The Technical Secretariat of the Committee on Cooperation in the field of Non-Proliferation of Nuclear Weapons

Post evaluation on the Project named “The Modernization of the System to Deter the Illicit Trafficking of Nuclear and Radioactive Materials at the State Borders of the Republic of Belarus”

Post-evaluation results overview

January 2013

Nuclear Safety Research Association

1. Outline of the Project

Country: The Republic of Belarus

Name of the project: The Modernization of the System to Deter the Illicit Trafficking of Nuclear and Radioactive Materials at the State Borders of the Republic of Belarus

Area: Nuclear security

Form of cooperation: Provision of equipment

Total cost: Approximately 76 million Japanese Yen

Project duration: July 2010 to August 2011

Targeted organizations/facilities: The State Border Committee of the Republic of Belarus

1.1. Background of the Cooperation

The Republic of Belarus (hereinafter referred to as "Belarus") which became an independent state after the collapse of the Soviet Union in 1991 acceded to the Nuclear Non-Proliferation Treaty (NPT) in July 1993, and the safeguards agreement based on the NPT entered into force in August 1995. During this time, the Government of Japan concluded the "Agreement between the Government of Japan and the Government of the Republic of Belarus concerning cooperation for the non-proliferation of nuclear weapons and establishment of a committee on this cooperation" with the Belarusian Government in November 1993, and the two have since cooperated mainly in the field of nuclear non-proliferation.

Since Belarus is a landlocked country surrounded by Russia, Ukraine, Poland, Lithuania and Latvia, the trade between Russia and member countries of the European Union (hereinafter referred to as "EU") through Belarus has been active. On the other hand, the number of cases has been on the rise, where radiation dose exceeding a standard level is detected from vehicles and cargo passing through the country.

The State Border Committee of the Republic of Belarus (hereinafter referred to as the "State Border Committee") is responsible for activities to combat illicit trafficking of nuclear and radioactive materials at the state borders of Belarus. Immediate and efficient response has been sought for an increasing number of radiological incidents. The area contaminated with radiation (hereinafter referred to as "the contaminated area") as a result of the Chernobyl catastrophe in 1986 is concentrated on the Belarusian-Ukrainian border sites, and radioactively contaminated materials are often carried out of the area. Therefore the enhancement of capability to detect and control radioactivity in the border sites has been an urgent issue.

Against this backdrop, the Japan-Belarus Committee on Cooperation for the Non-Proliferation of Nuclear Weapons (hereinafter referred to as the "Japan-Belarus Committee") has provided equipment and devices required by the State Border Committee and furnished the Specialized Classroom for Radiation Security of the Border Guard Institute under the project named "The Modernization of the System to Deter the Illicit Trafficking of Nuclear and Radioactive Materials at the State Borders of the Republic of Belarus" (hereinafter referred to as the "RADBEL

Project").

1.2. Contents of the Cooperation

(1) Overall Goal

Enhancement of nuclear security in Belarus through international cooperation

(2) Objectives of the Project

Establishment of comprehensive measures to detect, interdict and respond to the illicit trafficking of nuclear and radioactive materials at the state borders of Belarus

(3) Results

This project produced the following contributions.

① Establishment of the immediate and efficient operational response* to radiological incidents at the border checkpoints including airports.

* Response to the majority of radiological incidents without any serious security concerns, health hazards, nor proliferation threat that can be solved in a routine response mechanism

② Facilitation of the strategic response* to the serious radiological incidents with significant potential hazards to security and health, which necessitates the cooperation with relevant domestic ministries and agencies.

* Response to the emergency level radiation incidents which concerned serious danger to the environment and public including impoundment of radiation materials

③ Integration of database of illicit trafficking of nuclear and radioactive materials at the borders in the format which can be shared with the International Atomic Energy Agency (hereinafter referred to as "IAEA"), and accessed by relevant domestic ministries and agencies.

④ Strengthening the radiation safety of the border guard staff on duty in the Chernobyl contaminated border sites and the local residents in the areas.

⑤ Increase of radiation detection capabilities at the local border checkpoints, water border sites, aviation patrol areas, "green" borders* and the counter-terrorism division of the State Border Committee.

* Desert border sites between border checkpoints

⑥ Enhancement of technical proficiency of the border guard specialists in nuclear and radiation security and countermeasures against the illicit trafficking of nuclear and radioactive materials.

