

National Progress Report: Ukraine

March 31, 2016

Since the 2014 Nuclear Security Summit, Ukraine has strengthened nuclear security implementation and contributed to building up the global nuclear security architecture by:

Strengthening Nuclear and Other Radioactive Material Security

As part of the comprehensive action plan on improving physical protection of nuclear facilities, nuclear material, radioactive waste and other sources of ionizing radiation, strengthening security of nuclear and radioactive materials on nuclear and radiation hazardous objects is a constant process.

Organization and implementation of measures for physical protection of the Ukrainian nuclear power plants (NPPs) is being carried out under real threats caused by the Russian aggression in eastern Ukraine and deterioration of social and political situation in the country. In these conditions, to ensure stable operation of nuclear power facilities, significant efforts are directed at strengthening physical protection, defense and practical training focused on anti-terrorism and anti-sabotage measures at nuclear power plants. Systematic monitoring of crisis situations and development of new approaches to protect nuclear facilities are underway.

Taking into account unstable military and political situation in the east of Ukraine, in order to prevent provocations, mass disorders, incidents with unpredictable consequences, illegal actions towards nuclear facilities, nuclear material, radioactive waste and other sources of ionizing radiation, in January, 2014 the state system of physical protection of Ukraine was switched to a high alert regime.

Acts of inter-agency committees on protection of nuclear material, facilities, radioactive waste and other sources of ionizing radiation have been revised and reapproved by competent authorities of Ukraine. According to their provisions, protection of all nuclear power plants in Ukraine has been significantly strengthened.

New Plans of coordination in case of sabotage and relevant Action Plans in case of crisis situation were developed and introduced at all Ukrainian NPPs. All-round automated data control systems of engineering and technical means of physical protection have been placed in operation.

Vulnerability assessment studies of all Ukrainian NPPs have already been completed.

Physical protection of Ukraine's nuclear facilities, nuclear material, radioactive waste and other sources of ionizing radiation is organized according to the current legislation in this area. In order to verify its conformity with the legislation, in 2014 -2015 regular state inspections were carried out at all nuclear power plants, research facilities, radioactive waste management facilities and entities that use category I sources of ionizing radiation in their work.

However, due to the inability to safely perform their duties by state inspectors in Crimea and certain areas of Donetsk and Luhansk regions, in 2014 only 3 inspections of the systems of physical protection of radioactive waste management facilities were carried out.

Within the framework of the Global Threat Reduction Initiative, in order to enhance security of sources of ionizing radiation, in 2015 physical protection systems were examined at the following facilities:

- Vinnytsia regional oncology center;
- Zhytomyr regional oncology center;
- Kyiv regional oncology center;
- Chernihiv regional oncology center;
- Cherkasy regional oncology center;
- Kirovohrad regional oncology center.

Systems of physical protection of radioactive waste and other sources of ionizing radiation were installed and put into operation at radioactive waste management facilities.

On August 27, 2015 "New design basis threat to nuclear facilities, nuclear material, radioactive waste and other sources of ionizing radiation in Ukraine" was approved by a Presidential Decree.

Project proposals on modernization of systems of physical protection of nuclear facilities and nuclear waste management facilities, announced in 2014-2015 during the G7 Global Partnership meetings, have been incorporated into Integrated Nuclear Security Support National Plan (INSSP) of Ukraine for 2016-2018 and to the Action Plan on its implementation, in particular:

