



Illicit Trafficking of Nuclear and other Radioactive Material The Legislative Response

Arms Control and Disarmament/National Implementation Measures Programmes

April 2012

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VERTIC provides this support through research and analysis, assistance and training, dissemination of information, and interaction with the governmental, diplomatic, technical, scientific and non-governmental communities.

VERTIC's work focuses on the development and application of monitoring, reporting, review, verification and compliance mechanisms, and on national implementation measures.

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Credits

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Current funders: Department of Foreign Affairs and International Trade Canada, Joseph Rowntree Charitable Trust, Norwegian Ministry of Foreign Affairs, Ploughshares Fund, Swedish Ministry of Foreign Affairs, UK Foreign & Commonwealth Office (Strategic Programme Fund), US Department of State (Federal Assistance Award)

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Printed in the United Kingdom by 3G Printing Limited

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1. Executive Summary

The illicit trafficking of nuclear or other radioactive material is considered by many to represent an emerging but nonetheless concrete threat to international peace and security. In 2007, an international conference convened by the International Atomic Energy Agency (IAEA) agreed that ‘terrorist groups have the intention of attempting to acquire and use nuclear or radioactive material for malicious acts.’¹ Moreover, the conference found ‘a strong sense that the possibility of an attempt is real.’ The consequences of a successful attempt could be catastrophic.

This report represents the outcome of research conducted by VERTIC into the international legal framework currently in place to address the illicit trafficking of nuclear and other radioactive material. This research has aimed to identify what activities are covered by existing prohibitions. In doing so, it intends to provide a clear overview of the current state of legal instruments underpinning the fight against illicit trafficking of these materials.

The definition of illicit trafficking used in this report is: *the wilful illegal movement of nuclear or other radioactive material across international borders*. In preparing this report, however, VERTIC recognised that illegal cross-border transportation takes place within a wider context.

Chapter 1 describes the nature and scale of the problem, including an examination of the materials themselves and possible trafficking scenarios. The chapter on International Norms analyses and assesses several key conventions and instruments relevant to the illicit trafficking of nuclear or other radioactive material. They are, in no particular order: the Convention on the Physical Protection of Nuclear Material (CPPNM) and its 2005 Amendment; the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT); the Beijing Convention; the SUA Protocol 2005 and the Protocol to the 2005 Protocol; and United Nations Security Council resolution 1540 (2004). The chapter addresses each of these conventions and instruments in turn, providing background, an analysis of key articles and overall assessment of each. There is also the non-legally binding IAEA Code of Conduct on the Safety and Security of Radioactive Sources and its Supplementary Guidance.

The National Implementation chapter stems from the recognition that states may need to harmonize the relevant legal and administrative provisions dealing with illicit trafficking in an accurate and comprehensive document. A major challenge facing legislators is that a considerable amount of overlap exists among the legal instruments examined in this report. Notwithstanding the fact that not all states have signed up to every convention listed, the National Implementation chapter of this report asks *how states can implement the various obligations identified in the International Norms chapter into their national legal frameworks*.

To date, no international surveys of national implementing legislation have been done and, reportedly, not many national studies have been undertaken either. A second question that this report logically

1 President’s Findings, International Conference on Illicit Nuclear Trafficking: Collective Experience and the Way Forward, Edinburgh, 19–22 November 2007.

points towards is, therefore, *to what extent are states already implementing national legislation in conformity with international norms?*

VERTIC has already completed template-based analyses (also known as legislation surveys) of 136 countries with regard to states' national laws and regulations to implement the Biological Weapons Convention (BWC). On the basis of this data, it has become considerably easier to identify which countries require new laws and regulations to implement the BWC, and this has in turn led to direct legislative assistance provision to over 30 countries in all regions of the world (with several draft laws currently under inter-ministerial review or being considered by national assemblies). A similar process might be considered useful for the illicit trafficking of nuclear and radioactive material.

An international survey would be able to provide an enhanced understanding of the state of legislation worldwide. If conducted thoroughly, it would check all relevant aspects of a country's legislation, including: penal and criminal procedure codes, laws on counter-terrorism and organised crime, laws to prevent weapons of mass destruction, customs codes, licensing laws, import/export and trade laws (including trade in strategic or dual-use goods legislation), money-laundering laws, laws on mutual criminal assistance and extradition, laws on the management and transport of hazardous or dangerous substances, aircraft and ship/airport and port security laws, rail security laws, laws on surveillance and intelligence gathering, and others.

Such an effort would not be a small undertaking, nor would the results be fast in materialising (although countries of particular concern could be addressed first), but it may well—given the possible consequences of stray nuclear and radioactive material—be worthwhile nonetheless.

VERTIC wishes to thank the UK Foreign and Commonwealth Office for their financial support for this report. We also wish to extend our gratitude to the UN Office on Drugs and Crime for their invaluable contributions to those parts of the report within their mandate. Finally, we wish to extend our gratitude to those individuals in international organizations, governments or non-governmental organizations who gave comments on earlier versions of this report.

2. The Scale and Nature of the Problem

The definition of illicit trafficking used in this report is *the wilful illegal movement of nuclear or other radioactive material across international borders*. This definition narrows the scope of analysis to the specific act of illegal cross-border transportation, and has been chosen to facilitate a more detailed legal analysis of this particular aspect of the problem. Nevertheless, in order to promote a clear understanding of the challenges posed by illicit trafficking, how to address them and what role international legal instruments play, this scene-setting chapter will also assess the wider context in which cross-border transportation takes place.

It is important to state, at the outset, that possessing and moving nuclear or other radioactive material across boundaries is not in itself illegal. Only if a registration and permission process—where required by law—has not been completed is it an illegal act. If the nuclear or other radioactive material is stolen in the first place it will probably not be possible to register it or make movements legal in any way.

The IAEA states that incidents of illicit trafficking of nuclear or radioactive material have regularly taken place every year since it began collecting information on this issue in 1993. There are indications that trafficking in these materials also occurred before this time. It is also plausible to assume that some illicit trafficking has occurred that has not been reported by any sources: either because it was never detected, or in cases where it was, because the authorities decided not to make this information public for various reasons.

Trafficking increases and widens illegal access to nuclear and other radioactive material. Groups or individuals who are considering using nuclear or other radioactive material for criminal purposes may be able to acquire these substances domestically. If they are not able to do so however, or if they want to clandestinely transport such material to a third country, they may attempt to illegally traffic the material.

A key question addressed in this report is, therefore, how best can trafficking of these materials be controlled, in terms of prevention, detection and response? In essence, we believe that this can be done most effectively by coordination at the national and international level.

In the case of nuclear material, it is clear that some emphasis must be placed on prevention. This is because the detection of (possibly deliberately-shielded) nuclear material at national borders, while effective for most materials seems at present to remain problematic in a few special cases.

In the case of radioactive, non-nuclear, material the later consequences of terrorist use may be regarded as much smaller in impact. Nevertheless, the fact that many radioactive sources are available in many countries suggests that less than perfect detection is still worthwhile in terms of threat reduction. Providing a current framework for effective prevention, detection and response at the international and national level are the several international instruments examined in this report. By gaining a coherent understanding of what these instruments specify on illicit trafficking and how the instruments interact or are inter-related, this report simultaneously identifies areas that may be missing or that are necessary to ensure a coherent, measured and comprehensive approach. This legal analysis will also enable states to assess more easily whether they are implementing the obligations fully and thereby taking full advantage of the prescriptions and enabling a wholesale approach.

This report focuses on the threat of harm posed by trafficking in nuclear and other radioactive material to people, the environment, property, society and the economy. Open-source data indicates that intentional trafficking of these types of materials for malicious purposes forms only a small proportion of the total number of interception events. Though open-source records that are currently available suffer from problems of incompleteness, inconsistency and inaccuracy, the data indicates that at least some intentional trafficking for malicious purposes does occur. Any increase in access to nuclear and other radioactive material by unauthorized people presents a significant risk and threat to global security.

2.1 Understanding the materials

Understanding how and why illicit trafficking of nuclear or other radioactive material takes place—and what prevention, detection and response measures are appropriate—requires knowing what their properties are, what they are used for, where they are used, by whom and in what forms and quantities.

2.1.1 Nuclear material

The term ‘nuclear material’ is typically used to refer to fissile materials that can be used in nuclear explosive devices—particularly plutonium and highly-enriched uranium.²

These materials, once produced and processed into the appropriate form, are put to various uses. They are the essential ingredient in nuclear power plants as well as nuclear weapons. They are used as the primary power source for certain maritime vessels such as submarines, aircraft carriers and ice-breakers. These materials are also the chief source from which other man-made radioactive materials are produced—either through dedicated production processes or as a by-product of nuclear power generation.

Uranium is a naturally-occurring element. It is typically extracted through mining of its ore.³ To transform mined uranium ore into a form that is usable in power plants, it must be milled, and ‘converted’—a chemical process involving dissolution and re-crystallisation into a new and usable chemical form. In its converted state, the material can be used directly as a feedstock to produce metal or oxide-based fuel elements—nuclear fuel for certain types of reactors. However, it can also be ‘enriched’ in the fissile isotope uranium-235 (these days usually by centrifugation of gaseous uranium hexafluoride) so that it can be used as stainless-steel clad, oxide pellet fuel, in light-water reactors, which are now the most common type of power plant reactor.

Plutonium is essentially a man-made element. Although it would have existed at the time the Earth was formed, because the half-life of plutonium isotopes are all short compared with the age of the Earth, all that ‘natural’ plutonium has now decayed away. Plutonium is created in uranium nuclear fuel during reactor operation, essentially by uranium atoms absorbing some of the neutrons that are travelling around the core. This results in the plutonium being intimately mixed in the fuel on an atomic scale. It is produced in small amounts in the matrix of nuclear reactor fuel as it burns up and resides in spent fuel, until and unless it is subsequently chemically separated in a reprocessing plant.

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2 The 1980 Convention on the Physical Protection of Nuclear Material (CPPNM), which entered into force in 1987, defines nuclear material as ‘plutonium except that with isotopic concentration exceeding 80% in plutonium-238; uranium-233; uranium enriched in the isotope 235 or 233; uranium containing the mixture of isotopes as occurring in nature other than in the form of ore or ore-residue; any material containing one or more of the foregoing.’

3 And, in some cases, extracted from sea water.

2.1.2 Other radioactive material

All nuclear material is radioactive, but the reverse is not true. That is to say: by no means is all radioactive material also 'nuclear' material. 'Other radioactive material' may include a wide range of materials including the strong gamma-ray emitters cobalt-60 and caesium-137 and beta-emitters such as strontium-90, which is a long-lived fission product of reactor operation.

Radioactive material is commonly used in several sectors, and particularly in the industrial and medical fields. Industrially, they have applications in manufacturing, construction, chemical, mineral or materials processing, coastal engineering, non-destructive examination, oil refining, coal fired boilers, drilling, agriculture, and hydrology.

They are typically used, in the form of sealed sources, for measurement of physical properties or chemical processes, for example, in civil engineering in flow gauges and to test soil moisture, material thickness and integrity for construction, in well logging for oil exploration, and in the airline industry in fuel gauges and to check welds and structural integrity. They can be found in portable devices or in industrial fixed gauges (used for process control) for measurement of flow and volume (as diagnostics), in smoke detectors, and to make electricity or heat, as in radioisotope thermo-electric generators—devices used to generate power in remote areas ranging from lighthouses to outer space—and as power sources for applications requiring small amounts of energy such as remote weather stations and navigation beacons.⁴

Medical uses of radioactive material are varied, from the use of sealed sources to irradiate cancers to the use of unsealed sources (i.e. radioactive solutions) injected into the human body for scanning and imaging purposes. Some sealed sources are also implanted in the body. Most are quite small, ranging from tiny brachytherapy needles or seeds that are implanted for localized cancer treatment, but there are also larger internal devices such as heart pacemakers.

In its industrial use, sources are also rather small, as small even as disks or pucks on the few-millimetre diameter scale, sealed inside welded capsules for industrial gauges. Even the larger sources are not very large; for example, the radioactive component of a radioisotope-thermal generator (RTG) can range from the size of a roll of duct tape to the size of a small wastebasket. However, the outer housing can more than double the overall size. Most sources are encapsulated or sealed in housings of stainless steel, titanium, platinum, or other metal, and gamma emitters are stored and transported in a dense shielding container (such as lead) to attenuate external gamma irradiation—essentially as a personnel protection measure.

Virtually all radioactive materials are illegal to handle or keep without authorization. In the UK this issue is under the oversight of the UK Environment Agency, Health and Safety Executive, the Nuclear Regulator and others. The Ionising Radiations Regulations (IRR99), which addresses the health and safety aspects of facilities and equipment involving ionising radiation, and the Radioactive Substances Act (RSA93), which governs the possession and handling of radioactive sources, are key documents in this context.

Whether a substance could be used to cause harm depends on the material's specific properties: its level and type of radioactivity, its portability, its physical form, how it is contained and its biological mobility. These factors limit the type and numbers of materials likely to be useful to a malicious user to a particular sub-set of radioactive material.⁵

4 EPA, 'Common Industrial Devices and Other Uses of Radioactive Sources'.

5 Naturally occurring radioactive elements are ubiquitous but generally have very low levels of radiation emissions.

2.1.3 Sources, production process and life-cycle

As stated above, the majority of radioactive material used in industry or any other sector is sourced from nuclear reactor processes. Some materials are made in small reactors with dedicated programmes for their production. Others can be removed from the waste-stream of nuclear power plants.

Processing material into the form where it can be certified as a sealed source essentially involves manufacture within a special laboratory or industrial facility, encapsulating the material inside a welded metal container and then leak-testing it to a defined standard of containment.

2.1.4 Amounts of nuclear and other radioactive material in existence

Nuclear material

In 2010, the global inventory of highly enriched uranium (HEU) was estimated to be approximately 1,475 tons, whereas the global stockpile of separated plutonium (for both military and civilian purposes) stood at an estimated 485 tons.⁶ The global uranium stockpile refers to that used in and available for weapons, for fuel used in naval, power and research reactors, and as material in reserve, whereas the global plutonium figures represent largely production from civilian reprocessing programmes. In both cases, Russia and the USA are dominant holders of both the uranium and plutonium stocks. The overwhelming majority of fissile material stockpiles are primarily located in nuclear-weapon states in Europe (including Russia) and North America.

Other radioactive material

The IAEA has said that millions of sources have been distributed worldwide over the past 50 years, with hundreds of thousands currently being used, stored and produced. Many of these sources are weakly radioactive, and pose little radiological risk.

Worldwide, the IAEA has tabulated more than 20,000 operators of significant radioactive sources: more than 10,000 radiotherapy units for medical care are in use; about 12,000 industrial sources for radiography are supplied annually; and about 300 irradiator facilities containing radioactive sources for industrial applications are in operation.⁷

The IAEA points out that while radioactive sources number in the millions, only a small percentage have enough strength or radio-toxicity to cause serious radiological harm. It is these powerful sources that need to be focused on as a priority. That may be problematic as in many countries inventories are not well known as regulatory control of radioactive sources is weak.

Around the world, radioactive sources have been widely used for decades to benefit humankind—to diagnose and treat illnesses, to monitor oil wells and water aquifers, to irradiate food to eliminate microbes, and for many other uses. The IAEA has identified radioactive sources used in industrial radiography, radiotherapy, industrial irradiators and thermo-electric generators as those that are the most significant from a safety and security standpoint because they contain large amounts of radioactive material—such as cobalt-60, strontium-90, caesium-137, and iridium-192.⁸

6 These figures are derived from the 2010 Global Fissile Material Report, produced by the International Panel on Fissile Materials: http://www.fissilematerials.org/ipfm/site_down/gfmr10.pdf.

7 IAEA Press Release, 'Inadequate Control of World's Resources', 24 June 2002.

8 Ibid.

2.1.5 Why is nuclear and other radioactive material at risk?

The main reasons for why nuclear and other radioactive material is at risk relate to their desirability by a malicious organisation. Such a group could attempt to make a nuclear explosive device, and other radioactive material can also be used to threaten civilian populations with various devices that will spread radioactive contamination or otherwise expose civilians to radiation doses that can cause death or disability.

Trafficking, at least in the case of radioactive, non-nuclear material is made possible by their ready availability. There are also weaknesses in accountancy of radioactive sources and weaknesses in the chain of regulation and control in countries of origin, transportation routes, transshipment hubs, and countries of receipt. The almost complete unavailability of weapons-usable nuclear material is the most important factor preventing non-state actors from taking advantage of the singularly powerful threat of obtaining a nuclear device.

Though much can be said about regulation and control weaknesses in the initial stages of acquiring radioactive material, whether by design or accident, this is not the focus of this report. Instead, this report focuses on the process of trafficking itself.

2.2 Types of traffickers and trafficking scenarios

The IAEA's Illicit Trafficking Database, in its fact sheet summary, takes note of the nature of such offences:

Many trafficking incidents could be characterized as 'amateur' in nature, as demonstrated by ad-hoc planning and a lack of resources and technical proficiency. However, there are a few significant cases that appear more organized, better resourced and that involved perpetrators with a track record in trafficking nuclear/radio-logical material.

To facilitate a systematic analysis of the problem, it may be useful to attempt to categorize the types of traffickers and scenarios as follows:

Types of Traffickers

1. Traffickers with a malicious end-purpose, who are also the 'end-user' of the material;
2. Dedicated or organized groups, who will seek to obtain such material illegally, are attracted by the value of selling on such material and are indiscriminate about who they sell it to;
3. Opportunistic or semi-organized groups, who may be trafficking a variety of goods, and who are attracted by the value of trafficking such material in return for payment;
4. 'Mules' who are unaware they are being used to traffic such material;

Types of Scenarios

5. Smuggling, with no malicious end-purpose, for commercial uses abroad, where the trafficker knows the material is radioactive and potentially dangerous;
6. Smuggling, with no malicious end-purpose, for commercial uses abroad, where the trafficker does not know the material is radioactive and potentially dangerous;
7. Accidental trafficking where agents are unaware that they are carrying nuclear or other radioactive material;
8. Criminals who will steal anything that they think they can sell abroad, but who do not realise that the object they have stolen or are smuggling contains nuclear or other radioactive material.

Regarding types (2) and (3), both dedicated and opportunistic traffickers may or may not have customers lined-up before acquiring and transporting the material in question. If they do not have a customer lined up, their intention may be to identify buyers later.

Regarding type (5), though the transporting agents themselves may not have any intention or capacity to use the material for harmful purposes or financial gain, this scenario is nevertheless important since it shows that the material is not under regulatory control in the country of origin and may remain outside appropriate controls in the country of receipt.

Two other types of agent are of peripheral relevance: those who are carrying out ‘scams’ in which they purport to transport radioactive material; and those who have the intention of trafficking radioactive material, and believe that they are doing so, but are in fact not transporting such material—either because they have wrongly identified a non-radioactive material (or more likely a container), or because they themselves were scammed.

The groups listed above could conceivably comprise several types of agents including those who are commissioning, financing and brokering the act to those involved in the physical transportation of the materials. Though in some cases, these may be one and the same.

2.3 Why nuclear or other radioactive material might be targeted by traffickers

The attractiveness of a particular type of material to a trafficker depends on the material’s specific properties and consequent value and also on the specific knowledge, expertise, resources and motivations of the trafficker. If the traffickers are the end-users, the material’s value would lie in how effective the material is likely to be in furthering their aims.

