PHYSICAL PROTECTION OF NUCLEAR MATERIALS
STRENGTHENING GLOBAL NORMS

BY GEORGE BUNN

Global concerns over illicit trafficking in nuclear materials have intensified in the 1990s. Some countermeasures have been taken, including steps involving the IAEA. But greater international cooperation, and higher standards of physical protection, may be needed to guard against the chance that weapons-grade material might fall into the wrong hands. This viewpoint article — based on a presentation to the IAEA's International Conference on Physical Protection in November 1997 (see box, next page) — advocates steps to raise global standards, and to have them monitored internationally.

For many years, those concerned with the spread of nuclear weapons worried more about their acquisition by nation-states than by terrorists. This was probably for two main reasons:

First, it was believed that terrorists could not acquire the nuclear explosive materials — highly enriched uranium and separated plutonium — needed to make nuclear weapons. The problems of producing these weapons-usable materials were thought to be technically beyond the reach of small groups, and States having the ability to produce them were believed to have adequate physical protection against their acquisition by thieves or smugglers.

Second, many experts believed that terrorist groups did not want to kill thousands of people — only enough to force the public to pay attention to the messages the terrorists wished to convey. As a result, the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT), and the IAEA safeguards it requires of non-nuclear-weapon States who sign it, were designed primarily to deal with the fear that States, not terrorists, might turn ostensibly peaceful nuclear activities into bomb-building efforts.

The main purpose in drafting the NPT's safeguards requirement was on detecting diversion of nuclear materials to military purposes by the government that owned the materials — not to guard these materials from theft or burglary by outsiders, or even from theft by insiders, who want to sell the materials to terrorists or other governments.

In the 1990s, events have shown that the NPT safeguards regime alone is inadequate to deal with the problems of illicit trafficking in nuclear materials. Indeed, its safeguards do not even apply to nuclear-weapon States where the greatest amount of weapons-usable material exists. And it does not require physical protection of weapons-usable material — which now has become a major international concern. Global physical protection standards that exist have been revised over the past decade. *(See box, page 6.)* But they need to be strengthened even more, for several reasons.

■ First, smuggling of sensitive nuclear materials has in fact occurred. L. Koch of the European Commission's Joint Research Centre that analyzes material from nuclear smuggling cases says that some involved "weapon" material or "weapon-usable" material. Indeed, there have been multiple seizures by authorities in Russia and elsewhere of kilogram quantities of weapons-usable material, mostly highly enriched uranium.

Given the huge quantities of weapons-usable material produced by both Russia's predecessor and the United States, given the changes taking place in Russia, and given the current dismantlement of 1500-2000 nuclear weapons per year by both countries, theft and smuggling of weapons-usable material should not be surprising. Moreover, many familiar with law enforcement believe that crimes of many kinds go undetected and therefore unknown. Successful smuggling of weapons-usable material could

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have occurred without detection. We can no longer assume that terrorists, whether domestic or international, cannot acquire weapons-usable material.

■ Second, the assumption that terrorists do not want to kill thousands of people and therefore would not use weapons of mass destruction has turned out to be wrong. The bombing of the World Trade Center in New York City by international terrorists, had it gone according to plan, might have killed many of the 10,000 people in the twin towers that were supposed to fall. The bombing of the Federal Building in Oklahoma City by a domestic terrorist killed 169 and injured 600. The release of the chemical-weapon nerve gas in the Tokyo subway by the Japanese Aum Shinrikyo sect was meant to kill more than twelve; it did injure 5000. Why wouldn't these terrorists have used nuclear explosives, even crude devices, if such explosives had been within their reach?

GLOBAL RESPONSES

Last year the UN General Assembly recognized the terrorist threat and established an ad hoc committee under the Sixth Committee to negotiate new treaties to deal with it. To that committee, the Group of Seven major industrialized countries plus Russia (the G-8) submitted a draft treaty "for suppression of terrorist bombings" (including nuclear bombings). The draft would define terrorist bombing and require national legislation and police cooperation to deal with it — just as does the international Convention on Physical Protection for the offenses it covers. With the addition of language added in the working group, the draft would state that any natural person (not a government) who detonates an explosive device (including a nuclear one) in a public place or who "manufactures, possesses, transfers or acquires" such a device with the intent to detonate it in such a place would commit an offense.