- Technical re-equipment of physical protection system of South-Ukraine NPP's perimeter;
- Technical re-equipment of physical protection system of South-Ukraine NPP's units 1-3;
- Technical re-equipment of physical protection system of Khmelnytsky NPP (establishing main control panel);
- Technical re-equipment of physical protection system of Rivne NPP's personnel and vehicles access control points;
- Technical re-equipment of physical protection system of Rivne NPP's unit 3;
- Construction of interim storage facility for long-term storage of vitrified high-level radioactive waste, returned from the Russian Federation after processing of spent nuclear fuel from Ukrainian NPPs with WWER-440 units;
- Establishing a communication subsystem of physical protection system of Zaporizhia NPP;
- Technical re-equipment of physical protection system of Zaporizhia NPP;
- Establishing automated complexes of physical protection system of radioactive waste processing of Zaporizhia NPP;
- Technical re-equipment of physical protection system of Khmelnytsky NPP's unit 1;
- Strengthening physical protection system of specialized radioactive waste management enterprises of the UkrDO Radon State Corporation;
- Liquidation of radioactive inheritance of the former Soviet Union at specialized radioactive waste management enterprises of the UkrDO Radon State Corporation;
- Improving capabilities of the UkrDO Radon State Corporation for ensuring nuclear and radiation safety of spent radiation sources.

Currently, after taking into account comments and recommendations of the IAEA experts, in February 2016 the INSSP was approved.

Central long-term storage of spent sources of ionizing radiation is scheduled to be put into service in 2016.

In order to adjust national legislation on physical protection to the IAEA recommendations, in 2016 the respective Resolution of the Cabinet of Ministers of Ukraine will be revised (On approval of the order of determination of level of physical defense of nuclear facilities, nuclear material, radioactive waste and other sources of ionizing radiation according to their categories).

Minimizing Nuclear and other Radioactive Material

There are 6 repositories of radioactive waste and sources of ionizing radiation, which are kept in storage facilities, equipped in accordance with national legislation with high level security systems. However, three of these repositories are currently located on the temporarily occupied territories: 2 in the Autonomous Republic of Crimea and 1 near the city of Donetsk.

During 2014-2015, competent authorities of Ukraine continued to collect spent sources of ionizing radiation, transferring them to specialized radioactive waste management enterprises of the UkrDO Radon State Corporation. Activities in this area have been carried out in close cooperation with the donor states (USA, Great Britain, Germany, France), the European Union, the IAEA and NATO.

On June 17, 2015 the Implementing agreement between the Cabinet of Ministers of Ukraine and the NATO Support Agency on disposal of radioactive waste, accumulated in the result of carrying out military programs of the former USSR in Ukraine, was ratified. According to this Agreement, the disposal of nuclear waste repositories is to be conducted at the enterprises of the UkrDO Radon State Corporation with NATO financial assistance.

Countering Nuclear Smuggling

Ukraine continues to strengthen radiation control system at its State Border. During 2010-2015 in the framework of the projects of international technical assistance, Ukraine installed and put into operation stationary systems for radiation monitoring in more than 50 border-crossing checkpoints, 7 of which are located on temporary occupied territories of Crimea and certain areas of Donetsk and Luhansk regions.

Border Guard staff participated in more than 100 training sessions on detecting radioactive (nuclear) materials on the State Border using nuclear radiation detectors for control and

reconnaissance. Five exercises were devoted to response to detection of radioactive (nuclear) material smuggling.

As part of the agreement with the IAEA, advanced training on physical protection and accounting of nuclear material was held for officials of the State Border Guard Service of Ukraine at the training center for physical protection, accounting and control of nuclear material.

Regular exchange of information between the border agencies of neighboring countries is ensured by the border guard executives in order to counter smuggling of nuclear and radioactive materials and timely respond to the threat of nuclear terrorism.

As part of the "Identifying and preventing nuclear smuggling" international technical assistance project, in 2015 five obsolete Russian-made stationary systems for radiation detection were upgraded, two new TSA-type American-made modern stationary systems were put into operation, TSA stationary equipment was supplied for installation in 4 border-crossing check-points on the Ukrainian-Moldovan border.

Preparatory phase of installing new stationary systems for radiation monitoring in 6 border-crossing check-points on the Ukrainian-Belarusian border is underway. Competent authorities of Ukraine are working actively at the establishment of automated system for exchange of information on cases of stationary systems triggering. Such system will be a potential platform for inter-agency information and telecommunication system to register facts of detection and intents of illicit trafficking of nuclear and radioactive materials through the territory of Ukraine and across its State Border.