The ability to complete the process of trafficking, and subsequent handling of the nuclear or radioactive material, with one’s personal safety entirely intact may be of secondary or no concern to some or the entire group of perpetrators, so long as the mission can be completed. Terrorist attacks over the last two decades have highlighted that risk evaluation must examine a range of threat scenarios including those in which actors’ personal safety is not only not a constraint on attack planning, but also a variable that is willingly compromised. This means that trafficking activities methods may include a wide range of activities, from those aimed at fully retaining personal safety to those which do not prioritise this aspect.

This factor could also increase the numbers of actors who could carry out this task, as it lowers the threshold of required expertise or specialised knowledge for trafficking agents to handle the nuclear or radioactive material safely. Former IAEA Director General Mohammed El Baradei referred to this changing approach to risk-aversion when he said in 2002: ‘The danger of handling powerful radioactive sources can no longer be seen as an effective deterrent, which dramatically changes previous assumptions’⁹.

For traffickers who are not the end-users and intend to sell material on, the material’s value may be entirely, or in part, financial. The financial value might increase or decrease in relation to supply and demand where the supply-side might include factors such as the abundance of the material, the ease of acquisition, ease of successful non-detected transportation/risk and consequences of detection, and the prevalence of agents willing and able to carry out the act. Demand might be influenced by how much the customer wants a specific type of material and how quickly it is required.

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9 IAEA Press Release, ‘Inadequate Control of World’s Resources’, 24 June 2002.

2.3.1 Accidental cross-border movements of radioactive material

There are numerous examples of radioactive material in the form of glazed ceramics, electrical items, densely-packed tobacco etc., which set off gamma detectors. These are known as Naturally Occurring Radioactive Materials or NORMs. Also, occasionally a source is inadvertently carried across a border in cargo, most commonly in obsolete equipment or scrap which contains a genuine radioactive source—but one that has not been properly recorded and tracked.

2.3.2 IAEA rankings

The International Atomic Energy Agency has developed a ranking of radioactive sources according to their relative potential to cause immediate harmful health effects if not safely managed or securely protected. Individual sealed sources are ranked from highest potential (Category 1) to lowest potential (Category 5).

- **Category 1**

These sources could lead to the death or permanent injury of individuals who are in close proximity to the source for a short period of time (minutes to hours).

Examples are: radioisotope thermoelectric generators, irradiators, teletherapy machines, and fixed multi-beam teletherapy machines.

- **Category 2**

These sources could lead to the death or permanent injury of individuals who are in close proximity to the source for a longer period of time than for Category 1 sources.

Examples: industrial gamma radiography equipment and high/medium dose-rate brachytherapy.

- **Category 3**

These sources could lead to the permanent injury of individuals who are in close proximity to the source for a longer period of time than Category 2 sources. Sources in Category 3 could, but are unlikely to, lead to fatalities.

Examples: fixed industrial gauges (level gauges, dredger gauges, conveyor gauges, and spinning pipe gauges) and well logging gauges.

- **Category 4**

These sources could lead to the temporary injury of individuals who may be in close proximity to the source for a longer period of time than Category 3 sources. Permanent injuries are unlikely.

Examples: low dose-rate brachytherapy sources, thickness gauges, portable gauges, and bone densitometers.

- **Category 5**

These sources could, but are unlikely to, cause minor temporary injury of individuals.

Examples: X-ray fluorescence devices, static eliminators, and electron capture devices.

2.4 Trafficking feasibility

The feasibility of intentionally trafficking nuclear or other radioactive material across borders will depend first and foremost on the material's availability.

The feasibility and likelihood of trafficking nuclear and radioactive material will depend mostly on the desires, intentions and situation of the actors involved, as well as on the substance's particular properties,

the amount available or intended to be carried, detection and enforcement measures, and the resources and knowledge base available to the trafficker. It will also depend on whether the trafficker wants to carry the risk themselves or pass it on to a mule.

2.4.1 Nuclear material

Although no official figures have been released, open literature suggests that some kilogrammes of plutonium and some tens of kilogrammes of highly-enriched uranium are sufficient to make a nuclear weapon. Since these materials are heavy metals, the weight could be concentrated in relatively small volumes, which means that concealment from visual inspection of amounts necessary for a single nuclear device would not be a major challenge.

If plutonium were the material in question, direct exposure to unshielded nuclear material would result in a significant radiation dose to its handlers. In the case of HEU, the dose effect would be much lower. However, as noted above, such radiation side effects might be of low consideration for the organisation involved. It is also quite possible that the individual detailed to handle the materials may not have been informed about its properties and hazards.

Provided that these materials are in sealed containers, therefore, transporting these materials with no immediately-incapacitating health effects on the carrier is relatively straightforward. If the precaution of sealed containers is not taken, contamination with uranium would be a serious health risk. Contamination with plutonium (possibly the most toxic material on earth) would be rapidly fatal. It should be noted, however, that nuclear material is normally under high levels of protection and, relatively speaking, unavailable.

2.4.2 Other radioactive material

Certain materials that fall under this category are far more radioactive than uranium or plutonium. They have such penetrating gamma or neutron radiation emissions that exposure to a large source containing these substances would quickly lead to health effects. Cobalt-60 is an example of such an intensely-penetrating gamma ray emitter.

Sealed sources tend to be very small indeed, and weigh just a few grams—including the primary containment, which is often a welded stainless steel capsule. However, sources of any significant strength (that is, of large radiation dose rate) will come in a secondary containment, often of lead, which may weigh from a kilogram to fractions of a tonne (the latter requiring specialised means of movement and transport).

2.5 Level of Trafficking

The previous sections have examined the foreseeable range of actors, materials and transportation actions that could be involved in trafficking incidents. To inform any assessment of the threat posed by potential incidents of illicit trafficking, it is instructive to survey how often such incidents have taken place historically as well as the kind of materials and agents were involved in these incidents. This data could assist decision-makers in prioritising efforts in areas that appear to be particularly weak or risky.

It is not known to what extent state actors have been or may in the future be, involved in illicit trafficking of nuclear or radioactive material. The ITDB reports that the majority of thefts and losses reported to it involve radioactive material associated with industrial or medical applications. In fact, a startling majority of industrial sources that are reported stolen or lost are typically used in 'non-destructive testing and

for applications in construction and mining. The majority of such devices use relatively long-lived isotopes such as iridium-192, caesium-137 and americium-241.¹⁰

Other incidents of misfortune stem from the simple fact that certain sealed sources or containers may not display adequately-labelled radiation warnings. These containers might appear to be made of valuable metals and in some cases may as a result appear attractive to scavengers in the scrap metal trade. The IAEA has noted cases where unsuspecting members of the public have tampered with sources, leading to serious injury and in some cases death.¹¹

2.5.1 Trafficking in Radioactive Sources

More than 70 states have joined with the IAEA to collect and share information on trafficking incidents and other unauthorized movements of radioactive sources and other radioactive material. The ITDB includes confirmed incidents involving radioactive material other than nuclear material. In most of these cases, the radioactive material was in the form of sealed radioactive sources, but some incidents with unsealed radioactive samples or radioactively-contaminated materials such as contaminated scrap metal also have been reported to the database and are included in the statistics. According to the IAEA not all these incidents reflect deliberate attempts to steal radioactive sources. The great majority of detected trafficking incidents appear to involve opportunists or unsophisticated criminals, motivated by the hope of profit. In some cases, the theft of sources was incidental to the theft of vehicles, and in other cases, the thieves may have been interested in an item's resale value as an expensive instrument or as scrap metal. Nevertheless, it is apparent that an important fraction of cases involved persons who expected to find buyers interested in the radioactive contents of stolen sources and their ability to cause or threaten harm. Customs officials, border guards, and police forces have detected numerous attempts to smuggle and illegally sell stolen sources.

2.5.2 Technical Detection Methods

Radioactive sources can be detected and their movement monitored. The effective detection range depends on the amount and type of radiation emitted by the source and also on the possible presence of shielding materials that may reduce the amount of radiation that reaches the detector.

According to the 2007 IAEA reference manual,¹² the four basic types of equipment in use for detecting illicit trafficking of radioactive material are:

1. Fixed Radiation Portal Monitors (RPMs);
2. Personal Radiation Detectors (PRDs);
3. Hand-held gamma and neutron search detectors (GSDs and NSDs); and
4. Hand-held radionuclide identification devices (RIDs).

There also exists specialised laboratory-fitted detection equipment, which is not directly relevant to the types of cross-border detection of nuclear smuggling that this report tackles.

.....
10 ITDB Fact Sheet.

11 IAEA Press Release, 'Inadequate Control of World's Resources', 24 June 2002.

12 'Chapter 10: Technical Detection Methods', *Combating Illicit Trafficking in Nuclear and other Radioactive Material – Reference Manual*, IAEA, IAEA Nuclear Security Series No.6 Technical Guidance (2007).

Although designed to detect illicit material, the equipment will also detect naturally occurring radioactive material. These legitimate movements of radiation-emitting materials include medical isotopes, fertiliser and even ceramics or cement.

Fixed Radiation Portal Monitors (RPMs)

RPMs are single or dual pillars or slabs, containing gamma radiation and neutron detectors. These are semi-permanent, pass-through type monitors installed at a variety of checkpoints (i.e. road and rail border crossings, airports, sea ports) for personnel, vehicles, packages and other cargo. RPMs are ideal for high sensitivity monitoring in situations where incoming traffic can be efficiently ‘funnelled’ into ‘choke points’.

RPMs are often supported by CCTV and sometimes by additional radiation detectors, especially hand-held equipment to localise and identify radionuclide sources. Monitoring distances for pedestrians and vehicles vary; notably, vehicle portal monitors often have an occupancy sensor.

When scanning material that is purposely concealed in vehicles, detectors to view all areas above and below vehicles are also more effective than truck-bed monitors, as they overcome the inherent ‘shielding’ in vehicle metal structures.

RPMs are only as effective as their ‘choke points’ or position of installation—all pedestrians, vehicles or cargo traffic must be forced to pass through them. RPMs should reach the widest range and have an unobstructed view of the defined search area.

A frontline system being trialled includes the collection of a gamma spectrum at fixed choke points. With inbuilt algorithms, appropriately-skilled operators or high-speed data transmission to government laboratories, this has the potential to accurately and expediently identify radioactive material.

Personal Radiation Detectors

PRDs are lightweight, compact devices worn by front line officers. Requiring minimal training, they provide simple displays and alarms (flashing light, tones, vibration, and/or digital numerical displays) that correspond to the radiation level. PRDs are useful for the personal radiation safety of the individual, and in patrolling large areas with few or no choke points.

Hand-held gamma and neutron search detectors

Gamma search detectors and neutron search detectors provide greater flexibility and discrimination than either radiation portal monitors or personal radiation monitors. Their purpose is either as the primary detection device, or to complement radiation portal monitors in verifying and localising gamma neutron sources. Because hand-held detectors continuously make short measurements of radiation levels, correct hand-held management can influence its findings; training is thus hugely important. The equipment must also be calibrated periodically using calibration sources.

Hand-held radionuclide identification devices

RIDs have multiple functions: to search and localise radioactive sources; to make gamma dose rate measurements for radiation safety; and to indicate neutron dose rate. RIDs might be used as primary detection devices or as secondary detection for verifying alarms obtained with radiation portal detectors.

RIDs are often not designed to detect neutron sources, and must be supplemented by special high sensitivity hand-held neutron monitor devices, or long period timer/counter modes. Notably, newer

versions of RIDs are required to have computer linkages for remote transmission of detection data to expert teams. There are a number of RIDs on the market but they remain an unreliable method of identifying radionuclides as their algorithms often get confused by shielding. These can also have trouble differentiating between sources that have similar signatures.

2.5.3 Limitations of detection systems

The threshold criteria for front-line portal detectors to register an alarm, either for gamma emissions or neutron emissions or both, varies. It appears that there is no international standard to guide or recommend a suitable alarm threshold level. Most systems that have been installed have been built to and installed against exacting national requirements. There is not an international standard because to date these national security systems have been designed according to a given country's perception of the threat they face, or because they have been supplied/donated by other countries and the host country uses the donor's expert guidance on suitability.

2.5.4 Actors and instruments

Many countries are known to have urgent needs with respect to the control of radioactive material. The IAEA has taken the leading role in the United Nations system in establishing standards of safety, the most significant of which are the 'Basic Safety Standards for Protection Against Ionizing Radiation and for the Safety of Radiation Sources' and the more recent 'Code of Conduct on the Safety and Security of Radioactive Sources'. These guidelines promote consistent international approaches to radiation protection, safety and security.

Through its programme to help countries improve their national infrastructures for radiation safety and security, the IAEA has found that more than 100 countries may not have the minimum infrastructure in place to properly control radiation sources. However, many IAEA member states are making progress through an IAEA project to strengthen their capabilities to control and regulate radioactive sources. The IAEA is also concerned about non-IAEA member states, as these do not benefit from IAEA assistance and are likely to have no regulatory infrastructure.

2.6 Discussion

Data on the detection and response to incidents of illicit trafficking of the type addressed in this report exists, in various databases, and is very much the business of the IAEA internationally. The data is unfortunately incomplete in some respects, and of course includes only those instances where an event was detected or in some other way intercepted. Accessibility of the databases themselves is limited, often with only derivative data, such as general trends, being released into the public sphere for general access.

Thankfully, the scale of illicit trafficking of nuclear materials appears to be very small indeed, with only amounts very much less than that required for the construction of a nuclear device being detected and/or intercepted. For its part, the scale of illicit trafficking in other radioactive material is larger.

Although efforts to illegally procure and illicitly move nuclear material for malicious uses is likely to continue, national and international efforts to prevent this are—if one judges by press coverage and official statements—increasing. The combination of national nuclear materials accountancy systems and IAEA (and to some extent EURATOM) safeguards are both key factors in preventing access by unauthorised persons to this highly valuable and highly attractive material.

3. International Norms on Illicit Trafficking

As seen in the previous chapter, the overall challenge of securing nuclear and other radioactive material is huge. The main focus has traditionally been to formulate rules regarding the physical protection of nuclear material, largely ignoring other radioactive material.

At present, the international legal regime governing the illicit trafficking of nuclear or other radioactive material is contained in several instruments. This paper will examine those most relevant for the illicit possession and transfer of fissile or other radiological material. Other instruments that have some relevance for the broader problem of the illegal possession of nuclear or other radioactive material are examined in Annex I of this report.

The IAEA's comprehensive nuclear security approach is a good starting point for examination. This approach essentially builds on three components¹³:

1. *The prevention of the unlawful acquisition of fissile or other radioactive material.* This component emphasises the role of nuclear security; if the materials are secure, criminal or terrorist groups will not have access to them.
2. *The detection of the unlawful acquisition of fissile or other radioactive material.* If a theft or diversion is not detected, it is not possible to coordinate a response, or to recover and return the lost material.
3. *The response to the unlawful acquisition of fissile or other radioactive material.* This component emphasizes the recovery and return of the material through information-sharing and coordinated law enforcement.

This report will only partly be based on the comprehensive approach. The prevention of the unlawful acquisition of nuclear or other radioactive material is critically important, and many of the international instruments addressed below and in the appendices aim to counter just that. Putting materials under strict physical security is key, and so is preventing unauthorized access to them. After all, trafficking of materials will not occur if the traffickers cannot get access to them in the first place. However, physical security is not the main focus of this report.

Likewise, the detection of any loss of control is important. Early detection helps ensure that law enforcement and border control agencies are aware that material is missing and potentially destined for cross-border movement (if such movement has not already occurred). Early detection is likely to significantly increase the likelihood of successful interdiction—possibly before any material reaches an international border.

It is, however, not practical to strive to produce a comprehensive report covering all aspects of illicit trafficking, from production and control of the material, to its unlawful acquisition and movement, and to its ultimate use. This report, and the corresponding implementation framework, will instead focus on the act of moving the material itself. It focuses on the legislative framework needed to lock loose material inside the territory of sovereign states, and on the legal authority to interdict instances of illegal cross-

13 Anita Nilsson, *Combating Illicit Trafficking: Global Perspective*, Presentation to the AAAS Annual Meeting, Boston, USA, 14–18 February 2008, available at www.cstsp.aaas.org/files/nilsson.pdf.

border movement and to prosecute and punish those involved in the trade. This chapter therefore largely focuses on the third component of the IAEA's comprehensive approach. Each instrument will first be described and briefly assessed, with their prohibitions then unpacked and examined.

3.1 Analytical framework

3.1.1 Actors

A number of different types of actor can be involved in an international trafficking offence. Someone, however, will need to supply the material in the first place. In this report, we call this someone the supplier. It is immaterial, for the trafficking offence, how this person has acquired the material. It could be through theft or robbery, or it could be through the violation of a lawfully-held permit. This person may hold the material for some time before handing it over to a transporter. The transporter could be the same person as the supplier. It could be an amateur or a professional smuggler, or even a lawfully registered shipper. In some cases, the transporter may not even be aware of actually transporting material. It could be planted, for instance. The transporter will then carry the material over an international border, after which it will be handed over to a customer (a receiver). This customer will then, perhaps, transfer the material to the end-user. In some cases, the receiver and the end user may be the same person. And, in fact, it is possible for one individual to act in all roles.

List of potential roles

- i. Supplier
- ii. Transporter
- iii. Customer
- iv. User

In those cases, one individual will have committed multiple offences. If all acts are criminalized, the offender will then be sentenced for more than one offence at the same time. The offences are considered to be linked.

3.1.2 Actions

As will be examined in the subsequent chapter, each actor will conduct specific actions when handling nuclear and radioactive material. The person may possess such materials by carrying it on his person, in his luggage, or keeping the material in a holding area, such as a warehouse, office or residence.

List of potential actions and definitions

The list below gathers the terms used by the instruments examined in this chapter to denote actions. Definitions for these terms have, where possible, been drawn from the instruments themselves. For terms that are not defined in any of the instruments, definitions have instead been drawn from *the IAEA Handbook on Nuclear Law: Implementing Legislation*. If definitions could not be found either in the instruments or in the *Handbook*, the Oxford Dictionary of English is used.

It should be noted that treaty terms are often context-dependent, and dictionary definitions might not have the same degree of precision and applicability in relation to the treaties examined in this chapter.

