Threats & Risks

The illicit trafficking of nuclear material is a menace that needs to be stopped. An IAEA project is facilitating the understanding of the problem, as well as helping identifying potential solutions.

Former UN Secretary-General Kofi Annan once described nuclear terrorism as 'one of the most urgent threats of our time'. Indeed, there is an almost global consensus, reflected in resolutions of the UN Security Council and General Assembly, that there is a real threat that terrorist groups are seeking to acquire nuclear and radioactive materials and would use them for malicious purposes.

While this threat is real, the possible effects of a terrorist act involving nuclear material would be, by anyone's standards, dire. For example, the consequences of an improvised nuclear explosive device (IND) being detonated in a populated area would be truly catastrophic in their immediate impact and have far reaching and unpredictable future consequences. For this reason alone, measures to prevent such an event must be our highest priority. We cannot accept even a possibility that this might happen. We must, therefore, achieve the very highest standards in prevention measures.

But nuclear terrorism has other facets, not as destructive as an IND but also with far reaching and unpredictable consequences. Sabotage of a nuclear facility or transport could, in certain circumstances, produce a widespread radiological hazard; and the use of radioactive materials in dispersal devices (e.g., 'dirty bombs') and other malicious applications have the potential to produce high levels of disruption, cost and distress. In these cases, the consequential economic/financial costs can be very high, measured in modelling of possible scenarios in multiples of billions of euros.

The unique place that radiation occupies in the public psyche, a place shared only with biological and perhaps chemical weapons, means that the value of radioactive materials for a terrorist may lie in their power to capture public attention, produce disruption and incur high economic costs.

A Symptom and an Indicator

Stop people on the street and ask them what they understand by illicit trafficking. Amongst the elements which would come to their minds first are criminality, intent, some concept of quantity, and movement across borders. Probe a little more deeply and they would probably also accept that the material does not have to be actually moving. Illegal or unauthorized possession is enough. They would probably also accept that stealing, or otherwise acquiring material illegally, is included, that intent does not have to be known and that movement across an international border is not a necessary condition.

The scope of the definition is important because, from the perspective of those of us dedicated to enhancing nuclear security, illicit trafficking is an indicator of potential risks and threats. But it is also a symptom: a symptom of failures or vulnerabilities in prevention and detection measures. If we are to pursue comprehensive solutions to the nuclear security threat, we need information which helps to identify needs and priorities. These range from generic and specific weaknesses and vulnerabilities in accounting and protection control to information on routes and modus operandi of traffickers.

This approach is reflected in the scope of the information collected by the IAEA's Illicit Trafficking

Between 2002 and 2006 the number of reported incidents rose by 385%. But it must be emphasized that whilst this is evidence of a major problem, it is not necessarily one which is getting worse so quickly.

Photos: IAEA

in Trafficking

by Richard Hoskins

Database (ITDB), a respected source of credible information on nuclear trafficking and other unauthorized activities first established in the mid-1990s. *(see sidebar 'Information Against Trafficking').* The ITDB contains information on 1340 incidents reported by States since 1993. Many more incidents have been reported in open sources but await confirmation or denial by the States involved.

The number of incidents reported to the ITDB each year fluctuates. Until very recently it has shown some very substantial increases. But this is not necessarily an indication that the problem is getting worse: other factors are also at work. Some are administrative, but other reasons include better control and inventory measures, and improved national detection and interdiction capabilities. Therefore, the increase in the numbers of incidents being reported may, at least in part, be an indicator of success in efforts to improve security. It should also be noted that the number of States reporting to the ITDB has increased substantially; from 72 in 2002, to 99 at the end of 2007.

Absolute numbers have their attractions, especially to headline writers, but each incident reported to the ITDB has an intrinsic significance for security which is related to individual circumstances and type of material involved. The IAEA is in the late stages of developing a methodology for assigning a value for 'security significance' of each incident reported. This will be used for internal analytical purposes first and, if IAEA Member States and others such as the media find it useful, its use will be extended.

