" (НІІ 306.3.02/3.040-2000) establishes that the subsection "Analysis of potential accidents" shall include information on potential accidents at the decommissioning stage and provide for measures to prevent accidents and mitigate its consequences." Annex to this regulatory document contains a "Tentative list of potential accidents".

The members of the Team asked for an example of a safety assessment report for decommissioning activities. This example could not be provided, as all NPP units were sited and designed in Soviet time. Therefore there is no decommissioning plan included in the project documentation. But in 2004 the NPP operator, Energoatom, prepared the concept of decommissioning of all NPP units; based on this generic concept, NPPs are preparing the unit specific concepts. In Ukraine the "decommissioning plan" is named "concept for decommissioning".

For the research reactor in Kiev the decommissioning plan was prepared and it is expected that it will be reviewed within the framework of the IAEA regional project. For the research reactor in Sevastopol there is no decommissioning plan, but the licence condition for the operation requires the preparation of such plan.

According to sub-item 4) of item 4 of the Provisions on SNRCU, approved by enactment by the Cabinet of Ministers of Ukraine of 27.12.06 No 1830: "SNRCU, in compliance with its tasks, shall develop and implement arrangements to foster the safety culture in the field of use of nuclear energy".

Item 2.50. of ЗПБ АЕС-2007 indicates that "**Safety culture** is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance". According to item 4.2.2. "The safety culture ensuring is among the fundamental principles", item 5.1.2. envisages that "each NPP shall develop and implement a programme of actions aimed at the safety culture development. This programme comprises three levels:

- technical policy of the management in the field of safety;
- management responsibilities as to the NPP safety ensuring; and
- responsibilities of each member of personnel as to the NPP safety ensuring.

According to item 3.1.1. of ЗПБ АЕС-2007: "A basic objective of the NPP safety is to ensure personnel, public and environment protection from unacceptable radiation effects during NPP commissioning, operation and decommissioning." According to item 11.6. of ЗПБ АЕС-2007: "A component part of the NPP decommissioning plan are measures to ensure personnel, public and environment radiation protection and works related to the management of nuclear fuel, radioactive

and other hazardous wastes and materials."

Item 11.1. of **ЗПБ АЕС - 2007** establishes that decommissioning of a NPP unit is aimed at achieving conditions, which would allow the re-use of its territory. Total or restricted release from regulatory control is to be achieved as the result of decommissioning. Item 11.15. points out that "After completion of all works envisaged in the NPP decommissioning plan, the Operator implements measures to achieve total or restricted release from regulatory control of the NPP territory."

Criteria for the exemption of practices from regulatory control are established in item 9.4. of **HPBY-97**. In the case of a release of a nuclear facility other criteria should be considered, such as the environmental background existing at the site when the NPP was authorized for operation as well as the background existing at the site at the moment of the shutdown. Moreover the possibility of a construction of another NPP at the same site should be considered; that means that the requirement for re-use of the site could be higher than 10 µSv/year.

In general, some of the requirements are described in:

- the Law of Ukraine "On the settlement of issues related to the nuclear safety ensuring";
- item 10 of the General Provisions on the NPP Safety (2007); and
- regulatory document "Requirements to structure and contents of the safety analysis report for the decommissioning of NPPs and research nuclear reactors".

Criteria for determining when a facility, or a part of it, is permanently shutdown are set in chapter 9.4 and 9.5 of **HPBY-97** for green field (10 µSv/y and 1 man.Sv). For brown field they have to be set by the regulatory body. The licence is terminated based on chapter 11.15 of **HP 306.2.141-2008** "**General Requirements on the NPP Safety Provisions**".

Criteria for the decommissioning of facilities, including criteria for clearance of material during decommissioning can be found in chapter 15.1.6 of Sanitary Rules and chapter 3.4 B) of **HP 306.3.04/2.002-97** (surface contamination).

Some requirements for decommissioning planning can be found in chapter 11 of **HP 306.2.141-2008** "**General Provisions on the NPP Safety**" and Order of CMU No **594** from 27. 4. 2006 on the review and approval of decommissioning project. The project is build up according to the concept, which also is a basis for the financial assessment of decommissioning activities. The Government is managing the decommissioning fund.

According to item 9.8 of **HPBY-97**, a restricted release (i.e. release from certain regulatory controls) of practical activities is allowed under conditions established by regulatory bodies. At the same time, item 9.9 states that "detail requirements to the procedure of exemption, as well as detailed list of relevant conditions, are set in a separate document to be developed by the regulatory bodies". At present, this document does not exist.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** WS-R-5 § 2.5. states "*Environmental radiation protection, consistent with that for a practice, shall be maintained during the entire decommissioning process and beyond if a facility is released with restrictions on future use. If there are no such restrictions, the site and the facility shall meet the pertinent regulatory end point criteria*".

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (2) **BASIS:** WS-R-5 § 6.5. states *“If the decommissioned facility is released with restrictions on its future use, financial assurance that is adequate to ensure that all necessary controls remain effective shall be obtained before authorization is terminated.”*
- (3) **BASIS:** WS-R-5 § 9.6. states *“If a facility cannot be released for unrestricted use, appropriate controls shall be maintained to ensure the protection of human health and the environment. These controls shall be specified and shall be subject to approval by the regulatory body. Clear responsibility shall be assigned for implementing and maintaining these controls. The regulatory body shall ensure that a programme has been established to apply the remaining regulatory requirements and to monitor compliance with them.”*
- R19 **Recommendation:** The SNRCU should include, in the future revision of regulations, special requirements for the release of NPP sites from regulatory control after decommissioning in accordance with the IAEA Safety Standards.

In the framework of the national legislation, the issues of decommissioning procedure (including a requirement to develop a decommissioning concept and project), of safety during decommissioning and of establishment of financial resources for decommissioning are dealt within the:

- **Law of Ukraine "On the Settlement of Issues Related to the Nuclear Safety Ensuring";**
- enactment by the Cabinet of Ministers of Ukraine of 27. 04. 06 No 594 **“Issue of Build-up and Use of the Reserve Fund for Nuclear Facilities Decommissioning”**; and
- regulatory document **“General Provisions on the NPP Safety”** (2007), in particular in item 10.

For example the RADON facilities do not have decommissioning plans yet, but their revised licensing documentation will contain a decommissioning plan according to the HPI 306.4.142-2008 “Requirements to the Structure and Content of the Safety Assessment Report of the radioactive waste Storage Facilities”.

In case when an organization has a licence to carry out activities related to a separate stage of a nuclear facility lifecycle or to radioactive waste management activities or facilities, this organization is held responsible for the fulfilment of effective legislative requirements in the field of use of nuclear energy including decommissioning.

In general, safety requirements are set forth in the regulatory documents: **“General Provisions on the NPP Safety” (ЗПБ АЕС-2007)**, in particular, in item 10; and **“Requirements to Structure and Contents of the Safety Analysis Report for the Decommissioning of NPP and Research Nuclear Reactors”**.

The Team was informed that, in addition to **ЗПБ АЕС-2007**, more detailed requirements are to be included in the regulatory document “Requirement to the procedure of cessation of a nuclear facility operation and decommissioning”, which is planned to be developed in 2008- 2009. The radioactive waste management is regulated by a set of 26 national regulations covering also the waste from decommissioning.

Decommissioning activity is licensed following a separate process. The contents of the decommissioning project is set up in Law No. 1868-IV **“On the Settlement of Issues Related to the Nuclear Safety Provisions”**

The project has to be assessed by six regulators and at the stage of project licensing process the public is not consulted. However the Law of Ukraine states "**On the Use of Nuclear Energy**" in chapter 11 states that "Citizens and their groups have the right to participate in discussions of draft legislation documents and programmes for the use of nuclear energy, and also to participate in discussions of issues associated with the siting, design, construction, operation, and decommissioning of nuclear installations or ionizing radiation sources. ... The procedure for holding the public hearings is established by the Cabinet of Ministers of Ukraine."

Besides, more detailed requirements are to be included in regulatory document "**Requirements to the Procedure of a Cessation of Nuclear Facility Operation and Decommissioning**", which is planned to be developed in 2008 to 2009.

Art. 4 and 5 of the Law of Ukraine "**On the Settlement of Issues Related to the Nuclear Safety**" require the development of the decommissioning plan. And enactment by the Cabinet of Ministers of Ukraine of **27.04.06 No 594 "Issue of build-up and use of the reserve fund for nuclear facilities decommissioning"** approves the "**Procedure of review and approval of a nuclear facility decommissioning plan**", according to which the Operator is obliged to submit the final decommissioning plan 18 months before the scheduled date of cessation of operation.

According to item 11.2. of **ЗПБ АЕС -2007**: "A nuclear plant design shall include a section with basic provisions on the safe NPP decommissioning", and item 11.4 stipulates that "in the process of NPP operation, the Operator takes into consideration the future decommissioning and takes measures to prepare for the decommissioning".