- **Access.** The means or opportunity to approach or enter a place.¹⁴
- **Alteration.** The action or process of changing in character or composition.¹⁵
- **Attempt.** An effort to achieve or complete a difficult task or action.¹⁶
- **Carrying.** To carry: Support and move (someone or something) from one place to another; transport, conduct or transmit.¹⁷
- **Demand.** An insistent and peremptory request.¹⁸
- **Directing [. . .] others.** To control the operations of, to manage or govern others.
- **Dispersal.** The action or process of distributing or spreading things or people over a wide area.¹⁹
- **Disposal.** The emplacement of radioactive sources in an appropriate facility without the intention of retrieval.²⁰
- **Export.** The physical transfer, originating from an exporting state, into an importing state or to a recipient in an importing state, of one or more radioactive source(s).²¹
- **Holding.** To hold: grasp, carry, or support with one's arms or hands.²²
- **Import.** The physical transfer, into an importing state or to a recipient in an importing state, originating from an exporting state, of one or more radioactive source(s).²³
- **Malicious (act/use).** Intending or intended to do harm.²⁴
- **Moving.** To move: change the place, position, or state of.²⁵
- **Organising [. . .] others.** To coordinate the activities of a person or group.²⁶
- **Participation (as an accomplice).** To be involved with another committing a crime; to help another commit a crime.²⁷
- **Possession:** Visible power or control over something, as distinct from lawful ownership.²⁸
- **Receipt.** The action of receiving something or the fact of its being received.²⁹
- **Sabotage.** An act directed against a nuclear facility or nuclear material in use, storage or transport which could directly or indirectly endanger the health and safety of personnel, the public or the environment by exposure to radiation or release of radioactive substances.³⁰

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14 Oxford Dictionary of English, 2nd ed. (2003).
 15 Oxford Dictionary of English, 2nd ed. (2003).
 16 Oxford Dictionary of English, 2nd ed. (2003).
 17 Oxford Dictionary of English, 2nd ed. (2003).
 18 Oxford Dictionary of English, 2nd ed. (2003).
 19 Oxford Dictionary of English, 2nd ed. (2003).
 20 P. 3, Code of Conduct on the Safety and Security of Radioactive Sources. P. 19 of the IAEA Handbook on Nuclear Law: Implementing Legislation (2010) defines it as 'the emplacement of spent fuel or radioactive waste in an appropriate facility without the intention of retrieval'.
 21 Article IV, Guidance on the Import and Export of Radioactive Sources. P. 19, Handbook on Nuclear Law: Implementing Legislation (2010) defines it as 'The physical transfer, originating from an exporting state, into an importing state, of nuclear or other radioactive material, including sources'.
 22 Oxford Dictionary of English, 2nd ed. (2003).
 23 Article IV, Guidance on the Import and Export of Radioactive Sources. P. 19, Handbook on Nuclear Law: Implementing Legislation (2010) defines it as 'The physical transfer, into an importing state or to a recipient in an importing state, originating from an exporting state, of nuclear or other radioactive material, including sources'.
 24 Oxford Dictionary of English, 2nd ed. (2003). IAEA Safety Glossary (2007 ed.) defines malicious as 'characterised by malice, the intention to do evil or to do harm; in law, the intention to commit a crime'.
 25 Oxford Dictionary of English, 2nd ed. (2003).
 26 Oxford American Dictionaries (2011).
 27 Oxford Dictionary of English, 2nd ed. (2003).
 28 Oxford Dictionary of English, 2nd ed. (2003).
 29 Oxford Dictionary of English, 2nd ed. (2003).
 30 Paragraph 3 (d) of the Amendment to the CPPNM.

- **Sending.** To send: arrange for the delivery of, especially by post.³¹
- **Terrorist acts.** ‘Criminal acts intended or calculated to provoke a state of terror in the general public, a group of persons or particular persons for political purposes’.³²
- **Threat.** A menace of bodily harm, such as may restrain a person’s freedom of action.³³
- **Theft.** An action or crime of stealing.³⁴
- **Transfer.** An act of moving something to another place, organization, team, etc.³⁵
- **Transport.** To initiate, arrange or exercise effective control, including decision-making authority, over the movement of a person or item.³⁶
- **Use.** Take, hold, or deploy (something) as a means of accomplishing or achieving something.³⁷

3.1.3 Materials

- **Nuclear material.** Plutonium except that with isotopic concentration exceeding 80 per cent in plutonium-238; uranium-233; uranium enriched in the isotope 235 or 233; uranium containing the mixture of isotopes as occurring in nature other than in the form of ore or ore-residue; any material containing one or more of the foregoing.³⁸
- **Enriched uranium.** Uranium enriched in the isotope 235 or 233 means uranium containing the isotope 235 or 233 or both in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is greater than the ratio of the isotope 235 to the isotope 238 occurring in nature.³⁹
- **Radioactive material.** Nuclear material and other radioactive substances that contain nuclides and which undergo spontaneous disintegration (a process accompanied by the emission of one or more types of ionizing radiation, such as alpha, beta, neutron particles and gamma rays) and which may, owing to their radiological or fissile properties, cause death, serious bodily injury or substantial damage to property or the environment.⁴⁰
- **Source material** means uranium containing the mixture of isotopes occurring in nature; uranium depleted in the isotope 235; thorium; any of the foregoing in the form of metal, alloy, chemical compound, or concentrate; any other material containing one or more of the foregoing in such concentration as the Board of Governors from time to time determine; and such other material as the Board of Governors shall from time to time determine.⁴¹
- **Special fissionable material** means plutonium-239; uranium-233; uranium enriched in the isotopes 235 or 233; any material containing one or more of the foregoing; and such other fissionable material

31 Oxford Dictionary of English, 2nd ed. (2003).

32 This is taken from UN General Assembly Resolution 49/60 (Measures to eliminate international terrorism), and thus is not a legal definition of terrorist acts. The ICSANT recalls the resolution in its preamble. See also UN Security Council resolution 1566.

33 Oxford Dictionary of English, 2nd ed. (2003).

34 Ibid

35 Ibid

36 Article II of the Protocol of 2005 to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation. P. 22, Handbook on Nuclear Law: Implementing Legislation (2010) defines it as ‘All operations and conditions associated with and involved in the movement of nuclear and other radioactive material. This includes the design, manufacture, maintenance and repair of packaging, and the preparation, consigning, loading, carriage including in-transit storage, unloading and receipt at the final destination of loads of such material and packages’.

37 Oxford Dictionary of English, 2nd ed. (2003).

38 CPPNM, Article 1(a).

39 Statute of the IAEA, Article XX, para. 2; CPPNM Article 1(b).

40 ICSANT, Article 1(1).

41 Statute of the IAEA, Article XX(3).

as the Board of Governors shall from time to time determine; but the term special fissionable material does not include source material.⁴²

3.1.4 Key Term

- **International nuclear transport.** The carriage of a consignment of nuclear material by any means of transportation intended to go beyond the territory of the state where the shipment originates, beginning with the departure from a facility of the shipper in that state and ending with the arrival at a facility of the receiver within the state of ultimate destination.

3.2 Legal Architecture

3.2.1 Convention on the Physical Protection of Nuclear Material (CPPNM)

The Convention on the Physical Protection of Nuclear Material (CPPNM) was adopted on 26 October 1979. It entered into force some ten years later, on 8 February 1987. To date, the convention has attracted 145 state parties. On 8 July 2005, an Amendment to the Convention was adopted. The amendment will enter into force when two thirds of the state parties to it have ratified it. As at 14 March 2012, 53 states parties had signed up to the amendment; the uptake has generally been slow.⁴³

The scope of the CPPNM, and its 2005 Amendment, is limited to peaceful nuclear activities; nuclear material of a military nature is not covered by the convention. In addition, the CPPNM covers exclusively nuclear material, which is defined in the convention to include weapons-grade plutonium, uranium (except depleted uranium, uranium ore or ore-residue). It does not cover other radioactive material (such as regulated or 'orphan' radioactive sources).⁴⁴

3.2.1.1 Background

The treaty was motivated by a desire to, in the words of the preamble, 'avert the potential dangers posed by the unlawful taking and use of nuclear material'.⁴⁵ The amended text goes further: the parties now desire, in addition, to avert, 'the potential dangers posed by illicit trafficking' as well as 'the sabotage of nuclear material and nuclear facilities'. The parties also note 'that physical protection against such acts has become a matter of increased national and international concern'.⁴⁶ This is a considerable strengthening of the preambular language.

The parties to the CPPNM sign up to the idea that 'offences relating to nuclear material are a matter of grave concern' and that therefore, 'there is an urgent need to adopt appropriate and effective measures to ensure the prevention, detection and punishment of such offences'.⁴⁷ The convention is therefore clearly intended to establish rules on the national level.⁴⁸ From that perspective, the parties to the amended CPPNM recognize 'that there are internationally formulated physical protection recommendations that are updated from time to time which can provide guidance on contemporary means of achieving effective

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42 Statute of the IAEA, Article XX(1).

43 See http://www.iaea.org/Publications/Documents/Conventions/cppnm_amend_status.pdf (accessed 14 March 2012).

44 CPPNM, Article 1.

45 CPPNM, preambular paragraph 3.

46 CPPNMF, preambular paragraph 7.

47 CPPNM, preambular paragraph 4.

48 This desire has remained in the CPPNMF, as the only material change in the preamble is a desire to 'further strengthen this cooperation, and to 'strengthen existing measures' (see CPPNMF, preambular paragraph 10).

levels of physical protection'.⁴⁹ What is referred to here is primarily *The Physical Protection of Nuclear Material and Nuclear Facilities* (INFCIRC/225 as revised).

The treaty covers nuclear material while it is in domestic use, storage and transport, as well as during international transport.⁵⁰ States parties are required to protect nuclear material at the levels in Annex I to the convention, when it is in international transport in the state's territory or going to or from its territory on a ship or aircraft under its jurisdiction.⁵¹ Article 4 of the CPPNM deals with the conditions of import and export of nuclear material. It also ensures that there are no loopholes in the levels of protection applied when nuclear material is shipped between states parties or states parties and non-states parties.

3.2.1.2 Key articles

The unamended CPPNM is not primarily intended to establish rules governing the safe storage and control of nuclear materials domestically. As noted above, the CPPNM physical protection provisions apply to nuclear material used for peaceful purposes while in international nuclear transport. It notes explicitly that, for the most part, 'nothing in this Convention shall be interpreted as affecting the sovereign rights of a state regarding the domestic use, storage and transport of such nuclear material'.⁵² The 2005 Amendment, however, is intended, amongst other things, to strengthen the physical protection regime on the national level while noting that the 'responsibility for the establishment, implementation and maintenance of a physical protection regime within a state party rests entirely with that state'.⁵³

Import and export of nuclear material

The CPPNM's export and import provisions do not explicitly address illicit trafficking. Properly implemented, however, they do tend to counter criminal cross-border movement.

Article 4.1. stipulates that, for exporting states:

Each State Party shall not export or authorize the export of nuclear material unless the State Party has received assurances that such material will be protected during the international nuclear transport at the levels described in Annex I.

This means that a CPPNM state party needs to review each planned export for physical security purposes. In practice, therefore, if a state were not to require export notifications, it would be physically unable to receive an assurance that the material will be adequately protected. It could only receive such assurance if it were aware of the export, and prior to it requested assurance from the transporter that the material is protected. We note, however, that this is not a requirement to set up a national authority to issue licenses. One should also observe that such an authority would significantly streamline any export and import control procedures.

States do need to think about an import control procedure as well. Article 4.2. stipulates that:

Each State Party shall not import or authorize the import of nuclear material from a State not party to this Convention unless the State Party has received assurances that such material will during the international nuclear transport be protected at the levels described in Annex I.

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49 CPPNMF, preambular paragraph 14.

50 CPPNM, Article 2.1-2.

51 CPPNM, Article 3.

52 CPPNM, Article 2.3.

53 CPPNMF, Article 2.

The article is directed towards imports from non-state parties, and is designed to close any loopholes in the physical protection regime. However, it also implies that states should review or introduce a system for import authorizations besides the export control regime. Again, this is not a requirement to set up a national authority – although such an authority could be useful in streamlining import and export procedures.

Finally, the CPPNM foresees some modifications to the domestic legislation of a country as Article 4.4. stipulates:

Each State Party shall apply within the framework of its national law the levels of physical protection described in Annex I to nuclear material being transported from a part of that State to another part of the same State through international waters or airspace.

We note, however, that this is applicable only for the rather rare occurrence that a transport may pass international waters or airspace while being transported domestically.

Articles relevant for the criminalization of illicit trafficking

The CPPNM includes several articles, which place a heavy emphasis on ensuring that certain acts involving nuclear material are punished and penalized, and that those who commit these crimes cannot escape prosecution. From that perspective, the convention, even in its unamended form, is relevant for the curtailment and prosecution of illicit trafficking offences. As is highlighted below, however, the 2005 Amendment significantly strengthens the criminalization provisions in regard to illicit trafficking offences.

The main prohibitions, as far as criminalization is concerned, are contained in Article 7 of the convention, which reads, in its most relevant part:

1. The intentional commission of:
 - a. an act without lawful authority which constitutes the receipt, possession, use, transfer, alteration, disposal or dispersal of nuclear material and which causes or is likely to cause death or serious injury to any person or substantial damage to property;
[. . .]
 - f. an attempt to commit any offence described in paragraphs (a), (b) or (c); and
 - g. an act which constitutes participation in any offence described in paragraphs (a) to (f)shall be made a punishable offence by each State Party under its national law.

The 2005 Amendment keeps most of the original language, but adds, in relevant parts:

1. The intentional commission of:
 - (a) [as above, and adds] . . . or to the environment;
[. . .]
 - (d) an act which constitutes the carrying, sending, or moving of nuclear material into or out of a State without lawful authority;
[. . .]
 - (h) an attempt to commit any offence described in sub-paragraphs (a) to (e);
 - (i) an act which constitutes participation in any offence described in sub-paragraphs (a) to (h);
 - (j) an act of any person who organizes or directs others to commit an offence described in sub-paragraphs (a) to (h); and
 - (k) an act which contributes to the commission of any offence described in sub-paragraphs (a) to (h) by a group of persons acting with a common purpose; such act shall be intentional and shall either:

- (i) be made with the aim of furthering the criminal activity or criminal purpose of the group, where such activity or purpose involves the commission of an offence described in sub-paragraphs (a) to (g), or
- (ii) be made in the knowledge of the intention of the group to commit an offence described in sub-paragraphs (a) to (g) shall be made a punishable offence by each State Party under its national law.

One important change introduced by the 2005 Amendment to the CPPNM is the stipulation that any cross-border movement of nuclear material without lawful authority should be made punishable by states parties, irrespective of whether this movement causes or is likely to cause death, serious injury or substantial environmental or property damage.

By contrast, in the unamended CPPNM, certain transfers of nuclear material are also outlawed, but a criminal act has not occurred unless there is a causal link between the act and actual or likely damage. If, for instance, an unlawful transfer of nuclear material has not caused death, serious injury or damage to property, or was not likely to do so, the act is not punishable. This would be the case if for instance Person A wrongly thought that he had lawful authority to transfer the goods to Person B, and applied necessary protection levels while the goods were being transferred. One might also envision a scenario where unlawfully shipped materials were being used peacefully by the end-user, and where there was no risk of diversion of the material during shipment. We note, however, that it is sufficient that damage is 'likely' to have been caused by the act.⁵⁴

The 2005 Amendment to the CPPNM adds two supplementary acts that should be criminalized. The first applies to a person who may not participate directly in the transfer of the material, but who 'organizes or directs others'. Hence, brokering contracts or supplying means of transport constitute unlawful activities. In addition, any act that contributes to the trafficking offence is outlawed, if the offender contributes to 'a group of persons acting with a common purpose'. This applies to persons involved with, for instance, terrorist groups or organized crime. The contribution is only criminalized under certain strict conditions.

Implementation considerations

Irrespective of whether a legislator decides to implement the provisions of the CPPNM only or decides to also incorporate the modifications and additions introduced by its 2005 Amendment, a number of key provisions need to be present in the national legal system.

First, outlawed acts are, in both the CPPNM and its 2005 Amendment, tied to 'lawful authority'. Consequently, all CPPNM parties must have a system in place which is able to differentiate between 'lawfully held' material and those materials that are held 'unlawfully'. This means that an individual can hold nuclear materials if the government has so approved it. Often, countries have a licensing system in place to regulate this. A license can be wide-ranging. It could, for instance, give the individual the right to possess, transfer and use nuclear material. It could also be quite restricted: an individual could be given a license to possess material, but not to do anything else with it. The key question, which needs to be adequately answered in national law, is who issues the license, and hence conveys 'lawful authority' to the possessor. In most of the cases, this would involve setting up a national authority, which would usually have more wide-ranging rights and responsibilities than just issuing licenses.

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 54 The use of the word 'likely' often signals that the lowest standard of evidence is required to prove the case. The strength of the evidence needs to establish that it is 'more likely than not' that effect B is caused by action A. Compare this with a requirement to prove 'beyond reasonable doubt' that action A has caused effect B.

It is important to note that the CPPNM Amendment requires states to ‘establish and maintain a legislative and regulatory framework to govern physical protection’.⁵⁵ Naturally, this also means that the state is under the obligation to, in addition, ‘establish or designate a competent authority or authorities responsible for the implementation of the legislative and regulatory framework’.⁵⁶

The amended text further calls on state parties to establish, implement and maintain an ‘appropriate physical protection regime’, which aims to protect against the theft and other unlawful taking of nuclear material and to ensure rapid location and recovery of lost material. The regime should also be designed to protect against and mitigate the consequences of sabotage of national nuclear facilities. To aid the state in the establishment of such a regime, the amended convention enumerates a number of fundamental principles of physical protection of nuclear material and nuclear facilities that states parties shall “apply insofar as is reasonable and practicable” (see the new Article 2A.2).

Second, the legislator needs to consider whether to enact a blanket prohibition on unlawful possession (as stipulated in the CPPNM Amendment) or if it is more suitable to enact a narrower prohibition. As noted above, the act itself must ‘cause or be likely to cause’ death or serious injury to a person, or substantial damage to property. Hence, if possession itself is not likely to cause any injury then no punishable offence has occurred. However, injuries or damages can materialize many years after the act itself has occurred; exposure to highly radioactive material may not lead to death for many years. It is easier, from a drafting perspective, but also with an eye on effectiveness to make the unlicensed possession itself unlawful, irrespective of the consequences of that possession.

Article 7.1.f. and 7.1.g. of the CPPNM make clear that the state needs to cover attempted offences, as well as participation in an offence, in its national legislation. What constitutes attempts are likely to be fairly well-covered by domestic criminal law. What constitutes participation may or may not be developed in domestic law. In any case, it is likely that the state has some leeway in formulating rules here, either through stipulations in primary legislation or by leaving the meaning open, thus allowing for flexibility in the application of law by the authorities and the courts. The same reasoning would apply on the additional acts defined in the CPPNM Amendment (that is, in respect to contribution and organization).

For illustrative purposes, it may be useful to break up the prohibitions listed in article 7 and apply them to the user types identified in section 3.1.1 above. The resulting matrix is given in table 1.

Table 1: Article 7.1: acts and actors

Supplier	Transporter	Customer	User
Unlawful possession	Unlawful possession	Unlawful possession	Unlawful possession
Unlawful transfer	Unlawful transfer	Unlawful transfer	
	Unlawful receipt	Unlawful receipt	Unlawful receipt
			Unlawful use
			(Unlawful alteration)
			(Unlawful disposal)
			(Unlawful dispersal)

The CPPNM amendment adds more prohibitions to this matrix, as illustrated in Table 2.

55 CPPNMF, Article 2A.2.(a).

56 CPPNMF, Article 2A.2.(b).

Table 2: Additional acts and actors in the CPPNM amendment

Supplier		Customer	User
Carrying without lawful authority			
Sending without lawful authority			
Moving without lawful authority			

When examining the actions in relationship to the actors it becomes clear that some actions are more commonly occurring than others. For instance, it is clear that possessing nuclear material without lawful authority is a central theme. Possession is closely linked with the action ‘carrying’ and ‘moving’ in the amended CPPNM. This may seem obvious, as it is not possible to carry a material without being in possession of it. Likewise, it is not possible to move a material without, however briefly, taking possession of the material first. Again, the requirement that possession must be unlawful indicates that the state must have a system in place that determines under what circumstances possession, transfer, receipt and use are lawful.

The CPPNM puts a strong emphasis on causality, as highlighted in table 3.

