NUCLEAR TERRORISM

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Nuclear terrorism

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Speaking frankly to the UN General Assembly on 1 October 2001, Secretary-General Kofi Annan said, "It is hard to imagine how the tragedy of 11 September could have been worse. Yet, the truth is that a single attack involving a nuclear or biological weapon could have killed millions. While the world was unable to prevent the 11 September attacks, there is much we can do to help prevent future terrorist acts carried out with weapons of mass destruction."

The terrorist attacks on New York and Washington, DC have raised new concern over the threat of nuclear terrorism, but it is fair to ask, what is the nature of this threat? and is there good reason for concern? Examination of the nature and likelihood of a nuclear terrorist attack indicates that, while this type of terrorism would require considerable financial and technological resources, it is not an impossibility, especially for a group with the scope of Osama bin Laden's Al Qa'ida network.

Analysts agree that a nuclear terrorist attack would likely take one of three forms: detonation of a nuclear weapon, detonation of a radiological or 'dirty' bomb, or an explosion of or near a nuclear reactor. Of these, a nuclear bomb would be the most destructive, but experts predict that a dirty bomb would be the terrorist weapon of choice.

Attack with a nuclear weapon on a densely populated region would have a devastating effect. Dr. Bruce Blair has estimated that the explosion of a device with a yield of 15 kilotons in Manhattan would kill upwards of 100,000 on impact and many more in the aftermath, virtually destroy the city centre and cause considerable fallout, contaminating the city for many years. By comparison, the 15 kiloton bomb detonated at Hiroshima killed 140,000 people and over 90 per cent of the city's buildings collapsed or burned. Non-state terrorists with access to state nuclear facilities or the financial and technological resources might consider building a nuclear weapon, but alternatively, theft of a nuclear warhead is a real possibility.

A radiological dispersion bomb or 'dirty' bomb would use conventional explosives laced with radiological material to create an explosion that spreads toxic radiation. A radiological bomb would not have the kind of direct impact of a nuclear weapon in terms of fatalities, but the environmental impact of dispersing radioactive material in an urban centre would be significant. Radioactive waste, which is available even at hospitals or industrial sites, could be used to build such a bomb with a relatively simple explosive device. Experts believe that terrorists would be more likely to use a dirty bomb because of greater access to non-weapons-grade nuclear materials and its relatively simple construction.

While nuclear reactors have always been regarded as a potential target requiring heightened protection, the events of September 11 have exposed their real vulnerability. Extensive security and containment systems are designed to protect reactors, but aerial attack poses a more serious threat. David Kyd, a spokesman for the International Atomic Energy Agency (IAEA), confirmed this: "[Reactors] are built to withstand impacts, but not that of a wide-bodied passenger jet full of fuel. A deliberate hit of that sort is something that was never in any scenario at the design state. These are vulnerable targets and the consequences of a direct hit could be catastrophic." An aerial attack would have a similar effect to a radiological bomb, dispersing radioactive contamination across a wide area. But an aerial

attack is not the only way to sabotage a nuclear reactor – a well placed truck bomb, exploded near a nuclear reactor or spent fuel cooling pond, could cause a similar disaster.

Attack with a nuclear or dirty bomb would require access to fissile material, the technological know-how to construct the explosive device, and the means to deliver the bomb. While national nuclear programs are built on years of research by highly skilled technicians and scientists, a crude bomb could be built with only limited expertise. Instructions and designs are available from open source technical manuals and on the Internet. Furthermore, there are thousands of nuclear scientists worldwide who have the necessary technical knowledge, many of whom are unemployed or underpaid and might be willing to offer their expertise to terrorists for money. Providing legal, gainful employment to these experts is key to preventing the proliferation of nuclear weapons technology.

It is unlikely that non-state terrorists would have access to sophisticated means to deliver a nuclear bomb from a distance. Rather than a ballistic missile, they would rely on conventional means such as a ship container or truck to transport the weapon. The constraints of missile delivery – restrictions on both size and weight – would not apply to the crude design of a terrorist weapon. A small nuclear weapon could be transported by truck, van, or car and detonated in place. Safe transport and reliable delivery systems are inconsequential for suicidal terrorists.

Of the requirements needed to build a nuclear or radiological bomb, fissile material is the most difficult element to acquire, and access to these materials is the primary limitation on illicit production and use of nuclear weapons. Because production of weapons-grade fissile material is both a lengthy and technologically difficult process, non-state terrorists would be more likely to acquire it through theft or a blackmarket transaction. Weapons-grade Highly Enriched Uranium (HEU) and separated plutonium are relatively well protected by military and research facilities, but considering the sheer quantity of stockpiled materials, the risk of theft is considerable. Estimates suggest that stockpiles of separated plutonium equal some 450 tons, while there are over 1,700 tons of HEU stored at military facilities and civilian research reactors worldwide (Bunn and Bunn 2001).