According to Art. 32 of the Law of Ukraine "**On the Use of Nuclear Energy**": "A Licensee bears full responsibility for the radiation protection and safety of a nuclear facility or ionizing radiation source, regardless of activities and responsibilities of suppliers and nuclear and radiation safety regulatory bodies. "A licensee's authority with respect to the types of activities mentioned above are in force only after obtaining the appropriate written authorization from the state regulatory body for nuclear and radiation safety. Revocation of such permit shall not relieve the licensee from responsibility for the safety of the nuclear installation or ionizing radiation source until it is transferred to the other entities or until a permit is renewed"

Requirement to develop a financial mechanism for nuclear facilities decommissioning is described in Art. 33 of the Law of Ukraine "**On the Use of Nuclear Energy and Radiation Safety**". Legal and organizational basis for the financial provision of cessation of nuclear facility operation and decommissioning is described in the **Law of Ukraine "On the Settlement of Issues Related to the Nuclear Safety "**. **Enactment No 594 of 27.04.06** approved provisions on the Operator's special account and amount of assignments.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** WS-R-5 § 1.9 states "... *This publication applies to all types of facility, including nuclear power plants, research reactors, fuel cycle facilities, manufacturing plants, medical facilities, research and university laboratories and other research facilities. ...*"
- (2) **BASIS:** WS-R-5 §5.1. states "*The operating organization shall prepare and maintain a decommissioning plan throughout the lifetime of the facility, unless otherwise approved by the regulatory body, in order to show that the decommissioning can be accomplished safely to meet the defined end state.*"

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (3) **BASIS:** WS-R-5 §5.4. states *“For new facilities, consideration of decommissioning shall begin early in the design stage and shall continue through to the termination of the practice or the final release of the facility from regulatory control. The regulatory body shall ensure that operators take into account eventual decommissioning activities in the design, construction and operation of the facility, including features to facilitate decommissioning, the maintenance of records of the facility, and consideration of physical and procedural methods to prevent the spread of contamination.”*
- (4) **BASIS:** WS-R-5 §5.7. states *“This initial plan shall be reviewed and updated periodically, at least every five years or as prescribed by the regulatory body, or when specific circumstances warrant, such as if changes in an operational process lead to significant changes to the plan. Revisions or amendments shall also be made as necessary in the light of operational experience gained, new or revised safety requirements or technological developments. If an incident or accident occurs, the decommissioning plan shall be reviewed as soon as possible and modified as necessary.”*
- S30 **Suggestion:** Existing experience in regulating decommissioning of NPP should be extended, applying a graded approach, to other facilities such as radioactive waste management facilities including storage facilities, research laboratories, irradiators, etc.

According to item 11.12. of **ЗПБ АЕС-2007** "Before the start of NPP decommissioning operations, the Operator shall have adapted to new conditions: Quality management system; Decommissioning information support system; Radiation protection programme; Nuclear fuel management programme; Radioactive waste management programme and Emergency response plan."

According to item 11.6. of **ЗПБ АЕС - 2007** "A component part of the NPP decommissioning plan are measures to ensure radiation protection of personnel, public and environment and works related to the management of nuclear fuel, radioactive and other hazardous wastes and materials."

НП 306.3.02/3.040-2000 establishes "Requirements to structure and contents of the safety analysis report for the decommissioning of NPPs and research nuclear reactors".

According to item 11.7. of **ЗПБ АЕС - 2007** "Before development of the decommissioning plan, the Operator undertakes a comprehensive engineering and radiological surveys of the condition of structures, systems and components in order to evaluate their contamination level, volumes and characteristics of radioactive and other hazardous materials and wastes accumulated during operation, and in order to forecast changes in the basic characteristics of structures, systems and components in time."

According to item 11.15. of **ЗПБ АЕС – 2007** "After completion of all works envisaged in the NPP decommissioning plan, the Operator implements measures to obtain total or restricted release from regulatory control of the NPP territory". The Operator submits to SNRCU an application and report on the completion of decommissioning works in compliance with the NPP design."

A direct requirement does not exist for the planning for decommissioning to be based on the decommissioning strategy, as defined by the operator. In present time the decommissioning strategy and the national decommissioning and waste management policy are under approval by the

Government. In development of documents, which define the national policy of radioactive waste management (State programme of radioactive waste management); decommissioning needs are taken into account.

The Team was informed that according to Art.4 of the **Law of Ukraine "On the Settlement of Issues Related to the Nuclear Safety Ensuring"**: "Cessation of operation of a nuclear facility and its decommissioning are implemented on the basis of a nuclear facility decommissioning plan". A nuclear facility decommissioning plan is developed by the Operator based on the concept of decommissioning and shall comply with nuclear and radiation safety rules, regulations and standards in force. The recommendation made before to approve as soon as possible the National Programme and the National Strategy on Radioactive Waste Management is also relevant to this point.

The Team was informed that the SCNRU does not require that immediate dismantling of NPP after shutdown is the preferred decommissioning strategy.

According to item 11.11. of **ЗПБ АЕС – 2007** "If a decision is taken to proceed to a decommissioning with a deferred dismantling of a part of NPP, the Operator shall envisage measures for conservation of this part. In this case, the Operator takes into account the ageing of equipment and structures, in particular, carries out monitoring of safety-related structures, systems and components, and, if required, makes arrangements to ensure their reliability".

Item 11.13 of **ЗПБ АЕС – 2007** stipulates that: "During NPP decommissioning the Operator shall provide radiation monitoring to control: individual doses of personnel exposure; radiological condition of premises; activity releases in the environment; and management of nuclear fuel, radioactive materials and wastes". In Item 11.14 "Operator shall provide physical and fire protection during the whole period of NPP unit decommissioning". It is further stated that "After completion of all works envisaged in the NPP (unit) decommissioning plan, the Operator implements measures to obtain total or restricted release from regulatory control of the NPP territory."

There is a document of the NPP operator on the selection of decommissioning option based on HII 306.2.02/1.004-98, as amended by HII 306.2.141-2008 "General Provisions on the NPP Safety".

The operator is responsible for the facility decommissioning and generates funds for conducting the decommissioning activities. There is no special executive board dealing with this issue (enactment No. 594 by the Cabinet of Ministers, dated 27/04/2006).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1) **BASIS:** WS-R-5 § 4.2 states "*If the deferred dismantling or entombment strategy is chosen, the operating organization shall provide a justification for the selection. The operating organization shall also demonstrate that, for the selected strategy, the facility will be maintained in a safe configuration at all times and will be adequately decommissioned in the future and that no undue burdens will be imposed on future generations.*"

S31 **Suggestion:** Currently there are two legal documents containing provisions for NPP decommissioning - HII 306.2.02/1.004-98 and HII 306.2.141-2008. However, the latter one does not contain as much detail as the previous one, such as the justification of the decommissioning option selection. The SNRCU should consider retaining and updating the detailed information available in HII 306.2.02/1.004-98 in future regulatory documents on decommissioning.

According to item 11.10. of **ЗПБ АЕС – 2007**: "Works at the stage of NPP decommissioning are

to be undertaken on the basis of an appropriate licence issued by SNRCU. Before the licence is obtained, only the activities of spent nuclear fuel discharging from the core and transfer to the cooling pool and external storages, of radioactive waste and radioactive material management, of working media removal and equipment decontamination can be allowed. These works can be carried out within the framework of the NPP operation licence and in compliance with the safe operation technological instructions (rules)."

According to item 11.9. of **ЗПБ АЕС – 2007**: "After all the nuclear fuel is retrieved from the unit, further NPP decommissioning activities are regulated by the general safety provisions established for radioactive waste management entities".

The Team was informed that the decommissioning strategy does not comprise provisions to ensure that, if final shutdown occurs before a final decommissioning plan is prepared, adequate arrangements are provided to ensure the safety of the facility until a satisfactory decommissioning plan can be prepared and implemented. At the same time, **Art. 5 of the Law of Ukraine "On the Settlement of Issues Related to the Nuclear Safety Ensuring"** stipulates that "In the absence of an approved NPP decommissioning plan, decommissioning activities are financed from the funds of the Operator's economical activities".

The Team was also informed that in the case of a sudden shutdown of a facility (e.g. as a consequence of a severe accident), there is not a requirement that the facility shall be brought to a safe configuration before an approved decommissioning plan is implemented, and that the decommissioning strategy in that case shall be reviewed on the basis of the situation that caused the sudden shutdown to determine whether revision is required.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** WS-R-5 § 4.4. states *"The decommissioning strategy shall include provisions to ensure that, if final shutdown occurs before a final decommissioning plan is prepared, adequate arrangements are provided to ensure the safety of the facility until a satisfactory decommissioning plan can be prepared and implemented."*
- (2) **BASIS:** WS-R-5 § 4.5. states *"If the shutdown of a facility is sudden (e.g. as a consequence of a severe accident), the facility shall be brought to a safe configuration before an approved decommissioning plan is implemented. The decommissioning strategy shall be reviewed on the basis of the situation that caused the sudden shutdown to determine whether revision is required."*
- (3) **BASIS:** WS-R-5 § 5.8. states *"A baseline survey of the site, including obtaining information on radiological conditions, shall be performed prior to construction and updated prior to commissioning of a new facility. This information will be used to determine background conditions during the end state survey. For those practices for which such a baseline survey has not been done in the past, data from analogous, undisturbed areas with similar characteristics shall be used instead of pre-operational baseline data."*

R20 **Recommendation:** The SNRCU should revise regulations relating to decommissioning to bring them into line with paras 4.4., 4.5. and 5.8 of WS-R-5.

In accordance with item 11.12. of **ЗПБ АЕС – 2007** "Before the start of NPP decommissioning works and operations, the following should have been adapted to new conditions: Nuclear fuel management programme; and the Radioactive waste management programme."

In accordance with Art. 3 of the Law of Ukraine "**On the Radioactive Waste Management**", one of the principles of national policy in the field of radioactive waste management consists in: "storage of radioactive wastes on the radioactive waste generator's site for a limited time with further transfer to specialized radioactive waste management enterprises". Radioactive waste management during decommissioning is fully regulated by regulatory documents pertaining to the radioactive waste management;"

In addition to the existing Concept of Ukrainian NPPs decommissioning, NAEC "Energoatom" (Operator) develops for each NPP a specific "Concept of decommissioning". Then, a decommissioning plan is to be developed based on the Concept of NPP decommissioning. In the course of a given facility decommissioning safety analysis, the influence of other on-site structures on the facility is taken into consideration ("Requirements to structure and contents of the safety analysis report for the decommissioning of NPPs and research nuclear reactors" (**НП 306.3.02/3.040-2000**) (п.3.2).

According to item 11.12. of **ЗПБ АЕС-2007** "Before the start of NPP decommissioning operations, the Operator shall have adapted to new conditions: Quality management system; Decommissioning information support system; Radiation protection programme; Nuclear fuel management programme; Radioactive waste management programme and Emergency response plan."