Table 3: Article 7.1: causality under CPPNM

Cause
Likely to cause

Causality only comes into play on trafficking offences under the unamended CPPNM. As noted in Table 2, above, the amended CPPNM makes unauthorized carrying, sending or moving nuclear material unlawful, irrespective of the consequences of those acts.

If a legislator opts to implement the unamended CPPNM, it has to take into account causality. That is, for criminalization purposes, an offence under the convention is not considered to have occurred unless there is causality between the act and the effects of that act.

This opens up a potential loophole that can be exploited by traffickers. Hence, it is recommended that the legislator either chooses to implement the stricter requirements in the amended CPPNM or, alternatively, satisfies itself that such activities will be caught by other, functionally related, pieces of legislation—such as other provisions in the country’s criminal code.

The causality requirement links the possession of the material to certain, specified, effects, which are listed in Table 4 below.

Table 4: Article 7.1: effects

Death (of person)
Serious injury (of person)
Substantial damage (to property)

Additional effect under the CPPNM Amendment

Substantial damage (to the environment)

Only the most serious consequences of an act are characterised as the alleged offence. If, for instance, someone unlawfully possesses nuclear material, and that possession only causes lesser injury, an offence has not been committed. Likewise, unless property damage is 'substantial', no offence under the convention has occurred. The amended CPPNM, in line with other instruments adopted in the past decade, adds substantial damage to the environment to the list of effects.

Cooperation

The CPPNM requires the state to make known to the International Atomic Energy Agency a 'central authority and point of contact having responsibility for physical protection of nuclear material'. Should nuclear material be unlawfully removed, states parties to the convention are required to 'provide co-operation and assistance to the maximum feasible extent in the recovery and protection of such material'. However, another state party has to request help, and the assisting state party is only required to render assistance 'in accordance with their national law'.⁵⁷ In particular, parties have an obligation to inform each other of thefts and to exchange information on how materials can be protected and recovered.

Jurisdiction, extradition or prosecution

Article 8 of the CPPNM requires states parties to exercise jurisdiction over the offences outlined above when they are committed in a state's territory or on board a ship or aircraft registered in the state; when the offender is a national of the state; and when the offender is present in the state's territory and they do not extradite him. States parties are also given the option in Article 8.4 to exercise jurisdiction over Article 7 offences when they are involved in international transport of nuclear material as the importing or exporting state.

Articles 9 to 11 ensure that perpetrators of crimes involving nuclear material will be detained and prosecuted or extradited, in line with their national legislation and agreements with other states. Article 13 requires states parties to provide one another with assistance in criminal proceedings related to enforcement of the convention. Article 14 requires states parties to inform the IAEA of its laws and regulations to implement the convention.

3.2.1.3 Overall assessment

While the CPPNM contributes strongly to the overall physical protection regime, its focus on nuclear rather than radioactive material limits its applicability in respect to the illicit trafficking of radioactive material. The CPPNM language already covered most instances of illicit trafficking of nuclear material since that act in itself involves the unlawful possession and, if the act was completed, transfer of material. The 2005 language harmonizes the CPPNM with the ICSANT (see below), which minimizes the risk of normative conflicts between the two instruments.

3.2.2 International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)

The International Convention for the Suppression of Acts of Nuclear Terrorism (ICASNT) was adopted by the UN General Assembly on 13 April 2005. It entered into force on 7 July 2007. It has 115 signatories and, as at 23 November 2011, 77 states parties.

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⁵⁷ CPPNM, Article 5.2.

3.2.2.1 Background

This convention was negotiated within the United Nations framework. On 17 December 1996, the UN General Assembly adopted resolution 51/210 on ‘measures to eliminate international terrorism’. In particular, the resolution recognized ‘the need to enhance international cooperation to prevent the use of nuclear materials for terrorist purposes and to develop an appropriate legal instrument’. As the only existing convention on the subject matter at the time was the CPPNM, the resolution therefore urged the UN membership to become parties to the CPPNM as a matter of priority. It also decided to establish an ‘Ad Hoc Committee [. . .] to elaborate an international convention for the suppression of acts of nuclear terrorism’.

The resulting convention is formulated along the lines of a Russian proposal, and based on the principle of ‘extradite or prosecute’. In its preamble, it notes that ‘acts of nuclear terrorism may result in the gravest consequences and may pose a threat to international peace and security’, and furthermore, that ‘existing multilateral legal provisions do not adequately address those attacks’.

The ICSANT borrows its definition for ‘nuclear material’ from the CPPNM, and incorporates it into its definition of radioactive material.⁵⁸ ‘Radioactive material’ is defined in Article 1(1) as ‘. . . nuclear material and other radioactive substances which contain nuclides which undergo spontaneous disintegration (a process accompanied by emission of one or more types of ionizing radiation, such as alpha-, beta-, neutron particles and gamma rays) and which may, owing to their radiological or fissile properties, cause death, serious bodily injury or substantial damage to property or the environment’.

In the *Combating Illicit Trafficking in Nuclear and other Radioactive Material Reference Manual*, a distinction is drawn between the terms, radioactive and nuclear material, in as much that ‘. . . radioactive material covers a much broader class of substances and includes nuclear material, but also other substances that, although emitting ionizing radiation, are not suitable for producing nuclear explosions. Such material is commonly used in research and applications for science, industry, medicine and agriculture’.⁵⁹ Radioactive material includes regulated radioactive sources and unregulated orphan sources.

3.2.2.2 Key articles

A number of offences listed in Article 2.1.a. of the ICSANT include the possession of radioactive material or devices, as well as making nuclear or radiological devices to cause death or serious bodily injury or substantial damage to property or the environment. Article 2.1.b. criminalizes the use of radioactive material or devices or sabotage of nuclear facilities⁶⁰ for the purposes of causing death, injury or damage. It also criminalizes acts designed to ‘. . . compel a natural or legal person, an international organization or a state to do or refrain from doing an act’. Finally, article 2.2-4 criminalizes threats, demands, attempts and other forms of participation.

Not all prohibitions are immediately relevant for curtailing illicit trafficking of nuclear materials, however. Stripping away language that deals with other aspects of nuclear terrorism from Article 2 is illustrative for this point. Article 2.1., as relevant to illicit trafficking, reads as follows:

1. Any person commits an offence within the meaning of this Convention if that person unlawfully and intentionally:

58 ICSANT covers all nuclear materials, whereas the CPPNM does not cover nuclear materials used for non-peaceful purposes.

59 *Combating Illicit Trafficking in Nuclear and other Radioactive Material Reference Manual*, IAEA Nuclear Security Series No. 6 (Jointly Sponsored by the European Police Office, International Atomic Energy Agency, International Police Organization, and World Customs Organization (IAEA, Vienna, 2007)), p 7.

60 It should be noted that the definition of nuclear facility in ICSANT is much broader than the one in CPPNM.

- (a) Possesses radioactive material [. .]:
- (i) With the intent to cause death or serious bodily injury; or
- (ii) With the intent to cause substantial damage to property or to the environment;
- [. .]
- 3. Any person also commits an offence if that person attempts to commit an offence as set forth in paragraph 1 of the present article.
- 4. Any person also commits an offence if that person:
 - (a) Participates as an accomplice in an offence as set forth in paragraph 1, 2 or 3 of the present article; or
 - (b) Organizes or directs others to commit an offence as set forth in paragraph 1, 2 or 3 of the present article; or
 - (c) In any other way contributes to the commission of one or more offences as set forth in paragraph 1, 2 or 3 of the present article by a group of persons acting with a common purpose; such contribution shall be intentional and either be made with the aim of furthering the general criminal activity or purpose of the group or be made in the knowledge of the intention of the group to commit the offence or offences concerned.

As far as trafficking is concerned, the convention’s main prohibition is very similar to that of the unamended CPPNM above. It expands the scope of the prohibition by including radioactive material, but also constrains it by excluding the word ‘transfer’ from the prohibition. It very clearly does not mirror the amended CPPNM by prohibiting the carrying of nuclear or radioactive material without lawful authority.

Another principal difference is that the ICSANT focuses on the *intent* of the possessor, which the CPPNM does not cover. Under the latter, the unlawful possession must either cause a specified effect, or at least be likely to cause it, regardless of the intent. This places a very different burden of proof on the prosecutor than an offence under the ICSANT. Here, it is sufficient to point to the *intended effect* of the possession. The properties of the material in question become largely irrelevant. It could be that the material has no chance of creating the desired effect.⁶¹ In most jurisdictions, however, impossibility is no defence to the crime of attempt where the conditions creating the impossibility are unknown to the actor.

In practice, these criteria are not likely to be fulfilled unless the transporter belongs to the group planning to use the material. The supplier or the transporter may not be aware of the intended use of the material. If the transporter is delivering the material with knowledge of its end use but with no personal intent to use the material that way – the customer may, for instance, have informed him that the material is to be used in an RDD (radiological dispersal device) – he may instead have committed an offence as an accomplice to the act.

Table 5, below, lists the convention’s prohibitions and applies them to the potential actors. As with the CPPNM, the ICSANT puts a heavy emphasis on the possession of the material.

Table 5: Article 2: acts and actors

Supplier	Transporter	Customer	User
Unlawful possession	Unlawful possession	Unlawful possession	Unlawful possession
(Participation)	(Participation)	(Participation)	(Unlawful use)
(Organization)	(Organization)	(Organization)	(Threat of use)
(Contribution)	(Contribution)	(Contribution)	(Organization)
			(Contribution)

.....
 61 The classical example in criminal law is when person A acquires what he thinks is a harmful substance but which in fact is harmless. Person A then tries to poison person B by placing the material in his soup. In other words, person A had the *intent to murder* person B, but the crime had no possibility of being completed.

ICSANT also stipulates that the unlawful act must have an intended effect. Those effects are listed in Table 6.

Table 6: Article 2: effects

Death (of person)
Serious injury (of person)
Substantial damage (to property)
Substantial damage (to the environment)

The possession of radioactive material is criminal if it is both unlawful and intentional and there is a specific intent to use the material to cause death or serious bodily injury or substantial damage to property or to the environment. This means that if the possessor carries the material lawfully, he is not committing an offence under the convention, irrespective of who is scheduled to receive the material. Moreover, if a transporter carries radioactive material without knowing what it is (the shipping manifest may have been mislabelled), he has not committed an offence. In other words, mere possession is not sufficient for the act to qualify as an offence under the convention.

A person may also commit an offence if he contributes to the commission of another offence under the convention. For this to apply, the other offence has to be committed by 'a group of persons acting with a common purpose' (for instance a terrorist group or organized crime group). However, the individual needs to commit the act intentionally and 'with the aim of furthering the general criminal activity or purpose of the group' or 'in the knowledge of the intention of the group to commit the offence or offences concerned'. This means that if the person ships material to a sole customer or user (the 'lone gunman'), he is not committing an offence. Some perpetrators may well know about what their cargo is supposed to be used for, but this is not likely to be the case for all. There are a considerable number of both objective and subjective criteria that need to be proven in order to secure a conviction. This may, unfortunately, place a very heavy burden of proof on prosecuting authorities.

The convention does not apply where 'the offence is committed within a single state, the alleged offender and the victims are nationals of that state, the alleged offender is found in the territory of that state and no other state has a basis . . . to exercise jurisdiction'.⁶² Prima facie, this article excludes trafficking events within the territory of one state.

Article 5 require states to adopt such measures *as may be necessary* to establish the above-mentioned acts as criminal offences under their respective national laws. Article 6 states that countries should, in their criminal legislation, invalidate certain grounds for defence, such as that the crime was committed for political, philosophical, racial, ethnic, religious, or other similar reasons.

The convention also stipulates that these offences be made punishable by 'appropriate penalties which take in account the grave nature of these offences'. There is no guidance on how to interpret the word 'appropriate'.⁶³

International cooperation

State parties are also required to cooperate on a range of issues. For instance, they are supposed to take 'practical measures' to 'prevent and counter preparations' for acts intended to be commissioned both within the country and abroad. The convention does not specify what these practical measures might

62 ICSANT, Article 3.

63 For examples of how different states have dealt with different penalties, visit the National Legal Resources Page of the Terrorist Prevention Branch of the UN Office on Drugs and Crime Electronic Resources Database: www.unodc.org/tldb.

entail, but it does not exclude criminalizing the act of nuclear trafficking further than what is stipulated in the treaty.

Moreover, state parties are required to exchange ‘accurate and verified information’ and ‘coordinating administrative and other measures taken as appropriate to detect, prevent, suppress and investigate the offences set forth in [the convention]’. In particular, state parties must make every effort to ‘adopt appropriate measures to ensure the protection of radioactive material’. Here, relevant recommendations and functions of the IAEA should be taken into account.

If a party receives information that a convention offence has been committed or is being committed in its territory, it is required to ‘take such measures as may be necessary under its national law to investigate the facts contained in the information’. State parties are required to afford one another the greatest measure of assistance in connection with these investigations.

Article 8 requires states to ‘make every effort to adopt appropriate measures to ensure the protection of radioactive material, taking into account relevant recommendations and functions of the International Atomic Energy Agency’. The convention falls short of *requiring* states to take into account the requirements of the IAEA Code of Conduct (see below) and other non-binding documents. Nevertheless, states would need to consider implementing these recommendations fully, or perhaps even go beyond them, in order to fully implement Article 8.

Article 9 establishes when jurisdiction is mandatory (Article 9.1) and optional (Article 9.2). Jurisdiction is mandatory when the offence is committed in the state’s territory, on board a vessel or aircraft under the state’s jurisdiction, or committed by a national of the state. Articles 10 to 14 establish the principles for investigations, prosecutions and extradition, including mutual assistance on these matters. Finally, Article 15 disallows Article 2 crimes to be considered political offences for the purposes of extradition.

3.2.2.3 Overall assessment

The convention is designed, amongst other things, to prevent criminal acts involving radioactive material and to facilitate the effective prosecution of individuals or groups who possess or use radioactive material with the intent specified in the convention. It is not written to tackle the phenomenon of illicit trafficking specifically.

3.2.3 The 2010 Convention on the Suppression of Unlawful Acts Relating to International Aviation (‘the Beijing Convention’)

3.2.3.1 Background

A successor convention to the Convention on the Suppression of Unlawful Acts relating to International Civil Aviation (1971), or the Beijing Convention, was adopted with a vote in 2010 by the International Conference on Air Law in Beijing.⁶⁴ The Beijing Convention, which has the same name as the 1971 convention, has not yet entered into force. The depositary is the International Civil Aviation Organization (ICAO).

3.2.3.2 Key articles

The Beijing Convention⁶⁵ includes definitions in Article 2 for radioactive material, nuclear material, and BCN [biological, chemical and nuclear] weapon. The definition for ‘radioactive material’ is borrowed from

64 See http://www2.icao.int/en/leb/List%20of%20Parties/Beijing_Conv_EN.pdf, visited 24 November 2011.

65 Convention on the Suppression of Unlawful Acts relating to International Civil Aviation. Text available at http://www.icao.int/DCAS2010/restr/docs/beijing_convention_multi.pdf, visited 24 November 2011.

the CSNT, while the definition for ‘nuclear material’ comes from the CPPNM. Source and special fissionable material are defined by reference to the Statute of the IAEA. A BCN weapon is defined as, inter alia, ‘nuclear weapons and other nuclear explosive devices’.⁶⁶

Article 1

1. Any person commits an offence if that person unlawfully and intentionally:

[. . .]

(i) transports, causes to be transported, or facilitates the transport of, on board an aircraft:

(1) any . . . radioactive material, knowing that it is intended to be used to cause, or in a threat to cause, with or without a condition, as is provided for under national law, death or serious injury or damage for the purpose of intimidating a population, or compelling a government or an international organization to do or to abstain from doing any act; or

(2) any BCN weapon, knowing it to be a BCN weapon as defined in Article 2; or

(3) any source material, special fissionable material, or equipment or material especially designed or prepared for the processing, use or production of special fissionable material, knowing that it is intended to be used in a nuclear explosive activity or in any other nuclear activity not under safeguards pursuant to a safeguards agreement with the International Atomic Energy Agency; or

(4) any equipment, materials or software or related technology that significantly contributes to the design, manufacture or delivery of a BCN weapon without lawful authorization and with the intention that it will be used for such purpose;

For activities involving a state party, including those undertaken by a person or legal entity authorized by a state party, it shall not be an offence under subparagraphs (3) and (4) if the transport of such items or materials is consistent with, or is for a use or activity that is consistent with, its rights, responsibilities and obligations under the applicable multilateral non-proliferation treaty to which it is a party including those referred to in Article 7.⁶⁷

The prohibition is divided into two principal parts. The first part, in Article 1.1.(i).1, deals with radioactive material carried on an aircraft that may be used for criminal purposes. The language is primarily aimed to cover terrorist offences. The second part, in Article 1.1.(i).2-3, deals with the unlawful transport of nuclear or other material that ought to be under IAEA safeguards. The intended end usage of these materials is not so much terrorist or other criminal activities, but use ‘in a nuclear explosive activity or in any other nuclear activity not under safeguards pursuant to a safeguards agreement with the International Atomic Energy Agency’.

The article also prohibits the unlawful transport of ‘any equipment, materials or software or related technology that significantly contributes to the design, manufacture or delivery of [biological, chemical and nuclear weapons] without lawful authorization and with the intention that it will be used for such purpose’. The latter, while important, is far removed from the illicit trafficking of nuclear and radioactive material and will not be covered in this report.

Table 7: Article 1.1: acts and actors

Supplier	Transporter	Customer	User
	Transports		
Causes to be transported		Causes to be transported	(Causes to be transported)
(Facilitates the transport)		(Facilitates the transport)	(Facilitates the transport)

66 Ibid at Article 2(h).

67 Article 7 mentions the Nuclear Non-Proliferation Treaty and the Biological Weapons and Chemical Weapons Conventions.

We will turn first to the prohibition in Article 1.1.(i).1. This chiefly covers the trafficking offence itself. But it also covers most other actors insofar that they cause the material to be transported on the aircraft. Other actors may facilitate the transport. This would, for instance, cover individuals working at the airport or on the aircraft itself that have facilitated the loading on-board of the material.

Table 8: Article 1.1: causality under the Beijing Convention

knowing that it is intended to be used to cause
knowing that it is intended to be used in a threat to cause, with or without a condition

All actors must know what the material is intended to be used for. This excludes situations where the trafficker, or other actors, have been misled about the true purpose of the shipment. For instance, they may believe that the item is scheduled to be used in an obscure industrial or medical process. In those cases, the trafficker would be unaware of the intended effects of the trafficking offence, and hence not liable under the convention.

Table 9: Article 1.1: effects under the Beijing Convention

Death
Serious injury
Damage

As in the other conventions, the primary effects of the use of the material must be to kill or seriously injure one or more individuals. Note that it is sufficient to cause ‘damage’, and not ‘serious damage’ as is required in other conventions. It is also not specified *what kind* of damage that is supposed to occur. Arguably, the convention would also cover non-material types of damage: loss of income, loss of reputation, third party damages, etc.

Table 10: Article 1.1: intent under the Beijing Convention

purpose of intimidating a population
compelling a government or an international organization to do or to abstain from doing any act

The act must finally be committed with a specific purpose in mind. The convention would hence not cover the situation where someone unlawfully carries radioactive material with the purpose of killing a single person, unless the murder is designed to intimidate the population.⁶⁸

The article criminalizes the act itself, but also threats, attempts, and other forms of participation in or organization of the act.

