



PROTECTING THE SOURCE



Securing nuclear material & strong radiation sources

New threats of terrorism are prompting the need for swift action to better secure nuclear material and strong radiation sources. Are measures already in place enough? The Stanford-Salzburg initiative suggests not.

by Fritz Steinhausler & George Bunn

At a time of growing concern over threats of terrorism, the security of nuclear and radioactive material is an urgent and serious issue. Working with a range of partners, the IAEA has put into place a multi-faceted Action Plan to help countries upgrade their capabilities. But more needs to be done to counter new types of threats. One particular area that needs to be strengthened is the physical protection of nuclear and radioactive material.

The attacks of 11 September 2001 opened our eyes to the urgent need to strengthen national physical protection (PP) practices for nuclear and other radioactive material. The principle that highly radioactive material will protect itself does not apply to

the newest generation of terrorists. Existing PP systems were not designed to deal with the threat of suicidal terrorists commanding the numbers, skills, training, and resources available to those who carried out the attacks in the US. Moreover, because there are no mandatory international standards for domestic PP systems for nuclear or radioactive material, protection measures vary greatly from country to country. The IAEA recommended standards (INFCIRC/225/Rev. 4) were not designed with the new terrorist threats in mind and national practices often fall short of even these recommendations. The result is inadequate protection against the new form of terrorism. Few argue the point that national physical protection practices for nuclear and other radioactive material need to be strengthened.

This article summarizes a Stanford-Salzburg plan developed by experts from Stanford University's Center for International Security and Cooperation, (USA) and revised at the EU-Physical Protection NUMAT Conference in September 2002 in Salzburg, Austria. It includes six recommended elements to consider in addition to what the IAEA is now doing to improve PP practices around the world:

- Establish a global list of physical protection priorities;
- Create a multilateral security cooperation system;
- Create an international Nuclear Threat Protection Task Force;
- Establish an International Radioactive Material Tracking Centre;
- Develop a Nuclear Security Bonus System;
- Establish a Global Partnership Co-operation Committee between the IAEA and the G8 States (Japan, France, Germany, Italy, UK, United States, Russia and Canada).

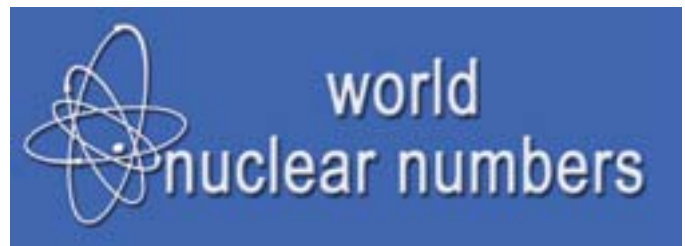
Each of these elements is discussed below.

Why Change?

Ideally, physical protection would be based on a “cradle-to-grave” oversight for all nuclear material and for strong radiation sources that are not classed by the Agency as “nuclear material”. Presently, the amount of both kinds of material around the world in the civilian sector is enormous (*see box: World Nuclear Numbers*).

On 21 September 2001, the Agency's General Conference called for a review of the IAEA's programs to see what could be done in light of the September terrorist attacks. Among the key issues were measures to enhance PP of nuclear and other radioactive material and the facilities that house them. On 14 November 2001, a report by the Director General summarized the Agency work then in progress to deal with terrorist attacks, which included:

- Seeking consensus on amendments to the Convention on Physical Protection of Nuclear Material (CPPNM) to make it applicable within States, not just to transport between states;
- Establishing norms and guidelines for the security of other radioactive materials;
- Providing assistance to States to improve practices for physical protection of nuclear material and facilities as well as other radioactive materials;
- Developing methodologies, technologies and guides for detection and response to illicit activities involving nuclear and other radioactive materials, and assisting States in the application of them.



