Recent changes in the IAEA safeguards regime

The IAEA safeguards system has changed significantly since the entry into force of the International Atomic Energy Agency's (IAEA) Statute in 1957. Initially designed to prevent the loss or diversion of nuclear materials or specialized equipment, safeguards have become a major part of the non-proliferation regime after adoption of the Nuclear Non-Proliferation Treaty (NPT) in 1968.

Today, some 175 countries have facilities or materials under IAEA safeguards. The IAEA has faced continuing challenges during safeguards implementation. Some of these have been country-specific; such as safeguards implementation in Iran, Syria and North Korea. Others have been more general, such as coping with nuclear power expansion and technological evolution.

Future challenges also loom; the IAEA may yet come to play a role in disarmament verification, as modelled in the Treaty of Pelindaba, but this is remains uncertain. In the more immediate future, the IAEA is to play a role in verifying the 2000 Plutonium Management and Disposition Agreement, as amended in 2010. This is a US-Russian agreement on the disposition of plutonium no longer needed for defence purposes.

Facing an increasing workload, the IAEA is running on a tight budget. The recently-published 'Programme and budget for 2012-2013' warns that 'demands for the Agency's services are growing at a rate beyond what can realistically be funded through the regular budget'. Therefore, some of the money will need to be delivered to the Agency on an extrabudgetary basis, and in support for specific projects. This is not without risk. The

In this issue

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programme and budget notes that these 'are unpredictable, often tied to restrictive conditions and thus involve some risk for the programme'.

This year, the General Conference of the IAEA agreed on a budgetary increase of no more than 2.1 per cent (plus a 1.1 per cent inflation increase) but the IAEA Secretariat will still have to try to deliver more services—which means that the IAEA has to deal with the challenges of both effectiveness and efficiency.

Herman Nackaerts, the head of the IAEA's Department of Safeguards, summed up this challenge in his opening statement to the 2010 IAEA safeguards Symposium.'We need to further optimize the use of our resources', he said,' by avoiding unnecessary effort and focusing instead on that which is most important'. He continued by saying that at the same time, the Agency must not compromise its ability to draw 'independent and soundly-based safeguards conclusions: we must continue to apply safeguards in a fair and non-discriminatory manner to all states'.

Mr Nackaerts stressed the need for fundamental reform. In his words, the IAEA needs to 'move further away from an approach that is narrow, prescriptive, criteria-driven, and focused at the facility level—to one that is more objectives-driven, customized, and focused at the state level'. He concluded that, 'this makes sense because we need to be guided by objectives rather than procedures: concerned with outcomes rather than processes.'

Also introduced during the symposium, the first ever long-term (2012-2023) strategic plan of the IAEA Department of Safeguards gives further details on how the new approach will be implemented for the next twelve years.

This article introduces the improved safeguards system as suggested by the IAEA. The first part highlights the need to leave an approach that is narrow, prescriptive, criteria-driven, and focused at the facility level. The second part then explores developments needed to set up an objectives-driven, customized and state-level focused safeguards system.

The established 'quantitative' approach to safeguards implementation

The current form of safeguards agreements that have to be concluded pursuant to the NPT are known as comprehensive safeguards agreements (CSAs). Non-nuclear-weapon states agree to a CSA individually with the IAEA; however, since 1972, all agreements are based on the model text known as Information Circular (INFCIRC)/153.

This template stipulates a 'bottom-up' approach for safeguards. This means that implementation starts with material accountancy at each individual facility and finishes with the IAEA evaluating the collected data in the state as a whole.

This approach, according to paragraph 28 of INFCIRC/153, intends to ensure 'the timely detection of diversion of significant quantities of nuclear material from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices'. It is not necessary for the IAEA to confirm that materials are going to weapons manufacturing, as a breach of safeguards will also have occurred if materials are diverted 'for purposes unknown'. Importantly, comprehensive safeguards aim to deter such diversion by means of early detection.

Nuclear material accountancy is the cornerstone of the safeguards regime. To comply with its safeguards agreement, a state must provide the IAEA with accounting records of all nuclear material subject to safeguards. To do this, they need to have developed a 'State or Regional System of Accounting for and Control of Nuclear Material' (known as SSACs or RSACs). The frequency and intensity of routine inspections by IAEA inspectors are then determined by the type and quantity of nuclear material present at the site.

