Assistance to State Nuclear Regulatory Committee of Ukraine (SNRCU) in regulation on safe radioactive waste management and harmonization of regulatory requirements on nuclear and radiation safety

Description

The project summary will be published after the completion of the project. The project has 2 components:

Component A
Ukraine has 15 nuclear power plant units in operation at 4 sites: Khmelnitsky NPP (2 units), Rivne NPP (4 units), South Ukraine NPP (3 units) and Zaporizhzhya NPP (6 units). In addition, there are several other nuclear installations in the country, including the shutdown RBMK reactors at the Chornobyl site.
Radioactive waste (RAW) is generated at the following civilian facilities in Ukraine:

- operating nuclear power plants,
- research reactors,
- other nuclear fuel cycle enterprises (e.g. performing uranium ore mining and milling),
- non-nuclear enterprises (e.g. medical or scientific institutes using ionising radiation).

A large amount of RAW was scattered by the accident at Unit 4 of the Chornobyl NPP (ChNPP) in 1986. Additional large quantities of RAW are expected to be generated during the planned decommissioning of the ChNPP, as well as during the clean-up activities to be carried out in the contaminated areas. RAW management issues therefore will remain in the focus of assuring radiation safety in Ukraine during the coming years.

The nuclear operator of Ukraine is NNEGC Energoatom and as such, it is responsible for the initial treatment, processing and storage of the waste generated at NPPs until centralized facilities for long-term storage and for disposal become available. The responsibility for radiation protection and safety during waste management operations in the Chornobyl NPP area rests with the ChNPP. In the Chornobyl Exclusion Zone (ChEZ), radiation protection and safety issues related to RAW management are the responsibility of the ChEZ administration. Radioactive materials transferred to the "RADON" RAW management specialised enterprises belong to the Ukrainian State. "RADON" is a state management body in the area of RAW management and is responsible for the long-term storage and disposal of all RAW generated in the country. Currently, repositories for handling the RAW generated in the NPPs are not in operation in Ukraine. The RAW in the Chornobyl exclusion zone is stored or disposed in facilities located in the ChEZ.
Since 2010, SSE CEMRW, the Ukrainian State Specialized Enterprise “Central Enterprise for the Management of Radioactive Waste” is responsible for the operation and development of the radioactive waste management facilities in Ukraine. SSE CEMRW is also in charge to prepare the adequate licensing documentation. The radioactive waste management facility operator must establish, maintain and develop an internal management system with the associated procedures and these have to be approved by SNRIU. The present INSC project provided support to SSE CEMRW to create such a management system.

The operator is obliged to perform a comprehensive safety assessment of the Vector site and the industrial project U4.01/10F was launched to support SSE CEMRW in this activity. The methodology to be applied for conducting this safety assessment is outlined in the following document: Guideline for the comprehensive safety assessment of the radiological impact on environment and population of the Vector site with multiple facilities for radioactive waste processing, storage and disposal. Sub-task 1.2 provided support to the operator by reviewing selected technical reports developed in the frame of the industrial project.

The operator is obliged to develop updated Safety Analysis Reports (SARs) and Waste Acceptance Criteria (WAC) for the various RAW disposal facilities located or constructed at the Vector site. The facilities involved are as follows: Lot 3 – a near surface RAW disposal facility; SRW-1 – a facility for storing low and intermediate solid RAW in reinforced concrete containers and SRW-2 – a facility for storing non-packed and bulky waste in modules. The industrial project U4.01/11B was launched to support the operator during the above safety assessments. Sub-task 1.3 was planned to give support to the operator by reviewing the SARs and WAC developed in the frame of the industrial project.

Within the decisions stipulated by the National Ecological Program on RAW management, decision should be taken on the terms and scope of possible RAW transfer from old disposal facilities at State Enterprise "RADON" to a final disposal facility located in the Vector complex. Task 3 was planned to provide guidance and support in these activities.

Objectives

The main objective of the UK/TS/46 project was to strengthen the capabilities of SNRIU in fulfilling its regulatory functions in the field of nuclear, radiation and radioactive waste safety in Ukraine, taking into account international and EU standards and best practice. The work was focused on supporting the Ukrainian regulatory authority in its regulatory decision making process, by using state-of-the-art safety regulations, international standards, recommendations, assessment methodologies and advanced experience of EU countries. The basic aim was to ensure an efficient regulation of RAW management safety during the solving of priority issues outlined in the State National Ecological Program of Radioactive Waste Management of Ukraine (Law of Ukraine № 516-VI, 17 Sept 2008), to be carried out by the Ukrainian industry in the future.