From Weapons Grade to the Not-So-Dangerous

The IND threat can be defined as incidents in which weapons usable material is involved. Fortunately, episodes regarding high-enriched uranium (HEU) or plutonium (Pu), are, in statistical terms, relatively rare. Only 18 incidents have been reported since the database began collecting information. But this provides no grounds for complacency. Given the consequences of the detonation of an IND, any incident which involves material for such a device is of the highest concern.

Some of the cases in the early 1990s involved kilogram quantities, but we have not seen these amounts since. Typically cases have involved gram quantities in recent years. But a worrying aspect is that some incidents are, or appear to be, linked - e.g., HEU seized in France and Bulgaria. This raises the possibility that the materials offered for sale and/or recovered, were samples drawn from larger caches which as yet are unrecovered. Alternatively, and equally worrying, is that linked cases are evidence of a weakness in secu-

Information Against Trafficking

Now in its fifteenth year of operation and approaching the recruitment of the hundredth participating State, the IAEA's Illicit Trafficking Database (ITDB) is not just a database. A better description would be to call it an information system which includes information dissemination and analysis, both regular and, on request. These produce some interesting insights into the threat.

Its scope is intentionally broad, extending beyond the narrow definition of illicit trafficking as is found in areas such as drugs or small arms. Developed in close consultation with the participating States and established in more or less in its current form many years ago, the ITDB covers all types of radioactive material, all quantities, and all unauthorized activities including thefts and losses, interdictions and recoveries, sales and attempted sales, unauthorized movements and disposals.

By including all forms of unauthorized activities, the potential for making a real contribution to understanding the problem and identifying potential solutions is maximized.

rity at the facility of origin which has already led to some thefts and may be exploited again.

The great majority of uranium cases reported to the ITDB involve low-enriched uranium (LEU) or source material. These materials are of little direct use in themselves and would require processing beyond the capabilities of a terrorist group to become so. But they are symptomatic of failures or vulnerabilities in control and protection measures at the facility of origin — in some cases, such facilities may handle both HEU and LEU — and of detection and interdiction measures along the lines of movement. They are also indicative of the existence of an illicit market, perceived or real.

One piece of good news is that the number of incidents involving LEU reported to the ITDB has been declining since 1994. This appears to be an indication of the success of measures to improve security, in particular at fuel fabrication and storage facilities.

Radioactive sources involved in incidents range through all categories of materials: from the very dangerous to the not dangerous according to the IAEA's categorization scale. The materials suitable for malicious use can be extended if the desired consequences go beyond the deterministic, to include psychological, social, economic and other considerations unrelated to destructive power or even the power to contaminate.

Of the 1340 incidents reported to the ITDB by States, 879 involved radioactive sources—although the radioisotope involved, or its activity level, is not always known. Of those incidents where we have this information, one third involved Cs-137 sources. The activity levels involved are usually not very high (from hundreds of mega bequerels to tens of giga bequerels), mostly, but not exclusively, Category 4 and 5 on the IAEA Categorisation scale. Even so, these Cs-137 sources have the potential for malicious use either individually or through accretion. Of the remaining incidents, most of these are also Category 4 and 5 sources but include some more dangerous materials, mainly Ir-192, Sr-90, Co-60 and Am-241 .

Thefts, Losses and Recoveries

A report of a theft or loss is evidence of a weakness or vulnerability in measures to control and secure such materials. Analysis also shows that detection or recovery of nuclear and other radioactive materials, whether in unauthorized possession, intercepted whilst being trafficked, or recovered by a roadside or in a load of scrap metal, involve materials which have not been previously reported as lost or stolen. Assuming that States are assiduous in reporting thefts and losses to the ITDB, the logical conclusion is that national control mechanisms are inadequate because not all thefts and losses are being detected.

Analysis of evidence shows that materials which have been reported as stolen or lost are, in the majority of cases, not recovered. Coupled with the evidence that some thefts and losses are going undetected, this points to the existence of a 'pool' of radioactive materials outside of authorized control and potentially available for malicious use.

