A OVERVIEW OF THE IAEA MATERIAL SECURITY PROGRAMME

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Ensuring that nuclear materials, nuclear facilities, and radioactive sources do not become tools of nuclear terrorism is a vitally important but also very difficult task. The nuclear sector is large and diverse, with more than 400 nuclear power reactors and more than 250 nuclear research reactors in operation, more than 200 operational fuel cycle facilities of various types, and widespread use of radioactive sources. More than 100,000 significant quantities of nuclear material are subject to IAEA safeguards, and additional material not subject to safeguards includes on the order of 1,000 tonnes of highly enriched uranium and plutonium.

The IAEA is engaged in a wide range of activities to help secure these materials and facilities from theft or sabotage. Our efforts include programmes for physical security, interdiction of and response to illicit trafficking, nuclear installation safety, safety and security of radioactive sources, transport safety, and emergency response, along with verification of safeguards undertakings. The IAEA's Security of Material Programme takes a comprehensive approach that includes:

- Prevention measures, to help States establish the necessary infrastructure to prevent criminals or terrorists from acquiring nuclear material. This includes physical protection of nuclear material and nuclear facilities and the establishment of State systems of accounting and control.
- Detection measures, to help States detect and intercept illicit trafficking and other illegal activities.
- Helping States plan for adequate response measures, in case prevention fails.

Since the events of September 11th, we have been undertaking a thorough review of all our programmes in order to understand the implications of the enhanced terrorism threat and to see where our activities can be strengthened. In the short segments that follow, several of the contributors to our work in these areas will provide brief snapshots of current activities and also address what more needs to be done given the new urgency to combat the threat of nuclear terrorism.

Threat Assessments

Richard Hoskins, IAEA

Designing physical protection systems for nuclear material and nuclear facilities requires an evaluation of the threat that one is trying to protect against. Development of a design basis threat (DBT) allows a graded resource allocation depending on the threat and consequences.

Threat assessments address questions about who, why, capabilities, tactics, and support, taking into account both demonstrated behavior and potential behavior. In that respect, the characteristics demonstrated by recent terrorism events may have profound implications for nuclear threat assessment:

- Mass casualties were the intended outcome, with no limits on numbers.
- The attacks involved suicide by perpetrators
- The attacks were planned and prepared for over years
- They required complex and co-ordinated planning
- They involved modus operandi that were unforeseen or seen as having low likelihood
- The socio-political, economic and psychological dimension were important.

The consequences for nuclear security are several. Nuclear material other radioactive may now be regarded as more attractive targets. Sabotage of nuclear facilities with the goal of radiological release has become a major risk and requires planning for suicide attacks. Complex and sophisticated plans of attack requiring long lead times, previously dismissible as far-fetched, may now be a reality. We need more and better information on threats—as well as more international exchange of threat information—and we need to re-visit out threat assessment methodology.

Improving the Knowledge Base on Nuclear Terrorism Threats
George Anzelon, IAEA

The IAEA's Illicit Trafficking Database contains information on about 400 confirmed incidents since 1 January 1993. While most of these incidents concern low-grade nuclear material or relatively weak radioactive sources, some cases involve materials relevant to nuclear terrorism. In 1994, two seizures of nearly 3 kilograms of high-enriched uranium (HEU) each and one seizure of 0.36 kg plutonium (Pu) were recorded. Since then, the total amount of HEU and Pu stolen or seized in all confirmed cases has not exceeded 200 effective grams, far below what is required for a nuclear explosive. Nevertheless, one must be concerned that even small quantities could be samples of larger stocks of available material. And the *unseen* illicit trade could be substantially more serious, involving more knowledgeable actors with a better prospect of evading detection. To augment the limited view that our current database provides, we may need to begin tracking additional types of information. Here are a few examples:

- Indications of interest on the part of known terrorist organizations in anything nuclear related, such as surveillance of civilian or military nuclear sites or acquisition of technical information, specialized equipment, or nuclear expertise.
- Indications of organized crime involvement.
- Information not only on actual thefts and seizures but also on *attempted* thefts or other indications of interest.
- Information about use or threatened use of nuclear explosives or radiological weapons.
- Information about acts or threatened acts to sabotage nuclear facilities or shipments

Physical Protection of Nuclear Materials and Nuclear Facilities
Mark Soo Hoo, IAEA

The IAEA's work in this area has two programme elements: (i) development of standards and guides and (ii) providing direct assistance to States. Examples from the first category are TECDOC-967 (Rev.1), *Guidance and considerations for the implementation of INFCIRC/225/Rev.4, The Physical Protection of Nuclear Material and Nuclear Facilities,* and the development and publication of security principles and fundamentals. With respect to the second category, direct assistance, one of our most important activities has been the International Physical Protection Advisory Service (IPPAS), which sends teams of 4 to5 highly qualified experts to help States establish evaluate the strengths and weaknesses of their physical protection systems and identify where upgrades are needed. Future priorities for IPPAS will be to:

- increase the number of IPPAS missions, as resources permit, to meet increased demands for this service,
- assist States in implementing IPPAS recommendations, including provision of equipment and technical assistance as resources permit,
- conducting more in-depth evaluations at the level of individual facilities.

The Role of Technology
Reza Abedin-Zadeh, IAEA

Technology can play an important role in detecting and intercepting illicit trafficking. The IAEA has a considerable base of experience in application of technology for *verification* (non-destructive and destructive assay as well as containment and surveillance techniques) and technology for *physical protection* (sensors, motion detector systems, optical surveillance systems, and radiation monitors). During the last few years, we have been active in promoting development and application of techniques for detection of illicit trafficking of nuclear and radioactive material, using detection technology ranging from hand-held instruments to fixed-point portal monitoring systems, and including exploration of forensic analysis techniques to characterize seized materials. The remaining challenges are several. Detection of some types and quantities of nuclear and radioactive material is not trivial, and much research development remains to be done before proven, optimised, effective, user-friendly, and economic techniques and equipment are available. The IAEA plans to initiate a Co-ordinated Research Project to provide a forum for co-ordination among States regarding the development of detection systems and promotion of development needs. We also plan to establish a network of laboratories experienced in nuclear forensic science to assist Member States in responding to illicit trafficking or acts of nuclear or radiological terrorism.