(4) Inputs

[Japanese side]

① Establishment of the geo-informational system called "Nuclear Protection Network" (hereinafter referred to as the "NPNET System") and provision of the necessary

communications system, LAN-related equipment and computers for the system.

② Procurement of minibuses for the “mobile strategic/operational response laboratory” and “mobile operational response laboratory” (hereinafter referred to as “mobile operational response laboratory”) and installation of measuring equipment such as NaI gamma radiation spectrometers on these vehicles.

③ Procurement of a minibus for the “mobile radiometric laboratory” and installation of a whole body counter (hereinafter referred to as “WBC”), radiation-detection equipment, dedicated communications equipment, etc. on the vehicle.

④ Provision of portable radiation detectors/dosimeters for patrolling simplified border checkpoints (border checkpoints without customs procedures) and other border sites.

⑤ Furnishing of a newly established Specialized Classroom for Radiation Security of the Border Guard Institute (hereinafter referred to as the “Specialized Classroom for Radiation Security”), and provision of portable radiation detectors, spectrometers, etc.

[Belarusian side]

① Development of border radiation control concept and implementation of field testing using a pilot model of the mobile operational response laboratory developed within the framework of the IAEA Coordinated Research Project (CRP).

② Provision of places/facilities to store and set up the equipment/systems, technical support, etc.

③ Allocation of required staff for establishment of a project management team and implementation of training for the border guard staff.

④ Bearing cost for operation and maintenance of the equipment and systems.

2. Outline of the Evaluation and Survey Team

Survey team: Nuclear Safety Research Association (NSRA)

Survey period: November 18 through 25, 2012

Type of survey: Post-evaluation

NSRA surveyed the following organizations/facilities:

(1) The Headquarters of the State Border Committee of the Republic of Belarus (Minsk)
(2) The Specialized Classroom for Radiation Security of the Border Guard Institute of the Republic of Belarus (Minsk)
(3) The Pinsk Border Guard Department of the State Border Committee of the Republic of Belarus (Pinsk)
(4) The Brest Border Guard Department of the State Border Committee of the Republic of Belarus (Brest)
(5) The Ministry of Foreign Affairs of the Republic of Belarus (Minsk)
(6) Pinsk District Executive Committee (Pinsk)
(7) Scientific and Production Enterprise ATOMTEX and Polimaster Ltd. (Minsk)
(8) Office of Nuclear Security, IAEA (Vienna)

3. Outline of evaluation results

3.1 Evaluation results based on the five evaluation criteria developed by the Development Assistance Committee (DAC)

All equipment supplied under the RADBEL Project (NPNET System, mobile operational response laboratories, a mobile radiometric laboratory, radiation detectors, radionuclide identification devices and communication equipment) was observed as operating properly. It was also confirmed that each department has been using the equipment as intended and maintaining and managing the equipment under the appropriate management plans.

It was confirmed that on-site training has been provided to the border guard staff in charge of operations in order for them to use the equipment smoothly and appropriately. It was also confirmed that the training has been provided to the students of the Border Guard Institute using the Specialized Classroom for Radiation Security established at the institute, including retraining of the field staff. The training program developed by the Headquarters of the State Border Committee for all the staff has been conducted in a well-organized manner, while training based on the educational programs at each border guard department has also been conducted. In light of these results, it was confirmed that the equipment was being put to effective use.

As described above, it was deemed that the RADBEL Project has sufficiently achieved its initial objectives and successful results have been obtained. This is clear from the fact that these results have been highly appreciated not only by the surveyed agencies and facilities, but also by the relevant ministries and agencies in Belarus. In addition, the IAEA officials valued the fact that the Japanese assistance in the field of nuclear security in Belarus had been completed successfully

in such a short period of time.

The results of evaluation based on the DAC five evaluation criteria are shown below.

(1) Relevance

The RADBEL Project was considered to be relevant in the light of the following points.

① Consistency with the requirements of Belarusian side

Every component under the RADBEL Project was selected based on the highest priority needs of Belarusian side in order to strengthen and modernize systems to deter the illicit trafficking of nuclear and radioactive materials across Belarusian state borders. It can be concluded that the RADBEL Project has met the requirements of Belarus through conducting intensive interactions with relevant Belarusian agencies to materialize the cooperation.