The number and types of facilities containing nuclear material subject to safeguards are also important characteristics of a state's nuclear fuel cycle to be taken into account when determining safeguards activities. In this respect, the model text of INFCIRC/153 prescribes the 'concentration of verification procedures on those stages in the nuclear fuel cycle involving the production, processing, use or storage of nuclear material from which nuclear weapons or other

nuclear explosive devices could readily be made, and minimization of verification procedures in respect of other nuclear material, on condition that this does not hamper the Agency in applying safeguards under the agreement.'

Together, these provisions reflect the 'prescriptive, criteria-driven and focused at the facility level' approach described by Herman Nackaerts.

Towards a 'qualitative' approach to safeguards implementation

With the uncovering of clandestine Iraqi nuclear activities in the early 1990s, it was revealed that Saddam Hussein had managed to hide an extensive weapons programme under the noses of IAEA inspectors. This development deeply shook the Agency, which subsequently reaffirmed the need to provide assurance on both the correctness and the completeness of states' nuclear material declarations.

The Model Additional Protocol (INFCIRC/540) was subsequently introduced to strengthen the IAEA's capacity to provide this extent of assurance. The Additional Protocol was adopted in 1997, after several years of development and negotiations. In the words of John Carlson ('Is the Additional Protocol optional?', *Trust & Verify* No. 132, January-March 2011) the protocol 'substantially strengthens levels of assurance on the peaceful nature of nuclear activities […] by broadening the information to be reported to the IAEA and the access given to inspectors.'

The task of examining the completeness, as well as correctness, of states' declarations has prompted the IAEA to develop a more 'qualitative' approach to safeguards implementation.

Consequently, over the last 10 years, the Agency has been working to develop more 'information-driven' safeguards; that is safeguards 'whose planning, conduct and evaluation are based on an ongoing analysis of all safeguards relevant information available to the Agency about a state' (IAEA Annual report 2009 and 2010, p. 79) The objective is to focus verification activities on states and facilities of the most concern. In other words, verification activities are to be guided by a broader set of information. Under this approach, the IAEA not only uses information provided by states through their reporting duties and information gained from Agency inspections, but it also looks for 'open-source' and 'third-party' information.

The process described aims to develop a picture of states' nuclear programmes through a comprehensive evaluation of all available information. This necessitated the development of the 'state-level approach' (SLA). As explained by Richard Hooper, a former Director of the Division of Concepts and Planning within the Department of Safeguards, the SLA reflects a 'shift in emphasis from evaluating information on a facility-by-facility basis to the consideration of information for the state as a whole' (IAEA Bulletin, No 45/1, June 200). These approaches include state-specific factors that modulate safeguards implementation and evaluation. Thus, they allow for more flexibility and a less mechanistic application of safeguards. In this respect, Article 4 of the Additional Protocol precisely states that the IAEA 'shall not mechanistically or systematically' seek to verify information referred to elsewhere in the protocol.

So-called Integrated Safeguards (IS) have been implemented for the last nine years, partly to try to realize this principle of flexibility. According to the 'Conceptual framework for integrated safeguards' adopted by the Agency's Board of Governors in 2002, IS are 'an optimized or optimum combination of measures under comprehensive safeguards agreements and Additional Protocols.'

The implementation of IS are carried out individually in states with both a CSA and an Additional Protocol in force. However, before IS can be applied, the IAEA Secretariat first has to draw a 'broader conclusion' that all nuclear material in the state concerned has remained in peaceful activities. In other words, it must be absolutely sure that the state's declarations are correct and complete. Once such a conclusion has been drawn, an integrated approach for that state can be implemented.

Compared to traditional safeguards implementation, IS involve more 'randomization' of on-site verification. Unan-

nounced or short-notice inspections, provided for in a comprehensive safeguards agreement, are conducted, together with the complementary access allowed by the Additional Protocol, on a random basis. It 'places the potential diverter in a permanent state of uncertainty and can be used to detect and deter from undeclared activities in a facility', as the ESARDA working group on integrated safeguards explains (Arnold Rezniczek and Christophe Xerri 'Aspects of Unannounced Inspections—A View of the ESARDA WG on Integrated Safeguards', *Esarda Bulletin* No. 32, 2004).