Since 1 January 1993, the IAEA has recorded in its database 550 unsuccessful attempts to traffic in nuclear and radioactive materials. One hundred seventy-five of these cases involved nuclear materials while the rest involved low-grade radioactive waste. Five cases involving gram weights of HEU or plutonium were recorded in the period from May 1999 to July 2001 (IAEA 2001). One estimate says that to build a nuclear bomb a terrorist would need 3-25 kilograms of HEU or 1-8 kilograms of plutonium (Williams and Woessner 1996, pp. 40-44). It is safe to assume that the recovered illicit fissile material is only representative of the larger trade, although it is impossible to tell what percentage is never recovered. Because there could be dire consequences if even a small fraction of nuclear materials were to end up in the wrong hands, any leakage should be taken seriously.

The nuclear facilities of the former Soviet Union are particularly susceptible to theft and are the major source of fissile materials seized in illicit smuggling operations. The maintenance costs of its once extensive nuclear program are beyond Russia's financial resources and employees' wages are low or unreliable; consequently, security has slipped. The incentive and the means are there for disgruntled employees to engage in theft and blackmarket sales of fissile materials. The US has cooperated with Russia over the last decade to improve security at Russian nuclear facilities, but there is still reason for concern. Conflicting reports suggest that as many as 80 Russian suitcase nuclear bombs are unaccounted for. The most recent recovery of nuclear materials occurred in November 2001 when Turkish police broke up a smuggling gang who tried to sell to undercover police 1 kg of HEU – material purchased from a Russian several months ago.

In the early to mid-1990s the major heists of nuclear material occurred in Europe, primarily in Turkey and Germany; more recently there has been a shift to the Central Asian Republics. Reports indicate that traffickers would be most likely to follow a path from Russia through Central Asia to suspected prospective buyers in Iran, Iraq, Libya, and North Korea via routes along long and porous borders. The international market in nuclear material is not,

however, fed only by former Soviet states; other nuclear weapons states, as well as the 27 states with nuclear research and power facilities, have materials at risk of becoming part of the illicit trade. In 1998 police in Italy intercepted HEU that was stolen from a research reactor in the Congo. In 2001 Colombian police seized HEU originating from an unknown location.

Osama bin Laden has attempted to purchase fissile material illegally. Recorded incidents begin in 1993 and include the following.

• The prosecution's key witness in the case of the US embassy bombings in Africa, a Sudanese man named Jamal Ahmad al-Fadl, has testified to his role in a 1993 transaction of $1.5-million for an unknown quantity of uranium. Al-Fadl was unable to confirm that the transaction took place.

• In September 1998 bin Laden's aide, Mamdough Mahmud Salim, was arrested in Munich, Germany on charges of attempting to obtain HEU in the mid-1990s, reportedly on behalf of bin Laden.

• The Arabic newspaper *Al-Hayat* reported in late 1998 that bin Laden had made a $30-million deal in Chechnya to purchase 20 nuclear warheads stolen in Russia by Chechan warlords. This claim was never substantiated.

• A Bulgarian businessman, Ivan Ivanov, has testified that he was approached in April 2001 by an associate of bin Laden who was seeking radiological material. After a series of meetings near the Pakistani border with Afghanistan and an offer of $200,000 to purchase spent fuel rods, Ivanov seems to have backed out.

A verbal commitment to acquire nuclear weapons accompanied bin Laden's attempts to purchase fissile material. Bin Laden issued a statement in May of 1998 entitled "The Nuclear Bomb of Islam," in which he claimed that Muslims have a duty to acquire nuclear weapons and terrorize the enemies of God. In an interview with Rahimullah Yousafsai from *ABC News* he stated that "acquiring weapons for the defence of Muslims is a religious duty. … But how we could use these weapons if we possess them is up to us." President George Bush has obviously taken bin Laden's declaration seriously, testifying at the Warsaw Conference on Terrorism in November 2001 that the Al Qa'ida cell groups "are seeking chemical, biological and nuclear weapons. Given the means, our enemies would be a threat to every nation, and eventually, to civilization itself."