- 438 nuclear power plants with, typically, several thousand fuel rods each
- About 650 research reactors with typically several tens of fuel elements each
- 250 nuclear fuel-cycle plants with an unknown amount of material
- More than 10,000 teletherapy sources with one Cobalt-60 capsule each; several hundred teletherapy sources with one Caesium-137 capsule each
- About 300 industrial irradiators with numerous rods each
- Several tens of thousands of industrial radiography sources (80% Iridium-192, remainder Cobalt-60, Selenium-75, Ytterbium-169)
- About 10,000 Iridium-92 industrial radiography sources added every year; Over 1,000 Cobalt-60 sources now in circulation
- About 1,000 sources of Selenium-75 and Ytterbium-169 supplied annually

Source: Stanford Center, USA

The IAEA Board has approved, in principle, this description of the Agency's work and goals for physical protection. While the Agency has received major budgetary contributions, much more remains to be done.

Months after the World Trade Center attacks, the Heads of Government of the G8 countries established a “Global Partnership” aimed at strengthening protection from terrorists equipped with nuclear and other radioactive materials as well as chemical and biological weapon materials. The resulting document outlined six principles. The first principle, which is particularly relevant to the IAEA's work, calls for “adoption, universalization, full implementation and, where necessary, strengthening of multilateral treaties and other international instruments” designed to protect nuclear and radiological materials as well as those for non-nuclear weapons of mass destruction. This principle also calls for the strengthening of the existing “institutions designed to implement” these treaties and “other international instruments.”

Principle 2 calls for measures to “secure” (as well as account for) nuclear and radiological as well as chemical and biological weapon materials.

Principle 3 calls for “effective physical protection measures...” In both cases, the leaders called for “assistance to States lacking sufficient resources to protect their facilities.”

Principles 4, 5 and 6 deal with border and export controls, cooperation in law enforcement efforts aimed at illicit trafficking, and disposal of excess stocks of fissile material.

Two years before the attacks, the Director General convened an expert group to consider an amendment of

the CPPNM. Current draft texts by CPPNM experts for such an amendment would make it applicable domestically as well as to sabotage and theft, but exclude any specific minimum technical standards — though such standards do exist for international transport. If strengthening is not possible in this respect, the treaty amendment should be put aside, in our view, with efforts turning to strengthen INFCIRC/225/Rev.4. An effort also should be made to adopt recommended standards for protection of strong radiation sources not covered by INFCIRC/225.

Global Physical Protection Initiative

While the G8 “Global Partnership” initiative outlined above takes a broad stroke at thwarting nuclear terrorism, the Stanford-Salzburg plan shores up this initiative with additional elements:

1. Establish a global list of physical protection priorities. The plan recommends taking stock of what has been accomplished and what more needs to be done. Since the first G8 principle deals with “multilateral treaties and other international instruments,” amending the CPPNM to provide specific standards for domestic physical protection should have a high priority. In addition to revising INFCIRC/225/Rev.4, the plan recommends the development of new INFCIRC standards for PP of radiological materials not classed as nuclear that have significant threat potential. Terrorist acquisition of such materials to make radiological dispersion weapons is much more likely than terrorist acquisition of fissile materials in order to make nuclear weapons. The present treaties and IAEA non-treaty publications provide guidance for safety and related measures applicable to other radioactive materials but give insufficient guidance for the physical protection of such materials from terrorists and thieves.

The G8 statement calls for financial assistance for improving PP, in the first instance, assistance for Russia. Through the IAEA’s International Physical Protection Assistance Programme (IPPAS), an initial list of priorities could be set for national improvements around the world. The list could be co-ordinated with the World Association of Nuclear Operators (WANO) and the Institute of Nuclear Plant Operators (INPO).

2. Create a Multilateral Security Cooperation System calling for regional or similar multilateral cooperation among those responsible for implementing PP standards. This could start with an effort to produce an accurate survey of national regulatory standards in particular regions, continuing the work of the Nuclear

Energy Agency of the Organization for Economic Cooperation and Development (OECD) publications. They contain short descriptions of physical protection regulations and legislation. Great variation from country to country seems to exist, perhaps in part because there are no required international standards for physical protection. Many countries are now unwilling to release information about their physical protection standards for security reasons. However, in a cooperative framework, those responsible for implementing these standards could discuss the strengths of particular PP practices against particular threats in a secure environment. This could lead to an agreement on common estimates of what the minimum threat to be guarded against should be in particular regions. Multilateral groups might also agree to “transparency” measures for sharing information among themselves on aspects of physical protection.