② Degree of achievement of project objectives and overall goal

The RADBEL Project aimed to deter the illicit trafficking of nuclear and radioactive materials chiefly across the Belarusian-Ukrainian state border, and also to detect radioactivity quickly and deter the illicit trafficking of radioactive materials to/from the country through the development of NPNET System along the Belarusian border. It is evaluated that a baseline for nation-wide comprehensive measures to deter the illicit trafficking of nuclear and radioactive materials in Belarus has been developed as the project objectives for the time being have been achieved through the utilization of the supplied equipment, though there may be a possibility of need to improve security along water border sites in the future. The deployment of the mobile radiometric laboratory was deemed to play a major role in achieving objectives for a more comprehensive radiation detection system for local residents and border guard staff in the contaminated area by the Chernobyl catastrophe.

The RADBEL Project constituted a part of international efforts through various consultations with IAEA, EU, USA and Belarus for achieving the above overall goal of improving nuclear security within Belarus through international efforts. It is expected that the quick completion of the RADBEL Project by the Japanese government will encourage the promotion of the cooperative implementation by EU and USA and thus lead the sooner achievement of the above goal.

(2) Efficiency

This project was considered to be efficient due to the following points.

① Role of project management team on domestic procedures (such as project registration, tax exemptions), schedules, equipment procurement and budgeting

The project management team established within the State Border Committee fully engaged in the quick completion of the RADBEL Project based on the mutual relationship of trust between Japan and Belarus. The State Border Committee also made a tremendous contribution to the smooth and quick completion of the RADBEL Project via various types

of interaction and coordination. A good example is that the Committee registered the RADBEL Project as an international technical support project with the Ministry of Economy of Belarus and secured tax exemption measures through above registration within a short period of time. The Committee also carried out procurement of all required equipment at one time through elaborate consultation on the request from work sites that has led to meet the planned schedules. In spite of the fact that the additional procurement of the equipment was implemented twice based on the requests from the Belarusian side, the project was therefore deemed worthy of high efficiency. The project was completed for only about 76 million Japanese yen as against 90 million Japanese yen originally budgeted, as a result of cost saving efforts by the Belarusian side.

② *Response to plan changes and unforeseen events*

Despite of the Great East Japan Earthquake and the Fukushima Daiichi Nuclear Power Plant accident on March 11, 2011, the project was implemented according to the schedule through the concerted efforts of the authorities concerned between Japanese and Belarusian side.

The Belarus currency was devalued while the RADBEL Project was underway. However the project specifications were adhered to as per initial plans because the budget was based on US dollar. Additional provision of such equipment as air-conditioning, radiation detectors and computer equipment was implemented responding to the requests by Belarusian side, and it was ended up the efficient spending of the budget to contribute to the enhancement of comfortable working environment at the State Border Committee. No other major changes were observed, and therefore it is considered that the RADBEL Project has been implemented efficiently.

(3) Effectiveness

This project is considered to have been effective due to the following points.

① *Organizing an immediate and effective response system (operational response) to radiological incidents at border checkpoints*

There were approximately 290,000 vehicles, freight trains and passenger trains inspected by mobile operational response laboratories in 2011 and 2012. Around 2,000 incidents of them were detected with high radiation dose rates, and 30 vehicles were forced to return to the country of departure. The mobile operational response laboratories were dispatched approximately 2,700 times over this period. At the Pinsk region, mobile operational response laboratories were dispatched approximately 530 times, and 16,700 vehicles and trains were inspected in 2011 and 2012 after the completion of the RADBEL Project. Approximately 100 cases of these were detected with a high radiation dose rate and most of them were found that it was due to natural radioactive materials, except for one case which was forced to return to the country of departure. The dramatic increase in the number of

detections indicated that deployment of mobile operational response laboratories had drastically increased the capability to manage radiological incidents.

Previously, it took 4 days in average and even more than 10 days in some cases, for the inspection of radiological incidents in which special radiation control experts were dispatched to the site in response to a reporting of detection of radioactive substances at a border checkpoint and determined the cause with consulting with the Headquarters of the State Border Committee over the phone.

