

SECURITY OF MATERIAL

THE CHANGING CONTEXT OF THE IAEA'S PROGRAMME

BY ANITA NILSSON

When the IAEA established its programme on the Security of Material about five years ago, the prospect that nuclear or other radioactive materials could fall into the wrong hands was a main concern. Among the major driving forces behind the Agency's action then was an alarming increase in reported cases of illicit nuclear trafficking in the early and mid-1990s, and the recognition that States needed better and more coordinated assistance in their efforts to combat the problem.

Today, the dimensions and perceptions of nuclear security are being shaped by additional driving forces, specifically the spectre of nuclear terrorism. The terrorist attacks on the United States in September 2001 have elevated issues of security to unprecedented heights of international concern and they have prompted a broad-based global response. The attacks made it clear that terrorism has new and far-reaching international dimensions and that its aim of inflicting mass casualties is a serious threat for all States.

In the nuclear sphere, the IAEA has taken a leading role in international efforts directed at combating nuclear terrorism. Initiatives taken by the Agency aim to upgrade levels of security for nuclear facilities and the protection of

nuclear and other radioactive materials. Toward these ends, the IAEA Board of Governors is considering proposed measures for strengthening the Agency's activities relevant to preventing nuclear terrorism. *(See the insert in this edition for an update on proposed measures.)*

In this new and challenging context, it is worth reviewing some fundamental aspects of the IAEA programme on Security of Material as it has been developed over the years. The programme is part of a wider framework of Agency activities related to nuclear security, safety, and safeguards. In reviewing the programme's evolution, this article principally focuses on the major components and elements of the planned 2002-2003 programme, while pointing to directions ahead in light of additional measures being considered for prevention of nuclear terrorism. *(Also see the article on the security of radioactive sources, page 39.)*

ESTABLISHING THE FOUNDATION

Before the September attacks, activities related to the security of material were being carried out in response to the interests of IAEA Member States on several fronts. Up to the 1990s, for example, the activities included interregional training courses on physical

protection of nuclear material — mainly fissile material (plutonium and highly enriched uranium) that, in addition to peaceful uses, are the main ingredient of a nuclear explosive device.

The IAEA programme on the Security of Material evolved from this foundation. In the 1990s, Agency activities were expanded in response to the rising cases of illicit nuclear trafficking. In September 1994, the IAEA General Conference requested the Director General to strengthen the Agency's activities against illicit trafficking in nuclear and other radioactive materials, and in March 1995, the IAEA Board of Governors approved a first set of such activities. They subsequently formed the basis of a dedicated programme on the Security of Material, which was first set up for the 1997-98 period.

Since then, the programme has grown, and an expanded set of activities is planned for the 2002-2003 period. They are based on plans put into place over the past several years and approved by the IAEA Board and General Conference in September 2001.

Major Components. Two basic components underpin the programme. Both are essential and complementary aspects of

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efforts to combat nuclear terrorism:

■ One component — the system of safeguards — directly addresses the risk of nuclear proliferation. The system comprises an extensive set of technical measures carried out under agreements with States by which the IAEA independently verifies that safeguarded nuclear material and activities are used only for peaceful purposes. Verification activities include evaluation of information provided through systems for accounting and control of nuclear material that States are required to establish.

■ The second component — security of material — addresses the risk of theft, sabotage or other illegal activities involving nuclear and other radioactive materials. This component includes activities to further develop and improve international standards for protecting nuclear material; foster information exchange about preventing, detecting, and responding to illicit trafficking; and provide guidance, expert advice, and training to strengthen capabilities in Member States. Activities are closely connected with efforts related to the security of radiation sources, the design and safety functions of nuclear installations, and emergency response plans. These are all vital aspects for upgrading nuclear security, demanding close programme coordination, contact, and communication among a range of experts and disciplines.

Key Elements. Important elements of these interrelated components include:

Assisting States to Improve the Physical Protection of Nuclear

Material. Considerable efforts are aimed at strengthening the physical protection regime. This encompasses work related to the:

■ *Convention on the Physical Protection of Nuclear Material*, which was negotiated under IAEA auspices. It has 71 States Parties and entered into force in 1987. The Convention obligates Parties to protect nuclear material used for peaceful purposes while in *international* transport; however, presently there is no obligation on Parties regarding the physical protection of nuclear material in *domestic* use, storage, and transit. The Convention requires Parties to make specific acts criminal offenses under their respective national laws, a provision that applies to nuclear material in international transport as well as to civil nuclear material while in domestic use, storage, and transport. (*Also see the article on nuclear theft and sabotage, page 20.*)

Work is under way related to a possible amendment of the Convention to, among other things, extend its obligations to protect nuclear material in domestic use, storage, and transit. In December 2001, the IAEA Director General convened a group of legal and technical experts to draft an amendment to strengthen the Convention for consideration by the Parties.