Item 1.5 of the "Requirements to structure and contents of the safety analysis report for decommissioning of NPPs and research nuclear reactors" (**НП 306.3.02/3.040-2000**) indicates that "SAR shall provide the following information about the safety analysis performed: Input data and prerequisites taken for analysis; and Analysis results. Based on the safety analysis results, SAR provides information on the measures identified to ensure radiation protection, with justification of their necessity and sufficiency. "

Art. 39 of the Law of Ukraine "**On the use of nuclear energy**" requires that "A NPP design shall provide for a decommissioning plan in compliance with regulations, rules and standards in the field of use of nuclear energy." According to item 11.2. of **ЗПБ АЕС-2007**: "A NPP design includes a section describing basic NPP safe decommissioning provisions. At the stage of design, analysis and selection of design solutions taking account of the NPP safe decommissioning shall be performed (selection of materials taking account of minimization of their contamination, accumulation and spreading of radioactive substances, minimization of the use of potentially hazardous substances etc.)." A condition stipulating the decommissioning concept development is included in the licensing conditions.

For sites that house more than one facility, it is required in chapter 3.2 of НП 306.3.02/3.004-2000 "Requirements on the Structure and Content of the Safety Analysis Report for Decommissioning of NPPs and RRs" that an overall decommissioning programme is developed for the entire site.

The Team was informed that the Operator – NAEC "Energoatom" developed and approved a branch-wise standard "**Requirements to the Contents of NPP Decommissioning**". According to item 5.5 of this document, the decommissioning concept shall be revised at least once every 10 years, and in case new information appears about factors that influence a facility decommissioning (i.e. about facility condition, development of decommissioning and radioactive waste management techniques and processes, development of new or updating of effective regulatory or branch-wise documents etc.).

The Team was informed that a baseline survey of the site, including obtaining information on radiological conditions, is performed prior to construction and updated prior to commissioning of a new facility according to the "**Requirements to NPP siting**". Nevertheless there is not requirement on the further use of this information to determine background conditions during the end state survey.

Item 5.4 of **HP 306.5.02/3.017-99 "Requirements to the Quality Assurance Programme at all Stages of A Nuclear Facility Lifecycle"** requires that: "a procedure for identifying, checking, approving and keeping records, which provide evidences of the product or process quality (i.e. personnel qualification, process performance parameters, readings of registering equipment, inspection and test results, welding control results etc.) shall be in place. A system has to be established to provide collection, coding or indexing, registration, storing, maintenance, updating, correction and distribution of records. Records have to be clear, complete, and suitable for identification and use". Item 5.5 states that "Time limits for storage of records shall be established in documents and controlled. Proper storages for records have to be provided". According to item 6.9.1. of **ЗПБ АЕС-2007**: "Operator and NPP create a system of collection, analysis and use of the operation experience. Appropriate databases are to be accessible for all NPs".

In item 9.1 of the regulation **"General Safety Requirements for Decommissioning NPP"** there is a requirement on the retention, as far as possible, of the key staff and institutional knowledge about the facility. There is a special requirement that appropriate records and reports, relevant to decommissioning (e.g. records on the use of the facility, events and incidents, radionuclide inventories, dose rates and contamination levels), are retained during the life of the facility as a way of assuring that the design and modifications of the facility and its operating history will be identified and factored into the decommissioning plan.

According to item 11.11. of **ЗПБ АЕС – 2007** "If a decision is taken to proceed to a decommissioning with deferred dismantling of a part of NPP, the Operator shall envisage measures for conservation of this part. In this case, the Operator takes into account the ageing of equipment and structures, in particular, carries out monitoring of safety-related structures, systems and components, and, if required, makes arrangements to ensure their reliability". But the Team came to the conclusion that there is not a requirement on the use of passive safety systems during the deferred dismantling period in national legal documents.

Item 11.1. of **ЗПБ АЕС - 2007** establishes that "A NPP decommissioning is aimed at achieving conditions, which would allow the re-use of its territory. Total or restricted release from regulatory control is to be achieved in the result of an NP power unit decommissioning", item 11.15 states that "After completion of all works envisaged in the NPP decommissioning plan, the Operator implements measures to obtain total or restricted release from regulatory control of the NPP territory."

According to items 2 to 5 of the **"Procedure of a NPP Decommissioning Plan Review and Approval"**, approved by enactment by the Cabinet of Ministers of Ukraine of 27.04.06 No 594, the Operator submits, 18 months before the date of cessation of operation, the decommissioning plan for the state expert assessment, which is conducted in compliance with the procedure established for investment programmes and construction projects (which envisages, according to enactment by the Cabinet of Ministers of Ukraine of 11.04 02 No 483, a Comprehensive state expert assessment including: sanitary and hygienic, ecological, fire safety, occupational safety, energy saving and, if required, nuclear and radiation safety state expert assessments). In case of a negative conclusion of the state expert assessment, the Operator will re-work the plan and re-submit it for the assessment. Then, the Operator submits the decommissioning plan with a positive conclusion of the state expert assessment for approval by the state administration authority in the field of use of nuclear energy and by the state nuclear and radiation safety regulatory body.

The decommissioning plan approved by the state administration and regulatory bodies is then submitted, according to the established procedure, to the Cabinet of Ministers of Ukraine for consideration (6 months before the date of cessation of the nuclear facility operation).

According to Art. 5 of the Law of Ukraine **"On the Settlement of Issues Related to the Nuclear Safety Ensuring"**: "In the absence of an approved NPP decommissioning plan, decommissioning

activities are financed from the funds of the Operator's economical activities". There are also the requirements of Art. 22 "Human and financial resources" of the Joint Convention on the Safety of Spent Fuel Management and Safety of radioactive waste Management, concerning the provision of sufficient financial resources to support the safety of spent fuel or radioactive waste management facilities during the operation period and for their decommissioning.

Amount of the Operator's assignments to the decommissioning fund is determined in compliance with the "**Procedure of determining the amount of the Operator's assignments to a special account**", approved by enactment by the Cabinet of Ministers of Ukraine of 27.04.06 No 594. The sufficiency of this fund is not independently controlled. Committee, made of members of Ministry of Finance, Ministry of Economics, Ministry of Fuel and Energy, SNRCU, etc. should be established in accordance to the above mentioned Procedures issued by the Cabinet of Ministers of Ukraine to manage this fund.

Art. 4 of the Law of Ukraine "**On the use of nuclear energy**" and Art. 4 of the Law of Ukraine "**On the Licensing Activity**" establish basic principles of radiation protection during the use of nuclear energy. According to Art. 32 of the Law of Ukraine "**On the use of nuclear energy**": "A Licensee bears full responsibility for the radiation protection and safety of a nuclear facility or ionizing radiation source, regardless of activities and responsibilities of suppliers and nuclear and radiation safety regulatory bodies".

Item 8.2. of **НП306.5.02/3.017-99** "Requirements to the quality assurance programme at all stages of a nuclear facility lifecycle" stipulates that "a procedure of assessment of a prospective supplier shall be established in order to ensure that a selected supplier is capable of providing supplies in conformity with quality requirements specific to a NPP. Activities of a supplier, including its sub-suppliers, are to be controlled on a regular basis by the Operator to be confident that the products supplied meet requirements.

Art. 32 of the Law of Ukraine "**On the Use of Nuclear Energy**" establishes that "Cancellation of a licence does not relieve the Licensee from the responsibility for safety of a nuclear facility or ionizing radiation source until the moment of its transfer to other persons or obtaining of a new license", and, also, that "the Licensee is obliged to notify the Regulatory Body of the transfer of an ionizing radiation source to another person having an appropriate license. The Licensee is not authorized to hand over an ionizing radiation source to a person having no appropriate license."

The Team was informed that, since practical activities on NPP decommissioning are not carried out in Ukraine, concrete procedures have not been established yet.

According to item 5.2.5. of **ЗПБ АЕС-2007** "the Operator shall ensure recruitment and training of a sufficient and necessary number of managers and specialists, whose qualification will guarantee the performance of Operator's functions". According to item 5.2.6. "the Operator appoints a NPP administration, its managers and identifies their qualifications, authorities and responsibilities".

Item 2.10 of **НП306.5.02/3.017-99** "Requirements to the quality assurance programme at all stages of a nuclear facility lifecycle" stipulates that "For all safety-related works and processes, operating instructions, programmes, process charts, operational schemes, measurement procedures and other operational, maintenance and testing documents are to be developed, as applicable". Item 5.2 states that "All works having influence on the safety and quality shall be identified, given proper consideration, described in documents (procedures, instructions, drawings etc.) and carried out in conformity with these documents". Item 5.6 states that "A proper procedure of introduction of changes to documents and records shall be established".

Item 5.4 of **НП306.5.02/3.017-99** "Requirements to the quality assurance programme at all stages of a nuclear facility lifecycle" requires that "a procedure for identifying, checking, approving and keeping records, which provide evidences of the product or process quality (i.e. personnel

qualification, process performance parameters, readings of registering equipment, inspection and test results, welding control results etc.) shall be in place. A system has to be established to provide collection, coding or indexing, registration, storing, maintenance, updating, correction and distribution of records. Records have to be clear, complete, and suitable for identification and use". Item 5.5 states that "Time limits for storage of records shall be established in documents and controlled. Proper storages for records has to be provided". According to item 6.9.1. of **ЗПБ АЕС-2007** "Operator and NPP create a system of collection, analysis and use of the operational experience. Appropriate databases are to be accessible for all NPPs".

According to Art. 32 of the Law of Ukraine "**On the Use of Nuclear Energy**": "The Licensee shall have a proper organizational structure and personnel to maintain a safety level envisaged in safety regulations, rules and standards and in conditions of the license. A Licensee shall establish requirements to personnel qualification according to their responsibility for the safe use of nuclear facilities, ionizing radiation sources and appropriate control over them, and for the proper operation of the equipment related to safety. Qualification requirements to the personnel, whose work is regulated by an appropriate licence (i.e. licensed personnel), are subject to approval by the appropriate nuclear and radiation safety regulatory body. According to item 5.2.5. of **ЗПБ АЕС-2007**, "the Operator shall ensure recruitment and training of a sufficient and necessary number of managers and specialists, whose qualification will guarantee the performance of the Operator's functions".

