

International IAEA Conference on Advances in Nuclear Forensics  
1B Main Plenary Meeting  
Nuclear Forensics Historical Evolution

Nuclear Forensics Development in Russia  
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As was noted in the communiqué of The Hague Nuclear Security Summit-2014 – “Nuclear forensics is developing into an effective tool for determining the origin of nuclear and other radioactive materials and providing evidence for the prosecution of acts of illicit trafficking and other malicious acts”.

In the Russian Federation where the issues of the nuclear security strengthening and reduction of risks of the nuclear terrorism are assigned high priority, much attention is also paid to the nuclear forensics development, taking into account the existing international experience as well.

Therefore, the IAEA initiative to conduct this international conference on advances in nuclear forensics seems quite timely and useful. We hope that the specialists participating in the conference will learn a lot and will exchange their opinions on this important part of the nuclear security. We also hope that the issue of terminology will not be forgotten during these discussions. The current interpretation of the term “nuclear forensics” varies from using nuclear methods in traditional

forensics to methodologies of determining a place of origin of nuclear material.

At the same time, considering the nuclear forensics history it should be mentioned that this notion has been put by the international community into wide use relatively recently - with the appearance of Global Initiative to Combat Nuclear Terrorism and a number of nuclear security summits. However, criminalist actions concerning the crimes linked with nuclear and radioactive materials were performed much earlier. In this connection, there is ground to believe that the world nuclear forensics history may be considered taking its development in Russia as an example.

Let me begin with the fact that the nuclear forensics in Russia is developed in close cooperation between the law-enforcement authorities performing criminal investigations and experts in nuclear and radioactive materials. The development has not begun from scratch. Looking back, we should say that certain methods of what is now called nuclear forensics were used in the Russian investigative and court of justice practice from the middle of the previous century when the intensive nuclear program development and radioactive material application for industrial and medical purposes started.

But in early 1990-ies, these separate methods started to form a certain system due to a necessity to investigate the cases of nuclear and radioactive materials illicit trafficking. Already at that time it was possible not only to determine origin of the intercepted material, but also to narrow the circle of suspects significantly.

Today, in Russia the following three main tasks are being solved in the area of the nuclear forensics:

- 1) Providing the law enforcement investigation with the data on the nuclear and radioactive materials that are intercepted from the area beyond the regulatory control as well as providing the information of the transfer routes of these materials, and on people connected to the nuclear and radioactive material illicit trafficking;

- 2) Disclosure of false charges and counteraction to provocative acts;

- 3) Deterrence of criminal intent due to the possibility of their guaranteed disclosure which provides the unavailability of punishment for illegal actions.

From the criminal prosecution and a number of criminalistics approaches point of views, the illicit trafficking in nuclear and radioactive materials (ITNRM) does not differ from existing and much more widely spread illicit trafficking in

precious metals, weapons, drugs, explosives and other prohibited for free circulation chemicals, etc. Therefore, the investigative basis as described in the Russian Federation Criminal Code, the Criminal Procedure Code and the Judicial-Expert Activities in the Russian Federation turned out to be quite suitable for ITNRM incidents investigation as well, and no legal framework development for such investigations in Russia is needed.

On the other hand, the Russian developed nuclear complex, the experience of developing and manufacture of a wide range of materials for both peaceful and military purposes provided a significant number of experts in nuclear and radioactive materials and the existence of advanced analytical laboratories for these materials' parameters and properties study.

Thus, the law enforcement officials' task in the Russian nuclear forensic community is mainly incorporating in the developed approaches and procedures the provision of criminal law. The nuclear and radioactive material experts in their turn have to develop new methodologies, and adapt the existing ones, for the reliable identification of materials with unknown origin and for the analysis characteristic of samples of the physical evidence found at the scene of the crime or in connection with the crime.

Further development of understanding the importance of counteraction to the nuclear terrorism threat and illicit trafficking of nuclear and radioactive materials was implemented in the Russian Federation Law of December 1, 2007 No/ 317-FZ Art.15. According to this law, the Rosatom State Corporation was entrusted with “the organization, within its competence, of the activities to combat the threat of nuclear terrorism and illicit trafficking in nuclear and radioactive materials”; besides, with “the organization and conduction of criminalistics and other expertizes for the identification of nuclear and radioactive materials and radioactive waste withdrawn from illicit trafficking”.

On the basis of this law, in 2009 an Information and Analytical Centre (IAC) for the identification of nuclear materials was set up in Rosatom State Corporation, and was imposed with the task of performing the analyses and identification of the nuclear materials with the unknown origin. The key role in the Centre activities is played by JSC “Bochvar VNIINM”. However, the laboratories of V.G.Khlopin Radium Institute, NP “Microparticle analysis laboratory”, Federal Medical and Biological Centre laboratories are also engaged in this work. These four institutions constitute a network of Russian analytical nuclear forensic laboratories. Additionally,

the laboratories of other institutes of both the Rosatom Corporation and other organizations can also be invited for the particular work.

The network laboratories solve the following analytical tasks:

- Determining the material element composition and isotope composition of uranium and plutonium in the materials and separate microparticles.
- Measuring the content of isotopes-chronographs.
- Measuring the content of impurity elements.
- Determining the morphological parameters of nuclear and radioactive material fragments and microparticles.
- Measuring the content of radionuclides in the samples.

