

Enhancing Nuclear Security at Ukrainian Border Stations to Prevent Illicit Trafficking

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Abstract

In the context of the possible threat of illicit trafficking of radioactive or nuclear material it is of great importance to stop the transport of such material across international borders in order to prevent terrorist groups from facilitating nuclear explosive devices or radiological bombs containing this kind of material. The TACIS (Technical Assistance to the Commonwealth of Independent States) program of the European Commission comprises several projects concerning the enhancement of borders of former Soviet Union states to the European Union (EU) with respect to nuclear security. One of these projects refers to a common project of the European Commission and the State Border Guard Service of Ukraine concerning Ukrainian border stations. The Fraunhofer INT attends to this project as consortium leader. Other projects in that respect refer e.g. to Republic of Belarus and Republic of Armenia.

Several Ukrainian border stations to EU states were examined concerning the necessities and options for installing radiation detection equipment for the purpose of monitoring of vehicles and pedestrians crossing the Ukrainian border. For that reason Fraunhofer INT scientists visited some of the Ukrainian border stations. To assure an appropriate selection of equipment several aspects were taken into consideration, e.g. general layout of the station, traffic flow, and detection systems which had already been installed at or near the station. Based on these considerations both the technological needs for the detection of radioactive and nuclear material including a priority list and the associated technical specifications were provided to the contracting entity by the Fraunhofer INT.

The next step, which is currently under way, is an invitation to tender addressed to manufacturers of relevant equipment concerning appropriate measuring systems with requirements specifications based upon the Fraunhofer INT's expertise. After the acquisition and installation of the measuring devices at the border stations in question, demonstration exercises of the new detection systems will follow, also with participation of the Fraunhofer INT. Furthermore Fraunhofer INT will be involved in supporting the training of the Ukrainian experts.

This project serves as a further step towards a higher degree of security in the nuclear sector at EU borders. The course and the preliminary results of the project will be presented.

1 Introduction

Illicit trafficking of nuclear or radioactive material became an issue of worldwide concern in the early 1990s after a number of incidents involving the seizure of highly enriched uranium. The global terrorist activities during the last decade increased the worry of governments and the public that such material may fall into the hands of people who could use it for malicious purposes.

In that regard special problems arose when in 1991 the Soviet Union fell apart and a highly developed nuclear industry had to be reorganized. The new states of the Commonwealth of Independent States (CIS) had to manage the problems of safety and security of this material. New authorities and regulations were established to fulfil this difficult task. The process of allocating these responsibilities had to be carried out against the background of State's structures

development and reforming with all consequences arisen.

In 2000 the European Commission launched the program TACIS (Technical Assistance to the Commonwealth of Independent States) to encourage democratisation and to strengthen the rule of law as well as the transition to a market economy in the former Soviet Union states [1, 2]. Improving the nuclear safety and security is an important objective of the program, too. Since 1st January 2007 the TACIS program is part of the ENPI (European Neighbourhood and Partnership Instrument) [3].

The project "Ukrainian border crossing station" is a task within this TACIS program where the European Commission is represented by the Institute for the Protection and Security of the Citizens (IPSC), Italy, part of the European Joint Research Centre (JRC). The overall objective of the project is the strengthening of the non-proliferation regime and the extension

of the counteraction against the threat posed by illicit trafficking of nuclear or radioactive material (NRM) and its use for terrorist purpose. It is a follow-up of the TACIS Task “Counteraction against non-authorized transfer of nuclear material” [4] and is dedicated to the security situation at the borders of the Ukraine.

Especially methodological and metrological support is to be provided to the activities of the relevant Ukrainian institutions aimed at the detection, identification and categorization of NRM at Ukrainian borders. This includes training activities as well. The project is conducted by a consortium with the Fraunhofer Institut für Naturwissenschaftlich-Technische Trendanalysen (Fraunhofer Institute for Technological Trend Analysis, Fraunhofer INT) as consortium leader and the Bundesanstalt für Materialprüfung (German Federal Institute for Materials Research and Testing, BAM) as partner and extends over four years until 2012.