According to item 11.11. of **ЗПБ АЕС – 2007** "If a decision is taken to proceed to a decommissioning with deferred dismantling of a part of NPP unit, the Operator shall envisage measures for conservation of this part. In this case, the Operator takes into account the ageing of equipment and structures, in particular, carries out monitoring of safety-related structures, systems and components, and, if required, makes arrangements to ensure their reliability".

According to Art. 33 of the Law of Ukraine "**On the Use of Nuclear Energy**" "The Operator is obliged to re-assess on a regular basis, in accordance with nuclear and radiation safety rules, standards and regulations, the safety of a nuclear facility or radioactive waste disposal facility and submit a report on its results to the Regulator. A safety re-assessment can also be carried out upon request of the Regulator in case of substantial changes in the facility design or when operation experience has shown drawbacks of the previous assessment".

According to item 6.4.1. of **ЗПБ АЕС -2007**, "the Operator shall make comprehensive substantiations of the safety of the NPP and submit their results in the form of safety analysis reports and regular safety re-assessment reports".

In accordance with **ЗПБ АЕС -2007** (item 4.2.3.), general organizational and technical principles of safety include the use of well-tried (certified) engineering practices; quality management; NPP safety self-assessment; safety analysis; regulatory supervision; independent audits; consideration of human factors; radiation safety; consideration of operational experience and scientific and engineering support.

Item 11.2. of **ЗПБ АЕС-2007** envisages that "At the stage of designing, analysis and selection of design solutions taking account of the NPP safe decommissioning shall be performed (selection of materials taking account of minimization of their contamination, accumulation and spreading of radioactive substances, minimization of the use of potentially hazardous substances etc.)". Item 11.3 states that "Design of a structure, system or component shall be developed so as to enable decontamination and step-by step dismantling, as well as collection, compacting and safe storage of radioactive wastes generated during decommissioning."

Item 3.5.3 of the "**Requirements to structure and contents of the safety analysis report for decommissioning of NPPs and research nuclear reactors**" (**НП 306.3.02/3.040-2000**) stipulates

that "sub-section "Analysis of potential accidents" shall include information on potential accidents at the decommissioning stage and provide for measures to prevent accidents and mitigate its consequences".

The "Tentative list of potential accidents" in annex to this regulatory document includes accidents due to internal events, in particular: fire, explosion; flooding; load drop; pressurized vessel damage; loss of power supply; ventilation failure; chemically active substances; and destruction of structures due to corrosion, expired service life.

According to **ЗПБ АЕС -2007** (item 4.2.3.), general organizational and technical principles of safety include, in particular, the use of well-tried (certified) engineering practices. According to Art. 24 of the Law of Ukraine "**On the Use of Nuclear Energy**", the Regulatory Body conducts the expert assessment of the safety of a nuclear facility and issues appropriate authorizations. In accordance with Art. 40 of the Law of Ukraine on the "**Use of Nuclear Energy**", feasibility studies, decommissioning projects, documents containing safety substantiation and changes to safety requirements and limits of facilities are subject to compulsory state expert assessment. Conclusions of state expert assessments are binding upon all entities in the field of use of nuclear energy. However it is not directly required to justify the use of new, untried technologies.

In accordance with item 11.12. of **ЗПБ АЕС – 2007**, "Before the start of NPP decommissioning operations, the Operator shall have adapted to new conditions: Nuclear fuel management programme; and Radioactive waste management programme". According to item 3.3.4 of the "**Requirements to structure and contents of the safety analysis report for decommissioning of NPPs and research nuclear reactors**" (**НП 306.3.02/3.040-2000**), decommissioning SAR sub-section "Radioactive materials" provides information on radioactive materials inside the facility and on the site. Information on these materials location, quantity, geometry, physical state, basic physical and chemical properties, radionuclide composition, activity, and radionuclide distribution over the volume of material is provided. It is defined which materials are radioactive waste and which ones are intended for the further use.

Within the framework of development of decommissioning plans for NPP units, SNRCU established a requirement to develop a separate radioactive waste management programme at the stage of decommissioning (the requirement was formulated in a letter to the licence holder of Ukrainian NPPs in operation (NAEC "Energoatom"). To fulfil this requirement, NAEC "Energoatom" has to develop, first of all, a branch-wise standard "Requirements to structure and contents of the programme of radioactive waste management during NPP unit decommissioning", which is identified in a schedule of development of the Operator's standards for preparation for decommissioning, approved by NAEC.

According to item 11.15. of **ЗПБ АЕС – 2007** "The Operator submits to SNRCU an application and report on the completion of decommissioning works in compliance with the NPP design. Based on these documents, SNRCU makes a decision on the termination of licence and decommissioning, in compliance with the Law of Ukraine "On the Licensing Activity in the field of use of nuclear energy". It should be noted that SNRCU should develop requirements for release of facilities from regulatory control.

According to item 11.15. of **ЗПБ АЕС – 2007**, "The Operator submits to SNRCU an application and report on the completion of decommissioning works in compliance with the NPP design. Based on these documents, SNRCU makes a decision on the termination of licence and decommissioning, in compliance with the Law of Ukraine "**On the Licensing Activity in the field of use of nuclear energy**".

In accordance with Art. 8. of the Law of Ukraine "**On the Licensing Activity**", "Conditions of a licence for activities at a certain lifecycle stage, which is issued to the Operator, define works or

operations, which can be undertaken at a NPP commissioning, operation and decommissioning stages or at radioactive waste storage operation and closure stages only on the condition that an appropriate written permit was received from the Regulatory Body. Conditions and procedure of issuance of these permits are determined by the Regulatory Body“.

According to item 11.6. of **ЗПБ АЕС-2007**: "A component part of the NPP decommissioning plan are works related to the management of nuclear fuel, radioactive and other hazardous wastes and materials. Item 3.5 of the **“Requirements to structure and contents of the safety analysis report for decommissioning of NPPs and research nuclear reactors“ (НП 306.3.02/3.040-2000)** establishes that the decommissioning SAR shall include a sub-section “Fire-hazardous and explosive materials”, which provides information on fire-hazardous and explosive materials present in the facility or on the site. Information on these materials location, quantity, geometry, physical state, basic physical and chemical properties is provided. It is defined also which materials are subject to disposal and which ones are intended for further use.

Within the framework of development of decommissioning plans for NPP units, SNRCU established a requirement to develop a separate radioactive waste management programme at the stage of decommissioning (the requirement was formulated in a letter to the licence holder of Ukrainian NPPs in operation (NAEC “Energoatom“). To fulfil this requirement, NAEC “Energoatom“ has to develop, first of all, a branch-wise standard "Requirements to structure and contents of the programme of radioactive waste management during NPP power unit decommissioning", which is identified in a schedule of development of Operator’s standards for preparation for decommissioning, approved by NAEC.

Conclusion

In principle there is in Ukraine an appropriate framework in place to ensure that decommissioning will be performed in a safe manner. A decommissioning plan (conception) exists for all the NPP. The situation is not the same for radioactive waste management facilities, such as RADON, which need to develop decommissioning plans. The national decommissioning policy and strategy is in place. The state fund for decommissioning was created but funding mechanisms for decommissioning are still missing. Adequate plans for managing the waste arising from decommissioning in a safe manner are established in the decommissioning plans.

8. MANAGEMENT SYSTEM

Introduction (background of activity)

Historically, the SNRCU has always documented the most important regulatory processes and practices in internal documents. The documents existing till 2005 were describing the internal organizational practices and processes. However, the existing system was not called Quality Management System (QMS). The current QMS started its development in 2005. The first and fundamental document of the system is the General Quality Manual (GQM).

The work on development of the system progressed during 2006 and 2007. A Decree was issued by the CM 614/11.05.2006 describing the responsibilities for development, implementation and certification of the QMSs at all state authorities. The Decree specifies a requirement for ISO certification of all executive authorities, which is being followed by the SNRCU. Adoption of the ISO standard as a national one was done in 2001 as the respective Ukrainian document being DSTU ISO 9001-2001. The indication 2001 stands for the year of adoption of the standards as national.

Methodologies and Manuals are the main documents of the systems. Groups for internal audits have been developed, as well as, 18 methodologies and 4 manuals. An external consultant was hired for the development of the quality system and respective documents.

The fundamental document of the system is the GQM, approved by the SNRCU Chairperson. The document describes the structure of the quality management system and promotes the management policy on quality.

By an order of the SNRCU Chairperson 153 of September 2006, a commission was appointed for the establishment of the system, the responsible person for the system being the First Deputy Chair. A plan-program was established for the further development of the system approved by the Chair. By an order of the SNRCU Chairperson 42 of March 2007 – responsible quality officers were appointed at each unit, and the units were required to make all necessary changes in the respective job descriptions.

In May 2008, an internal audit has been completed after the system has been put in place. Results have been documented and a plan for corrective actions is being developed to address non-conformances. The plan is approved by the SNRCU Chairperson. Audits were carried out at all units. Audits were led by certified auditors (from outside). One of the main objectives of the audits was to see how the new procedures fit the existing practices. The process continued for about five months. All supervisors and the SNRCU top management were involved in the audit. 48 non-conformances and 12 good practices were recorded. Initially, team concern referred to the fact that the structure and the objectives, as well as part of the QMS documents were developed by an external Consulting company. However, during the discussions it was recognized that the SNRCU staff participated actively in the development of the documents. Independently of the main contractor, the SNRCU received assistance from leading European experts under the TACIS program. EU experts performed their own independent review of the system. With the development of the process, the staff was getting more and more involved in the development process and it even became their initiative to develop some documents.

The Quality Policy of the management is stated in the General Quality Manual. In the QM documents the team did not find much evidences that management expectations are formulated and communicated to the staff. For example, mission and vision statements as well as core values are not clearly defined in the QMS as they are considered by the management obvious to the staff from the Provisions of the SNRCU and are included in many other regulatory documents, starting from

the Law on Civil Servants, through the SNRCU Quality Policy and ending with the individual job descriptions. Team also identified that not all processes related to the operation of the authority were covered in the system especially the “review and assessment” which is one the core processes of a regulatory body. .