As noted above, Article 1.1.(i).3 applies to ‘source material, special fissionable material, or equipment or material especially designed or prepared for the processing, use or production of special fissionable material’.⁶⁹ Here, the purpose of the trafficking offence is not to terrorize a population but to further another state’s nuclear weapons programme. The trafficker needs to know that the material or the equipment

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68 For instance, the person carrying radioactive Polonium-210 into the United Kingdom in 2006, to murder Alexander Litvinenko, a former KGB officer, might not have committed an offence under the convention. But he could have been prosecuted under other implementing legislation, for example, for ICSANT, had it been in force at that time.

69 This is a wide ranging definition, which would arguable cover nuclear material as well as equipment listed in the Nuclear Suppliers Group’s trigger lists, as well as the Annex of the IAEA Additional Protocol to the Comprehensive Safeguards Agreement.

'is intended to be used in a nuclear explosive activity or in any other nuclear activity not under safeguards pursuant to a safeguards agreement with the International Atomic Energy Agency'. It is important to note that the transport of such material or equipment is lawful if it is 'consistent with its rights, responsibilities and obligations under the applicable multilateral non-proliferation treaty' to which the actor is a party.⁷⁰ This means, for instance, that nuclear-weapon states are free to carry such material on an airliner.⁷¹

In addition the convention includes a 'fugitives offence', which criminalizes any assistance to persons evading investigation, prosecution or punishment of his or her crime.⁷² This applies only offences under the convention, whereas the SUA convention (see below), has a fugitives clause that extends to other treaties as well. The Beijing Convention also criminalizes conspiracy to commit an offence.⁷³

3.2.3.3 Other provisions

In Article 3 of the convention, state parties undertake to make the offences punishable by 'severe penalties'. This is a conceptual departure from other conventions, which call on penalties to reflect the severity of the crime. Crimes are, however, likely to be punished on the same scale under the Beijing Convention as under other similar conventions.

Article 4 stipulates that legal entities may be held liable for crimes committed by individuals under the 'management and control' of that entity. In practice, this means that airports could face liability if a baggage handler or security staff member has participated in the offence. Likewise, airlines could face liability if their own staff members participate. Given the wide-ranging prohibition above, any airline with staff found complicit in a trafficking event may face far-reaching consequences.

The treaty has a complicated article on non-application. Article 5.1-2 excludes, for instance, military, customs or police aircraft, but also domestic flights by domestic carriers. Article 5.3 states, however, that if the trafficking offence has been conducted on a domestic flight by a domestic carrier, the convention still applies if the perpetrator is found in a third country. Article 5.4 stipulates a certain exemption for joint air transport organizations and international operating agencies.

The instrument also includes provisions supporting extradition and mutual legal assistance. None of the offences in the convention may be considered a 'political offence' to avoid prosecution.⁷⁴ No state is, however, required to extradite a person or provide legal assistance, if there are substantial grounds to believe that it would lead to a prosecution on discriminatory grounds.⁷⁵

3.2.3.4 Overall assessment

The Beijing Convention pinpoints a set of acts that could form part of an illicit trafficking incident if actors have chosen to use airplanes to transport material unlawfully. The convention includes language criminalizing the transport of both radioactive material and also nuclear material, though in separate provisions.

The provisions dictate that actors must know what use the material is intended for. It specifies that it covers effects including death, serious injury, and damage, but fails to further qualify what *type* of damage,

.....

70 Article 1.1. in fine.

71 This is arguably a very unlikely event. Observe that the convention prohibits the transport of a nuclear weapon on the airliner, irrespective of whether the weapon is lawfully produced and held.

72 Article 1.4.d.

73 Article 1.5.

74 Beijing Convention, article 13.

75 Ibid, article 14.

leaving this term open for extensive interpretation. The convention also specifies what ultimate purpose the act should have, in this case large-scale incidents; it does not cover situations where the purpose is to kill a single person. Like the CPPNM, the convention includes threats, attempts and other forms of participation and group activities. In addition, the treaty states that legal entities, such as companies, could be held liable.

The treaty contains exemptions for the lawful transport of nuclear material under the NPT. It also exempts military aircraft and planes used for other official purposes.

The Beijing Convention represents an agreement by its signatories to put in place legislation to criminalize nuclear and radioactive material being trafficked by air; one of the major modern modes of international transport. Most trafficking offences, however, would be easier to prosecute under an instrument such as the amended CPPNM, which contains a blanket prohibition on unlawful cross-border movement of nuclear and radioactive material. The main advantage with prosecution under Beijing convention would be the possibility of sanctioning legal entities, and that offences under Beijing, due to their serious nature, are likely to be punished more harshly.

Some of the acts and prohibitions contained in the Beijing convention bear close resemblance to those in the treaty addressing unlawful acts against the safety of maritime navigation – one of the other major modes of international transport. This treaty is discussed next.

3.2.4 Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation and the Protocol of 2005

3.2.4.1 Background

The Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation, or SUA, was adopted in 1988 and entered into force in 1992.⁷⁶ It has 157 states parties. The 2005 Protocol to SUA, or SUA 2005, entered into force in 2010; it has 21 states parties.⁷⁷ The Secretary-General of the International Maritime Organization (IMO) is the depositary for both instruments.

As amended by SUA 2005, Article 1 under SUA includes a definition for 'BCN weapon' which is defined as, amongst other things, '... nuclear weapons and other nuclear explosive devices'. The terms 'source material' and 'special fissionable material' have the same meaning as given to those terms in the Statute of the International Atomic Energy Agency (IAEA).

3.2.4.2 Key articles

The 1988 convention aims to prevent unlawful acts against the safety of maritime navigation, and to prosecute and 'punish' perpetrators of such acts. The treaty identifies a number of specific offences such as seizing a ship by force or destroying it. The provisions provide a framework describing when the treaty applies, what jurisdiction states parties may have and how states should deal with offenders. In a similar manner to the Beijing Convention, the treaty exempts warships, vessels used by official bodies and laid-up ships.

76 *Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation*, available at <http://treaties.un.org/doc/db/Terrorism/Conv8-english.pdf>, visited 24 November 2011.

77 *Protocol of 2005 to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation*, LEG/CONF.15/21 (IMO, London, 2005).

We note that the 1988 treaty is not directed at preventing or responding to cases of illicit trafficking. It is rather more similar to instruments aimed at preventing or responding to criminal acts themselves, rather than possible precursors, such as trafficking incidents. However, the 2005 Protocol to the convention provides an amended agreement that widens its subject scope in a manner facilitative to our discussion of illicit trafficking.

Though the overall aim of these supplementary provisions, as outlined in its preamble, remains to suppress terrorist acts against the safety and security of international maritime navigation, the amended treaty nevertheless addresses acts of illicit trafficking.

Articles 3*bis* of the amended SUA, says that:

1 Any person commits an offence within the meaning of this Convention if that person unlawfully and intentionally:

[. . .]

(b) transports on board a ship:

- (i) any explosive or radioactive material, knowing that it is intended to be used to cause, or in a threat to cause, with or without a condition, as is provided for under national law, death or serious injury or damage for the purpose of intimidating a population, or compelling a government or an international organization to do or to abstain from doing any act; or
- (ii) any BCN weapon, knowing it to be a BCN weapon as defined in article 1; or
- (iii) any source material, special fissionable material, or equipment or material especially designed or prepared for the processing, use or production of special fissionable material, knowing that it is intended to be used in a nuclear explosive activity or in any other nuclear activity not under safeguards pursuant to an IAEA comprehensive safeguards agreement;
- (iv) any equipment, materials or software or related technology that significantly contributes to the design, manufacture or delivery of a BCN weapon, with the intention that it will be used for such purpose.

2 It shall not be an offence within the meaning of this Convention to transport an item or material covered by paragraph 1(b)(iii) or, insofar as it relates to a nuclear weapon or other nuclear explosive device, paragraph 1(b)(iv), if such item or material is transported to or from the territory of, or is otherwise transported under the control of, a State Party to the Treaty on the Non-Proliferation of Nuclear Weapons where:

- (a) the resulting transfer or receipt, including internal to a State, of the item or material is not contrary to such State Party's obligations under the Treaty on the Non-Proliferation of Nuclear Weapons and,
- (b) if the item or material is intended for the delivery system of a nuclear weapon or other nuclear explosive device of a State Party to the Treaty on the Non-Proliferation of Nuclear Weapons, the holding of such weapon or device is not contrary to that State Party's obligations under that Treaty.

In the provisions listed above, the amended SUA specifically criminalizes acts of illicit trafficking during the transit or shipment phase of the process. This protocol therefore aims to bring a major potential mode of transporting nuclear or radioactive material into states' legislative penal frameworks. Like the Beijing Convention, it provides exemptions based on NPT provision (though it does not use the same wording).

The treaty also requires the criminalization of transporting people who have committed offences under a number of related treaties:

Any person commits an offence within the meaning of this Convention if that person unlawfully and intentionally transports another person on board a ship knowing that the person has committed an act that

constitutes an offence set forth in [...] 3bis or 3quater or an offence set forth in any treaty listed in the Annex, and intending to assist that person to evade criminal prosecution.⁷⁸

This language significantly strengthens other treaties, such as the CPPNM, by extending a ‘fugitives clause’ to them. This means that if an individual has committed an offence, for instance by unlawfully transporting nuclear material across a border, and later attempts to evade prosecution by fleeing on a ship, their accomplices or assistants could be prosecuted under the 2005 Protocol to SUA.

The James Martin Center for Nonproliferation Studies sums up the 2005 Protocol to SUA as follows: ‘the new Protocol provides the first international legal framework criminalizing the use of a non-military ship as a weapon or as a means to carry out a terrorist attack, and the transport of terrorists or cargo destined for use in a BCN weapon by ship’.⁷⁹

In addition to the above provisions, the 2005 Protocol to SUA includes provisions covering attempts to commit an offence, participation as an accomplice, organizing or directing others and contribution to an offence by groups.⁸⁰ It also proscribes transporting equipment that can significantly contribute to making a BCN weapon.

It appears that the 2005 Protocol to SUA largely uses the same formulations as the Beijing Convention to criminalize equivalent illicit trafficking acts on air transport, and covers many similar acts —for instance, both exempt military and official craft. Both also proscribe transporting certain types of equipment, though as noted above such items are beyond the scope of this report.

There are substantive differences, however, between the two instruments. Chief among these is that the Beijing Convention, in addition to criminalizing the unlawful transport of materials, also criminalises causing or facilitating such transport, whereas the amended SUA merely stipulates criminalizing unlawful transport.

Many of the remaining articles in the 2005 Protocol to SUA address issues of jurisdiction, extradition, and procedures for boarding vessels where offences may be occurring.

Articles 6(1) and (2) of the 2005 Protocol to SUA contain provisions describing when states parties need to exercise mandatory jurisdiction over offences and when they can exercise optional jurisdiction. Article 6(4) requires that states parties prosecute or extradite alleged offenders.

Article 8bis of the 2005 Protocol to SUA facilitates co-operation between states when dealing with offences. The article focuses on the relationship between flag states and other states in cooperating in the prevention and suppression of offences, and vessel boarding request procedures.

Articles 10 to 12bis concern prosecution, extradition and co-operation on criminal matters. Article 11bis disallows crimes under Articles 3, 3bis, 3ter or 3quater to be considered political offences for the purposes of extradition.

The amended treaty provides a number of [useful] definitions including for ‘transport’; ‘serious injury or damage’; and BCN weapons though the definition of nuclear weapon is not illuminating being only ‘nuclear weapon and other nuclear explosive device.’ Unlike the Beijing Convention, the 2005 Protocol to SUA does not provide definitions for the terms ‘radioactive’ or ‘nuclear’, though in its preamble it does allude to other instruments of the counter-terrorism regime that do such as the CPPNM and the ICSANT.

.....
78 Article 3ter of the amended SUA. The treaties in this Annex include the CPPNM and the Protocol for the Suppression of Unlawful Acts against the Safety of Fixed Platforms Located on the Continental Shelf.

79 Inventory of International Nonproliferation Organizations and Regimes, James Martin Center for Nonproliferation Studies, 15.05.2010.

80 Amended SUA Article 3quater.

3.2.4.3 Overall assessment

The 2005 Protocol to SUA is a useful addition to the body of international instruments relevant for controlling and repressing illicit trafficking. It specifically criminalizes unlawful transport by sea of radioactive material and unsafeguarded source and special fissionable materials. By criminalizing the transport of offenders under several other treaties' provisions, the treaty provides states with additional tools to apprehend and prosecute illicit traffickers. The importance to the international community of trying to prevent or catch attempts to use ships for trafficking radioactive material is highlighted by the prevalence of detection equipment in ports around the world.

The language used, and several of the acts covered, in the 2005 Protocol to SUA's criminalization provisions on illicit trafficking are broadly similar to those used in the Beijing Convention. These similarities in criminalization formulations used by these conventions might facilitate national implementation, for instance in creating similar legislative bodies. However, the national authorities must bear in mind that there remain significant differences in the scope of actions related to illicit trafficking covered by the two treaties.

Read together, the 2005 Protocol to SUA convention and Beijing Convention provide legislative instruments criminalizing illicit trafficking on the two major forms of international transport: sea and air.

3.2.5 Security Council resolution 1540, and related resolutions by the UN Security Council

3.2.5.1 Background and key articles

UN Security Council resolution 1540 was adopted on 28 April 2004 under Chapter VII of the UN Charter. It is, therefore, legally-binding on all UN member states.

Resolution 1540 is perhaps one of the most important tools for controlling and repressing illicit trafficking in nuclear material (along with biological and chemical weapons and materials) by non-state actors. It specifically requires all UN member states to enact a series of measures in national law to prevent the proliferation of nuclear, biological and chemical weapons. The heart of these requirements can be found in operative paragraphs 2 and 3 (OP2 and OP3) as follows:

- OP2: laws to prohibit non-State actors from manufacturing, acquiring, possessing, developing, transporting, transferring or using nuclear, chemical or biological weapons and their means of delivery; also covered are:
 - terrorist purposes;
 - attempts; and
 - participating as an accomplice, assistance, or financing.
- OP3: domestic controls (including over related material) to prevent the proliferation of nuclear, biological and chemical weapons and their means of delivery, such as:
 - measures to account for and secure items in production, use, storage or transport;
 - effective physical protection measures;
 - effective border controls and law enforcement efforts to detect, deter, prevent and combat illicit trafficking and brokering of these items; and
 - national export and trans-shipment controls (e.g., related laws and regulations, controls on funding and transport, end-user controls and criminal or civil penalties for violations).

In operative paragraph 6, the Security Council calls on UN member states to develop control lists (presumably for related materials), and in operative paragraph 10, states are urged: ‘. . . in accordance with their national legal authorities and legislation and consistent with international law, to take cooperative action to prevent illicit trafficking in nuclear, chemical or biological weapons, their means of delivery, and related materials.’

Resolution 1540 requires a comprehensive framework for national legislation to prohibit the proliferation of nuclear, biological and chemical weapons through the control of related materials, including their export. It is directed to nearly all countries in the world, even those who may not belong to the NPT, Biological and Toxins Weapons Convention or the Chemical Weapons Convention. It only addresses non-state actors, however, so the state-supported insider is not covered here.

Moreover, and interestingly, Resolution 1540 does not cover explicitly, or even implicitly, radioactive material other than nuclear. Although the resolution describes the general measures that should be implemented in national legal frameworks, it does not provide greater detail. States must therefore decide of their own volition which specific measures to implement, whilst simultaneously being encouraged to incorporate the existing requirements under the multilateral treaties such as the NPT, Biological and Toxins Weapons Convention and Chemical Weapons Convention. Resolution 1540 was extended to 2021 by resolution 1977 in 2011.

UN Security Council Resolution 1887 was adopted on 24 September 2009; it is not a legally-binding resolution under Chapter VII. For the purposes of this paper, the most important operative paragraphs are 26 and 27, regarding controlling and repressing illicit trafficking through national measures. In paragraph 26, the Security Council calls on ‘. . . all states to improve their national capabilities to detect, deter and disrupt illicit trafficking in nuclear materials throughout their territories...’ In paragraph 27, it calls on ‘. . . all states to take all appropriate national measures in accordance with their national authorities and legislation, and consistent with international law, to prevent proliferation financing and shipments, to strengthen export controls, to secure sensitive materials, and to control access to intangible transfers of technology.’

Much like Resolution 1540, Resolution 1887 does not explicitly refer to other radioactive material.

3.2.5.2 Overall assessment

UN Security Council Resolution 1540 makes it mandatory for all UN member states to implement appropriate laws and regulations on the illicit trafficking of nuclear materials, but it does not address other radioactive material. There is also a lack of guidance on what measures to implement in respect of illicit trafficking. Despite this, it does provide a legislative imperative, however loosely defined, on which many legislative provisions going beyond formal treaty commitments could be hung.

3.2.6 IAEA Code of Conduct on the Safety and Security of Radioactive Sources

The IAEA Code of Conduct was drawn up to assist states in developing and maintaining high levels of safety and security for radioactive sources.⁸¹ The code provides a basic governance framework for radioactive sources made up of key safety and security requirements that states should ensure are addressed

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⁸¹ The code defines radioactive source as ‘radioactive material that is permanently sealed in a capsule or closely bonded, in a solid form and which is not exempt from regulatory control [. . .]’.

in their laws and regulations, as well as by their administrative bodies. It does not, however, provide a detailed or exhaustive list of measures.

3.2.6.1 Background

Development of the code began after the 1998 International Conference on the Safety of Radiation Sources and Security of Radioactive Materials.⁸² This meeting's findings indicated that there was interest in exploring whether some form of 'international undertaking' in this area could be developed. The IAEA was duly tasked with preparing an action plan to investigate this idea. The IAEA secretariat organized a series of meetings of technical and legal experts who agreed that 'any undertaking should, for the present, be in the form of a code of conduct'.⁸³

A number of conferences between 2000 and 2003 provided further support to the development of the code, while the events of 11 September 2001 led to the strengthening of provisions on the security of sources. In June 2003, the G8 summit made a declaration that provided political support for implementing the code and the following month a group of technical and legal experts reached consensus on the code's text.

The IAEA Board of Governors approved the code in September 2003. Following this, the IAEA General Conference urged each state to write to the IAEA Director General to show their support for the IAEA's efforts in this area and that they were 'working towards following the guidance' contained in the code. The current version of the code was published in January 2004. As of November 2011, 105 states have submitted a statement of political support.

3.2.6.2 Key provisions

When the text of the code was approved some concerns remained over the import and export of radioactive sources. These concerns resulted in further meetings of experts that produced a supplementary document, titled *Guidance on the Import and Export of Radioactive Sources*. The supplementary guidance was approved by the Board in 2004 and was subsequently endorsed by the General Conference.

Legal nature of the code and supplementary guidance

Both the code and its supplementary guidance are voluntary in nature and not legally-binding. The recommendations or 'provisions' in the code are expressed as exhortations using, in general, the following formulation: 'Every state should . . .', or appropriate variations.

In the code's preamble, the IAEA member states have agreed to language showing that they recognize 'the need to protect individuals, society and the environment from the harmful effects of possible accidents and malicious acts involving radioactive sources' and 'the need for effective and continuous regulatory control, in particular to reduce the vulnerability of radioactive sources during transfers, within and between states'. Much of the remainder of the preamble addresses aspects of safety and security that lie outside the scope of the definition of illicit trafficking used by this report.