In the following a review on the so far performed activities and achieved results is given: Objective of the first phase of the project was to get and document an updated overview about the general situation concerning illicit trafficking and criminal use of NRM in Ukraine, about related countermeasures [5] (see 2.1) and about the related current regulations, equipment and procedures at Ukrainian borders [6] (see 2.2). In the next phase the needs with highest priority were identified, described and a related procurement call was launched by the European Commission [7, 8] (see 2.3). In the last phase the new equipment will be installed and a related training of trainers will be implemented. The project will close with a demonstration exercise of the new equipment and the training results (see 3).

2 Illicit Trafficking of Nuclear or Radioactive Material (NRM) in Ukraine

2.1 The National Situation

As mentioned above the breakdown of the Soviet Union and the process of reorganisation has caused a difficult situation with respect to nuclear safety and security in the new independent states – amongst them Ukraine, a country with nuclear industry and materials (e.g. in the Chernobyl Exclusion Zone), a difficult economic situation and the geographical position between Asia and Europe: The north-south axis was the main traffic axis in the time of the Soviet Union. Since the independence of Ukraine west-east orientation is rising.

Today Ukraine is an important transit country between Middle Europe and Caucasus, and between South Europe and Russia, respectively. An alarming number of cases of illicit trafficking of NRM have

been observed, indeed, in the recent years in Ukraine. Therefore many national and international efforts have been made to cope with the situation.

Multilateral and bilateral programs and projects have been established. International technical assistance is provided by the US Department of Defense, the US Department of Energy, the European Commission, the IAEA, and the Swedish Nuclear Power Inspectorate (SKI) by means of projects concerning the prevention of proliferation and the installation of detection equipment at border crossing points. Bilateral and multilateral support schemes have contributed (and are still contributing) to a significant improvement of the situation with respect to detection and response to illicit trafficking in the Ukraine.

In general the efforts of the European Community, the IAEA and Department of Energy (DoE) / National Nuclear Security Administration (NNSA) in combating illicit trafficking at borders are coordinated through the Border Monitoring Working Group (BMWG), which was established in 2005. Support projects, programs and activities are amongst others: The US Second Line of Defense Program (SLD), US Nuclear Smuggling Outreach Initiative (NSOI) or Program Technical Assistance to the Commonwealth of Independent States (TACIS).

An overall number of more than 10 Ukrainian state agencies and legal entities are at least in part involved in the field of prevention of illicit trafficking concerning nuclear or radioactive material in Ukraine. Amongst others response plans were developed to define responsibilities and actions with respect to illicit trafficking of NRM, trainings were provided and border crossing stations were equipped with detection systems. This process is far from being finished. The measures and provisions have to be continued and expanded.

2.2 Detection of NRM and Related Procedures at Ukrainian Borders

This Ukraine has borders with seven countries with a total length of nearly 6000 km. The border traffic in Ukraine includes ground vehicles (trains, buses, trucks, cars) and pedestrians, but also sea and air traffic. Many of these check-points are used for multiple transportation modes. For example most of the automobile check-points are also used by pedestrians.

All Ukrainian border stations are designed with the same structure. There are three areas starting from the foreign country: border control (controlled by the State border guard service - SBGS), customs and neutral (see **Figure 1**).

The general procedure for passing a border crossing station is as follows: For travelling from Ukraine abroad first a SBGS officer controls whether the border crossing persons have passports and provides them a checklist. Secondly in the customs office de-

clearable goods are checked and duty has to be paid. Thirdly the passports are inspected in detail. Fourthly a SBGS officer controls the fulfilled checklist before the travellers leave the border control area. For travelling into Ukraine the customs office and the passport control is done in reversed sequence.

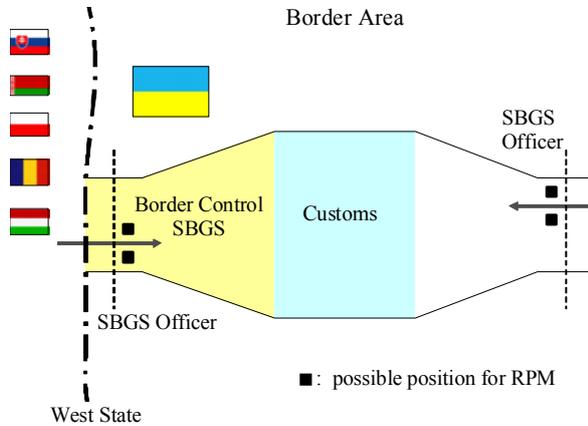


Figure 1 Sketch of a typical border crossing station

Thus on both sides of the border crossing station area a SBGS control exists where the vehicles are stopped and controlled at only one or two, seldom more lanes. This is an ideal position for the installation of radiation portal monitors (RPM), where for technical reasons a slowdown of the vehicles is necessary. At this position the number of monitors is minimal and no additional delay of the total procedure is required. Equipping the border crossing stations with suitable portal monitors was therefore the main focus of several programs.