To the same ad hoc committee, Russia submitted a draft convention on the Suppression of Acts of Nuclear Terrorism. Work on this draft was put off, probably until 1998, with a view to completing work first on the treaty for "suppression of terrorist bombings". Most of the Russian draft is concerned with defining nuclear terrorism, requiring parties to adopt laws prohibiting it and calling on them to arrest and prosecute or extradite alleged offenders. But the draft has one paragraph which would obligate parties to cooperate in adopting laws, regulations and "*technical measures*" to "ensure the physical protection of nuclear material,... radioactive products...nuclear installations and nuclear devices as well as protection against illegal or unauthorized access to them by third parties." If adopted, it would thus require physical protection measures for nuclear material beyond those that now exist.

Further steps are likely by the General Assembly committee. If IAEA Member States do not consider strengthening physical protection requirements in Vienna, that committee may deal with aspects of the problem in New York. But the expertise for physical standards of protection — as distinct from definitions of criminal behavior — exists at the IAEA in Vienna rather than in New York.

The international community needs to do for physical protection what it has done for the strengthened safeguards system — it needs to make physical protection standards mandatory for domestic uses; to raise these standards; and to require international inspections, or other transparency or enforcement mechanisms, to provide international assurance that States are in fact applying stronger standards.

INTERNATIONAL CONFERENCE ON PHYSICAL PROTECTION

More than 200 experts from 48 countries and organizations attended the IAEA's International Conference on the Physical Protection of Nuclear Materials in November 1997. The meeting focused on national and global experience in regulation, implementation, and operation of physical protection systems and standards. Reviews of national experience included papers and presentations covering a wide range of topics. They included the implementation of protection programmes at specific types of nuclear facilities; organizational, regulatory, and legal aspects of national infrastructures; methods and approaches for assessing and improving procedures and systems; bilateral cooperative programmes for physical protection; physical protection during the transport of nuclear materials; research, development, and use of instrumentation and computerized security systems; and programmes that have been put into place for combating and preventing illicit trafficking in nuclear materials.

Proceedings of the Conference are being published by the IAEA.

STATE RESPONSIBILITY

What are the responsibilities of States in this regard?

First of all, Russia and the United States — which have the largest collections of weapons-usable explosive material — have the largest responsibility for its physical protection. Both countries have taken many steps to this end, but both have had problems. Perhaps the greatest common problem is providing enough information to assure other countries that American and Russian physical protection efforts are adequate. Obviously, some information on the protection of weapons must remain secret. But that should not prevent providing more information than has been provided.

There have been many negotiations between Russia and the United States to provide exchanges of information and more transparency about their weapons and materials. There have been cooperative efforts to improve protection of nuclear explosives by, for example, the specialized facility for storing weapon pits being built at Mayak in Russia. Both countries have offered to have the IAEA monitor weapons-usable materials that they declare excess to military needs, and the IAEA has agreed to do so provided the materials are thereafter irrevocably dedicated to peaceful uses. When IAEA monitoring finally begins, perhaps the rest of the world will be assured that these materials, at least, are adequately protected. But the materials will be a small proportion of total current stocks of weapons-usable material in the two countries.

Second, the G-8 clearly has a major responsibility for physical protection. Besides Russia and the USA, the G-8 includes two more declared nuclear-weapon States, France and the United Kingdom, plus major industrial countries with large civilian nuclear energy programmes, such as Germany and Japan.

In addition to the draft treaty for suppression of terrorist bombings mentioned earlier, the G-8 has been developing a political framework for cooperation against nuclear smuggling. Also, at the April

EVOLVING INTERNATIONAL STANDARDS

In part because the NPT regime contains no required standards for the physical protection of weapons-usable nuclear materials, there is a great variation in what countries actually do to protect them. Differences in culture and in perceived dangers from terrorists or inside thieves accounts for some of the differences. So may the lack of a clear mandatory international standard.