It should be mentioned that all these tasks had been solved by the Russian analytical laboratories prior the creation of the network of the nuclear forensic laboratories, within the framework of other tasks performed in connection with nuclear monitoring and geological exploration.

In the same 2009, with the IAEA assistance, the Information and Analytical Centre (ITNRM IAC) was set up in the Rosatom State Corporation for collecting and processing the information on the cases of illicit trafficking in nuclear and radioactive materials. This IAC performs the interaction with the

IAEA database on the INTRM cases at the Russian Federation territory which became known from the law enforcement authority and mass media information.

In addition to law enforcement authorities and nuclear material experts, organizations of other Russian Federation authorities are involved in the work to combat INTRM: Russian Ministry for Defense, Emercom of Russia, Federal Custom Service of Russia, and Rostehknadzor.

A significant difference of handling the physical evidence compared with analysis made during fulfilment of other tasks is connected with the need to provide the guarantee that from the moment of the withdrawal to the presenting in court, the physical evidence was not substituted and did not change its properties. Following the procedure determined by the Criminal Code, Criminal Procedural Code and the Law on Judicial-Expert Activities in the Russian Federation ensures such guarantee.

In accordance with this procedure, any object shall become a physical evidence only if it is withdrawn by an investigator and documented in due order. Each object or material considered physical evidence shall be packed into a container. Any movements of the physical evidence shall be documented.

Nuclear and radioactive materials shall be put to a special container in compliance with the radioactive material handling

rules. The same rules shall be observed when performing any operations with the radioactive physical evidence. Therefore, the three laws mentioned above, together with Radiation Safety Norms determining the rules of radioactive material handling, form a legislative basis in the field of nuclear forensics in Russia.

For identification of the intercepted nuclear materials, a comparative analysis of the intercepted material and one or several materials from among those manufactured in the country and having characteristics close to those of the material concerned, is performed. For determining the list of materials under suspect, the information from relevant Russian enterprises databases is used. But only the coincidence of the analysis results of the intercepted material and one or more samples from the material archive shall be a ground for conclusions on the detained material origin.

However, if the comparative analysis cannot be performed because of the absence of a corresponding sample in the archive, any information available for the expert analysis shall be used, with the understanding of the fact that all kinds of comparison, excluding the coincidence of comparative analysis results, require additional expert study of actual and possible variations of results or data.

Based on this practice and taking into consideration the experience of nuclear material databases use during the actual study, with the clear understanding of the rare and limited character of such use, and also observing the existing procedure of nuclear information security, a conclusion was made in Russia on the inexpediency of developing so-called National Nuclear Forensic Database. The availability of the information on nuclear materials stored in special databases is also taken into account, as well as sufficient timeliness in providing this information to the investigators.

It should be pointed out that the practice of performing investigations linked with illicit nuclear and radioactive material trafficking showed also the necessity of analyzing not only samples of bulk NRM but also their microparticles. In the absence of the intercepted material and also when the material is determined but may be manufactured at different enterprises the analyses results of individual microparticles of the objects taken as physical evidence can become the key to a successful investigation.

The analysis of individual microparticles when investigating actual incidents proved its informative value, for example, during a case where the route of persons having contacts with NRM and the actual manufacturer of the material

intercepted in a container were determined. Judging by the material characteristics it could be concluded that this material has been manufactured at any of the two enterprises, and only the analysis of industrial dust microparticles at the container surface allowed to unambiguously identify one of them as the enterprise where the stolen material was produced.

Only the analysis of individual microparticles can solve the task of identifying the material if a powder consisting of various materials microparticles is detained. Besides, the microparticle analysis can be the only informative approach in the situation when fragments of various materials are dispersed during an incident and can be present in various samples from the place of incident.

In general, it can be stated that nowadays the network of Russian nuclear forensic laboratories is available and can solve any nuclear forensic tasks. It can analyze both bulk samples of nuclear and radioactive materials and their small fragments and individual microparticles. Nevertheless, the network is constantly developing taking into consideration procedural and methodological recommendations worked out under the auspices of the IAEA.

A special significance in the procedure of criminal trials connected with nuclear and radioactive materials beyond the

regulatory control plays the presentation of the expert materials to court. All the relevant materials are presented in the Russian court only as expert opinions or evidence in the form of printed documents. Preference is given to the expert opinions based on the comparison of simultaneous analyses results. These documents shall also be mandatorily included as part of the criminal case file to be considered by the court, the prosecutor and the lawyer. If necessary after presenting the expert opinion to the court the expert gives additional oral statement during the examination in court for clarifying some statements of the opinion and precluding misunderstanding.

An extensive international cooperation in the nuclear forensics field should also be mentioned as it helps to speed up the Russian potential development in this area.

We believe that the activities of the International Technical Working Group (ITWG) on the nuclear forensics in which Russian experts work among others, as well as continuation of a wide international cooperation on nuclear forensics in frame of the IAEA, GICNT and Interpol are very important.

Discussing the nuclear forensics at this conference today, I would like to stress that we see the further development of the nuclear forensics in Russia both as the analytical methodologies advancements and further strengthening interaction between

analysts and law enforcement officers and certain updating of regulatory documents. For example, the revision of “Generic plan of response to ITNRM incidents” has been started in compliance with the IAEA recommendations “Nuclear Forensics support”, series 2. We also believe that achievements which we will learn during this conference also will assist us in this work.