Atomic Detectives:
Science Behind International Efforts To Combat Nuclear Terrorism

Saturday, February 19, 2011: 10:00 AM-11:30 AM
145B (Washington Convention Center)

The nuclear security summit of April 2010 aimed at enhancing international cooperation to prevent nuclear terrorism, an issue that has been identified as the most immediate and extreme threat to global security. International cooperation at the scientific, technical, and operational level is of key importance for sustainable success in combating illicit nuclear trafficking and nuclear terrorism. The three main steps related to combating illicit trafficking are prevention, detection, and response. If prevention fails and nuclear material is detected (through measurement systems or by intelligence), an appropriate response has to be initiated. An essential element of the response process is to provide clues on the origin and intended use of the material (that is, nuclear forensic investigations). The results serve for prosecution and for improving the control of nuclear material at the source (for example, physical protection and safeguards) to prevent future thefts or diversions. This timely session spotlights the forensic science, tools, and tactics operated by the European Union, the United States, and the International Atomic Energy Agency. Speakers will focus on concrete examples to demonstrate how seized nuclear material is analyzed and explain cross-border capacity-building measures. The session will equally underscore current scientific challenges and the extent of ongoing international cooperation.

Moderator: **Paul Thompson, Atomic Weapons Establishment, U.K.**

Speakers:

Klaus Mayer, European Commission, JRC Institute for Transuranium Elements
Nuclear Forensics Science as Border Crossing Support: Experience and Perspectives

The nuclear security summit of April 2010 strongly underlined the need for international cooperation for addressing the threat of nuclear terrorism. The three main pillars related to nuclear security are prevention, detection and response. If prevention fails and nuclear material is detected (through measurement systems or by intelligence), an appropriate response has to be initiated. An essential element of the response process is nuclear forensics.

Nuclear forensics is a highly specialized discipline in science, at the interface between physics, chemistry, and material science on the one hand, and between law enforcement and non-proliferation on the other. It aims at providing clues on the history of nuclear material which was intercepting from illicit trafficking. To this end, nuclear forensic investigations include the measurement of parameters that help determining the age, the intended use, the production process or the

geographic origin of the material. While nuclear forensics may still be considered as an emerging discipline in science, nuclear forensic investigations have been carried out at many instances, supporting national and international authorities in the fight against illicit trafficking of nuclear material. During the past two decades, scientists at the European Commission, Joint Research Centre's Institute for Transuranium Elements (Karlsruhe, Germany) have analyzed nuclear material in the context of some 40 incidents. Numerous states called upon nuclear forensic support and requested analysis of intercepted nuclear material. This presentation will provide insights into the latest methodologies developed in nuclear forensic science and in the mechanisms that have been put in place to ensure that nuclear forensic investigations can be carried out, irrespective of the place (and country) of seizure of the material. Concrete examples of recent case work will serve for illustrating the processes and methodologies as well as the information on the origin and on the history of the material that is obtained.

Benjamin Garrett, Federal Bureau of Investigation
From Domestic to International Nuclear Forensics

The Federal Bureau of Investigation (FBI) leads any domestic investigation into crimes involving radiological or nuclear materials. To fulfil its investigative mission, the FBI and US government partners have invested in specialized infrastructure permitting the safe, secure conduct of traditional forensic examinations on radiologically contaminated evidence. The primary example of this infrastructure is the Radiological Evidence Examination Facility (REEF), located at the Savannah River National Laboratory, Aiken, SC.

To complement such infrastructure, the FBI has put in place the Hazardous Evidence Analysis Team (HEAT), a cadre of FBI examiners in traditional disciplines such as DNA, finger prints, firearms, questioned documents, tool marks, and trace. This cadre and the specialized infrastructure ensure that any criminal investigation can proceed expeditiously with the analysis, examination and characterization of both the radiological or nuclear material itself and the other items of interest that might be associated with the crime.

The experience of the FBI with REEF, HEAT, and related developments is being made available to the international community. For example, FBI experts serve as instructors for training on radiological crime scene management and nuclear forensics provided by the International Atomic Energy Agency (IAEA), Office of Nuclear Security. Similarly, the FBI is engaged with the Nuclear Forensics International Technical Working Group (ITWG), a non-governmental forum that encourages and promotes exchange of best practices from processing the crime scene through the conduct of laboratory analyses to the interpretation and reporting of results. Finally, the FBI makes available its assistance to its international law enforcement partners in investigating crimes on their sovereign territory involving radiological or nuclear materials.

Anita Nilsson, International Atomic Energy Agency (IAEA)
The Role of the Nuclear Watchdog: IAEA Efforts To Enhance Global Nuclear Security

The risk that nuclear or other radioactive material could be used in malicious acts is regarded as a serious threat to international peace and security. Although the responsibility for nuclear security rests entirely with each State, appropriate and effective national systems and measures for nuclear security are facilitated by the existence of common concepts and approaches, those that may be developed within the international community.

The IAEA has supported national efforts to establish and improve nuclear security since 1970. In 1975 the first Recommendations for the Physical Protection of Nuclear Material was issued as INFCIRC/225, subsequently revised four times. In the mid 1990ies, following reports of illicit nuclear trafficking, the IAEA strengthened its security related programmes and established, inter alia, the Illicit Trafficking Database Programme. Again, in 2002, the programme was significantly enhanced with the approval of the first comprehensive plan of action to protect against nuclear terrorism. The IAEA is now implementing its third Nuclear Security Plan for 2010-2013 and the international community has recognized the essential role of IAEA programme for worldwide nuclear security.
In implementing the Nuclear Security Plan, the IAEA assists and supports States national efforts to establish and improve their nuclear security regimes, and provide general contributions to achieve worldwide effective security including for circumstances when material is found to be out of regulatory control. Risk reduction, capacity building, guidance, human resource development and sustainability are important elements of the programme. The programme looks out to universal adherence to and implementation of nuclear security related international legal instruments, as well as to increased international cooperation and coordination.

The presentation will cover the IAEA Nuclear Security Plan 2010-2013, lessons learned from previous work and future directions. It will underline the need for a comprehensive and layered approach to nuclear security, with a first line of defence sustained with effective security at the facilities, locations or during transports. It will note a second line of defence - to detect unauthorized movement of nuclear and other radioactive material – as being of equal importance. It will also discuss the effective response measures for theft or other nuclear security events as essential elements of a comprehensive nuclear security system.