On 8 November 2001, bin Laden held an interview with a Pakistani newspaper editor in which he declared that "if America used chemical or nuclear weapons against us, then we may retort with chemical and nuclear weapons." He refused to say where he got such weapons, only that he had them as a deterrent. On 15 November it was reported that Al Qa'ida members fleeing Kabul left behind evidence of their intent to build a nuclear weapon. It was later uncovered that the document that was found, which described how to make an atomic bomb, was a spoof. It was published in 1979 by *The Journal of Irreproducible Results,* which parodies scientific journals.

Considering the ongoing crisis in Afghanistan, the status of the Pakistani nuclear arsenal is of great concern. While there is no direct evidence to suggest that Pakistan's nuclear weapons are in immediate peril, internal opposition to Pakistan's support of the US is strong and there is the risk that this faction could cause the kind of instability that might threaten the position of the Pakistani President, General Musharraf, and therefore his control over the nuclear installations. General Musharraf has insisted that the nuclear arsenal is in safe keeping, but if its security is threatened it will be moved to China. Despite these assurances, Pakistan's nuclear capacity still poses a threat. Recently two Pakistani nuclear scientists were called in for questioning about their activities in Afghanistan. Beginning in 1998, the men had made several visits to Kandahar, where, they argue, they were constructing flour mills, but it is feared that they may have been trading nuclear materials or weapons technology to the Taliban.

The security of nuclear material and facilities has been a concern of the international community since the beginning of the Cold War. In 1956 the member States of the UN voted on a statute to create the International Atomic Energy Agency to promote the use and development of atomic energy and its contribution to health and science, without furthering any military purpose. The issue of "The Physical Protection of Nuclear Material and Nuclear Facilities" was addressed by the IAEA in its Information Circular, INFCIRC /225, in 1975. This document provides states with guidelines for systems of protection and parameters for international cooperation in promoting physical protection and recovery of lost materials. INFCIRC /225 has been revised four times, taking into account advancements in protection technology, and is still considered authoritative. At the national level regulating bodies apply the standards outlined by the INFCIRC to the specific nuclear program of the country.

States are responsible for the physical safety of nuclear material and facilities within their own borders, but transport of nuclear material across national borders is an issue of international concern. The UN has addressed this with a Convention on the Physical Protection of Nuclear Material, signed in March 1980. The Convention applies to nuclear material used for peaceful purposes and outlines measures for international cooperation to ensure the physical protection of such material in transit across borders.

Since the terrorist attacks of September 11, there is increased concern over security at nuclear facilities and protection of nuclear materials. The IAEA General Conference, meeting in September, passed a resolution which called for a thorough review of its programs that promote the physical protection of nuclear facilities and material. On November 2 a special session brought together experts to examine the threat of nuclear terrorism.

States have taken a variety of steps to heighten security around their nuclear facilities. After September 11, the Nuclear Regulatory Commission in the US immediately advised all nuclear facilities to move to the highest level of security, which generally includes increased patrols, limited access to personnel and vehicles, and increased coordination with military and local police. The French Ministry of Defence called for a temporary no-fly zone within a 10-kilometer radius and a height of 1,524 meters over the La Hague nuclear facility and on 26 October ground-to-air missiles were positioned near the site. Members of the UK Parliament are engaged in a debate over placement of anti-aircraft batteries near the Sellafield nuclear power plant. Canada's 22 nuclear power plants have been placed on an enhanced security status and Atomic Energy Canada has implemented a no-fly zone around the Chalk River facility. The US and Russia have agreed to cooperate in improving the physical protection and accounting of nuclear materials to prevent illicit trafficking.

The reality of the nuclear terrorist threat is much clearer in the wake of September 11, which showed the extremes to which terrorists are willing to go. Events of the past decades suggest that there is a black market for nuclear materials, one in which Osama bin Laden is believed to be active. Review of the Russian nuclear program shows a dangerously lax security level at many facilities and a surplus of highly skilled, but under- or unemployed nuclear experts. Instability in South Asia has placed Pakistan's nuclear arsenal in an even more tenuous position. While experts do not believe that Osama bin Laden is in possession of nuclear weapons yet, there is reason for concern and regulatory commissions are right in reacting with tightened security and heightened awareness.

By definition, any use of a nuclear weapon – which always targets civilians – constitutes an act of terrorism, whether committed by non-state terrorists or states. States contribute to the terrorist threat with stockpiled nuclear weapons and fissile material that are at risk of being stolen, and nuclear technology that is at risk of being acquired by terrorists. As Kofi Annan has said, there is much that can be done to prevent terrorism being carried out with weapons of mass destruction. Tight control over military arsenals, accurate record keeping, safe storage of fissile materials, and productive employment for nuclear experts are all essential steps to thwart illicit use of nuclear materials and technology. However, complete nuclear abolition would be the most effective means to prevent nuclear terrorism.

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