The general feeling of the review team is that the SNRCU has spent a lot of human and financial resources on the establishment of the system; however, effective implementation of this system is still a challenge for the organization.

Concerning self-assessment, it was found out that SNRCU intention is to perform it on an annual basis. The review team considers this to be a quite an ambitious task as it requires intensive in-house resources and may be not that effective if performed too frequently. Generally, the practice used for self-assessment vary from country to country, and it is the decision of SNRCU to optimize its practices.

In the QMS the organization has made an attempt of establishing a system of regulatory internal indicators to monitor regulatory performance. However the approach was not based on any systematic approach. It should also be highlighted that there is no guiding document in this area. Some publications of international organizations however exist, but they are mostly general in nature. Currently the QMS includes 11 indicators, 7 of which direct, 3 indirect and one that could not be assigned to either of the first two. As indicated by the counterparts, additional indicators of regulatory effectiveness and efficiency are also included in some other documents, not part of the system.

The team concluded that in general a management system exists at the SNRCU, however, some areas such as management communication, development of core processes and self assessment need further improvement to comply with GS-R-3.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-1 § 4.5. states *“The regulatory body shall establish and implement appropriate arrangements for a systematic approach to quality management which extend throughout the range of responsibilities and functions undertaken.”*
- S32 **Suggestion:** In the process of continuous improvement of the quality management system, the SNRCU should consider the continuation of its efforts towards ensuring full compliance with the IAEA safety requirements as established in GS-R-3.
- (1) **BASIS:** GS-R-3 § 3.3. states *“Management at all levels shall communicate to individuals the need to adopt these individual values, institutional values and behavioural expectations as well as to comply with the requirements of the management system.”*
- S33 **Suggestion:** SNRCU should consider effectively communicating to all levels of its staff the values, mission, vision and goals of the organization. These values, mission, vision and goals can be included in a top level quality management document or set out as a separate document.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

- (1) **BASIS:** GS-R-3 §5.4 states *“The development of each process shall ensure that the following are achieved:*
- Process requirements, such as applicable regulatory, statutory, legal, safety, health, environmental, security, quality and economic requirements, are specified and addressed.*
 - Hazards and risks are identified, together with any necessary mitigatory actions.*
 - Interactions with interfacing processes are identified.*
 - Process inputs are identified.*
 - The process flow is described.*
 - Process outputs (products) are identified.*
 - Process measurement criteria are established.”*
- S34 **Suggestion:** In the quality management system, SNRCU should consider establishing ‘review and assessment’ as a separate main process as defined by the legislation and in accordance with the IAEA safety standards



APPENDIX I – LIST OF PARTICIPANTS

INTERNATIONAL EXPERTS:		
1. Dana DRABOVA	<i>State Office for Nuclear Safety (SÚJB)</i>	dana.drabova@sujb.cz
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8. Vladimir KUTKOV	<i>Russian Research Centre "Kurchatov Institute"</i>	Kutkov@front.ru
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10. Ivan LUX	<i>Nuclear Safety Directorate Hungarian Atomic Energy Authority</i>	Lux@haea.gov.hu
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IAEA STAFF MEMBERS		
1. Adriana NICIC	<i>Division of Nuclear Installation Safety</i>	A.Nicic@iaea.org
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2. Anna GORASHCHENKOVA	International Cooperation and European Integration Division	anna@hq.snrc.gov.ua

APPENDIX II – MISSION PROGRAMME

MISSION PROGRAMME		
<i>Sunday, 8 June 2008</i>		
16:00	<i>Opening Team Meeting</i>	
<i>Monday, 9 June 2008</i>		
09:00 – 17:30	<i>Entrance Meeting</i>	
	<i>Welcome and Introduction</i>	<i>O. Mykolaichuk</i>
	<i>Opening remarks</i>	<i>D. Drabova</i>
	<i>Introduction of IRRS Review Team</i>	<i>All Team members</i>
	<i>Briefing for IRRS Team</i>	<i>A. Gorashchenkova</i>
	<i>Introductions and working arrangements</i>	
	<i>Detailed presentations on each of the areas to be covered by the review</i>	<i>SNRCU counterparts</i>
	<i>Open Disucssions Planning of Interviews Identifying emerging issues</i>	<i>SNRCU + IRRS REVIEW TEAM</i>
18:30	<i>Closing remarks</i>	<i>D. Drabova</i>
18:30	<i>Official Reception</i>	
<i>Tuesday, 10 June 2008</i>		
08:30 – 16:00	<i>Daily Group interactions</i>	<i>IRRS TEAM</i>
17:00 – 18:00	<i>Daily IRRS Review Team Meeting</i>	<i>IRRS TEAM</i>
<i>Wednesday, 11 June 2008</i>		
08:30 – 16:00	<i>Daily Group interactions</i>	<i>IRRS TEAM</i>
17:00 – 18:00	<i>Daily IRRS Review Team Meeting</i>	<i>IRRS TEAM</i>
18:00 -	<i>Drafting of Report</i>	<i>IRRS TEAM</i>
<i>Thursday, 12 June 2008</i>		
08:30 – 16:00	<i>Daily Group interactions</i>	<i>IRRS TEAM</i>
09:30	<i>Departure to Ministry for fuel and energy (10:00-11:45) Meeting at NAEK (Energoatom) – Operator (14:00-16:00)</i>	<i>D. Drabova M. Satorius V. Ranguelova L. Guo S. Bozhko</i>
	<i>Departure to Ministry of Health (10:00-11:45)</i>	<i>S. Mallick S. Evans O. Makarovska V. Riazantsev</i>
17:00 – 18:00	<i>Daily IRRS Review Team Meeting</i>	<i>IRRS TEAM</i>
18:00 -	<i>Drafting of Report</i>	<i>IRRS TEAM</i>
<i>Friday, 13 June 2008</i>		

MISSION PROGRAMME

08:30 – 16:00	Daily Group interactions	IRRS TEAM
09:30	Departure to Marzeev Institute (10:00-17:00)	S. Mallick S. Evans L. Auxova V. Riazantsev
	Departure to SSTC NRS (10:00-17:00)	D. Drabova A. Thizon I. Lux A. Nacic S. Bozhko I. Shevchenko
	Departure to Ministry of Environment	P. Lietava L. Jova Sed O. Makarovska
17:00 – 18:00	Daily IRRS Review Team Meeting	IRRS TEAM
18:00 -	Drafting of Report	IRRS TEAM
Saturday, 14 June 2008:		
10:00	SOCIAL EVENT	
Sunday, 15 June 2008		
12:00	Departure to South Ukraine NPP	M. Satorius H. Reponen P. Lietava A. Thizon N. Vlahov A. Nacic O. Demchuk O. Gilev
08:00.....	Drafting of Report	IRRS TEAM
Monday, 16 June 2008		
08:00	Departure to Kharkiv	S. Mallick L. Baekelandt L. Auxtova L. Jova Sed T. Kutuzova R. Tripailo
08:30 – 16:00	Daily Group interactions	IRRS TEAM
17:00 – 18:00	Daily IRRS Review Team Meeting	IRRS TEAM
18:00 -	Drafting of Report	IRRS TEAM
Tuesday, 17 June 2008		
08:30 – 16:00	Daily Group interactions	IRRS TEAM
08:30-16:30	Emergency Drill	Kutkov Kusumi L. Guo

MISSION PROGRAMME

<i>17:00 – 18:00</i>	<i>Daily IRRS Review Team Meeting</i>	<i>IRRS TEAM</i>
<i>18:00 -</i>	<i>Drafting of Report</i>	<i>IRRS TEAM</i>
<i>Wednesday, 18 June 2008</i>		
<i>08:30 – 16:00</i>	<i>Daily Group interactions</i>	<i>IRRS TEAM</i>
<i>08:30-16:30</i>	<i>Departure to Ministry of Emergencies (10:00-12:00)</i>	<i>D. Drabova Kutkov Kusumi O. Makarovska T. Kilochitska</i>
<i>14:30-15:30</i>	<i>Meeting with Representatives of SNRCU Public Board</i>	<i>D. Drabova S. Bogdan V. Rangelova O. Mykolaichuk S. Bozhko</i>
<i>15:30-17:00</i>	<i>Meeting with Representatives of SNRCU Commission of Normative Regulations</i>	<i>D. Drabova S. Bogdan V. Rangelova O. Mykolaichuk S. Bozhko V. Matveeva</i>
<i>17:00 – 18:00</i>	<i>Daily IRRS Review Team Meeting</i>	<i>IRRS TEAM</i>
<i>18:00 -</i>	<i>Mission Report Handover to SNRCU</i>	<i>IRRS TEAM</i>
<i>Thursday, 19 June 2008</i>		
<i>08:30 – 16:00</i>	<i>Plenary</i>	<i>IRRS TEAM/SNRCU</i>
<i>Friday, 20 June 2008</i>		
<i>09:00</i>	<i>EXIT MEETING</i>	<i>IRRS TEAM/SNRCU</i>
<i>11:00</i>	<i>Official Closing</i>	<i>IRRS TEAM/SNRCU</i>
	<i>Reception at SNRCU</i>	<i>IRRS TEAM/SNRCU</i>

APPENDIX III – SITE VISITS

	NAME	LOCATION
1.	South Ukraine Nuclear Power Plant	South Ukraine
2.	Visit to Kharkiv	Kharkiv
3.	Ministry for Fuel and Energy	Kiev
4.	Ministry of Health	Kiev
5.	Ministry of Environment	Kiev
6.	Ministry of Emergencies	Kiev
7.	NAEK “Energoatom”	Kiev
8.	Marzeev Institute	Kiev
9.	SSTC NRS	Kiev