The international Convention on the Physical Protection of Nuclear Materials, which was completed in 1980 and last reviewed by its Parties in 1992, is limited in scope. Its protection standards, as general as they are, were only made applicable to nuclear material "for peaceful purposes in international transport." The draft originally submitted by the United States would have applied standards to domestic storage and use as well. But there were some objections to this. A compromise focused on international transport as the "most urgent" matter; added a preambular paragraph stressing the importance of "domestic" use, storage and transport," and agreed that the Convention's extension to domestic materials could be reconsidered at a future review conference. There were also objections to excluding materials used for military purposes. The compromise added a preambular paragraph reporting the understanding given the negotiators by the weapon-States that this material "is and will continue to be accorded stringent physical protection." The Convention's standards for physical protection thus did not apply to most weapons-usable nuclear materials — not to those for military purposes nor to those for peaceful purposes but not in international transport. Even in those cases to which the standards do apply, the Convention does not require inspections, other transparency requirements or enforcement provisions to give assurance to all States that adequate physical protection is in fact being provided.

The IAEA in 1989 issued strengthened, detailed recommendations for standards for the protection of nuclear materials (INFCIRC/225, Rev. 2), a revision of those first issued in 1972. They are not limited to nuclear material used for

1996 Nuclear Safety and Security Summit in Moscow, the Group proposed a "Programme for Preventing and Combating Illicit Trafficking in Nuclear Materials." This urged universal adherence to the Physical Protection Convention, acceptance of the IAEA physical protection recommendations, and strengthened G-8 collective efforts against illicit trafficking. The G-8 has invited other States to participate in the Programme and about thirty attended a recent meeting on the subject in November 1997.

A third group of States that should take leadership are the Parties to the Physical Protection Convention. They include over 60 States, of which all but about a dozen have relevant nuclear activities. The Parties should make every effort to get all States with nuclear activities to join the Convention.

The fourth group are IAEA Member States. The IAEA is the depositary for the Physical Protection Convention and has the responsibility to help organize any review conference requested by a majority of the Convention's Parties to strengthen protection standards. In addition to recommending detailed standards, it organizes "peer reviews" of physical protection efforts for States that request them. It is the international organization responsible for nuclear safeguards, and the only one with the expertise necessary to handle physical protection problems.

WHAT CAN BE DONE?

In the United States, a Committee of the National Academy of Sciences (NAS) has recommended what it calls a "stored weapons standard" for physical protection, with compliance to be monitored by an international organization. This means that all weapons-usable material — military or civilian — would be placed within highly secure vaults, with multiple layers of protection against insider or outsider theft, with continuous monitoring, and with substantial armed guard forces. As in US and Russian weapon security systems, no individual would be permitted to be alone with weapons-usable material, and individuals with access would be screened before they took protection jobs, as well as afterwards. The systems would guard against covert or forcible outsider threats as well as any insider threats.

The NAS Committee's recommended standard sets a high goal, and is a good one for international consideration.

As a first step, States should review again the IAEA's recommended protection standards and the less-demanding ones of the Physical Protection Convention. The review should focus on any changes suggested by the newly perceived dangers of illicit trafficking and nuclear terrorism. The process would of course require the formation of an expert committee and the cooperation of IAEA Member States to consider its recommendations, as well as those of the IAEA Secretariat.

States interested in taking leadership in this area could invite IAEA inspection or peer

peaceful purposes while in international transport. They recognized that the responsibility for physical protection rests with national governments but that the protection actually provided is "not a matter of indifference to other States." The purpose of the new standards was to "minimize the possibilities for unauthorized removal of nuclear material or for sabotage."

In 1993, the IAEA revised these recommendations somewhat to provide further guidance on such matters as irradiated fuel and nuclear material in waste (INFCIRC/225, Rev.3). In September 1997, the IAEA issued additional guidance on implementing the Convention.