National Academy of Sciences of Ukraine elaborated a draft Concept of the State program of development of nuclear forensics in Ukraine for the years 2014-2020. An agreement was reached to create a regional network of nuclear forensics expertise for the GUAM countries using the funds of the EU technical assistance. Research expert organizations of Ukraine, Georgia, Azerbaijan and Moldova started working on this project in 2015. Its objective is to create a network of nuclear forensics laboratories in the GUAM region, including the expansion of basic technical and information capabilities of national expert laboratories in each participating country, and creating a basis for mutual support and cooperation in this area of research.

Within the framework of TACIS and Instrument for stability (IfS) the Institute for Nuclear Research of Ukraine received a mobile laboratory for the on-site actions in response to illicit trafficking incidents. It also received the Element 2 precision mass spectrometer with inductively coupled plasma (ICP-MS) for multi-element analyses at trace levels in nuclear material and environmental samples. Such improvements increased greatly the technical expertise capabilities of the Institute.

Supporting Multilateral Instruments and Cooperating with International Organizations

Ukraine continues to fulfill its obligations within the framework of the Global Initiative to Combat Nuclear Terrorism (GICNT) according to approved plans, namely, the Statement on Principles of Combating Nuclear Terrorism and the Action Plan on improvement of capabilities of state-parties to the Initiative to achieve positive results based on multilateral cooperation.

Ukraine confirmed to the IAEA Secretariat its readiness to provide interested countries with consulting assistance in elaboration of laws and regulations on physical protection of nuclear facilities, nuclear material, radioactive waste, other sources of ionizing radiation, and to organize experts training in this field.

Partnering with External Stakeholders

With financial support of the US Government and in cooperation with Lawrence Livermore National Laboratory Ukraine is working on creation of a scientific and methodological basis for determining attributes of uranium-bearing materials of different origin and development of nuclear forensics library data and materials to enhance the effectiveness, efficiency and validity of conclusions of nuclear forensic expertise.

Within the framework of the Agreement on Nuclear Safety and respective Memorandum of Understanding Ukraine jointly with the United States designed and completed construction of the Neutron source based on subcritical assembly driven by linear electron accelerator (Neutron Source Facility). Currently pre-commissioning works, individual and complex tests are underway at the Facility.

Since 2014 the following joint projects aimed at strengthening capabilities in the area of detection of nuclear and radioactive materials have been carried out:

- Detecting and countering nuclear smuggling (US Department of Energy);
- WMD non-proliferation initiative: assistance to the State Border Service of Ukraine (US Defense Threat Reduction Agency);
- Technical assistance to strengthen Ukraine's export control system and countering the proliferation of weapons of mass destruction (US State Department);
- Increasing the capabilities of the border guard services of Ukraine and Moldova to detect chemical, biological, nuclear and radioactive materials (European Commission).

Following the agreement of the 2014 Hague Nuclear Security Summit, the trilateral Swedish-Norwegian-Ukrainian Initiative was successfully established. In 2014-2015 seven projects were implemented within the Initiative, namely:

1. *Safety requirements for new types of nuclear fuel.* Project support was provided to the State Nuclear Regulatory Inspectorate of Ukraine (SNRIU) to develop requirements for safe implementation of new types of nuclear fuel. These requirements were included in regulations related to safe management of fuel. The project was successfully completed in November, 2015. The regulations are currently under consideration of the Ukrainian authorities.

2. *Tools for probability safety assessment.* Online surveillance systems that enable assessment of safety risks related to operation of nuclear power plants are being introduced in Ukraine in the framework of this project. Safety assessment software was delivered to the SNRIU and the South Ukrainian nuclear power plant, followed by personnel training. Such systems will be installed at other Ukrainian NPPs as appropriate.