But not all materials in this 'pool' are suitable for malicious use. Some, like Ir-192, have relatively short half-lives and can be discounted once they have aged sufficiently. But some incidents involve 'dangerous' (i.e., Category 1, 2 and 3 radioactive sources), and yet more incidents involve materials which may not be classified as dangerous but nevertheless could have useful disruptive, economic or psychological applications. Unfortunately, and by definition, the numbers, types and categories of materials in the 'pool' whose theft or loss has not been detected is not known.

Where nuclear and other radioactive material is recovered, there is a good potential to draw generic lessons about regulatory and control systems and protection measures. But the scope for identifying specific vulnerabilities at the source — the facility from which it was originally stolen or lost — depends upon our ability to identify that point of origin. Nuclear forensics offers the possibility of identifying the origins of interdicted nuclear materials and subsequently addressing any weaknesses. However, for radioactive sources, the point of origin is harder to establish if regulatory and control systems are weak.

Motives, Intentions and Threats

The motives and intentions of those involved in incidents are not always known. This poses problems in deciding whether criminality and malicious intent are factors. Roughly 42% of all incidents reported to the ITDB show direct evidence of some form of criminality, including theft. In reality, many other cases may have involved criminality, such as losses of materials, unauthorized movement and recoveries of abandoned materials; but we do not have sufficient information to know.

Criminality, however, does not equate to malicious intent. Other motives, primarily profit, are common. Many incidents reported to the database involve middle-men seeking only financial gain from selling the material — to whom it doesn't matter, perhaps another middleman. But this only means that the potential threat is moved down the line of sellers and buyers. It does not mean that it disappears: eventually profit may turn into malicious use as the motive. Unfortunately, in the majority of cases the next buyer or end user is unknown or unidentified.

Some incidents reported to the ITDB have involved suspected or real malicious intent. For example, in Germany in 2004, a suspected member of a terrorist organization reportedly showed interest in acquiring nuclear material. In Belgium in 2005, small quantities of UF4 powder were mailed to various government and international officials in Brussels. More recently, a medical source was stolen whilst in transit with the apparent intention of using it in an RDD. Other past incidents reported in open sources occurred in Moscow and Argun and involved radioactive sources but neither have been confirmed to the ITDB. Such incidents provide collateral for the substantial body of information which apparently exists on the interest of terrorist groups in nuclear terrorism.

There is also some evidence of the involvement of organized groups in illicit trafficking and other unauthorized activities. In its commonest and simplest form, this involves a conspiracy apparently established for a single criminal enterprise. A second form of organization which has been seen is a criminal group which involves repeat offenders. One hesitates to call them specialists but there are indications that they have trafficked or attempted to traffic material more than once. And lastly, there are well established organized crime groups which are involved in multi-faceted criminal activities. There is very little evidence of their involvement in nuclear trafficking and other unauthorized activities, just some allegations of possible Mafia involvement in an incident of trafficking of LEU and, according to open source reports, of involvement in illegal disposal of radioactive waste.

Most reported cases of seizures of material/ interdiction of trafficking activities involve amateurish and technically naïve sellers who usually do not have a specific buyer. Both sets of characteristics make them vulnerable to counter trafficking activities by national security forces both through their incompetence and the need to 'advertise' their wares to find a buyer. We must be concerned that more experienced and professional criminals, such as organized

How to Address the Nuclear Terror Threat

The IAEA has released a reference manual that details how to prevent, detect, and respond to an incidence of nuclear terrorism. *Combating Illicit Trafficking in Nuclear and Other Radioactive Material* serves as a how-to manual on several topics related to criminal acts involving nuclear and radioactive material. The 150+ page text is intended for a broad audience, including law enforcement agencies, legislators, customs and border patrol personnel, intelligence officials, emergency response teams and users of nuclear technology.

The manual is composed of four sections, containing:

- Discussion of the nature of the threat posed by illicit acts utilizing nuclear and radioactive material, along with an outline of policy and legal frameworks currently in place to hinder such an act;

- Review of international steps being taken to counter the threat;

- Primer on radioactive material, the public health risks associated with exposure to radiation, and information on current applications and transport issues involving radioactive material; and

- Advisory text on how countries can prevent, detect and confront a possible threat.