Definitions

The code provides definitions of some of the key terms it uses. Of these, the following may be relevant for tackling illicit trafficking as defined by this report.

.....
82 http://www-pub.iaea.org/MTCD/publications/PDF/Pub1042_web.pdf.

83 See, for instance, J.R. Kraemer, Post-September 11 responses in US regulatory practice affecting the export and import of radioactive materials and related equipment, in the *International Journal of Nuclear Law*, Volume 1, No. 1 (2006).

- 'Authorization' means a permission granted in a document by a regulatory body to a natural or legal person who has submitted an application to manage a radioactive source;
- 'Management' means the administrative and operational activities that are involved in the manufacture, supply, receipt, possession, storage, use, transfer, import, export, transport, maintenance, recycling or disposal of radioactive sources;
- 'Orphan source' means a radioactive source which is not under regulatory control, either because it has never been under regulatory control, or because it has been abandoned, lost, misplaced, stolen or transferred without proper authorization; and
- 'Security' means measures to prevent unauthorized access or damage to, and loss, theft or unauthorized transfer of, radioactive sources.

Scope

The code and guidance apply to radioactive material *other than* nuclear material. This focus arose from two chief concerns: accidents involving this material and a growing anxiety during the 1990s over radioactive sources that were not under regulatory control.⁸⁴

Section II.2 'Scope and Objectives' of the code states that:

This Code applies to all radioactive sources that may pose a significant risk to individuals, society and the environment, that is the sources referred to in Annex I of this Code. States should also devote appropriate attention to the regulation of other potentially harmful radioactive sources.⁸⁵

It specifies that it does not apply to nuclear material as defined in the CPPNM, except for sources incorporating plutonium 239. It further specifies that it does not apply to radioactive sources in military or defence programmes.

Objective

The code has three objectives. Of these three, the first provides a general goal that could embrace all aspects of illicit traffic:

II 5. (a) The objectives of this Code are [...] to (i) achieve and maintain a high level of safety and security of radioactive sources.

The second objective is more specific about the types of actions the code wishes to address and includes reference to preventing unauthorized transfers of radioactive sources:

II 5. (a) The objectives of this Code are [...] to (ii) prevent unauthorized [...] transfer of, radioactive sources, so as to reduce the likelihood of accidental harmful exposure to such sources or the malicious use of such sources to cause harm to individuals, society or the environment.

Paragraph 5(a) states the objectives should be met 'through the development, harmonization and implementation of national policies, laws and regulations, and through the fostering of international co-operation'.

The remainder of the code provides the general guidance that states and their national authorities need for building the necessary policies and legislation to 'to ensure that radioactive sources are used within an appropriate framework of radiation safety and security.'⁸⁶

.....
84 Code—foreword.

85 Annex I provides a list of sources grouped into categories found in IAEA-TECDOC-1344. These categories serve to distinguish between potential levels of harm that the sources can cause. Neither nuclear material nor military radioactive sources are covered by the code.

86 Code—foreword.

Paragraph 5(b) sketches out what the scope of each country's regulatory control system should be:

These objectives should be achieved through the establishment of an adequate system of regulatory control of radioactive sources, applicable from the stage of initial production to their final disposal, and a system for the restoration of such control if it has been lost.

By recommending the establishment of control over the entire life-cycle of radioactive sources, this provision covers all aspects of illicit trafficking. It also specifies the need to have a system to regain control over orphan sources. This could be interpreted as promoting the use of detection equipment at border crossing points and elsewhere, and the establishment of procedures that enforcement agencies can use if they encounter an unauthorized cross-border transfer.

Nevertheless, the comprehensiveness of the system it is providing guidance for, combined with the overall brevity of the code, indicates that many aspects of the control system will only be dealt with in broad terms. The code further notes that it relies on 'existing international standards relating to nuclear, radiation, radioactive waste and transport safety and to the control of radioactive sources' and that it is intended to complement these instruments.

The first few paragraphs of the following 'Basic Principles' section largely reiterate the points discussed above. However, paragraphs 9-10 of this section provide some broad guidance on ensuring that personnel involved in managing radioactive sources have adequate resources for carrying out their jobs:

9. Every state should ensure that appropriate facilities and services for radiation [...] security are available to, and used by, the persons who are authorized to manage radioactive sources. Such facilities and services should include, but are not limited to, those needed for:

(a) searching for missing sources and securing found sources;

[...]

(d) the calibration of radiation monitoring equipment.

10. Every state should ensure that adequate arrangements are in place for the appropriate training of the staff of its regulatory body, its law enforcement agencies [...].

The broad focus of these paragraphs are devoted to maintaining the safety and security of sources and recovering orphaned sources, rather than highlighting aspects related to illicit trafficking. As outlined above, the code's definition of 'management' includes administrative and operational activities related to transfer, import, export, and transport of radioactive sources, which would seem to include customs and enforcement bodies concerned with illicit trafficking issues. In addition paragraph 10 explicitly mentions the regulatory body and enforcement organizations. This paragraph could therefore be interpreted as including a recommendation on providing resources for personnel involved in all aspects of controlling illicit trafficking.

Paragraph 12, while again broad in its approach, could be interpreted as including a recommendation that states inform other potentially affected states if they become aware of an incident of illicit trafficking:

Every state should ensure that information concerning any loss of control over radioactive sources, [or any incidents, with potential transboundary effects involving radioactive sources,] is provided promptly to potentially affected States through established IAEA or other mechanisms.

Paragraph 13 contains the only specific reference to customs in the code. Paragraph 13(a) contains a recommendation that states promote awareness of the safety and security hazards of orphan sources among relevant constituencies. 13(b) recommends that states should:

[...] encourage bodies and persons likely to encounter orphan sources during the course of their operations (such as scrap metal recyclers and customs posts) to implement appropriate monitoring programmes to detect such sources.

This paragraph therefore provides explicit, though broad, guidance on putting in place systems for detecting orphan radioactive sources, and thereby helping to counter illicit trafficking.

Paragraph 15 extends the scope of actors involved in countering trafficking by urging states to emphasize to suppliers (and others) their responsibilities for the security (and safety) of sources. It does not, however, provide any specific detail as to how to go about this.

Though paragraph 16 recommends that states define their domestic threat and vulnerability based on potential loss of control and malicious acts involving radioactive sources, this provision appears to be directed mainly at threats arising purely domestically rather than through illicit trafficking.

In the following section ‘Legislation and Regulations’, the code highlights the general areas that need to be included in a state’s legislative framework and regulatory system. The provisions relevant to illicit trafficking include the following:

18. Every State should have in place legislation and regulations that:
 - (a) prescribe and assign governmental responsibilities to assure the [. .] security of radioactive sources;
 - (b) provide for the effective control of radioactive sources; [. .]
 - (d) specify the requirements for the [. .] security of radioactive sources and of the devices in which sources are incorporated.

In paragraph 18, the code specifies that states need to explore what role government should play in assuring the security of radioactive sources, and then ensure that sufficient resources are allocated to the task along with adequate guidelines and rules.

Paragraph 19 specifies what the legislation and regulations should provide for. The first specification, 19(a), focuses on the need for states to set up a regulatory body that is able to function independently. Paragraphs 20 to 22 lists the responsibilities the regulatory body should have. States are to ensure that its legislation provides the body with the authority to establish regulations and issue guidelines relating to the safety and security of radioactive sources. The body should require those who intend to manage such sources to seek authorization for this activity. Those seeking such authorizations should be required to submit various types of information, including a security plan or assessment for the source, if deemed necessary ‘in light of the risks posed’ and ‘the current national threat assessment’.

The focus on the national level may indicate that the regulatory body should be more concerned with purely domestic issues, even though the code’s definition of management includes administrative and operational activities that are involved in the transfer, import, export, and transport of radioactive sources. If the body is indeed responsible for export and import, this provision should serve as broad guidance and provide general principles for establishing the basic regulatory framework for controlling cross-border movement of radioactive sources.

The code also provides guidance on how to ensure only appropriate authorizations are made. It recommends that the regulatory body obtain all relevant information from an applicant for an authorization to manage radioactive sources, and to revoke authorizations if necessary. It stresses that the authorizations should include measures to determine the trustworthiness of individuals involved in the management of radioactive sources, and the confidentiality of information relating to their security.

Paragraph 20(g) recommends that those supplying or transferring radioactive sources (or radioactive source devices) provide the recipient with all relevant technical information to permit their safe and secure management. The code’s definition of management includes both the terms ‘supply’ and ‘transfer’ as well as ‘import’ and ‘export’. If this paragraph applies to those that are involved in the cross-border movement of radioactive sources, this adds another layer of requirements that the exporter would need

to undertake, and which it could be penalized for not undertaking. This paragraph also specifies that the state should ensure that the regulatory body has the authority to 'enforce regulatory requirements'. Since this body is required to ensure that sources are managed in a secure fashion, this provision entails it may have enforcement responsibilities in issues related to illicit trafficking.

Paragraph 20(j) specifies that the body should have the authority to 'monitor, or request other authorized bodies to monitor, at appropriate checkpoints for the purpose of detecting orphan sources'. This provision focuses on an important aspect in breaking an illicit trafficking event. It does not detail in what types of places these checkpoints can or should be erected, however. It does, though, open the possibility of other authorized bodies carrying out these activities. The body should also be able to ensure that 'corrective actions are taken when a radioactive source is in an unsafe or non-secure condition.' Along with the monitoring and detection measures, this provision could help states addressing potential accidental trafficking situations; for example, by unknowingly transporting contaminated scrap metal.

The provision contained in paragraph 20(j) could also potentially apply to dealing with confiscated unauthorized sources during export or import, though the language seems to be directed more at internal and domestic scenarios. Similarly, when this paragraph, in 20(o), recommends that the body should 'establish criteria for intervention in emergency situations;', this would probably be understood to mean situations where radioactive sources have been released or are at risk of being released through accident or design. Again, though, detection of illicit radioactive sources during import or export could qualify as an emergency situation, in which case, this regulatory body may have a role in determining criteria for such events.

For its part, paragraph 20(h), which says that the body should have the authority to 'enter premises in order to undertake inspections for the verification of compliance with regulatory requirements', likely refers to verifying safety and security rules in domestic situations, such as a hospital. But if premises are used for storage immediately before or after import or export, this provision may enable the body to detect and prevent cases of illicit trafficking.

This paragraph also contains a number of generally-worded recommendations that may assist the body in maintaining on safety and security. These specify that the body should be authorized to provide information, coordinate with governmental and non-governmental bodies and liaise with the regulatory bodies of other countries as well as with international organizations.

Paragraph 22 lists several more responsibilities that the regulatory body should be given to maintain the safety and security of radioactive sources. Many of these fall outside the scope of this report's definition of illicit trafficking, but some are relevant. These include record-keeping on authorized persons and transfers, establishing systems for ensuring that radioactive material is identifiable and traceable and requiring prompt reporting by authorized persons of loss of control over radioactive sources. The final paragraph in paragraph 22 asks the state to ensure that its regulatory body can assist 'in respect of orphan sources that may have originated within the state' in obtaining technical information relating to their safe and secure management. This sub-paragraph does not specify to whom this assistance can or should be provided; it therefore leaves open the possibility of collaboration with its own or other states' border control authorities and law enforcement bodies.

In addition to recommending establishing a regulatory body, paragraph 19 lists a number of other key areas that a state's legislation and/or regulations should cover. Those of specific relevance to illicit trafficking, as defined in this report, are:

Such legislation and/or regulations should provide for, in particular: [. . .]

- (e) administrative requirements relating to notifications to the regulatory body of actions involved in the management of radioactive sources that may engender a significant risk to individuals, society or the environment;

- (f) managerial requirements relating in particular to the establishment of adequate policies, procedures and measures for the control of radioactive sources;
- (g) requirements for security measures to deter, detect and delay the unauthorized access to, or the theft, loss or unauthorized use or removal of radioactive sources during all stages of management;
- (h) requirements relating to the verification of the safety and security of radioactive sources, through safety and security assessments, monitoring and verification of compliance, and the maintenance of appropriate records; and
- (i) the capacity to take appropriate enforcement actions.

Within the above list, 19(f) recommends putting in place ‘managerial requirements’ for establishing adequate measures to control radioactive sources. 19(g) recommends putting in place legislation for requirements on security measures. Though much of the operational language appears to be referring to areas outside the scope of this report’s definition of illicit trafficking, it does underline that it applies to ‘all stages of management’, which includes export and import. 19(h) recommends establishing a broad mandate in law to verify the ‘safety and security of radioactive sources’ which could include ensuring that any imports and exports are legal.

The last sub-paragraph is an important provision, since it recommends that the state has legislation in place enabling it to take ‘appropriate enforcement actions’. This means that if unauthorized activities – including relating to cross-border movements of radioactive sources – are detected, the state is empowered to intervene and tackle the situation.

The remaining sections of the code focus on the import and export of radioactive sources, the role of the IAEA and other matters. The code specifies that the IAEA should advise and assist states on all aspects of safe management and secure protection of radioactive sources. This provision therefore provides a broad mandate for assistance from this intergovernmental agency, which can include efforts on illicit trafficking issues. As noted in the beginning of this report’s section on the Code of Conduct, when the text was approved, some concerns remained over the import and export of radioactive sources. Consequently, supplementary guidance was drawn up focusing on this issue. The following section examines this guidance along with the section on import and export in the code that it supplements.

3.2.6.3 Key provisions of the Supplementary Guidance on the Import and Export of Radioactive Sources

The *Supplementary Guidance on the Import and Export of Radioactive Sources* provides non-legally binding guidance on the import and export of radioactive sources. It is supplementary to the Code of Conduct’s paragraphs 23-29, which concern the import and export of certain categories of radioactive sources. The supplementary guidance is intended to establish a ‘common framework’ that states may apply, but ‘should not be construed to amend or supersede applicable guidance under other multilateral import and export arrangements’.

Export authorization

The guidance requires participating states to establish ‘export control procedures’ together with ‘appropriate enforcement measures’ to ensure that no radiological source is transferred without proper authorization. In particular, the exporting state should satisfy itself that the recipient is authorized by the importing state to receive and possess the source in accordance with its laws and regulations. This is done through the importing state issuing a confirmation of consent to the exporting state. If this system was not in place, the consignment may be lawful in the exporting state, but would become illicit trafficking once the source crosses the border.

The guidance specifies the types of information that the exporting state should provide to the importing state when requesting its consent. Moreover, the state should consider a number of factors before authorizing any exports:

- Whether the recipient has been engaged in clandestine or illegal procurement of radioactive sources;
- Whether an import or export authorization for radioactive sources has been denied to the recipient or importing state;
- Whether the recipient or importing state has diverted for purposes inconsistent with the Code any import or export of radioactive sources previously authorized; and
- The risk of diversion or malicious acts involving radioactive sources.

The guidance further suggests that the exporting state satisfy itself that the importing state itself has the 'appropriate technical and administrative capability, resources and regulatory structure needed for the management of the source in a manner consistent with the guidance in the Code'. The guidance also notes that the exporting state can consider the responses, if any, of the importing state to the 'Self-Assessment Questionnaire' (included as Annex I to the Guidance). This self-assessment form includes four broad questions enquiring as to whether the state has established a regulatory framework that is both in place and operational.

The exporting state thus carries out two assessments prior to approving a shipment. The first examines the recipient itself and the second looks at the importing state more broadly. The exporting state can block a consignment if the state has engaged in diversion in the past, but may also base a decision to deny a shipment on a general risk of diversion or malicious acts. This gives the exporting state a large degree of discretion when deciding on whether or not the export should be allowed. The state needs to have some sort of capacity in place to assess individual importers. This could include a simple check with the criminal register, but might also involve the setting up of a dedicated watch-list. Such pre-export checks are used in arms export control regimes, along with techniques to prevent forged documentation being used.

The guidance also deals with notifications prior to shipment. Once the exporting state has decided to authorize the export, the state should ensure that the export takes place in a manner consistent with international standards on transport of radioactive material. The guidance makes no further specifications on this issue but does recommend that the exporting state ensures that the importing state is notified in advance of the shipment with information regarding the estimated date of transport, exporting facility, recipient and other details relating to the radioactive source itself. These additional measures may help to deter or detect any illicit activities that might arise in the final stages of the export and transshipment process.

Import authorization

The importing state is required to set up a mirroring import control system. It should satisfy itself that the recipient is authorized to receive and possess the sources in accordance with its laws. The state must also assess whether it has the appropriate technical and administrative capability to manage the source. Furthermore, it must assess whether the recipient has been engaged in clandestine or illegal procurement in the past; whether an import or export authorization has been denied in the past; or whether there is a more general risk of diversion or malicious acts involving radioactive sources.

The guidance specifies what information it needs to transmit to the exporting state or facility, i.e. recipient authorization and consent notification. It also notes that the importing state should take appropriate steps to ensure the import is conducted in a manner consistent with international standards on transport of radioactive material.

In exceptional circumstances, for examples in cases of health or medical needs, the recommendations it makes do not have to be followed. In such situations, however, the exporting state may be required to maintain control over the sources throughout the period the sources are outside of its territory.

Transit and transshipment

The code does not apply on transshipment states, but requires participants to consider paragraph 29 of the Code when the transport goes through the territory of any state other than the importing or exporting state. This paragraph calls for transshipments to be ‘conducted in a manner consistent with existing international standards relating to the transport of radioactive materials, in particular paying careful attention to maintaining continuity of control during international transport’.

3.2.6.4 Overall assessment

The Code of Conduct applies to materials that could be used in an RDD. It provides guidance to states on establishing the broad legislative and regulatory framework that would form a first line of defence against these materials falling into the hands of terrorist groups or organized crime. However, the code is not legally-binding and allows some discretion to the individual state as to precisely what measures should be implemented.

Due to the breadth of its guidance, it does not focus closely on activities around the point when unauthorized radioactive sources may be taken across borders. It does nonetheless recommend putting in place the overall measures needed to prevent this from occurring, and to address the situation if it does happen. It does not focus strongly on the scenario when a lost radioactive source is trafficked across borders, though this is rectified by the supplementary guidance on export and import. This instrument sets up guidelines on when and how licenses for export and import should be granted to individuals or states. It does not, however, adequately address a situation where a radioactive source is stolen and trafficked across borders without lawful authority.

Read together, the two documents aim to establish a system that minimizes the risk of radioactive material being possessed or transported without lawful authorization. Though they do recommend establishing comprehensive safety and security regulations, along with appropriate enforcement procedures, they do not provide explicit guidance as to what degree such acts should be criminalized. Nor do they establish explicit rules on transnational law enforcement or jurisdiction.

3.3 Conclusions

It is evident from the analysis in this chapter that there are several legal instruments currently in place to control nuclear and other radioactive material. As has been seen, some of these can contribute greatly to controlling and repressing illicit trafficking of nuclear and other radioactive material; others make a smaller contribution. Some conclusions about each set of instruments are provided below, and an attempt to organize the variety and complexity of these instruments can be found in the table in Annex I of this report.

Regarding the IAEA instruments:

- All cover nuclear material except for the Code of Conduct;
- Only the amendment to the CPPNM appears to prohibit illicit trafficking, including cross-border movements, of nuclear materials,
 - However, as noted above, the amendment to the CPPNM is not yet in force;

- The Code of Conduct covers radioactive material, but
 - Does not explicitly prohibit illicit trafficking, and
 - Is not legally binding on members of the IAEA even though many states have expressed their strong support for its implementation;
- The IAEA instruments discussed above include provisions for accounting for, securing or physically protecting nuclear or other radioactive material;
- The IAEA instruments discussed above also include or require export control measures.