If an alarm is created by the RPM due to the exceeding of the preselected levels by the measurement values the vehicle is stopped and taken out of the line. A special place for the following examination purpose is foreseen (see **Figure 2**).



Figure 2 Measuring place for a closer examination of a suspicious vehicle

Then a task force committee comes into operation consisting of one member of the SBGS, one member of the customs and one member of the Ministry for Environmental Protection and Nuclear Safety of

Ukraine. This committee is available 24 hours 7 days a week and conducts the further investigations of the case as they are described in 2.3.

2.3 Technical Aspects of NRM Border Control

The first and main measure for the detection of NRM at border crossing stations in general are radiation portal monitors (RPM). If a RPM shows an alarm (detection) additional measurements have to be performed. This includes a detailed scan of the object - vehicle or pedestrian - to identify the position of the measured radioactive source (localisation) as well as the nuclides of which the source is comprised (identification) (see **Figure 3**).



Figure 3 Typical inspection situation with hand held detectors (picture made during an exercise) [9]

A reasonable first step is to repeat the measurement with the RPM to verify the alarm, and in the case of a vehicle to perform a first localisation by a very slow transit. If a controlled person has got a medical treatment with radioisotopes the vehicle should be checked without the person to rule out other hidden sources. Generally an identification of the radioactive material is important in the case when legal radioactive sources (e.g. the mentioned person after medical treatment with radioisotopes) are found and a comparison with the shown declaration has to be done. Because it is generally thinkable that an illegal nuclear source is masked with a legal source all steps – detection, localisation and identification - are important. In order to compare the measured results with the written declaration beside the identification a determination of the amount is necessary. In all cases it is necessary for self-protection to have personal dosimeter with direct indication of the received dose rates.

Radiation Portal Monitors (RPM) are detection systems with large detection areas which are mainly used only for detection of radioactive or nuclear sources and not for identification purposes. These RPM should have high detection efficiency for being able

to detect also smaller or shielded NRM sources. Handheld detectors are used for detection, identification and for searching NRM. At border crossing stations they are called into action when the RPM shows an alarm. With handheld detectors the suspicious vehicle or person are searched for the location of the supposed NRM. Furthermore the handheld detectors are used for the identification of gamma sources. Personal dosimeters respectively pagers (direct indication of the occurrence of increased radiation) are used for self-protection measures. Portable contamination monitors are necessary for the verification if objects are contaminated with radioactive or nuclear material. One of the fields of application for contamination monitors is for example the control of surfaces and objects after handling with NRM.

A comparison of the general technological needs with the status quo at the border crossing stations leads to the general requirements that were specified for the selected border crossing stations in phase two of the project. Furthermore a priority list for the importance of the installation of the described equipment needs was included. The technical specifications for vehicle RPMs, personnel RPMs, handheld radioisotope identifier devices and handheld radiation detection devices were defined according to ANSI N42.35-2006, ANSI N42.34-2006, ANSI N42.33-2006, ISO 22188 and IAEA standards and regulations. In addition local needs and conditions had to be taken into account.

3 Outlook

After the evaluation of the tenders new equipment will be bought and installed in the last phase of the project. In close cooperation with the parallel TACIS Task “Armenian Border Crossing Station” related training will be implemented. Fraunhofer INT will support the JRC in the organisation and execution of training for Ukrainian specialists to provide them with the competence to train other Ukrainian specialists. The training will take place at the JRC training centre in Ispra, Italy.

At the end of the project a demonstration exercise will be organized at a border crossing station in Ukraine to guarantee realistic conditions. Therewith it should be verified that NRM can be detected, localised and identified with the help of the implemented equipment and based on the given support. Also successful training is to be demonstrated in that way.

With all these technical and organisational measures the potential illicit trafficking of NRM will be reduced considerably thus prohibiting terroristic acts with such material.

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