Specific objectives of the project were as follows:

- Strengthening capabilities of the SNRIU in safety assessment concerning regulatory decisions and licensing of radioactive waste management facilities to be constructed or reconstructed in the future, according to the national RAW management program.
- Development of appropriate criteria, methodologies and procedures; improvement of coordination and interaction with the industrial actors, other involved regulatory authorities and their technical support organizations, at every licensing stage.
Ensuring a continuous transfer of relevant international experience and provide training to the staff of SNRIU and its TSO.

**Results**
The project consisted of an administrative task (*Project inception and coordination*) and 6 technical tasks. The actions performed and results achieved in the technical tasks are briefly summarised below.

**Task 1: Regulation of the national organisation on radioactive waste management**
Within task 1, two sub-tasks were implemented with the following objectives:

- **1.1 Management system of the operator (SSE CEMRW)**
  - Reviewing the documentation of the operator’s management system with focus on the key points for establishing an appropriate management system;
  - Reviewing the documentation related to high-level comprehensive programs (plans) for radioactive waste management;
  - Participation of RISKAUDIT experts in the inspection of management system.

- **1.2 Comprehensive safety evaluation of the Vector site**
  - Reviewing selected documents with focus on important safety issues;
  - Providing comments / recommendations on the implementation of regulatory requirements and criteria;
  - Supporting SNRIU in the dialog with the operator to solve the most important safety issues identified during the reviews.

Results of task activities were outlined in Task 1 Report (RA Report No 2232).
In connection with the management system of the operator, the Consultant reviewed the following document: Guidelines for Management System of Enterprise Activity (shortly Quality Guidelines). In the review a number of proposals and recommendations were suggested to improve the Quality Guidelines.
As for the safety evaluation of the Vector site, this sub-task reviewed reports produced in the associated industrial project U4.01/10F on the *Comprehensive safety assessment of radioactive waste management facilities in the Chornobyl exclusion zone*. Technical reports corresponding to U4.01/10F tasks F2, F3, F4 and F5 were reviewed taking into account modern approaches used in France, Germany, Italy and Ukraine. Requirements outlined in relevant IAEA standards and guides were also considered. The reviews pointed out several deficiencies of the industrial reports, but also put forward useful recommendations and proposed improvements.

**Task 2: Regulation of priority issues on characterisation, monitoring and control of radioactive waste and clearance of material from regulatory control**
Task 2 consisted of two sub-tasks with the following objectives:

- **2.1 Guideline for characterisation, accounting and control of radioactive waste**
- **2.2 Radioactive waste characterisation**

Results of task activities were summarized in Task 2 Report (RA Report No 2233).
In sub-task 2.1 a draft guideline was developed, taking into account the experience from previous related INSC projects, e.g. from UK/TS/39. The result was the “Guideline for
characterization, accounting and control of radioactive waste" and the final version (v3) of this guide was submitted to SNRIU in November 2017 for further consideration. Sub-task 2.2 supported SNRIU in assessing the documents produced in related industrial INSC projects (U4.01/10A, U4.01/10B and U4.01/10E) dealing with methods of RAW characterisation and clearance of material from regulatory control. The work included the review of the following documents:

1. Measurement methodology for full-scale RAW characterization in the Central Analytical Laboratory and the radiation contaminated areas inspection by the mobile laboratory;
2. Improvement of waste analytical capabilities for RAW characterization in Ukraine (submitted by U4.01/10A project);
3. Methodology for clearance of radioactive materials from regulatory control, (volumes "general approach" and "general provisions");
4. Methodology for defining radionuclide composition and activity levels of radionuclides difficult to measure in NPP waste;
5. Procedure for clearance of radioactive metal from regulatory control.

● Task 3: Assessment of the existing radioactive waste temporary storage site and radioactive waste storage/disposal facilities, in particular in the Chornobyl Exclusion Zone

Task 3 consisted of three implemented sub-tasks with the following objectives:

● 3.1 Guideline for safety assessment of emergency RAW temporary storage sites in the Chornobyl Exclusion Zone

The “Guideline for the safety re-assessment of the existing storage/disposal facilities and criteria of decision-making concerning subsequent measures on these facilities" was developed within the UK/TS/39 project. The Consultant had to use this guide as starting point to develop a guideline for the safety assessment of the temporary RAW storage sites created in the Chornobyl exclusion zone during the mitigation of the accident in 1986. The new guide is then to be used by the U4.01/10D industrial project "Investigation of radioactive waste storage/disposal sites in the ChEZ".

● 3.2 Review of safety assessment of emergency RAW temporary storage site in the Chornobyl Exclusion Zone

Sub-task 3.2 provided support to SNRIU in assessing the documents containing the results of the investigations of the temporary RAW storage/disposal sites in the ChEZ. It also included reviewing safety assessments developed by the U4.01/10D industrial project. The guideline developed under sub-task 3.1 was used during the review process, as well as in the frequent dialogues with the industrial side. The activities in sub-task 3.2 contributed directly to a regulatory decision made by the SNRIU.