In response to the threat of a possible radioactive terrorist attack, states and organizations have begun to synchronize their information-sharing capabilities on a wider scale. This handbook aims to further these efforts by providing a resource foundation to guide cooperative measures around policy, training and awareness.

Developed in cooperation with INTERPOL (International Police Organization), EUROPOL (European Police Organization), and the World Customs Organization (WCO), the reference manual is the first to provide a comprehensive guide that addresses the threat of a possible nuclear terror attack.

The manual can be found at: www-pub.iaea.org/MTCD/publications/PDF/pub1309_web.pdf

A Global Priority

The illicit trafficking of nuclear material and the potential threat it poses continues to be an issue of international concern, delegates from 60 countries agreed at an IAEA-organized international conference in Edinburgh, Scotland. The *Illicit Nuclear Trafficking: Collective Experience and the Way Forward* conference attendees also acknowledged that steps to establish effective technical and administrative systems to prevent the uncontrolled and unauthorised movement of nuclear and other radioactive materials must continue to be taken.

In the conference findings it was reported that halting the illicit movement of nuclear material, equipment and technologies that terrorists could use continues to be a global priority. A system that addresses both detection and prevention is essential, the conference attendees agreed. "Since the human, political and economic consequences of a successful malicious act involving nuclear or other radioactive materials could be far-reaching, the limited knowledge of direct attempts to acquire such material is no cause for comfort," said conference President Peter Jenkins.

The conference findings also stressed that international cooperation is essential to better understand the circumstances of trafficking events, patterns and trends, while continued effort is required to strengthen the compilation of information in systems such as the ITDB.

Although many states are benefiting from dramatic improvements — better equipped to combat illicit trafficking, supported by new international legal agreements, improvements in detection tools and techniques allowing material to be traced to its origin - significant disparities remain between the capabilities of some countries.

Recommendations made by the conference include the following:

- Continue the development of new technologies for hard-to-detect fissile materials;
- Share new technologies with states that lack them;
- Take into account unguarded borders in the need to increase the sophistication of detection capabilities;
- Formulate effective communication strategies to inform the public; and
- Have the IAEA convene a further conference about illicit trafficking in 2010 to assess progress.

About 300 delegates from 60 states and 11 international organizations attended the *Illicit Nuclear Trafficking: Collective Experience and the Way Forward* conference from 19-22 November 2007. The four-day event, which was hosted by the government of Great Britain, was called to take stock of global efforts to combat illicit nuclear trafficking and to consider future steps.

crime groups or terrorist groups will be much harder to interdict.

The Market

Incidents reported to the ITDB show a consistent perception amongst the sellers that there is a black market for nuclear and other radioactive materials. Although a lot of sellers have little understanding of what they are trying to sell, others are not so technically ignorant. They will try to pass off benign material as something more sinister but at the same time they may actively seek to acquire real nuclear and other radioactive materials to offer for sale.

Aside from scams, the perception of a market encourage thefts of nuclear and other radioactive material from the authorized owners and, most worryingly, raise the possibility that materials of high security concern will be stolen, sold in the black market and eventually acquired by terrorist groups. So there is only some comfort in concluding that sellers only perceive a black market to exist and that there is little evidence of a buyer driven market. Perceived markets could become real sources of supply.

Address the Causes

Illicit trafficking indicators and other activities involving unauthorized possession are symptoms: they are symptoms of malicious intent, perceived markets and the search for profit. But they are also symptoms of vulnerabilities in legislative, regulatory and accounting systems, as well as in physical protection and other preventive security systems. They are also symptomatic of vulnerabilities in detection and interdiction systems.

To address the trafficking problem and, thereby, reduce or eliminate the related threat, we must address the causes. Just like in medicine, prevention is better than cure and potentially less expensive. For nuclear security, this means a comprehensive approach to addressing the threat — an approach which encompasses preventing acquisition of materials suitable for malicious use and the timely detection of losses and thefts and effective detection and interdiction measures to prevent movement of material.

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This article is based on a speech delivered at the IAEA international conference on ***Illicit Nuclear Trafficking: Collective Experience and the Way Forward****, held in the UK in November 2007.*