APPENDIX IV – MISSION COUNTERPARTS

item	Subject Area	IRRS Experts	Lead Counterparts
I	LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES	<ul style="list-style-type: none"> • Ms. Drabova • Mr. Bogdan • Ms. Ranguelova • Mr. Vlahov 	<ul style="list-style-type: none"> • Ms. Makarvska • Mr. Bykov • Ms. Matveeva • Ms. Rumezhak • Mr. Kozulko • Ms. Laguta • Mr. Stoliarchuk
II	RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY	<ul style="list-style-type: none"> • Ms. Drabova • Mr. Bogdan • Ms. Ranguelova • Mr. Vlahov 	<ul style="list-style-type: none"> • Ms. Makarvska • Mr. Bykov • Ms. Matveeva • Ms. Rumezhak • Mr. Kozulko • Ms. Laguta • Mr. Stoliarchuk
III	ORGANIZATION OF THE REGULATORY BODY	<ul style="list-style-type: none"> • Ms. Drabova • Mr. Bogdan • Ms. Ranguelova • Mr. Vlahov 	<ul style="list-style-type: none"> • Ms. Makarvska • Mr. Bykov • Ms. Matveeva • Ms. Rumezhak • Mr. Kozulko • Ms. Laguta • Mr. Stoliarchuk

item	Subject Area	IRRS Experts	Lead Counterparts
IV	<p><u>NUCLEAR SAFETY</u></p> <p>IV. AUTHORIZATION V. REVIEW AND ASSESSMENT VI. INSPECTION AND ENFORCEMENT VII. REGULATIONS AND GUIDES</p>	<ul style="list-style-type: none"> • Mr. Satorius • Mr. Lux • Mr. Reponen • Mr. Thizon 	<ul style="list-style-type: none"> • Mr. Demchuk • Mr. Schevchenko • Mr. Gilov • Mr. Iesipenko • Mr. Soliarchuk • Mr. Kostenko • Mr. Khalenko • Mr. Dyback
V	<p><u>RADIATION SAFETY</u></p> <p>IV. AUTHORIZATION V. REVIEW AND ASSESSMENT VI. INSPECTION AND ENFORCEMENT VII. REGULATIONS AND GUIDES</p>	<ul style="list-style-type: none"> • Mr. Mallick • Ms. Auxtova 	<ul style="list-style-type: none"> • Mr. Riazantsev • Ms. Tripailo • Ms. Litvinska
VI	<p><u>RADWASTE MANAGEMENT</u></p> <p>IV. AUTHORIZATION V. REVIEW AND ASSESSMENT VI. INSPECTION AND ENFORCEMENT VII. REGULATIONS AND GUIDES</p>	<ul style="list-style-type: none"> • Mr. Baeckelandt • Mr. Lietava 	<ul style="list-style-type: none"> • Ms. Kutuzova • Ms. Kilochitska • Ms. Burzak • Ms. Rybalka
VII	<p><u>SAFETY OF TRANSPORT</u></p> <p>IV. AUTHORIZATION V. REVIEW AND ASSESSMENT VI. INSPECTION AND ENFORCEMENT VII. REGULATIONS AND GUIDES</p>	<ul style="list-style-type: none"> • Ms. Bakalova • Mr. Baekelandt 	<ul style="list-style-type: none"> • Mr. Gilov • Mr. Sakalo • Ms. Gavrylenko • Ms. Romenska

item	Subject Area	IRRS Experts	Lead Counterparts
VIII	MANAGEMENT SYSTEM	<ul style="list-style-type: none"> • Ms. Drabova • Mr. Bogdan • Ms. Ranguelova • Mr. Vlahov 	<ul style="list-style-type: none"> • Ms. Makarovska • Mr. Bykov • Ms. Matveeva • Ms. Rumezhak • Mr. Kozulko • Ms. Laguta • Mr. Stoliarchuk
x	EMERGENCY PREPAREDNESS	<ul style="list-style-type: none"> • Mr. Kutkov 	<ul style="list-style-type: none"> • Mr. Ananenko • Ms. Chuprina • Ms. Dzubak • Ms. Bizhko