During the 1980s, the Nuclear Suppliers' Group (a body outside the IAEA) began seeking provisions in nuclear export agreements calling for application of the IAEA-recommended physical protection standards in the States receiving exports, in some cases when the nuclear material protected was in domestic use.

Before the 1992 review conference of the Convention on Physical Protection, there were proposals for expanding the Convention's scope to apply to more nuclear material than just that in international transport. Its Parties decided not to amend it. At that time, the focus of many was on the inadequacy of NPT safeguards to detect State acquisition of nuclear weapons rather than on the inadequacy of the Physical Protection Convention standards to prevent terrorist acquisition. As a result, nothing was done to strengthen physical protection standards while the NPT safeguards were very significantly strengthened through the IAEA's "Programme 93+2".—*George Bunn.*

reviews of their own protection efforts. For States unwilling to accept physical protection inspections or peer reviews, the IAEA might develop forms on which States could report each year on their efforts for their significant nuclear facilities. The purpose would be both to raise national physical protection concerns in States with problems and to provide assurance to other States that protection in the problem States is improving.

Second, the G-8 should call upon its members to cooperate with this effort. Euratom is well represented among G-8 members, and it has physical protection experience that would be helpful to an effort to raise standards and persuade States to accept them. Japan has similar useful experience. As suggested above, Russia and the United States have much experience and more weapons-usable materials to protect than any other States.

Third, like the Nuclear Suppliers' Group, the Parties to the Physical Protection Convention should agree to adopt export controls requiring that all nuclear materials they export be subject to strengthened physical protection standards. The Physical Protection Convention now prohibits its Parties from exporting nuclear material unless they are assured by the recipient that the material will receive appropriate physical protection during international transport. At the next review conference of the Convention, the Parties could agree in their report that they would in the future require the recipient to continue this protection after international transport. Without even amending the Convention, they could accept a political undertaking to this effect that would be as binding as the guidelines of the Nuclear Suppliers' Group. They could also agree to accept new standards themselves on an experimental basis.

Fourth, the Parties to the Physical Protection Convention could agree in due course to expand the Convention's scope to cover all materials; to apply higher, more detailed physical protection standards; and to require inspections or reports on national physical protection efforts.

Amending the Convention to create a legal obligation for higher standards with broader application would require a two-thirds majority of the Parties, and the amendment's submission to parliaments as necessitated by national constitutions. Such an amendment might also require that international inspectors be permitted to check compliance with the new standards. Simply requiring that the Convention's existing standards apply to all nuclear material under the Parties' control (whether or not in international transport or dedicated to peaceful uses) might not be onerous as long as no inspection was required. But once that was required, the nuclear-weapon States might object to its application to their storage facilities. Is it possible for inspectors simply to check inspection requirements for fences, guards, sensors etc., *outside* a facility, without permitting inspection of weapons or weapon-usable material inside? The problem is that the level of protection required outside is dependent upon the kind and amount of material inside. To avoid inspecting weapons or the highest categories of weapons-usable materials inside, inspectors would have to accept the word of the inspected government that what was inside the fence, wall or building was in a particular category.

A better idea would be for the weapon-States to agree to peer-review inspection teams made up of experts from other weapon-States. Better still would be to combine IAEA inspection with some form of managed access, such as that used in several arms-control treaties, so that significant weapons information is not revealed. Since the purpose, from the IAEA's point of view, would be to prevent the material from being used for a non-peaceful purpose by terrorists or another State, compliance with the IAEA's statutory mandate could be possible.

GREATER COOPERATION

Given the possible dimensions of international threats emerging in the 1990s, greater global cooperation is needed to guard against them. The world needs to develop higher international standards to protect nuclear materials. These strengthened global norms should be internationally required for all weapons-usable material, and comparable to those now used by the nuclear powers to protect their own stored weapons.

Events have shown that each country has reasons to be concerned about how other countries protect their sensitive nuclear material from falling into wrong hands. ❐