Regarding the UN instruments:

- The Nuclear Terrorism Convention and UNSCR 1540 and 1887 cover nuclear materials; the Nuclear Terrorism Convention also covers radioactive material;
- Only the Nuclear Terrorism Convention contains an express prohibition on illicit trafficking;
- The Nuclear Terrorism Convention and UNSCR 1540 and 1887 require states to implement measures to account for, secure and physically protect nuclear materials; only the Nuclear Terrorism Convention extends this to radioactive material;
- Only UNSCR 1540 and 1887 require states to implement export controls, but this is only for nuclear materials.

The ICAO's Beijing Convention, with the objective of preventing unlawful activities involving aircraft, covers radioactive and nuclear materials and includes prohibitions on illicit trafficking as well as unlawful cross-border movements. The convention is not yet in force, however.

The IMO's SUA/2005 Protocol to SUA has the objective of preventing certain unlawful activities involving ships. The amended instrument covers nuclear and other radioactive material and includes provisions to prohibit illicit trafficking. The 2005 Protocol to SUA has specific prohibitions on unlawful cross-border movements of material. It does not include export controls or measures for accounting for, securing, or physically protecting nuclear or other radioactive material. Moreover, the application of the 2005 Protocol to SUA is still somewhat limited by the small numbers of states that have adhered to it.

4. National Implementation

The effective implementation of the international instruments discussed in Chapter 3 requires a careful review of their specific provisions. In order to combat unlawful acts of movement of nuclear and other radioactive material, states may need to harmonize the relevant legal and administrative provisions dealing with illicit trafficking in an accurate and comprehensive document.

It should be noted that it is a general duty for each state to bring its domestic law into conformity with its obligations under international law. Article 27 of the Vienna Convention on the Law of Treaties (1969) provides that a party to a treaty may not invoke the provisions of its internal law (or the absence of provisions) as justification for its failure to perform a treaty.

However, treaty adherence is not uniform. Some of the key treaties have not entered into force, while others have a rather low level of membership—see Annex II of this report. Furthermore, if there is no legislative imperative in the treaty itself, states are not required to implement it.

Naturally, states are not required to implement rules going beyond their treaty obligations. At the same time, there is nothing that prevents them from going beyond their treaty obligations voluntarily. They can do so by either identifying measures going beyond the particular treaty in question, or by implementing provisions of treaties yet to enter into force.⁸⁷

UN Security Council 1540 sets up a Security Council imperative to implement certain basic measures. The resolution lacks specificity, however, as it does not define which measures, precisely, should be implemented. This is left to each individual state to decide for themselves. The implementation of all measures identified in this report is likely to be viewed as a step towards the implementation of resolution 1540. Whether a country decides to do so or not is a sovereign choice. It should be noted, however, that state practice does seem to indicate that many states are willing to go beyond their formal treaty commitments when implementing this resolution.

A large challenge facing legislators is that there is a considerable amount of overlap in the conventions under discussion. It will be difficult to draft a piece of legislation which incorporates several provisions contained in many international legal instruments in an accurate, comprehensive and coherent piece. In addition, states may not be fully aware of the state of their own legislation on these matters. To date, no international surveys of national implementing legislation have been done. Reportedly, not many national studies have been done either. Some states have also highlighted the complexity of the task at hand.

There are two questions to consider in this part of the report. First, how can states implement the matrix of obligations in the instruments identified in the previous chapter—specifically those relating to illicit trafficking and cross-border movements of nuclear and other radioactive material—into their national legal frameworks. The second question is to what degree states are doing this already.

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⁸⁷ In some cases, national legislation may have been prepared beforehand and put into the statute books. However, they may contain a clause saying that the regulation does not enter into force before the entry into force of the underlying international agreement.

A look at these questions begins with the IAEA's recommendations on national measures, particularly in relation to illicit trafficking. The report then considers whether there is a way to systematically examine the laws and regulations in countries around the world to see how they are currently implementing the illicit trafficking-related measures in the instruments discussed in the previous chapter. The report also asks whether there is precedent for this kind of systematic examination and how such an examination could be structured. The chapter also considers whether all aspects related to the control and repression of illicit trafficking in particular should be pulled together into a workable model law for states to incorporate into their national legal systems.

4.1 IAEA recommendations on national measures

The publication *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities* (or Recommendations) dates its origins to 1975.⁸⁸ The fifth and latest revision was recently released in 2011. Though the recommendations do not form a legally-binding document, they 'receive a legal status in some situations by virtue of their adoption in state regulatory frameworks and by reference within other regimes, such as in the Nuclear Suppliers Guidelines'.⁸⁹ They do not apply to other radioactive material.

The recommendations set out a series of measures that should be enacted in national law relating to the physical protection of nuclear material and facilities. The basis for these measures is the suggested fundamental principle that: 'the state is responsible for establishing and maintaining a legislative and regulatory framework to govern physical protection'.⁹⁰

As indicated in the previous chapter, and as recommended by the IAEA, the framework should establish 'applicable physical protection requirements and include a system of evaluation and licensing or other procedures to grant authorization'.⁹¹

A national law should also, in the view of the IAEA, provide for a 'system of inspection of nuclear facilities and transport to verify compliance with applicable requirements and conditions of the license or other authorizing document, and to establish a means to enforce applicable requirements and conditions, including effective sanctions'. On this latter point, the recommendations suggest that 'sanctions against the unauthorized removal and against sabotage should be part of the state's legislative or regulatory system'.⁹²

The IAEA has also published a *Handbook on Nuclear Law—Implementing Legislation*, which draws on the recommendations but gives more detail on legislation to control and repress illicit trafficking of nuclear and radioactive material.⁹³ According to the handbook, such legislation should include:

- (a) A physical protection regime for nuclear and other radioactive material and related facilities;
- (b) Provisions regarding authorization (licensing), inspection and enforcement measures relevant to nuclear material and nuclear facilities (and other radioactive material);

88 *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities*, IAEA Nuclear Security Series No. 13, INFCIRC/225/Rev. 5 (IAEA, Vienna, 2011).

89 *Prevention of the inadvertent movement and illicit trafficking of radioactive materials* (IAEA TECDOC-1311) (IAEA, Vienna, 2002), p. 4.

90 *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities*, IAEA Nuclear Security Series No. 13, INFCIRC/225/Rev. 5 (IAEA, Vienna, 2011), at p 8.

91 *Ibid*, p. 8–9.

92 *Ibid*, p. 9.

93 *Handbook on Nuclear Law – Implementing Legislation*, Carlton Stoiber, Abdelmadjid Cherf, Wolfram Tonhauser, Maria De Lourdes Vez Carmona (IAEA, Vienna, 2010).

- (c) Measures for the prevention and detection of, and response to, incidents of theft or other unauthorized acquisition of or illicit trafficking in nuclear and other radioactive material or sabotage of related facilities;
- (d) Criminal offences for violations of applicable laws and regulations, with stringent penalties, particularly for malicious acts;
- (e) National arrangements necessary to implement international cooperation in protecting radioactive material, recovering stolen or lost material and dealing with offenders.’

Model provisions to implement this framework are proposed in the handbook.⁹⁴

The handbook also proposes a series of model provisions to implement the criminal prohibitions in the CPPNM (and the amendment thereto), the Terrorist Bombings Convention and the Nuclear Terrorism Convention, which were jointly developed by the IAEA and the Terrorism Prevention Branch of the United Nations Office on Drugs and Crime. More will be said below about these model provisions to control and repress illicit trafficking.

4.2 National legislation surveys

Several instruments reviewed in the previous chapter require states to implement their obligations or recommendations into national legislative frameworks. These instruments include:

- IAEA:
 - CPPNM
 - 2005 Amendment to the CPPNM
 - Code of Conduct on the Safety and Security of Radioactive Sources (and supplementary Guidance on the Import and Export of Radioactive Sources)(non-binding)
- UN:
 - ICSANT
 - UNSCR 1540
 - UNSCR 1887 (non-binding);
- ICAO Beijing Convention
- IMO:
 - SUA/2005 Protocol to SUA
 - [SUA PROT/2005 Protocol to SUA 2005]⁹⁵

The provisions calling for national implementation in each instrument are noted in the table in Annex I of this report.

The instruments discussed in Chapter 3 are only enforceable at the national level if they are effectively implemented through laws and regulations. It is difficult to adequately assess *whether* and *how* states are implementing these instruments without a systematic mechanism for doing so.

Such a mechanism has been developed and used to assess national implementation of treaties in other WMD fields including the chemical and biological weapons conventions. It is less clear if there has been a systematic analysis of countries’ laws and regulations to implement the legal instruments relevant to

94 Ibid, p. 135–137.

95 This instrument relates to fixed platforms and is analyzed in Annex I of this report for comparative purposes.

nuclear and other radioactive material discussed in the previous chapter of this report (or at least an analysis that is publicly available), apart from a self-assessment questionnaire in Annex I of the IAEA Guidance on the Import and Export of Radioactive Sources.⁹⁶

There may be an opportunity, then, for a future comprehensive review of whether and how states are implementing the instruments discussed in the previous chapter, with a particular focus on measures to control and repress illicit trafficking.

It should be possible to use the analytical framework and lessons learned from the development of the legislative survey in the chemical and biological weapons fields to inform the development of a legislative survey in the field of illicit trafficking.

Work on national implementation of the Chemical Weapons Convention (CWC), started shortly after its entry into force in 1997. This work originated in the Office of the Legal Adviser (LAO) in the Organisation for the Prohibition of Chemical Weapons (OPCW), and continues to be carried out by the LAO to this day, in co-ordination with the Implementation Support Branch of the International Co-operation and Assistance Division. Initial steps on implementation included national legislation surveys in 1998 and 2001, workshops on legislative issues in 2000 and 2001, and legislation checklists and questionnaires in 2002 and 2004.⁹⁷

Due to a lack of staff capacity and time, the surveys of legislation for implementation of the CWC that the LAO carried out in 1998 and 2001 did not continue. Instead, the LAO began to rely on self-reporting by states through the legislation questionnaires that came out in 2002 and 2004, but the answers were not always very detailed, nor necessarily accurate. Moreover, the Technical Secretariat was tasked by the Eighth Conference of the States Parties in 2003, under the Plan of Action regarding the Implementation of Article VII Obligations, to begin CWC drafting outreach fairly quickly, which left little capacity for systematic legislative analysis. This task fell largely to the LAO.

The first broad overview of legislation for national implementation of the Biological Weapons Convention (BWC) was the VERTIC publication *Time to Lay Down the Law* in 2003.⁹⁸ During 2006-2007, Interpol's Biocriminalization Project consisted largely of gap-analysis of laws and regulations related to implementation of the BWC. This included looking at definitions, criminal offences, jurisdiction, control lists, biosecurity and biosafety measures, transfer controls and enforcement. VERTIC's Senior Legal Officer, who was the Biocriminalization Project Manager at Interpol, continued this process when he joined VERTIC.

VERTIC's National Implementation Measures (NIM) Programme has to date completed 136 analyses or legislation surveys of countries' national laws and regulations to implement the BWC. These surveys are based on a template developed by the NIM Programme with 96 criteria covering the areas mentioned in the previous paragraph. On the basis of this data, it has become much easier to identify which countries require new laws and regulations to implement the BWC, and this has in turn led to direct legislative assistance to over 30 countries in all regions of the world (with several draft laws currently under inter-ministerial review or being considered by national assemblies). The laws and regulations that have been collected by VERTIC staff to prepare these surveys have been posted on the VERTIC website; there are now over 2000 entries.⁹⁹

In order to better understand how the legal instruments in Chapter 3 are being implemented, in relation in particular to illicit trafficking, legislative analysis could be undertaken based on the elements in Box 1.

96 *Guidance on the Import and Export of Radioactive Sources*, IAEA/CODEOC/IMP-EXP/2005 (IAEA, 2005).

97 See *Legislation Questionnaire: Penal Enforcement Of The Chemical Weapons Convention*, S/308/2002 (OPCW, The Hague, 2002), *Questionnaire on the Implementation of Trade Measures under the Chemical Weapons Convention*, S/440/2004 (OPCW, The Hague, 2004), and *Plan of Action regarding the Implementation of Article VII Obligations*, C-8/DEC.16 (OPCW, The Hague, 2003).

98 Available: <http://www.vertic.org/media/assets/Time%20to%20lay%20down%20the%20law%20-%20final%20report.pdf>.

99 See <http://www.vertic.org/pages/homepage/databases/bwc-legislation-database/introduction.php>.

Box 1. Survey template

<p>Definitions:</p> <ul style="list-style-type: none">● nuclear material (and source material and special fissionable material)● radioactive material (and radioactive source and orphan source)● explosive or other lethal device (and device)● nuclear weapon● nuclear explosive device● BCN [biological, chemical and nuclear] weapon● radiological dispersion device● illicit trafficking
<p>Prohibitions/penalties for:</p> <ul style="list-style-type: none">● unauthorized (or otherwise illegal) carrying, delivery, disposal, export, import, movement, possession, receipt, sale, sending, storage, supply, transfer and use● other malicious acts involving nuclear or other radioactive material, or weapons produced with these materials, including those involving aircraft, ships and (possibly) fixed platforms on the continental shelf● preparatory and conspiratorial offences, as well as participation in and contribution to certain crimes● penalties for legal persons
<ul style="list-style-type: none">● Jurisdiction (including extraterritorial) over unlawful acts or unauthorised activities
<ul style="list-style-type: none">● Measures to account for and secure nuclear and other radioactive material (and penalties for failures to ensure proper accounting or security)
<ul style="list-style-type: none">● Physical protection measures (and penalties for failures to ensure physical protection)
<ul style="list-style-type: none">● Measures for regulatory authority for implementation (authorisation, licensing) and enforcement (reporting, national and international inspections)
<p>Measures to control exports and imports, including:</p> <ul style="list-style-type: none">● authorisation (permits)● control lists (trigger lists; dual-use equipment, materials, software and technology lists)● catch-all clause● end-use/user● re-export, transit, transshipment
<p>Law enforcement:</p> <ul style="list-style-type: none">● investigations● surveillance and intelligence gathering● entry/warrant/seizure● evidence collection● prosecutions● international co-operation (e.g., mutual criminal assistance, extradition)

An international survey, such as the one proposed above in this section, would provide an enhanced understanding of the state of legislation worldwide. If conducted properly, the survey would check all relevant aspects of a country's legislation to control nuclear and radioactive material. The survey is likely to touch on several types of legislation, such as penal and criminal procedure codes, laws on counter-terrorism and organised crime, laws to prevent weapons of mass destruction, customs codes, licensing laws, import/export and trade laws (including trade in strategic or dual-use goods legislation), money-laundering laws, laws on mutual criminal assistance and extradition, laws on the management and transport of hazardous or dangerous substances, aircraft and ship/airport and port security laws, rail security laws, laws on surveillance and intelligence gathering and others.

Such a scope is probably necessary, since the legislative remedy to the illegal cross-border movement of nuclear or other radioactive material necessitates a broad response. A complete assessment of a state's nuclear regulation would take into account all aspects of the IAEA's comprehensive nuclear security approach.

4.3 Elements of a model law

Once there is a more comprehensive understanding through legislation surveys of whether and how states are implementing the instruments, the next question is how to assist them to fill in the gaps in their national legal frameworks. This could be done through the development of an integrated legal framework (for instance, a model law). What would such an integrated legal framework look like?

It should be recalled that the IAEA has proposed recommendations for the physical protection of nuclear material and facilities in the *Nuclear Security Recommendations*. In addition, the *Handbook on Nuclear Law—Implementing Legislation* provides model provisions on nuclear security, physical protection and illicit trafficking, as well as model criminal provisions, which can be incorporated into national legislation to control and repress illicit trafficking of nuclear and other radioactive material. These two guides together provide elements for an integrated legal framework.

In addition, this report has identified other elements that should be included in an integrated legal framework, including provisions to control and repress illicit trafficking via aircraft and ships. These are in the ICAO's Beijing Convention and the IMO's SUA/SUA 2005 discussed in the previous chapter.

There are other matters, however, that must be considered for the development of an integrated legal framework. Some instruments are not yet in force (the amendment to the CPPNM, the Beijing Convention), some instruments still have few states parties (the Nuclear Terrorism Convention, SUA 2005), some instruments or guidelines are not legally binding (such as the IAEA Code of Conduct) and some instruments cover either radioactive material or nuclear material—not both. Finally, some governments may not wish to subscribe to every single one of the instruments, and yet, illicit trafficking, especially of radioactive material, remains a serious problem.

UN Security Council resolution 1540 provides the final elements for an integrated legal framework. First, it requires all UN member states to enact certain criminal prohibitions against biological, chemical and nuclear weapons. Second, it requires all UN member states to establish domestic controls over materials which could be used to produce biological, chemical or nuclear weapons. This includes measures to account for, secure and physically protect such materials, and export controls.

Resolution 1540 has a disadvantage, however: it does not cover radioactive material. But it does contribute important elements for an integrated legal framework to counter illicit trafficking, with the imprimatur of Chapter VII of the UN Charter. Moreover, resolution 1540 goes beyond nuclear weapons and materials and encompasses measures against biological and chemical weapons proliferation. There is no reason not to include optional modules in an integrated legal framework, which deal with the illicit trafficking of these weapons and related materials, in addition to the illicit trafficking of nuclear and other radioactive material.

5. Conclusion

To address the problem of illicit trafficking of nuclear or other radioactive material through legislation, it would be useful to examine whether the existing international legal framework is being effectively implemented and applied by states. Based on such a review, there may be room for the development of integrated national legal frameworks to strengthen and streamline the process of dealing with nuclear and other radioactive material, and in particular illicit trafficking.

In Chapter 3 and Annex I of this report, a number of instruments that bear on the illicit trafficking of nuclear and other radioactive material have been identified and analysed. This analysis has shown that the international legal framework to prevent illicit trafficking involves an array of instruments, which have a varying degree of substantive and geographic scope and coverage.

A systematic way of seeing whether and how states are implementing this international legal framework has been proposed in Chapter 4 based on precedent from the BWC and CWC contexts. These surveys will give us a better understanding of how well (or how poorly) implemented the existing international regime is when a large sample set of surveys has been completed.



Annex I: Table of Comparison of Legal Instruments

At present, the international legal regime governing the illicit trafficking of nuclear or other radioactive material is contained in several instruments. This annex lists those with greatest relevance for the illicit possession and transfer of fissile or other radiological material as well as other instruments and arrangements that have some relevance for the broader problem of the illegal possession of nuclear or other radioactive material. These instruments are compared across a range of criteria, including whether they are legally-binding, whether they are in force and their number of parties. Amongst other categories, the annex also identifies whether they cover radioactive material, where their provisions for national implementation lie and where they make provisions for international cooperation and assistance.