3. *Safety enhancements at Rivne nuclear power plant.* Modernization of safety systems of Rivne nuclear power plant is an element of a Package program on safety enhancement of all NPP's units of Ukraine. Realization of this project will enable detection of the NPP's malfunctions at an early stage and to take timely actions to prevent accidents.

4. *Safety requirements for damaged nuclear fuel.* The primary objective is to develop regulatory requirements for management of damaged nuclear fuel. The project is in the development phase with implementation date set for 2016.

5. *Modernization of radioactive source register.* Upon review of the national source register of Ukraine it was determined that the system required upgrades to meet current regulations and to further improve control of radioactive sources. Assistance on upgrading the system was provided to the authorities that maintain and support the existing national source register. Further development of the database will include applying a web-based system.

6. *Security upgrades at Khmelnytsky nuclear power plant.* The project's main goal is to strengthen and upgrade physical protection system of Khmelnytsky NPP. Foreign experts visited this nuclear power plant to assess the volume and value of necessary works. The implementation of the project will begin in 2016.

7. *The 13th Ukrainian conference on nuclear security* will be organized at Khmelnytsky NPP in October 2016. All national stakeholders responsible for nuclear and radiological security will participate in the event to share their experience and expertise.

Issues of concern

Russian military aggression in eastern Ukraine and its attempt of illegal annexation of the Autonomous Republic of Crimea pose new threats to the national system of nuclear and radiation security and resulted in loss of regulatory control in those areas.

The following sources and facilities remain without regulatory control in the Eastern Ukraine:

- 1200 radionuclide sources of ionizing radiation (category 1-5);
- 65 entities that use sources of ionizing radiation (including eight that have high-level radiation sources of category 1 with activity of more than 1000 Ci);
- Donetsk specialized radioactive waste management enterprise of the UkrDO Radon State Corporation;
- 1 repository of radioactive waste and sources of ionizing radiation near Donetsk chemical plant;

- Radiation sources in two coal mining facilities of Donbas, which combine 15 coal mines (142 radiation sources, with the maximum activity of a single source of 2.35×10^{11} Bq).

The following sources and facilities are located on the territories of the Autonomous Republic of Crimea and the city of Sevastopol:

- Research reactor of the Sevastopol National University of Nuclear Energy and Industry: DR-100 research reactor, DR-100 (critical assembly) physical test bench, subcritical uranium water assembly, about 3488 kg of depleted uranium;
- 277 radionuclide sources of ionizing radiation;
- 53 entities that use radionuclide sources of ionizing radiation, six of them use category 1 and 2 radiation sources according to the level of potential hazard (medicine, shipbuilding) in which over 1200 kg of depleted uranium is used as biological shielding;
- 2 nuclear waste repositories.

Due to external aggression, Ukraine lost regulatory control on the territories of the Autonomous Republic of Crimea and the city of Sevastopol, as well as communication with the Crimean State Inspectorate. Property of the Crimean State Inspectorate was seized by illegal authorities and handed over to the so-called Council of Ministers of the Republic of Crimea – a regional branch of the Industrial and Nuclear Supervision Service of Russia (Rostekhnadzor).

Companies on the territory of the Autonomous Republic of Crimea lost the possibility to transfer radioactive waste (spent sources of ionizing radiation) for storage to the Odessa State Specialized Interregional Plant.

At present Ukraine cannot guarantee physical protection of the abovementioned research reactor, nuclear material and sources of ionizing radiation on the territory of Crimea, city of Sevastopol and certain areas of Donetsk and Luhansk regions.

Given the occupation of the Autonomous Republic of Crimea by the Russian Federation and ongoing anti-terrorist operation in eastern Ukraine, any damage to radiation-hazardous objects located on those territories may lead to dire consequences not only for Ukraine but for many European nations as well. Thus, we consider that the issue of establishing international control

over nuclear facilities that can be seized or damaged as a result of military actions, requires immediate international attention.