After a pilot model of the mobile operational response laboratory was introduced to the Brest Border Guard Department by the CRP of IAEA, the duration for inspection was shortened to an average of 0.67 days from an average of 4 days. Today, inspections can be completed in 2 to 5 hours using the mobile operational response laboratories supplied by the RADBEL Project, with the actual time for analysis taking 30 minutes to 1.5 hours. The project has therefore helped to increase response speed when an incident occurs. The skill level of inspection staff was also raised, which contributed to more efficient inspections.

Cooperation system was established with the Joint Institute for Power and Nuclear Research "Sosny" and other agencies to seek assistance in case of complex spectrums to be inspected. There was a case in 2009 when the suspicious nuclear material was detected. The Institute "Sosny" analyzed and found it out to be Ra-226 in fact, and appropriate measures (not allowing it to be brought into the country) were taken. In another case in 2010, cargo was discovered that was similarly suspected to contain nuclear material, however analysis by the said institute determined that the suspect material contained a mixture of natural radioactive materials.

② *Facilitating the "Strategic Response" to serious radiological incidents with security threat and health hazard*

"Strategic Response" system in the framework of which the Headquarters dispatches mobile operational response laboratories and takes the comprehensive measures cooperating with the Ministry of Emergency Situations and other related agencies has been established, in case that radioactive materials were detected along state borders. To date, there have been no serious radiological incidents occurred that require the strategic response.

③ *Supporting the integrated database of illicit trafficking of nuclear and radioactive materials at the state borders*

The NPNET System which can be accessed online was installed at the command center in the Headquarters of the State Border Committee and seven regional command points at the border guard departments (in Pinsk, Brest, Gomel, Lida, Grodno, Smargon and Polotsk). When the radiological incidents are detected, responsive data to them are transmitted simultaneously to the Headquarters of the State Border Committee, where the data is collected and stored centrally. The data can then be used by any of the border guard

departments.

Additionally, the data stored in the NPNET System is formatted to match the IAEA's Illicit Trafficking Database (ITDB), and it can be shared with relevant domestic ministries and agencies.

Communication devices to access to the NPNET System

NPNET System at the Pinsk Border Guard Department

④ *Strengthening the radiation safety of the border guard staff and residents in the areas contaminated by the Chernobyl catastrophe*

The number of the border guard staff and local residents who received radiation inspection has doubled since the mobile radiometric laboratory has been provided to the Pinsk Border Guard Department.

8,747 of people in Pinsk region (6,604 residents, of which 2,892 were children and 2,143 boarder guard staff) have been inspected by the mobile radiometric laboratory overall. Two residents with a reading of 400Bq/kg or more were identified by WBC inspection. One of them turned out to have received medical treatment with radioisotopes, and the other's cause for high reading remained unknown, so the person has continually received medical observation with lifestyle advice on dietary habits in cooperation with medical doctors. The gamma radioactivity monitor installed at this radiometric laboratory was also used for measurement of radionuclide content in foods, inspecting 107 samples in 2011 and 2012. Of these, 30 samples displayed high readings that exceeded the standard threshold, so a report was sent to governmental agencies so that they could issue a warning to the residents advising not to eat these foods. These efforts by the State Boarder Committee and the governmental agencies have contributed to the reduction of residents' risks in ingestion of radioactive materials.

It is highly respected by the residents with regards to safety as the governmental response system to incidents has been developed as well as the local doctors are assigned to assist in

diagnoses in case that high radiation measurement is detected by WBC.

Mobile radiometric laboratory


WBC

⑤ *Increasing the radiation detection capabilities at the simplified border checkpoints, water border sites, aviation patrol areas and "green" borders*

Portable radiation detectors have been playing an essential role in deterring the illicit trafficking of nuclear and radioactive materials, which were mainly provided to the border guard staff and widely used to search and detect nuclear and radioactive materials at the simplified border checkpoints, water border sites, aviation patrol areas, and "green" borders.


Mobile Radiation Safety Group
of the State Border Committee

⑥ *Enhancing the technical proficiency of the border guard specialists in radiation security and countermeasures against the illicit trafficking of nuclear and radioactive materials*

The Border Guard Institute was established in 2010 as a four-year institute certified for its specialized expertise by the Ministry of Education along with the development of the Specialized Classroom for Radiation Security. There are 120 students enrolled in each grade at the Institute and the students on the second grade take 80-hour classes on radiation related subjects (including theory and measurements). Additional 50-hour of re-education

classes to the executive candidate students (20 students in the fifth year) is provided in the Specialized Classroom.