APPENDIX V – RECOMMENDATIONS / SUGGESTIONS / GOOD PRACTICES FROM THE IRRS MISSION

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
1	LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES	G1	<u>Good Practice:</u> The legislation clearly specifies that regulatory requirements shall be developed with strict consideration of the recommendations of the competent international organizations. This will inevitably support the worldwide harmonization of nuclear and radiation safety requirements, as highlighted by INSAG-21.
		R1	<u>Recommendation:</u> When further developing the legal system, the Government should ensure that all nuclear and radiation safety legislation is consistent and that established practices that have proved to be effective are preserved unchanged.
		R2	<u>Recommendation:</u> The Government of Ukraine should define and guarantee the statute of the SNRCU in Law.
		S1	<u>Suggestion:</u> The Parliament and the Government are presently establishing common requirements and processes for the functioning of the state administration. In this context they should take into account the specific functions, responsibilities, characteristics and needs of a regulatory authority, in particular for the current case the SNRCU. In doing so the practices and legal arrangements in European countries may be of support and the draft law prepared by SNRCU may be used as a basis.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		S2	Suggestion: The existing trend of continuous increase of budget and expert salaries should be preserved in order to retain staff, to allow SNRCU to achieve a level of financing in accordance with best international practice and to allow SNRCU to fund its involvement in international activities, training, review and assessment, public communications, etc.
2	RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY	R3	Recommendation: SNRCU and the Ministry of Health should agree a memorandum of understanding clarifying the responsibilities of each of the authorities as well as the mechanisms for implementation of effective cooperation in regulating and controlling radiation protection, waste safety and other common activities that could arise.
3	ORGANIZATION OF THE REGULATORY BODY	S3	Suggestion: The SNRCU should continue its efforts to attract suitable qualified staff and fill the outstanding vacancies at the earliest opportunity commensurate with its human resource management policy. Measures should be identified to reduce the high staff turn-over in some fields.
		G2	Good practice: The SNRCU formal training programme is well developed and based on Systematic Approach to Training principles, and succession planning for key technical staff, workforce aging and knowledge management are taken into account. SNRCU makes effective use of training at international level.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		R4	<u>Recommendation:</u> The practice of direct payment for ‘state safety expertise’ to technical support organization by utilities might be seen as affecting the independence of judgement of safety assessors. Safety assessment process should be fully transparent and effectively regulated, including financial aspects, by SNRCU. The SNRCU should seek and apply arrangements that demonstrate in an unambiguous and transparent manner the effective independence of its technical support organizations and consultants.
		G3	<u>Good Practice:</u> The proposal and actions taken by the SNRCU management to establish an advisory body with involvement of internationally recognized nuclear safety experts from abroad is seen as a demonstrated commitment to safety improvements.
		G4	<u>Good Practice:</u> SNRCU applies a good system for communication with the public and other stakeholders, including the establishment of a Public Council to ensure transparency of its decision making, as well as providing the public with direct access to SNRCU senior management through telephone hotlines.
4	ACTIVITIES OF THE REGULATORY BODY	G5	<u>Good practice:</u> SNRCU utilizes its technical support organization in a well formalized, effectively organized, duly documented manner. SSTC NRS has the necessary expertise and experience.
		S4	<u>Suggestion:</u> SNRCU should consider further development especially in the context of new build in exercising regulatory oversight over the existence of a suitable management system of organizations carrying out activities on the premises of NPPs for all stages in the lifetime of a facility.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		S5	<u>Suggestion:</u> SNRCU should consider the issuance of a formal document describing in detail what is expected to be included in the application for authorization for the most common specific cases of applications.
		S6	<u>Suggestion:</u> The Government should consider enacting legislation that assigns responsibility to SNRCU for the authorization of siting and design of new reactor units.
		G6	<u>Good practice:</u> Application of the ‘pilot concept’ in authorization of similar modifications in several plants is an effective method, if it is performed with due attention paid to differences between the plants.
		S7	<u>Suggestion:</u> In licensing operating personnel, the SNRCU should consider covering additional posts and activities that may have substantial influence on the safety of a nuclear power plant.
		R5	<u>Recommendation:</u> SNRCU should have the authority to approve the operators’ organizational changes. Due consideration should be given to the assessment of the impact of such changes on safety. Conditions and requirements of such an authorization should be elaborated.
		S8	<u>Suggestion:</u> The current time constraints related to decision making by SNRCU during the licensing process should be revised in order to relieve undue pressure on SNRCU.
		S9	<u>Suggestion:</u> As a matter of priority SNRCU should consider adopting a graded approach for licensing conditions and requirements for radiation sources commensurate with the magnitude and nature of the associated hazard.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		S10	Suggestion: The Government of Ukraine should enact legislation to ensure that the financial obligations for the management of orphan sources do not discourage the reporting of the discovery of such sources (including those identified by scrap dealers).
		G7	Good practice: SNRCU has prepared a reference book containing pictures of radioactive material that can be found in scrap. The book has been distributed to scrap dealers. This is a good practice to help scrap dealers in identifying abandoned radioactive material in scrap
		S11	Suggestion: For the licensing conditions for medical facilities SNRCU should consider: <ul style="list-style-type: none"> - including a requirement for the licensee to submit within a determined period a statement concerning patient dose determination, including methodology and protocols on equipment testing - developing a formal strategy on the requirement for calibration of dosimetry systems. During the primary licensing process SNRCU should consider developing a national strategy of replacement of the equipment not in compliance with the adopted standards, with a transition period based on social and economic factors.
		S12	Suggestion: The Ministry of Health should consider providing to SNRCU information on withdrawn sanitary passports, as withdrawing of the passport can be initial evidence of non-compliance of the practice licensed with the regulatory requirements.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		S13	<u>Suggestion:</u> The SNRCU should review the justification from exemption of dental radiology from licensing.
		R6	<u>Recommendation:</u> The Government should ensure the methodological unity of dose monitoring in Ukraine as well as the establishment of a national dose registry.
		R7	<u>Recommendation:</u> It is recommended that the regulatory provisions dealing with exemption and clearance be reviewed and revised, where necessary, to bring them in line with the BSS. RS-G-1.7 (guidance on the application of the concepts of exclusion, exemption and clearance) should also be taken into account.
		S14	<u>Suggestion:</u> SNRCU should consider the enhancement of its review and assessment capacity and programme to ensure the most effective regulatory decisions are made taking into account the advice of its external consultants.
		S15	<u>Suggestion:</u> SNRCU should consider formalizing a process for ensuring that technical support organizations involved in the regulatory review have enough staff with appropriate competencies. This should include explicit understanding of SNRCU safety regulations and requirements and their application during regulatory review, as well as the quality management provisions foreseen for the review process. It is further suggested that SNRCU implements a formal procedure for the periodic evaluation of the competence of staff of technical support organizations involved in regulatory review activities. By this procedure, SNRCU experts would be directly involved in the implementation of the evaluation.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		S16	<u>Suggestion:</u> SNRCU should give consideration to the order of priority when modifying regulatory documents.
		G8	<u>Good Practice:</u> Guidelines for submission of the safety analysis report (SAR) for the use of ionizing radiation sources and for the format and content of annual reports are examples of clear and comprehensive documentation that can enhance the safety and security of sources through their application.
		G9	<u>Good Practice:</u> The Legislature’s initiative (Article 25 of Law of Ukraine “On the Use of Nuclear Energy and Radiation Safety,” 1995) to provide inspectors assigned to NPPs with compensation competitive with or equal to the compensation paid to the staff of the NPP has resulted in higher retention rates and more experienced SNRCU inspectors available to perform high quality inspections.
		S17	<u>Suggestion:</u> SNRCU should consider developing a programme to optimize the objectivity of NPP inspectors to ensure continuing unbiased and fully independent assessments of the operator’s safety performance.
		S18	<u>Suggestion:</u> SNRCU should consider actions to balance the compensation of inspectors assigned to headquarters with that of inspectors assigned to NPPs, in order to attract and retain high quality inspectors for assignment to headquarters.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		S19	<u>Suggestion:</u> SNRCU should consider enhancing its existing training programme for newly hired inspectors with extensive utility experience to include instruction, guidance and coaching to provide insights for the inspectors on the SNRCU's role as a regulator at a level that ensures sufficient preparedness for serving as an effective inspector.
		R8	<u>Recommendation:</u> SNRCU's current regulations do not provide guidance on the criteria used for initiating an 'ad hoc' or short notice inspection after being made aware of an abnormal occurrence that warrants immediate investigation. SNRCU should supply criteria for this decision-making procedure so that such short notice inspections may be initiated in a consistent and repeatable manner.
		S20	<u>Suggestion:</u> SNRCU should consider improving access for all inspectors to the database system for the tracking and trending of inspection findings and should make it available for use as a trending tool for individual NPPs and for assisting in inspection planning.
		R9	<u>Recommendation:</u> The Government should, at the earliest opportunity, take steps to reconsider substituting sanctions against individuals with sanctions against legal entities. The policy of fining individuals may discourage the staff of nuclear facilities from reporting on deficiencies related to safety.
		R10	<u>Recommendation:</u> SNRCU should prepare more detailed guidance or procedures for enforcement (e.g.: stop work, limiting actions) to radiation safety inspectors establishing in writing how they must proceed.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
5	TRANSPORT OF RADIOACTIVE MATERIAL	S21	Suggestion: The SNRCU should develop a guide on quality management systems for the safe transport of radioactive material taking into account the latest advice of the international organizations including the IAEA.
		S22	Suggestion: The SNRCU should develop a guide (regulation) taking into account the IAEA Safety Guide “Compliance Assurance for the Safe Transport of Radioactive Material”, No. TS-G-1.5.
6	EMERGENCY PREPAREDNESS	R11	Recommendation: To meet the IAEA requirements on categorizations of threats the Ministry of Health should take the necessary steps in order to harmonize the Sanitary regulations (DSP-05 [VK#27]) with NP 083-2004 [VK#25].
		G10	Good practice: The SNRCU has implemented a graded approach to emergency preparedness and response for facilities of Threat Category III.
		R12	Recommendation: The Ministry of Health should harmonize the Sanitary Regulations with the Law on Human Protection Against Impact of Ionizing Radiation to avoid misunderstanding in its use for decision making during the emergency response.
		S23	Suggestion: The Ministry of Health and SNRCU should jointly implement the PAZ/UPZ concept for taking urgent protective actions.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		R13	<u>Recommendation:</u> The SNRCU in cooperation with the Ministry of Health should establish requirements for the conduct of protective actions that will guarantee sufficient protection of responders and avoid delay in implementation of urgent protection actions, e.g. life saving. To avoid undue delay in implementing urgent protection actions, a procedure should be developed to ensure that authorizations that allow responders to receive doses above dose limits are issued promptly.
		S24	<u>Suggestion:</u> The Ministry of Health should consider harmonization of the system of intervention levels used for protection of emergency workers during response to emergencies with the BSS and GS-R-2.
7	RADIOACTIVE WASTE MANAGEMENT AND DECOMMISSIONING	R14	<u>Recommendation:</u> The Government should approve as soon as possible the revised National Programme on Radioactive Waste Management and the funding mechanism necessary to guarantee its implementation.
		S25	<u>Suggestion:</u> The Strategy on Radioactive Waste Management under development by the Ministry of Emergency Situations in cooperation with other interested parties and in the frame of a TACIS Project should be finalized and approved as soon as possible by the Government.
		R15	<u>Recommendation:</u> In order to provide an organizational framework for the safe management of disposed radioactive waste cognisant of the safety of future generations, it is recommended that Government assigns executive responsibility to a specialized agency to deal with the long-term management of radioactive waste.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		G11	Good practice: The implemented regulations and procedures for staff qualification and its periodic control ensure that staff are trained, qualified and competent as required by the regulatory body.
		G12	Good practice: The SNRCU and the Ministry of Emergency Situations responsible for the record keeping in the area of radioactive waste management have established a comprehensive record keeping system, requirements on which were elaborated in detail by SNRCU requirements on the content and format of data submitted on regular basis to the regulatory body.
		S26	Suggestion: The SNRCU should initiate a process to review and update the existing classification system for radioactive waste. It would be reasonable to classify radioactive waste on the basis of considerations of its long term safety, i.e. its disposal, so as to keep consistency among the different stages of radioactive waste management. Such a classification system would facilitate communication and information exchange among Member States, and eliminate some of the ambiguity that now exists in the Ukrainian classification schemes for radioactive waste.
		G13	Good Practice: The revision and review of the status and the safety assessment of RADON facilities with the intention to upgrade their technological characteristics and to enhance their safety features is considered as a good practice to be followed by other countries with the same type of facilities.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		R16	<u>Recommendation:</u> The SNRCU should initiate a process to review and update the procedures for the authorization, control and recording of radioactive discharges from medical practices. It should also request each RADON facility in the next review of its safety assessment report to develop or review the justification, safety assessment and procedures for the control and recording of radioactive discharges to the environment as needed and in accordance with international recommendations.
		S27	<u>Suggestion:</u> SNRCU might consider initiating the review of regulatory documents dealing with dose constraints applicable to different stages in the life time of a near-surface disposal facility, taking due account of the relevant IAEA safety standard.
		R17	<u>Recommendation:</u> The safety assessment for the near-surface disposal facilities SWR-1 and SWR-2 at the Vektor site does not fully comply with the requirements of WS-R-1, § 3.4 (a) and HII 306.3.02/3.038-2000. In respect of the post-closure safety of these two disposal facilities the SNRCU should request that a full scope safety assessment be performed.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		R18	<u>Recommendation:</u> The environmental assessment of neither the SWR-1 and SWR-2 facilities nor the LOT 3 facility, which are located at the same Vektor site, does not assess their joint impact on the members of the critical group and therefore the requirement on the overall safety assessment, as defined in WS-R-1, § 3.4 (c) is not completely fulfilled. Therefore the regulatory body should require the operator in the future licensing documentation to consider the possible integrated impact of all facilities at the Vektor site to people and the environment.
		G14	<u>Good practice:</u> Despite the fact that the operation of the national geological repository will commence only after several decades SNRCU has already prepared a regulatory document with the safety requirements for geological repositories. This document will be periodically updated and will provide the regulatory framework for the development of this kind of facility.
		S28	<u>Suggestion:</u> When developing the planned regulatory document “Requirements on the Structure and Contents of the Safety Analysis Report for a Geological Repository at Different Lifecycle Stages” the IAEA safety standards should be taken into consideration.
		S29	<u>Suggestion:</u> SNRCU should, when reviewing regulations, consider the possibility of including a requirement for a comprehensive monitoring programme covering all phases of the lifetime of a geological repository and on passive safety features during the post-closure period.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		R19	<u>Recommendation:</u> The SNRCU should include, in the future revision of regulations, special requirements for the release of NPP sites from regulatory control after decommissioning in accordance with the IAEA Safety Standards.
		S30	<u>Suggestion:</u> Existing experience in regulating decommissioning of NPP should be extended, applying a graded approach, to other facilities such as radioactive waste management facilities including storage facilities, research laboratories, irradiators, etc.
		S31	<u>Suggestion:</u> Currently there are two legal documents containing provisions for NPP decommissioning - HII 306.2.02/1.004-98 and HII 306.2.141-2008. However, the latter one does not contain as much detail as the previous one, such as the justification of the decommissioning option selection. The SNRCU should consider retaining and updating the detailed information available in HII 306.2.02/1.004-98 in future regulatory documents on decommissioning.
		R20	<u>Recommendation:</u> The SNRCU should revise regulations relating to decommissioning to bring them into line with paras 4.4., 4.5. and 5.8 of WS-R-5.
8	MANAGEMENT SYSTEM	S32	<u>Suggestion:</u> In the process of continuous improvement of the quality management system, the SNRCU should consider the continuation of its efforts towards ensuring full compliance with the IAEA safety requirements as established in GS-R-3.