Instrument	Legally binding	In force	Number of states parties/ members ¹	Covers radioactive material	Covers nuclear material	Relevant definitions	Prohibitions relevant to illicit trafficking ²	Prohibitions relevant to cross-border movements ³	Jurisdiction	Measures to account for/secure/physically protect	EXIM control	National implementation	International co-operation and assistance/extradition
IAEA													
<i>NPT (and amendment)</i>	Yes	Yes	189	No	Yes	Art. 1(a): nuclear material	Arts. I, II, III	Arts. I, II	Art. 8	Art. III	Art. III	Arts. 4(4), 14; Amendment: Art. 2A	Arts. 5, 11, 13; Amendment: Arts. 11A, 11B
<i>Radioactive Sources: Code of Conduct and Guidance on Import and Export</i>	No	n/a	⁵	Yes	No	Code: Para. 1: orphan source, radioactive source	Art. 7; Amendment: Art. 7(1)(d)	Amendment: Art. 7(1)(d)		Code: Paras. 18, 19, 20, 22	Code: Paras. 23-29	Code: Paras. 18, 19	Guidance: Para. 21
<i>Safeguard Agreement⁶</i>	Yes	Yes ⁷	⁸	No	Yes	Para. 110: nuclear material				Paras. 7, 31, 32, 41, 51 <i>et seq.</i>	Paras. 12, 91-97		
<i>Additional Protocol</i>	Yes	Yes ⁹	¹⁰	No	Yes	Art. 18(h): nuclear material				Art. 2(a)(vi) (a) and (vii)	Art. 2(a)(vi) (b)-(c)		
<i>Conv. on Early Notification</i>	Yes	Yes	112	Yes	Yes								Art. 2
<i>Conv. on Assistance</i>	Yes	Yes	107	Yes	Yes								Arts. 1-5
UN													
<i>Nuclear Terrorism Convention</i>	Yes	Yes	77	Yes	Yes	Art. 1(1): radioactive material; Art. 1(2): nuclear material; Art. 1(4): device	Art. 2		Art. 9	Art. 8, 18		Arts. 5-7	Arts. 7, 13-17
<i>Terrorist Bombings Convention</i>	Yes	Yes	164	Yes	No	Art. 1(3)(b): explosive or other lethal device			Art. 6			Arts. 4-5, 15	Arts. 8-13, 15

Instrument	Legally binding	In force	Number of states parties/ members ¹	Covers radioactive material	Covers nuclear material	Relevant definitions	Prohibitions relevant to illicit trafficking ²	Prohibitions relevant to cross-border movements ³	Jurisdiction	Measures to account for/secure/physically protect	EXIM control	National implementation	International co-operation and assistance/extradition
<i>Financing of Terrorism Conv.</i>	Yes	Yes	175	No	No ¹¹		Art. 2(1)(a) ¹²		Art. 7			Arts. 4-6, 18	Arts. 10-16, 18
<i>Resolution 1540</i>	Yes ¹³	Yes	193	No	Yes ¹⁴	Preamble: means of delivery; non-state actor; related materials				OP 3(a)-(b)	OP 3(C)-(d)	OP 2-3, 6, 8(b)	OP 7, 10
<i>Resolution 1887</i>	No	Yes	193	No	Yes					OP 15	OP 13	OP 27	OP 26
ICAO													
<i>Beijing Convention</i>	Yes ¹⁵	No	22 ¹⁶	Yes	Yes	Art. 2(e): radioactive material; Art. 2(f): nuclear material; Art. 2(h): BCN weapon; Art. 2(j): source and special fissionable material	Art. 1(n)(g)-(i), (3)-(5)	Art. 1(n)(i), (4)-(5)	Art. 8			Arts. 3-4	Arts. 12-18
IMO													
<i>SUA/SUA 2005</i>	Yes	Yes	157/21	Yes	Yes	Art. 1(1)(d): BCN weapon; Art 1(2)(b): source and special fissionable material	Art. 3bis(1)(a)(i), (iv), (b), (2); 3quater(b)-(e)	Art. 3bis(1)(b), (2); 3quater(c)-(e)	Art. 6			Arts. 5, 5bis	Arts. 7, 8, 8bis, 11, 11bis, 11ter, 12, 12bis, 13, 14
<i>SUA PROT/ SUA PROT 2005</i>	Yes	Yes	146/17	Yes	Yes	¹⁷	Arts. 2bis(a), (c), 2ter		Art. 3				¹⁸

Instrument	Legally binding	In force	Number of states parties/ members ¹	Covers radioactive material	Covers nuclear material	Relevant definitions	Prohibitions relevant to illicit trafficking ²	Prohibitions relevant to cross-border movements ³	Jurisdiction	Measures to account for/secure/physically protect	EXIM control	National implementation	International co-operation and assistance/extradition
Regional treaties													
<i>Tlatelolco Treaty</i>	Yes	Yes	33	No	Yes	Art. 5: nuclear weapon				Art. 13	Art. 13		
<i>Palmdaba Treaty</i>	Yes	Yes	31	²⁰	Yes	Art. 1(C): nuclear explosive device; Art. 1(f): nuclear material				Arts. 9(b)-(C) 10; Annex II	Art. 9(b)-(C); Annex II		
<i>Rarotonga Treaty</i>	Yes	Yes	13	²¹	Yes	Art. 1(C): nuclear explosive device	Art. 7(1)(b)-(c) ²²			Arts. 4, 8(2) (C); Annex 2	Arts. 4, 8(2) (C); Annex 2		
<i>Treaty of Bangkok</i>	Yes	Yes	10	Yes	Yes	Art. 1(C): nuclear weapons; Art. 1(e): radioactive material; Art. 1(f): radioactive wastes; Art. 1(g): dumping				Arts. 4(2)(b)-(e), (3), 5, 10(2)(a)	Arts. 4(3), 5, 10(2)(a)		Arts. 11(2)
Other arrangements													
<i>Zangger Committee</i>	No	n/a	38	No	Yes	Memo. A, Section 2 ²³ : source and special fissionable material				INFCIRC/209/Rev.2 (modified, corrected)	INFCIRC/209/Rev.2 (modified, corrected)		
<i>NSG</i>	No	n/a	46	No	Yes	Annex A, Material and Equipment ²⁴ : source and special fissionable material				INFCIRC/254/Rev.10/Part 1	INFCIRC/254/Rev.10/Part 1	INFCIRC/254/Rev.10/Part 1 (Section 11)	INFCIRC/254/Rev.10/Part 1 (Sections 12-17)

Annex 1 endnotes

- 1 As at 29 November 2011.
- 2 Including preparations and alternative criminal liability. The prohibitions here refer to illicit trafficking¹ in the broadest sense of the IAEA definitions.
- 3 Including preparations and alternative criminal liability. The prohibitions here refer particularly to unlawful cross-border movements of nuclear or other radioactive materials.
- 4 The amendment is not yet in force.
- 5 As at 5 September 2011, 105 IAEA member states have written to the Director General stating that they are working towards following the guidance contained in the revised Code of Conduct.
- 6 INFCIRC/153 corrected.
- 7 With those states that have entered into such an agreement with the IAEA.
- 8 178 states have entered into safeguards agreements with the IAEA (<http://www.iaea.org/OurWork/SV/Safeguards/what.html>).
- 9 With those states that have entered into such an agreement with the IAEA.
- 10 112 states have agreed an additional protocol to their safeguards agreements with the IAEA (http://www.iaea.org/OurWork/SV/Safeguards/documents/AP_status_list.pdf).
- 11 Article 2(1)(a) prohibits funding of acts which are offences under, inter *alia*, the CPPNM and Terrorist Bombings Convention.
- 12 Article 2(1)(a) prohibits funding of acts which are offences under, inter *alia*, the CPPNM and Terrorist Bombings Convention.
- 13 UNSCR 1540 is a Chapter VII resolution.
- 14 'Related material' is defined in the Preamble as "... materials, equipment and technology covered by relevant multilateral treaties and arrangements, or included on national control lists, which could be used for the design, development, production or use of nuclear, chemical and biological weapons and their means of delivery".
- 15 Once it enters into force.
- 16 Signatories.
- 17 Article 1(1)(d) [BCN weapon] of the SUA 2005 applies *mutatis mutandis* to SUA PROT as amended.
- 18 Articles 5 and 5bis of the SUA as amended by SUA 2005 apply *mutatis mutandis* to SUA PROT as amended.
- 19 Articles 7, 11, 11bis, 11ter, 12, 12bis, 13, and 14 of the SUA as amended by SUA 2005 apply *mutatis mutandis* to SUA PROT as amended.
- 20 Reference is made in Article 7(b) to radioactive waste and matter – these terms are not defined.
- 21 Reference is made in Article 7(1) to radioactive waste and matter – these terms are not defined.
- 22 These provisions refer to dumping of radioactive waste and matter.
- 23 INFCIRC/209/Rev.2 (modified, corrected).
- 24 INFCIRC/254/Rev.10/Part 1.

Annex 2: Status of International Agreements

X = accession, ratification, etc; (s) = signature only	IAEA Membership	CPPNM	Amendment to the CPPNM	ICSANT	Beijing Convention	SUA PROT	SUA PROT 2005	SUA	SUA 2005	Code of Conduct	Supplementary Guidance
Afghanistan	Yes	X		(s)		X		X			
Albania	Yes	X		(s)		X		X		X	X
Algeria	Yes	X	X	X		X	X	X	X	X	X
Andorra		X		(s)		X		X			
Angola	Yes										
Antigua and Barbuda		X	X	X		X		X			
Argentina	Yes	X	X	(s)		X		X		X	X
Armenia	Yes	X		X		X		X		X	X
Australia	Yes	X	X	(s)		X	(s)	X	(s)	X	X
Austria	Yes	X	X	X		X	X	X	X	X	
Azerbaijan	Yes	X		X		X		X			
Bahamas		X				X		X			
Bahrain	Yes	X	X	X		X		X			
Bangladesh	Yes	X		X		X		X		X	
Barbados						X		X			
Belarus	Yes	X		X		X		X		X	X
Belgium	Yes	X		X		X		X		X	
Belize	Yes										
Benin	Yes			(s)		X		X		X	X
Bhutan											
Bolivia	Yes	X				X		X		X	
Bosnia and Herzegovina	Yes	X	X	(s)		X		X		X	X
Botswana	Yes	X				X		X		X	X
Brazil	Yes	X		X	(s)	X		X		X	X
Brunei Darussalam						X		X			
Bulgaria	Yes	X	X	(s)		X	X	X	X	X	X
Burkina Faso	Yes	X		(s)		X		X		X	X
Burundi	Yes			X						X	X

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Cambodia	Yes	X		(s)		X		X			
Cameroon	Yes	X			(s)					X	X
Canada	Yes	X		(s)		X		X		X	X
Cape Verde	Approved	X				X		X			
Central African Republic	Yes	X		X							
Chad	Yes				(s)					X	X
Chile	Yes	X	X	X		X		X		X	
China	Yes	X	X	X	(s)	X		X		X	X
Colombia	Yes	X		(s)						X	X
Comoros		X		X		X		X			
Congo (Republic of the)	Yes										
Costa Rica	Yes	X		(s)	(s)	X		X		X	X
Côte d'Ivoire	Yes									X	X
Croatia	Yes	X	X	X		X		X		X	X
Cuba	Yes	X		X		X		X		X	
Cyprus	Yes	X		X	(s)	X		X			
Czech Republic	Yes	X	X	X	(s)	X		X		X	X
Democratic People's Republic of Korea											
Democratic Republic of the Congo	Yes	X		X						X	X
Denmark	Yes	X	X	X		X	(s)	X	(s)	X	X
Djibouti		X		(s)		X		X			
Dominica	Approved	X				X		X			
Dominican Republic	Yes	X		X	(s)	X	X	X	X	X	X
Ecuador	Yes	X		(s)		X		X		X	X
Egypt	Yes			(s)		X		X		X	X
El Salvador	Yes	X		X		X		X			
Equatorial Guinea		X				X		X			
Eritrea	Yes										
Estonia	Yes	X	X	(s)		X	X	X	X	X	
Ethiopia	Yes									X	X
Fiji		X	X	X		X	X	X	X		
Finland	Yes	X	X	X		X	(s)	X	(s)	X	X
France	Yes	X		(s)	(s)	X	(s)	X	(s)	X	
Gabon	Yes	X	X	X						X	X
Gambia					(s)			X			

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Georgia	Yes	X		X		X		X			
Germany	Yes	X	X	X		X		X		X	
Ghana	Yes	X		(s)		X		X		X	
Greece	Yes	X		(s)		X	(s)	X	(s)	X	X
Grenada		X				X		X			
Guatemala	Yes	X		(s)		X		X			
Guinea		X		(s)		X		X			
Guinea-Bissau		X		X		X		X			
Guyana		X		(s)		X		X			
Haiti	Yes	(s)									
Honduras	Yes	X				X		X		X	X
Hungary	Yes	X	X	X		X		X		X	
Iceland	Yes	X		(s)		X		X		X	X
India	Yes	X	X	X		X		X		X	X
Indonesia	Yes	X	X		(s)					X	
Iran	Yes					X		X			
Iraq	Yes					(s)		(s)		X	X
Ireland	Yes	X		(s)		X		X		X	
Israel	Yes	X		(s)		X		X		X	
Italy	Yes	X		(s)		X	(s)	X	(s)	X	
Jamaica	Yes	X		(s)		X		X			
Japan	Yes	X		X		X		X		X	X
Jordan	Yes	X	X	(s)		X		X		X	
Kazakhstan	Yes	X	X	X		X		X		X	X
Kenya	Yes	X	X	X		X		X			
Kiribati				X		X		X			
Kuwait	Yes	X		(s)		X		X			
Kyrgyzstan	Yes			X							
Lao People's Democratic Republic	Yes	X									
Latvia	Yes	X	X	X		X	X	X	X	X	X
Lebanon	Yes	X		X		X		X		X	X
Lesotho	Yes	X		X				X			
Liberia	Yes			(s)		X		X			
Libya	Yes	X	X	X		X		X			
Liechtenstein	Yes	X	X	X		X	X	X	X		
Lithuania	Yes	X	X	X		X		X		X	X

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Luxembourg	Yes	X	X	X		X		X		X	X
Madagascar	Yes	X		(s)		X		X		X	X
Malawi	Yes			X							
Malaysia	Yes			(s)							
Maldives											
Mali	Yes	X	X	X	(s)	X		X		X	
Malta	Yes	X		(s)		X		X		X	
Marshall Islands	Yes	X				X	X	X	X		
Mauritania	Yes	X	X	X		X		X		X	X
Mauritius	Yes			(s)		X		X			
Mexico	Yes	X		X	(s)	X		X		X	X
Micronesia (Federated States of)								X			
Monaco	Yes	X		(s)		X		X			
Mongolia	Yes	X		X		X		X			
Montenegro	Yes	X		(s)		X		X			
Morocco	Yes	X		X		X		X		X	
Mozambique	Yes	X		(s)		X		X			
Myanmar	Yes					X		X			
Namibia	Yes	X				X		X		X	X
Nauru		X	X	X		X	X	X	X		
Nepal	Yes				(s)						
Netherlands	Yes	X	X	X		X	X	X	X	X	
New Zealand	Yes	X		(s)		X	(s)	X	(s)	X	X
Nicaragua	Yes	X		X		X		X		X	X
Niger	Yes	X	X	X		X		X		X	X
Nigeria	Yes	X	X		(s)	(s)		X			
Norway	Yes	X	X	(s)		X	(s)	X	(s)	X	
Oman	Yes	X				X		X		X	
Pakistan	Yes	X				X		X		X	
Palau	Yes	X		(s)		X	X	X	X		
Panama	Yes	X		X	(s)	X	X	X	X		
Papua New Guinea	Approved										
Paraguay	Yes	X		X	(s)	X		X		X	
Peru	Yes	X		X		X		X		X	X
Philippines	Yes	X		(s)		X		X		X	X
Poland	Yes	X	X	X		X		X		X	X

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Portugal	Yes	X	X	(s)		X	(s)	X	(s)	X	
Qatar	Yes	X		(s)		X		X		X	X
Republic of Korea	Yes	X		(s)	(s)	X		X		X	
Republic of Moldova	Yes	X	X	X		X		X		X	X
Romania	Yes	X	X	X		X		X		X	X
Russian Federation	Yes	X	X	X		X		X		X	X
Rwanda	Approved	X		(s)							
Saint Kitts and Nevis		X						X	X		
Saint Lucia						X		X			
Saint Vincent and the Grenadines				X		X	X	X	X		
Samoa								X			
San Marino											
Sao Tome and Principe				(s)		X		X			
Saudi Arabia	Yes	X	X	X		X		X			
Senegal	Yes	X		(s)	(s)	X		X		X	X
Serbia	Yes	X		X		X		X	X	X	
Seychelles	Yes	X	X	(s)		X		X			
Sierra Leone	Yes			(s)							
Singapore	Yes			(s)				X			
Slovakia	Yes	X		X		X		X		X	
Slovenia	Yes	X	X	X		X		X		X	X
Solomon Islands				X							
Somalia											
South Africa	Yes	X		X		X		X			
South Sudan											
Spain	Yes	X	X	X	(s)	X	X	X	X	X	
Sri Lanka	Yes			X				X			
Sudan	Yes	X				X		X			
Suriname											
Swaziland	Approved	X		(s)		X		X			
Sweden	Yes	X		(s)		X	(s)	X	(s)	X	X
Switzerland	Yes	X	X	X		X	X	X	X	X	X
Syria	Yes			(s)		X		X		X	
Tajikistan	Yes	X		(s)		X		X		X	X
Thailand	Yes			(s)						X	X
The former Yugoslav Republic of Macedonia	Yes	X		X		X		X		X	

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Timor Leste				(s)							
Togo	Approved	X		(s)		X		X			
Tonga	Approved	X				X		X			
Trinidad and Tobago		X				X		X			
Tunisia	Yes	X	X	X		X		X		X	
Turkey	Yes	X		(s)		X	(s)	X	X	X	
Turkmenistan		X	X	X		X		X		X	
Tuvalu								X			
Uganda	Yes	X			(s)			X			
Ukraine	Yes	X	X	X		X		X		X	
United Arab Emirates	Yes	X	X	X		X		X			
United Kingdom	Yes	X	X	X	(s)	X	(s)	X	(s)	X	X
United Republic of Tanzania	Yes	X						X		X	X
United States of America	Yes	X		(s)	(s)	X	(s)	X	(s)	X	X
Uruguay	Yes	X		(s)		X		X		X	X
Uzbekistan	Yes	X		X		X		X		X	
Vanuatu						X	X	X	X		
Venezuela	Yes									X	
Viet Nam	Yes					X		X		X	X
Yemen	Yes	X				X		X		X	X
Zambia	Yes										
Zimbabwe	Yes									X	
Number of X	151	143	51	77	0	145	17	156	20	105	67
Number of (s)		1	0	61	23	2	13	1	12	0	0
Non-UN members	Holy See	Niue, EURATOM				Niue		Cook Islands, Niue	Cook Islands	Holy See	
Total number of ratifications (Inc. UN and non-UN states)	152	145	50	77		146	17	158	21	106	67
Status as of	17/11/11	29/09/10	15/11/11	01/12/11		08/11/11	08/11/11	08/11/11	08/11/11	23/11/11	23/11/11

Notes:

IAEA Membership: States with 'Approved' are the ones whose membership has been approved by the General Conference but which have not yet deposited their instrument of acceptance of the Statute.

Beijing Convention: Not yet in force

SUA PROT 2005: Article 8 (4) states only a State which has signed the 1988 Protocol without reservation may become a party to this protocol.

Code of Conduct: As this is not legally binding, states with 'X' are the ones that expressed their political commitment to the Code of Conduct.

Supplementary Guidance: Based on 'Notification pursuant to GC(48)/RES/10.D'