■ *Physical Protection Objectives and Fundamental Principles*, which were developed by an expert group convened by the IAEA in the late 1990s and endorsed by the Agency's Board in September 2001.

■ *Physical Protection of Nuclear Facilities and Nuclear Facilities*, recommendations which were last published by the IAEA in

1999 as INFCIRC/225/Rev.4. These recommendations are supplemented by technical documents that the IAEA has issued since then to provide additional guidance.

To assist States in upgrading their capabilities, a core activity is the International Physical Protection Advisory Service (IPPAS). Provided to IAEA Member States upon request, the service sends expert teams on field missions to review national physical protection systems, thereby helping States to identify needs for improvement and to properly implement internationally accepted standards and practices. A number of steps are needed to strengthen the service and its potential impact.

Firstly, a much higher number of State requests for IPPAS missions, and additional resources to support them, would directly contribute to improving nuclear security. The IAEA is encouraging more of its Member States to support and take advantage of the service, and is increasing its emphasis on both preparatory and follow-up activities to improve the effectiveness of missions.

Secondly, steps are needed to improve the implementation of IPPAS results, which include recommendations directed at strengthening protection of nuclear material and facilities against acts of terrorism. This will require better coordination of resources available to the IAEA and its Member States to support work for needed improvements at nuclear facilities in specific countries.

Thirdly, training in areas of physical protection is being strengthened. Up to now, about

1000 staff in Member States have been trained, and the need for additional training is growing. The IAEA's experience has shown that a well-focused training programme for Member States increases awareness of the need to protect nuclear material and facilities, and promotes high standards in national systems for physical protection.

Improving National Systems of Accounting & Control of Nuclear Material. As previously noted, States systems for the accounting and control of nuclear material are fundamental to the implementation of IAEA safeguards. The systems also are an essential element of a comprehensive approach to nuclear security. The keeping of records of nuclear material inventories, transactions, losses, and the control of material that is being imported or exported is a necessary element for the security of material. An effective system of accounting and control, at the facility level, deters theft and helps the early detection of any material that may have been stolen.

Continuing steps are planned to reinforce IAEA assistance to Member States for strengthening nuclear accounting and control systems. Besides providing up-to-date recommendations and guides, the Agency plans to provide additional expert advice, training and technical guidance to States in establishing the necessary systems at both the State and the facility levels. One particular activity focuses on upgrading capabilities for analytical measurements of nuclear material and the administrative systems required for them.

Countering Illegal Activities Involving Nuclear & Other

Radioactive Materials. Multiple measures are required to guard against theft of nuclear and other radioactive materials, and to effectively detect and respond to illegal activities. These measures are covered to a considerable extent in international standards and guides the IAEA has developed, but more work is needed.

There is a particular need, for example, for improved, user-friendly equipment to help authorities detect nuclear and radioactive material that may be smuggled. An IAEA project has generated a first set of functional specifications for such equipment, and activities now are directed at coordinating development among interested States. Also planned, subject to resources, is the establishment of a network of laboratories capable of performing sophisticated analysis of material seized in trafficking.

Of related concern is that customs and law enforcement officers are, in the majority of cases, not sufficiently trained in the detection of radioactive materials. Officers at borders and other law enforcement authorities require factual information, equipment, and instructions for taking the correct actions, should the need arise. The Agency has initiated training courses in cooperation with its Member States and international organizations, including the World Customs Organizations (WCO) and Interpol, in response to this need. A more comprehensive programme is planned, supported by technical manuals and handbooks.

Improving the Exchange of Information on Illicit Trafficking & Nuclear Security. Another area of emphasis has been the exchange of factual

information between States on illicit nuclear trafficking. About 70 States participate in the IAEA's Illicit Trafficking Database Programme, which was launched in 1993. (*See box*). Planned improvements, based on feedback from participating Member States, are related to better compilation, coordination and analysis of data.

Overall, a more complete database covering cases of theft, sabotage and illicit trafficking is needed to upgrade nuclear security and raise awareness and understanding of threats. National authorities and international organizations use the information to effectively target and define weaknesses in the prevention of nuclear terrorism and to put improvements in place. Steps to enhance the completeness and evaluation of data aim to assist these authorities and organizations, as well as the Agency, in planning and prioritizing their prevention, detection and response methods and strategies.