● 3.3 Review of safety reassessment reports dealing with storage/disposal facilities of the "RADON" enterprises

The work carried out in sub-task 3.3 consisted of four parts, addressing evaluation of the safety re-assessment reports of three "RADON" facilities (Kiev, Dnipropetrovsk and Lviv), as
well as an additional task assessing the Tender of the integrated automatic system for environmental radiation monitoring at Specialized Enterprises of the State Corporation “RADON”.

Results of Task 3 activities were summarized in Task 3 Report (RA Report No 2234).

- **Task 4: Regulation of priority safety issues in construction of radioactive waste processing facilities and radioactive waste transport**

  Task 4 consisted of two sub-tasks with the following objectives:

  - **4.1 Assessment of waste processing facilities**

    The original goal of sub-task 4.1 was to review the documentation for the construction of RAW processing facilities at the Vector site to perform processing of RAW from Chornobyl and radioactive waste from the "RADON" enterprises. These documents were to be developed in the frame of the U4.01/11A industrial project (*Support in establishment of radioactive waste processing facilities as a part of Phase 2 of the Vector Industrial Complex*). Within this sub-task 4.1 the PSARs corresponding to the waste processing facilities located at the Chornobyl site were reviewed. Also the SAR and the technical design documentation of the facility for the segregation of trans-uranium elements and organic material were reviewed in this sub-task.

  - **4.2 Radioactive waste containers**

    The sub-task could address the report produced within the U4.01/09В project (*Radioactive waste disposal concept in Ukraine*), which identified requirements for RAW containers.

  Results of Task 4 activities were summarized in the Task 4 Report (RA Report No 2235).

- **Task 5: Regulation of priority safety issues in terms of long-term storage of high-level and long-lived waste**

  The following two reports were reviewed in Task 5:

  - Selected chapters of the CFSIRS SAR with focus on the main issues related to the technology to be used for the processing of spent ionizing radiation sources, their preparation for long-term storage and the provision of long term storage safety.
  - The SAR on the construction of the facility for interim storage of vitrified high-level radioactive waste.

  Results of Task 5 activities were summarized in the Task 5 Report (RA Report No 2236).

- **Task 6: Regulation of priority safety issues in developing the concept for isolation of high-level and long-lived radioactive waste in stable deep geological formations**

  Task 6 was aimed to review documents developed in the U4.01/09B industrial project dealing with various aspects of a geological disposal facility for RAW, e.g. disposal concepts, safety assessment and feasibility, waste acceptance criteria, implementation program, etc. During the course of the work finally the following two documents dealing with RAW disposal
concepts were selected for review:

- Determination and justification of the optional potential concepts for the disposal of all Ukrainian radioactive waste;
- Development of a long-term program for implementation of the proposed disposal concepts.

Results of Task 6 activities were summarized in the Task 6 Report (RA Report No 2237).

As a summary it can be stated that the majority of the sub-tasks were performed according to the original plans defined in the ToR and the Inception Report. During the course of the work the scope of some tasks had to be decreased or enlarged, in order to be able to follow the availability of documents and to satisfy the actual needs of SNRIU.

The project utilized very efficiently and flexibly the complementary competencies of the consortium members and SSTC NRS, the Ukrainian TSO. The strong involvement of the SNRIU and the intense dialogues conducted with the applicants and their industrial contractors contributed to the successful completion of the project and helped to resolve occasional difficulties related to task schedules and document delivery delays.

According to the Beneficiary, the review results and the guidelines developed within this project will be very useful when performing further activities related to the RAW management at the Chornobyl area and at the "RADON" facilities.

The general conclusion is that the overall project objectives were duly achieved and that the work performed represents an important and valuable step in the regulation of RAW management processes in Ukraine. The review comments and recommendations also indicated several areas where additional investigations and safety demonstrations are still necessary.

Component B

This component aims at providing assistance to SNRIU to continue harmonisation of regulatory requirements with WENRA Reactor Safety Reference Levels and support of SNRIU participation in WENRA activities. The main objectives are:

- to assess the results of the SNRIU integrated self-assessment on compliance with WENRA Reactor Safety RLs with consideration of EU experience;
- to support SNRIU with the development of the corresponding action plan on harmonisation of the Ukrainian regulatory requirements with WENRA Reactor Safety RLs with consideration of EU experience;
- to support SNRIU participation in WENRA RHWG activities.

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**General Information**

**Title:** Assistance to State Nuclear Regulatory Committee of Ukraine (SNRCU) in regulation on safe radioactive waste management and harmonization of regulatory requirements on nuclear and radiation safety

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**reference:**

**Decision number:** NSI/2010/022-633

**Method of procurement:** Service contracts - Exceptional Negotiated Procedure with a single offer

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**Effective contract date:** 17/04/2014

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