Such an 'optimum combination of safeguards measures' thus provides for gains in both effectiveness and efficiency. Because of the increased assurance of the absence of undeclared nuclear material and activities for the state as a whole, the frequency and intensity of inspection activities at declared facilities and locations outside facilities could be reduced. Indeed, Integrated Safeguards may eventually lead to a significant drop in inspector days spent in the field, which would be desirable for both the Agency and the inspected country.

VERTIC blogs, July- September 2011

Monitoring the decline of Arctic ice – Kate Farrell – 29 September
The (temporary) fall of the safeguards resolution – Andreas Persbo – 28 September
Fifth day of the 55th IAEA General Conference – Sonia Drobysz and Kate Farrell – 24 September
Fourth day of the 55th IAEA General Conference – Sonia Drobysz and Kate Farrell – 22 September
Third day of the 55th IAEA General Conference – Sonia Drobysz and Kate Farrell – 21 September
Second day of the 55th IAEA General Conference – Sonia Drobysz and Kate Farrell – 20 September
Opening day of the 55th IAEA General Conference – Sonia Drobysz and Kate Farrell – 20 September
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Student VEREX: a host perspective – Hugh Chalmers – 29 July
Improving communications from space – Rebecca Pryce – 22 July
Syria referred to UNSC – Mikael Shirazi – 14 July
Value of interest in BWC – Isadora Blachman-Biatch – 8 July

Norway's experience of the system, as related by a staff member of the Norwegian radiation protection authority illustrates this trend. The staffer in question explained that, 'with the traditional safeguards regime the IAEA spent between nine and eleven days at Norwegian facilities every year. With integrated safeguards fully implemented the number of days stayed around the same for the first years, but has been reduced to seven days for the last two years.'

The IAEA also noted in the Programme and Budget for 2010-2011 that 'approaches based on unannounced inspections to verify transfers of spent fuel to interim dry storage were implemented at 16 power reactors and resulted in a saving of approximately 30% of inspection effort.'

This shows that implementation of the Additional Protocol in states may ultimately lead to a decrease in day-to-day verification. Nonetheless, some implementation issues remain. First, it usually takes around five years to set up integrated safeguards, sometimes longer. Some states therefore complain about not seeing the immediate benefit of having an Additional Protocol in force Current delays are sometimes due to the time needed to draw the aforementioned broader conclusion, or to the time required to design the state-level integrated safeguards approach. Other factors which slow down implementation are attributable to states' lateness in filing their first declaration under the Additional Protocol.

Second, integrated safeguards can involve 'hidden chores' for states. Indeed, less IAEA on-site presence implies more reliance on State Systems of Accountancy and Control activities. National authorities thus have to keep up with an increasing workload. Also, unannounced and short-notice inspections by the IAEA are sometimes inconvenient both for operators and national inspectorates who do not have enough time to get ready before the inspectors arrive.

Third, and finally, the implementation of Integrated Safeguards can actually be somewhat inflexible in itself. Some states complain of burdensome mechanistic requirements, such as multiple controls on the same item in a short period of time.

This brief assessment of information-driven safeguards, the state-level approach and integrated safeguards reveals significant progress towards a more qualitative safeguards system—despite a few remaining implementation issues. Along the lines of this progression, the IAEA is today willing to improve and optimize the system even further.

Developing a more objectives-driven, customized, and state level focussed safeguards system

First and foremost, developing fully information-driven safeguards is still a top-priority for the IAEA, as stated in the Agency's programme and budget for 2012-2013.

Nuclear material accountancy will always remain the lynchpin of safeguards implementation. However, its verification cannot be the sole purpose of the inspectors' work and other important factors—including information—have a role to play when the IAEA is deciding on the frequency and intensity of its on-site activities. As often said within the IAEA Department of Safeguards, inspectors are moving from being accountants to investigators.