	Areas	IAEA Comment No R: Recommendations, S: Suggestions, G: Good practices	Recommendations, Suggestions or Good Practices
		S33	<u>Suggestion:</u> SNRCU should consider effectively communicating to all levels of its staff the values, mission, vision and goals of the organization. These values, mission, vision and goals can be included in a top level quality management document or set out as a separate document.
		S34	<u>Suggestion:</u> In the quality management system, SNRCU should consider establishing ‘review and assessment’ as a separate main process as defined by the legislation and in accordance with the IAEA safety standards

APPENDIX VI – REFERENCE MATERIAL PROVIDED BY SNRCU

[1]	LAWS
	<ul style="list-style-type: none"> ➤ <i>Law of Ukraine on Human Protection against Impact of ionizing Radiation</i> ➤ <i>Law of Ukraine on Authorization Activity in Nuclear Energy Use</i> ➤ <i>Law of Ukraine on Metrology and Metrological Activity</i> ➤ <i>Law of Ukraine on arrangement of issues on Nuclear Safety Assurance</i> ➤ <i>Law of Ukraine on Radioactive Waste Management</i> ➤ <i>Law of Ukraine on the Use of Nuclear Energy and Radiation Safety</i>
[2]	PROCEDURES
	<ul style="list-style-type: none"> ➤ <i>NP 306.3.04/2.002-97 Procedure For Exemption Of Radioactive Waste And Radioactive By-Materials From Regulatory Control</i> ➤ <i>NP_017_EN Requirements to the quality assurance programme At all stages of the life cycle of nuclear installations</i> ➤ <i>NP_037_EN on a list and requirements for structure and content of documents submitted by the operating organization to obtain a licence for the activity at a specific life cycle stage of a radioactive waste disposal facility</i> ➤ <i>NP 306.5.04/2.060-2002 Safety Conditions And Requirements (Licensing Conditions) For Introducing Activity On Radioactive Waste Treatment, Storage, And Disposal</i> ➤ <i>NP 306.2.106-2005 Requirements On Modifications Of Nuclear Installations And Their Safety Assessment Procedure</i> ➤ <i>NRBU-97 Standards On Radiation Safety Of Ukraine State Hygienical Normatives</i> ➤ <i>Nuclear And Radiation Safety Norms And Rules</i>
[3]	ORDERS
	<ul style="list-style-type: none"> ➤ <i>ND 306.604-96 Radioactive Waste Disposal In Near-Surface Storage Facilities</i> ➤ <i>ND 306.607.95 Requirements to radioactive waste management Before the final disposal of waste</i> ➤ <i>17.05.2004 No. 87/211 Approval Of The Response Plan To Radiation Accidents</i> ➤ <i>Order Response plan</i> ➤ <i>02.12.2002 No 125 Order SIR licensing</i> ➤ <i>No. 141 Procedure for State Supervision on Observation of Nuclear and Radiation Safety Requirements in Nuclear Energy Use</i> ➤ <i>QMS-02 SNRCU General Quality Management Guide Quality Management System</i> ➤ <i>Cabinet of Ministers of Ukraine Enactment of 6 December 2000, No. 1782 Kiev On approval of the Order of licensing of particular activities in the use of nuclear energy</i> ➤ <i>Cabinet of Ministers of Ukraine Ordinance no. 1718 dated 16 November 2000 Kiev on issues concerning the State Regulation of Activity on the use of ionizing Radiation Sources</i> ➤ <i>Cabinet of Ministries of Ukraine Enactment of 27 December 2006, no. 1830, Kyiv, on approval of the provision on the State Nuclear Regulatory Committee of Ukraine</i>
[4]	SELF-ASSESSMENT
	<ul style="list-style-type: none"> ➤ <i>Self-Assessment Report</i> ➤ <i>IRRT Report 2001</i> ➤ <i>Module I - Legislation</i> ➤ <i>Module II - Functions</i> ➤ <i>Module III - Organization</i>

	<ul style="list-style-type: none"> ➤ <i>Module IV - Authorization</i> ➤ <i>Module V – Review and Assessment</i> ➤ <i>Module VI – Inspection and Enforcement</i> ➤ <i>Module VII – Development of Regulations and Guides</i> ➤ <i>Module VIII – Management System</i> ➤ <i>Safety of Nuclear Power Plants: Design NS-R-1</i> ➤ <i>Safety of Nuclear Power Plants: Operation NS-R-2</i> ➤ <i>Safety of Nuclear Power Plants: Site Evaluation NS-R-3</i> ➤ <i>Radwaste management (additional module)</i> ➤ <i>Safety of Transport (additional module)</i> ➤ <i>Emergency Preparedness</i> ➤ <i>Public Relations and mass media (additional module)</i> ➤ <i>Code of Conduct on the Safety and Security of Radioactive Sources (additional module)</i>
[5]	ANNUAL REPORT
	<ul style="list-style-type: none"> ➤ <i>SNRCU Annual Report 2005</i> ➤ <i>SNRCU Annual Report 2006</i> ➤ <i>SNRCU Annual Report 2007</i>
[6]	NUCLEAR SAFETY CONVENTION
	<ul style="list-style-type: none"> ➤ <i>Convention on Nuclear Safety Report 2004</i> ➤ <i>Convention on Nuclear Safety Report 2005</i> ➤ <i>Convention on Nuclear Safety Report 2007</i>

APPENDIX VII – IAEA REFERENCE MATERIAL USED FOR THE REVIEW

- [1.] **IAEA SAFETY STANDARDS SERIES GS-R-1** - *Legislative and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety*
- [2.] **IAEA SAFETY STANDARDS SERIES GS-G-1.1** - *Organization and Staffing of the Regulatory Body for Nuclear Facilities*
- [3.] **IAEA SAFETY STANDARDS SERIES GS-G-1.2** - *Review and Assessment of Nuclear Facilities by the Regulatory Body*
- [4.] **IAEA SAFETY STANDARDS SERIES GS-G-1.3** - *Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body*
- [5.] **IAEA SAFETY STANDARDS SERIES GS-G-1.4** - *Documentation for use in Regulation of Nuclear Facilities*
- [6.] **IAEA SAFETY STANDARDS SERIES GS-G-1.5** - *Regulatory Control of Radiation Sources*
- [7.] **IAEA SAFETY STANDARDS SERIES GS-R-2** - *Preparedness and Response for a Nuclear or Radiological Emergency Safety Requirements*
- [8.] **IAEA SAFETY STANDARDS SERIES GS-R-3** - *Management System for Facilities and Activities*
- [9.] **IAEA SAFETY STANDARDS SERIES NS-R-1** - *Safety of Nuclear Power Plants: Design Safety Requirements*
- [10.] **IAEA SAFETY STANDARDS SERIES NS-R-2** - *Safety of Nuclear Power Plants: Operation Safety Requirements*
- [11.] **IAEA SAFETY STANDARDS SERIES NS-R-4** - *Safety of Research Reactors*
- [12.] **IAEA SAFETY STANDARDS SERIES NS-G-4.1** - *Commissioning of Research Reactors*
- [13.] **IAEA SAFETY SERIES No. 115** - *International Basic Safety standards for Protection against ionizing Radiation and for the Safety of Radiation Sources*
- [14.] **IAEA SAFETY STANDARDS SERIES TS-R-1** - *Regulations for the Safe Transport of Radioactive Material*
- [15.] **IAEA SAFETY STANDARDS SERIES WS-G-2.1** - *Decommissioning of Nuclear Power Plants and Research Reactors*
- [16.] **IAEA SAFETY STANDARDS SERIES WS-G-2.2** - *Decommissioning of Medical, Industrial and Research Reactors*
- [17.] **IAEA SAFETY STANDARDS SERIES WS-R-1** - *Near Surface Disposal of Radioactive Waste*
- [18.] **IAEA SAFETY STANDARDS SERIES WS-R-2** - *Predisposal Management of Radioactive Waste including Decommissioning*
- [19.] **IAEA SAFETY STANDARDS SERIES WS-G-2.3** - *Regulatory Control of Radioactive Discharges to the Environment*
- [20.] **IAEA SAFETY STANDARDS SERIES WS-G-2.4** - *Decommission of Nuclear Fuel Cycle Facilities*
- [21.] **IAEA SAFETY STANDARDS SERIES WS-G-2.5** - *Predisposal Management of Low and Intermediate Level Radioactive Waste*
- [22.] **IAEA SAFETY STANDARDS SERIES WS-G-2.6** - *Predisposal Management of High Level Radioactive Waste*

- [23.] **IAEA SAFETY STANDARDS SERIES WS-G-2.7** - *Management of Waste from the use of Radioactive Material in Medicine, Industry, Agriculture, Research and Education*
- [24.] **IAEA SAFETY STANDARDS SERIES WS-R-3** - *Remediation of areas contaminated by past activities and accidents*
- [25.] **IAEA SAFETY STANDARDS SERIES WS-R-5** - *Decommissioning of facilities using Radioactive Material*
- [26.] **IAEA SAFETY STANDARDS SERIES WS-G-6.1** - *Storage of Radioactive Waste*
- [27.] **IAEA SAFETY STANDARDS SERIES RS-G-1.7** - *Application of the Concepts of Exclusion, Exemption and Clearance*
- [28.] **IAEA SAFETY STANDARDS SERIES RS-G-1.8** - *Environmental and Source monitoring for Purpose of Radiation Protection*
- [29.] **IAEA SAFETY STANDARDS SERIES RS-G-1.9** – *Categorization of Radioactive Sources,*
- [30.] *Code of conduct on the Safety of Research Reactors*
- [31.] *Guidance on the Import and Export of Radioactive Sources*
- [32.] **IAEA SAFETY SERIES NO. 111-G-1.1** - *Classification of Radioactive Waste*
- [33.] **IAEA SAFETY SERIES NO. 35 – G2** - *Safety in the Utilization and Modification of Research Reactors*
- [34.] **IAEA TECDOC 1388** - *Strengthening control over radioactive sources in authorized use and regaining control over orphan source national strategies*
- [35.] **INSAG SERIES NO. 17** - *Independence in Regulatory Decision Making*
- [36.] **INSAG SERIES NO. 20** - *Stakeholder Involvement in Nuclear Issues*
- [37.] **INSAG SERIES NO. 21** - *Strengthening the Global Nuclear Safety Regime*
- [38.] **IAEA LEGAL SERIES NO.14** - *Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency*
- [39.] **IAEA SAFETY STANDARDS SERIES – Predisposal Management of Radioactive Waste (Draft Safety Requirements, DS353).**

APPENDIX VIII – SNRCU ORGANIZATIONAL CHART