Re-education for border guard staff consists of following three courses: 3-month course (24 students/class, held 2 times), 1-month course (16 students/class, held 2 times), and 1 week course (to be planned). The classroom has been used effectively for these courses. While the instructor of special radiation control expert trains the staff of the State Border Committee at the classroom, each border guard department also develops their own individual training manuals.

The classroom was effectively utilized as a discussion venue for the inspection teams from Japan on radiation countermeasures and healthcare (the Fukushima inspection team, the Hirosaki University inspection team) and other inspection teams from overseas (a team from the State Border Guard of Latvia, etc.). The IAEA is also planning to utilize this specialized classroom for its training programs, and EU countries also expressed an interest in using the classroom.

Specialized Classroom for Radiation Security of the Border Guard Institute

(4) Impacts

The following positive impacts were observed after the completion of the RADBEL Project.

① *Economic and social spillover effects brought by the Project (impact on logistics and other distribution across the Belarusian borders)*

At the Belarusian-Polish border “Kozlovich”, the largest border checkpoint in the Brest region, a large number of cargo trucks pass every day. The supplied equipment to deter the illicit trafficking of nuclear and radioactive materials has contributed to faster and more efficient processing through the border checkpoint.

② *Spillover effects for Japan (in the field of deterring illicit trafficking of nuclear and radioactive materials and radiation safety)*

The RADBEL Project not only served as a valuable reference for similar projects of

Japan in the future, but also helped to highlight the difficulty of deterring illicit trafficking of nuclear and radioactive materials in the flow of materials (including people) to/from landlocked countries. The Project also highlighted that developing quick communication systems among relevant agencies was extremely important to deter illicit trafficking of nuclear materials at Japan's international airports and other checkpoints efficiently.

③ *Degree of awareness of the RADBEL Project in Belarus and inhabitants' reaction (in the press and other media)*

The RADBEL Project was extensively covered in newspapers or TV throughout the country about its project completion, usage of various equipment provided and especially health on studies of residents by WBC. Belarusian nationals are well aware of the Project.

④ *Impact on planned projects by other donor countries/agencies*

The RADBEL Project was completed over a short period of time. It is therefore assumed that the Project encourages EU and USA, both of which are considering implementing similar projects as the RADBEL Project, to start implementation of their projects.

The IAEA is well aware of implementation and operation of the RADBEL Project and highly appreciated that the equipment provided contributed greatly to improving capabilities for deterring the illicit trafficking of nuclear and radioactive materials. The IAEA officials indicated the possibility to examine the operative conditions of the domestic system for deterring illicit trafficking in Belarus as part of the "International Nuclear Security Advisory Service (INSServ)" from 2013 onwards.

(5) Sustainability

It was observed that the State Border Committee had taken a central role in efforts to maintain and manage the supplied equipment, including budgetary measures.

① *Maintenance plans of supplied equipment, and frequency of regular inspections and maintenance work*

The supplied mobile laboratories were deployed so many times. Significant efforts to keep proper conditions of the laboratories were made through regular maintenance works and inspections, as well as routine checks before each deployment.

Calibration of radiation detectors and other equipment was vital for maintaining reliability, and the Headquarters of the State Border Committee conducts such calibration regularly through an overall plan for inspections maintenance and calibration based on domestic laws. WBC calibration was conducted once a year using a standard phantom by the Belarusian State Institute of Metrology located in Minsk.

Staff training for the mobile laboratories and other equipment is conducted at the Specialized Classroom for Radiation Security, and re-education is also conducted for the staff already on duty with the equipment.

② *Budgetary management required for maintenance and management of supplied equipment (current status and forecast)*

Budgetary measures for the maintenance of supplied equipment are mainly taken by the Headquarters of the State Border Committee and similar measures are also taken for communication and the operation of the NPNET System. Three persons are required for the operation of each mobile laboratory. They are all members of the State Border Committee and their labor costs are covered with the national budget as others.

