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The Network of Russian Analytical Laboratories for Support of Nuclear Forensics

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Russian Federation has a well developed system of forensics organizations in the Ministry of Justice, Ministry of the Interior and Federal Security Service. This system is capable to implement the wide range of expert investigations of traditional (non-radioactive) material evidences such as fingerprints, biological traces, microparticles of natural and anthropogenic origin, etc. These organizations are staffed by the highly qualified experts.

At the same time no laboratory of this system has the necessary experience in analysis of nuclear and radioactive materials and no specialized forensics laboratory is able to implement a study of conventional and radioactive material evidence simultaneously. Therefore cooperation of these organizations with laboratories which can provide appropriate analysis of nuclear and radioactive materials is necessary for the solution of nuclear forensics tasks.

Decision of the following basic analytical tasks can be required in the process of nuclear forensic investigations for achieving the overall objective of criminal investigations:

• Measurement of the content and isotopic composition of uranium, plutonium and other radioactive materials in samples –for identifying the materials and determination of the possible fields of their use;

• Determination of the elemental composition of nuclear and other radioactive samples, including elemental composition of impurities –for identification of possible manufacturer of the materials;

• Determination of morphological characteristics of nuclear material fragments –for identification of possible manufacturer of the materials;

• Detection of the trace amounts of nuclear and other radioactive materials on the clothing, household items, in samples, collected at the crime scene and at the suspected crime scene –for determination of the route of illicit trafficking and the circle of involved persons;

• Detection of the nuclear and other radioactive materials including their trace amounts on the body, in the organs and in the metabolism products –for determination of the circle of involved persons;

• Measurement of isotopic composition of uranium and plutonium in microparticles –for identifying the materials and determination of the possible fields of their use;

• Determination of elemental composition and morphological characteristics of microparticles of nuclear and other radioactive materials –for determination of mechanism of its formation and of possible manufacturer of the materials;

• Measurement of the content of isotopes-chronographs in all types of specimens and samples, as well as in individual microparticles –for determination of the date of production of nuclear or other radioactive materials.

Analytical capabilities of laboratories are the main component of country's capability in the field of nuclear forensics. These analytical capabilities determine country's ability to implement comprehensive investigation of any incident with illicit trafficking of nuclear materials.

Capabilities of analytical laboratories are determined by:

• Qualification of analysts;

• Level of the used analytical equipment;

• Methodological support.

Four organizations cover analytical nuclear forensics needs in Russia. These are: Information and analytical center for identification of nuclear materials, founded on the base of analytical division of Rosatom's Bochvar

Institute, analytical subdivisions of Rosatom's Khlopin Radium Institute and Federal Medical Biophysical Center, "Laboratory for Microparticle Analysis".
No one of these analytical subdivisions can decide all mentioned analytical tasks on the level of the best world standards. But each of them possesses some unique analytical techniques, which correspond to the world level, and these four analytical subdivisions together are able to solve all analytical tasks for nuclear forensics on the best possible quality.

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