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Nuclear security aspect of the new NRNU MEPhI master program for Rostechnadzor.

The possibility of malicious acts involving nuclear or radioactive materials remains a worldwide threat. Ensuring nuclear security (NS) is one of the main responsibilities of an operator of any facility using nuclear / radioactive materials, and should be regulated by the state. Accounting, control and physical protection of nuclear materials and facilities are the subject of regulation. A prerequisite for the implementation of a NS regime is the appointment of competent authorities, among which must be a safety regulatory authority.
The development of human resources is one of the challenges in maintaining the required adequate level of NS to prevent, detect and suppress malicious acts directed at nuclear materials. In practice, there is a permanent loss of qualified personnel due to career growth, retirement and administrative changes, which influences negatively on the readiness of NS tasks performing of government bodies. Further, technologies and procedures are developing at an ever faster with the introduction of new equipment and technologies.
Therefore, there is a need for qualified NS experts at the national level. It is very important that sustainable NS competencies are achieved and maintained in each country to ensure and enhance global security. This goal can be achieved through training and education at all levels and in all organizations and facilities dealing with nuclear technologies. Educated and trained personnel is needed for government bodies, nuclear and radiation facilities. The training and education institutions play an important role in this process.
The master's educational program "Accounting, Control and Physical Protection of Nuclear Materials"was created at NRNU MEPhI in 1997. This was the first systematic training of specialists with higher education in NS in Russia. The program was designed for people with technical education (engineer or a bachelor's degree) in relevant areas. In general, about 200 graduates [1] were trained under this program, (including Kazakhstan, Belarus). In addition, the university has experience in training specialists under the joint program of Rostechnadzor and the NRC [2].
In May 2018, an agreement on scientific and technical cooperation was signed between NRNU MEPhI and the Federal Service for Environmental, Technological and Nuclear Supervision of Russia (Rostechnadzor). Rostechnadzor is the authorized state safety and security regulatory authority in the nuclear area in Russia.
The agreement framework covers a wide range of interactions, including the application of modern digital technologies for knowledge management, improving the methodological basis of educational area, the professional advanced training in the field of nuclear safety and security,
Under this Agreement, a master's program is being developed for training specialists for the Rostechnadzor in MEPhI. The wide experience of other educational programs in the field of nuclear security is used in developing this program. The area of competence will cover the most fully planned activities of Rostechnadzor employees:
1. Regulation of safety of nuclear power plants and nuclear research facilities.
2. Regulation of safety of nuclear fuel cycle facilities, nuclear power plants of ships and radiation hazardous facilities.
3. Emergency preparedness and response.
4. Supervision of accounting and control of nuclear materials and radioactive substances and physical protection.
The last point constitutes a very important activity in securing the NS. Therefore, the program features are the saturation of disciplines in the field of physical protection, accounting and control of nuclear materials. Including classes in laboratories [3]. NS competence is planned to develop the following disciplines:
Technical aspects of ensuring the nuclear non-proliferation regime:
Properties of nuclear materials, increasing their security
International Nuclear Non-Proliferation Regime
National Nuclear Nonproliferation Safeguards
Methods of physical measurements of nuclear materials:
Destructive and non-destructive methods for determining the mass and isotopic composition.
Instruments and equipment, measurement quality control.
Accounting and control procedures for nuclear materials:
Physical inventory.
Seals, barcodes, etc.
Design and evaluation of the effectiveness of physical protection systems:
Basic project threats.
General principles of physical protection systems design.
Vulnerability analysis of nuclear sites.
Technical means of physical protection of nuclear materials:

Sensors and detection.
Physical barriers and delay systems.
Access control.
The implementation of this educational program will create a strengthened human resource in one of the key areas of state security.

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State

Russian Federation

Gender

Male

Primary authors: Mr KRASNOBORODKO, Andrey (National Research Nuclear University MEPhI); Mr GERASKIN, Nikolay (National Research Nuclear University MEPhI)

Presenter: Mr KRASNOBORODKO, Andrey (National Research Nuclear University MEPhI)

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