TOWARD STRONGER SYSTEMS OF NUCLEAR SECURITY

More evident today is that the international dimensions of nuclear security demand stronger cooperation and coordination among States and international organizations. As part of its work, the IAEA is reinforcing its interaction with a number of organizations, including the WCO and Interpol, and increasing outreach to others, such as the United Nations Terrorism Prevention Branch and the United Nations Department of Disarmament Affairs.

At the State level, the Agency's joint work with

national authorities has resulted in putting into place the fundamental elements of a good national system for the security of nuclear and radioactive material. In key areas, the IAEA can assist its Member States seeking to upgrade their security measures for nuclear and radioactive material. While the responsibility for a national programme rests with each State, nuclear security can only be as good as its weakest link, as the IAEA Director General has pointed out, and is a matter of international concern.

The IAEA's support extends to developing or preparing standards or guidelines; training personnel; and upgrading infrastructures that would assist national authorities in the prevention, detection, and response to acts of nuclear terrorism. For delivering such assistance, the IAEA relies upon well-tested channels of technical cooperation. The Agency's close association with responsible national and international authorities, including customs and law enforcement organizations, has proved advantageous in many respects, by sharing best practices and expertise, and by identifying priorities for joint action.

In the years ahead, cooperative efforts must address the full range of threats to nuclear security, recognizing that:

- there is a wide spectrum of potential risks; they include nuclear weapons proliferation, theft of nuclear or other radioactive materials, and sabotage of nuclear facilities.
- there are different security risks when considering threats posed by hostile States or by what have been called "sub-

IAEA ILLICIT TRAFFICKING DATABASE PROGRAMME

About 70 States have joined the IAEA's Illicit Trafficking Database Programme since it was set up in 1993. The programme aims to assist States by alerting them to incidents, facilitating exchange of reliable information, and identifying common threads or trends that might help States combat illicit trafficking. Information reported to the programme is treated confidentially, with reporting States able to designate what information may be shared with other States and what can be shared publicly.

For the period 1 January 1993 to 1 April 2001, the database recorded more than 550 incidents, or which about two-thirds have been confirmed by States. Of these confirmed incidents, about half involved nuclear materials. The frequency of confirmed incidents has grown in recent years. The number of cases per year in 1999 and 2000 were roughly double the 1996 value, with most of this growth connected with incidents involving radioactive sources.

Of the confirmed incidents with nuclear material, one-third involved low-enriched uranium and 17 cases, or 10%, involved highly enriched uranium (HEU) or plutonium. In most cases, the quantity of HEU and plutonium encountered is small compared with the amounts required for a nuclear explosive, although it should be kept in mind that even small quantities of material sometimes may be samples of larger quantities available for purchase or at risk. After a three-year hiatus in incidents with HEU or plutonium during 1996-98, five such incidents were confirmed in the two years since April 1999, including the seizure in April 2000 of nearly a kilogram of HEU in the form of fast-reactor fuel pellets.

For incidents with radioactive sources where the source strength has been reported, about one in six involved sources of one curie (37 giga-becquerel) or more. In eleven cases, the reported source strength exceeded 1000 giga-becquerel, and eight of those eleven cases occurred during the last three years.

Trafficking in nuclear material and other radioactive sources is a global concern, with confirmed cases recorded in more than 40 countries on six continents. The majority of confirmed incidents involving nuclear material have occurred in Europe. --Contributed by G. Anzelon, W. Hammond, and M. Nicholas, Division of Safeguards Information Technology, IAEA Department of Safeguards.

national" perpetrators, including individuals or groups of criminals and terrorists bent on inflicting mass casualties and deaths;

- since risks are associated with different types of consequences, a graded approach is warranted to prioritize and effectively counter threats.

To a large extent, future directions of the IAEA's programme on the Security of Material rest upon measures to strengthen international cooperation for upgrading nuclear security, including improved capabilities for intercepting and responding

to illicit trafficking, and enhanced protection of facilities against terrorism and sabotage. It will be a difficult challenge for the IAEA and its Member States to consolidate all these measures into an integrated, efficient system, thereby ensuring that the security of nuclear and other radioactive material is woven into the infrastructure of nuclear safety and security programmes. Doing so will contribute significantly to national and global efforts to combat and reduce the multi-dimensional threats of nuclear terrorism. □