③ *Other*

It is only one year passed since the mobile radiometric laboratory and other equipment were provided. Measuring equipment such as WBC is used regularly to carry out health check of the State Border Committee staff including residents, and the demand for the usage of the measuring equipment will be increased from now on. It is relatively short period since the Specialized Classroom for Radiation Security began to be put on use. The Classroom is expected for training not only the staff of the State Border Committee but customs officers working at the border checkpoints. IAEA is also planning to hold training courses at the Classroom. Therefore it is expected to utilize the Classroom in various purposes in the years to come.

Radiation response training has begun at the Specialized Classroom and training activities are expected to grow furthermore in the future. It is therefore necessary to change and improve the curriculum and respond to the diversified lectures, practical exercise and texts, etc. In order to cope with various demands, current instruction system has to be strengthened.

3.2 Overall evaluation

The following table shows overall evaluation results based on DAC criteria.

Overall evaluation results of RADBEL Project

5 evaluation criteria	Evaluation results	Reasons
Relevance	High	The project matched Belarusian needs and helped to enhance prevention of illicit trafficking of nuclear and radioactive materials.
Efficiency	High	The project proceeded according to original plan and was adjusted accordingly to any unexpected changes.
Effectiveness	High	A system of immediate and effective response to radiological incidents was established and helped to strengthen prevention of illicit trafficking of nuclear and radioactive materials.
Impacts	Generally high	The project enabled faster distribution, brought an economic and social ripple effect and laid the foundation for efforts to prevent illicit trafficking of nuclear and radioactive materials throughout Belarus. The project significantly contributed to the prevention of the illicit trafficking on the entire border of Belarus. However, it will take time for strengthening the entire system to prevent illicit trafficking of nuclear and radioactive materials to be completed, as there has been slow progress in the cooperative programs of other donors in strengthening of the system.
Sustainability	Generally high	A maintenance management plan and technical/economic operation system was established to effectively utilize donated equipment and materials. More instructors are required for radiation security education.

Based on the results of the DAC five evaluation criteria as given in the above table, the RADBEL Project has been judged to have achieved its objective of enhancing prevention measures against the illicit trafficking of nuclear and radioactive materials at the state borders of Belarus.

Under the RADBEL Project, the equipment and materials modeled on the mobile operational

response laboratory by the CRP of IAEA were donated to the State Border Committee. These equipment and materials have been effectively utilized for border patrol and have played a significant role in enhancing prevention of illicit trafficking of nuclear and radioactive materials, primarily in Belarusian-Ukrainian border sites. The equipment and materials were provided for quick operational response to radiological incidents on the state borders and have also been observed to have a dramatic ripple effect on physical distribution as a whole.

In order to strengthen prevention of illicit trafficking of nuclear and radioactive materials at state borders of Belarus, the earliest implementation of EU and USA projects would play a pivotal role. Their earliest implementations of projects are very much encouraged taking the RADBEL Project as a reference.

3.3 Lessons learned

In international support activities, it is essential to take some factors into account for the comprehensive assessment in decision making. The factors include the technical level of domestic products of a beneficiary country meeting the required technical level of the equipment, materials or system (precision, etc.) and the country's technical level and production level in related fields when deciding whether to use domestically produced equipment/materials of the beneficially country.

The RADBEL Project used equipment/materials made in Belarus. Their performance level and other technical factors were well suited for the purpose of the project, indicating that use of domestic equipment/materials was extremely successful.

3.4 Recommendations

(1) Necessity for comprehensive training using donated equipment and materials

It appears that the education training for the staff of the State Border Committee is conducted using equipment donated. But it is recommended to carry out comprehensive training attended by the staff of other related institutions (Ministry of Emergency Situations, research institutes, etc.). For example, by implementing comprehensive training envisioning strategic responses to cases where nuclear materials are suspected at a border checkpoint, it is requested that the establishment of strong ties with related institutions can be realized so that more effective use of donated equipment and materials will be promoted and technical issues in the system will be further clarified to deter illicit trafficking of nuclear and radioactive materials.

(2) Training of instructors for radiation measurement, etc.

The Border Guard Institute started to provide training and education by itself with the establishment of the Specialized Classroom for Radiation Security, but it seems that only a single full-time instructor is now engaged in lectures. Educational activities in the Specialized Classroom are expected to grow in the future and therefore strengthening of teaching staff and

training of instructors are very much encouraged, because of strong request of new training programs, production of new lecture textbooks and preparation for practical training textbooks.