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Development of Nuclear Security Technologies for Response on Material Out of Regulatory Control Event and Nuclear Forensics Activities in Japan

A nuclear security event involving nuclear and other radioactive materials out of regulatory control (MORC) has potential severe consequence on public health, environments, economics and society. Therefore, each state has responsibility to develop national nuclear security measures including the response on any nuclear security events. Japan Atomic Energy Agency (JAEA) which is the national nuclear research institute, and National Research Institute of Police Science (NRIPS) which is an attached organization of national police agency in Japan, have been working on technology development for event scene activities and nuclear forensic activities to establish the capabilities for responding MORC related nuclear security event. These research institue from different research fields have information exchange and have initiated a discussion for future cooperation for more effective implementation and improvement of the national capabilities and strengthening internatinal nuclear security. In this paper, current status and future prospects on technology development in the two institure in Japan for contributing to the response capabilities for nuclear security event involving MORC.

In accordance with Japan's national statement at the first Nuclear Security Summit, Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) was established in JAEA, and ISCN has initiated nuclear forensics technology development for contributing to the identification of origin and history of MORC. ISCN has established fundamental nuclear forensics analytical capabilities to characterize nuclear materials and prototype nuclear forensics library for interpretation of the analytical results. These technical capabilities have been validated through the joint research with the U.S. national laboratories and EC-JRC, and participation in exercises organized by ITWG. ISCN has also engaged in development of advanced technologies for more rapid and precise nuclear forensics analysis and shared the achievements for strengthened international nuclear forensics capabilities. Recently, ISCN has initiated the development of nuclear forensics technologies for post-dispersion event and innovative nuclear forensics technologies. The post-dispersion technology includes the supporting technology for detection and recovery of radioactive samples in event scene, and mesurement and interpretation methodologies targeting post-dispersion samples. As the innovative technology, application of new technologies has been studied, such as machine-learning algorizm for nuclear forensics interpretation and autoradiography for supporting traditional forensics on contaminated evidence.

NRIPS conducts the research in forensic science and applies it in the examination and identification of evidence collected during police investigations. The physics section in NRIPS has developed the first responder equipment for nuclear detection and for sampling and categorization in nuclear forensics. In recent research, a radiological-threat scenario produced with Monte Carlo particle transmission simulation code and a survey system of radiological residue that performs real-time measurements of distributed sources in situ are studied in NRIPS. NRIPS also has developed a radiation detection simulator using smartphones and Wi-Fi beacons. This simulator helps the training for searching suspicious radiological sources and for screening of people for contamination. Additionally, the simulator using GPS on a smartphone is studied for control boundaries in nuclear security event involving MORC. This method can be used not only for countermeasures against radiological threat but also for training of nuclear disaster and radiation education.

State

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Gender

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