3. Establish an International Nuclear Threat Protection Task Force. International terrorists now operate globally, use high-tech communication, can be trained on how to attack nuclear facilities, seek to acquire nuclear weapons, and show interest in manufacturing radiological dispersion devices. This new global threat requires a global response, such as the formation of a Task Force. Its objective would be the improved co-operation between nuclear regulators, the intelligence communities, and the security forces. The joint tasks addressed could be:

- ✓ Analysing information on illicit trafficking of nuclear and other radioactive materials contained in various databases;
- ✓ Sharing intelligence information about impending terrorist attacks on nuclear facilities in a timely manner;
- ✓ Profiling known individuals at risk of engaging in criminal acts such as theft, sabotage or terrorism involving weapons-usable material and strong radioactive sources;
- ✓ Identifying links between nuclear terrorism and organised crime, in particular with regard to using existing drug and arms smuggling networks also used for trafficking in nuclear material and radiation sources;
- ✓ Surveying national research and industrial capabilities for hardware capable of detecting intruders and controlling access to PP sites.

4. International Radioactive Material Tracking Centre. On a global scale, the information on the location of weapon-usable nuclear material and the knowledge about the location of strong radiation sources varies considerably from country to country. This suggests that a loss of control over these materials can be associated with a considerable time delay between their criminal diversion and possible countermeasures to regain control.

The Stanford-Salzburg plan proposes creation of a centre to collect all relevant information on the location of such materials. This information would be provided automatically through a computerised nuclear material security system, allowing continuous supervision of the location of fissile and strong radiation sources. A system transponder (e.g., using a satellite-based positioning system), mounted on the material to be tracked, would provide real-time information on the current location of the material and issue a warning to the centre upon its unauthorised removal or tampering with the transponder. If required, the information on its location could be supplemented with coded data on ownership, user details, activity measurements, hazard class, or application of the material.

5. Nuclear Security Bonus System. In order to promote the upgrading of existing PP installations, a Nuclear Security Bonus System comprised of financial incentives, could be negotiated. The goal would be to establish that operator compliance with pre-determined PP minimum standards would reduce insurance premiums for a given facility. The system could be based on the services of IPPAS for assessing PP compliance and advising on PP upgrades, drawing on its international experience gained during the past IPPAS missions.

6. Establish an IAEA-G8 Global Partnership Cooperation Committee. Given the G8 Global Partnership Principles described earlier, an IAEA-G8 Co-operation Committee should seize the opportunity to increase funding for PP improvements by IAEA Member States that need assistance. This committee could be composed of experts on IAEA activities who would meet with G8 experts to make recommendations for actions at G8 Global Partnership meetings relating to PP. The G8 committed themselves to raise up to \$20 billion over the next 10 years to carry out their Global Partnership Initiative. This initiative should be open for support by other donors besides the G8, and assistance should be provided in the future to other States beyond Russia.

Conclusions

Since the events on September 11, the terrorist profiles, attack modes and inherent security features of nuclear and other radioactive material used in previous threat assessments are obsolete. They were based on the following pre-11 September assumptions that:

- Protection of sources was considered a domestic security issue and to be handled by concerned countries

with minimal guidance from international regulatory bodies;

- Attackers of a nuclear site would enter the facility, commit an act of sabotage, and attempt to leave the site alive;

- High radioactivity of some nuclear and other radioactive materials would serve the purpose of “self-protection” of the material, since anybody handling it would endanger his or her own life due to the potentially lethal dosage;

- Nuclear facilities should be designed to protect against uncontrolled radioactive releases due to operator error, equipment malfunction, violent storms, earthquakes, and accidental crashes of small military aircraft, but not suicidal attacks such as those the world has witnessed.

None of these basic assumptions are valid in the case of suicide commandos, using fully fuelled, large civilian aircraft as guided missiles in their attack against selected nuclear facilities or using strong radiation sources in building “dirty bombs.” The Agency’s actions since September 2001 show that the Secretariat understands these facts. In our view, additional measures should be enacted to build on steps already taken.

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