As part of this evolution, significant efforts are being devoted to improving the state-level concept for planning, implementation and evaluation of safeguards activities. The Department of Safeguards' long-term strategic plan and statements of staff members highlight the need to set up 'tailor-made' or 'customized' safeguards approaches for every state that emphasize more 'qualitative' factors. This does not only apply to states with an Additional Protocol in force, but also to states with comprehensive safeguards agreements only.

Nonetheless, state factors need to be precisely-defined and objective: this is the core of the 'differentiation without discrimination' idea referred to by Herman Nackaerts in his address to the 2010 Safeguards Symposium . Although often suggested by some, examining political or military intentions is not part of the Agency's mandate and is neither possible nor desirable (on 'nuclear-mind reading', see James Acton in Survival, vol. 51, February-March 2009).

Furthermore, additional ways could be explored to accelerate the integrated safeguards implementation process. Assistance programmes aimed at helping states to bring into force CSAs and Additional Protocols, and to help them comply with their reporting duties under those instruments could, for instance, help speed up the drawing of broader conclusions with regard to the peaceful use of all nuclear materials within a state.

There is also a pressing need for effective and efficient state systems of accountancy and control. This is underlined in the IAEA Safeguards Statement for 2010 (http://www.iaea.org/OurWork/SV/Safeguards/es/es2010.html): 'the performance of State and regional authorities and the effectiveness of SSACs and RSACs have a significant impact upon the effectiveness and efficiency of safeguards implementation.'

Some states still do not have such systems in place, or lack the necessary authority, independence, staff and resources. When this is the case, it becomes difficult for the IAEA to rely on the results of national verification to inform their own assessments. Helping states to develop their own systems of accounting for and control could eventually lead to a more flexible approach to safeguards implementation.

Technological improvements and strengthened analytical capabilities

An important aspect of the evolving safeguards system reflected in the IAEA 2010 Annual Report (on p83 of that document) is that it increasingly uses remote monitoring and surveillance systems.

Without undermining the added value of inspector's on-site presence when needed, such systems can help realize further efficiencies. The 2010 Annual Report mentions that it is difficult to precisely quantify savings of inspection efforts achieved through the implementation of remote monitoring. However, it nevertheless estimates a net saving of 227 person-days of inspections in 2010.

Surveillance and remote monitoring systems are also being modernized. Technological concepts and approaches are being developed to cope with new generations of nuclear

installations. The 'safeguards-by-design' approach should, for instance, permit safeguards features to be incorporated into the construction of nuclear facilities from the very beginning of the design process.

In addition, improvements to the IAEA's analytical infrastructure are being made. A project to strengthen the capabilities of the safeguards analytical services (the ECAS project) has been set up to ensure that the Agency's laboratories can keep up with the task of providing the necessary analytical support for the analysis of nuclear material and environmental samples in a cost-effective, timely and reliable manner.

The Safeguards Clean Laboratory Extension, which is part of the environmental sample laboratory in Seibersdorf, Austria, was inaugurated on 7 September 2011. In the press release announcing the event, the IAEA underlined the stated objective of 'enhancing the Agency's independent nuclear analytical capacity and forensics capability, strengthening the organization's ability to fulfil its role under the NPT.'

Changes in institutional practices

The functional and technological advances at the IAEA are being accompanied by changes to optimize institutional practices. Enhancement of the organizational culture is visible at two levels.

First at an internal level, inter-departmental communication and collaborative analysis are being strongly encouraged. The IAEA Annual Report notes that the Agency 'is moving to a system of collaborative analysis by multidisciplinary state evaluation groups'. In addition, the IAEA has set up 'a team consisting of senior safeguards staff to review the quality of several recent state evaluation reports to identify and recommend corrections to generic weaknesses in the process.'

Second, the IAEA Long-Term Strategic Plan identifies the need to develop communication with stakeholders and the public on the IAEA, its verification activities and missions.

In parallel with encouraging states to be more transparent on their nuclear programmes, the Agency seems to be willing to be more transparent itself. In this respect, it will be important to ensure that safeguards costs and implementation evaluation are correctly accounted for and reported The Safeguards Statement for 2010 therefore announces adoption of an improved cost calculation methodology, which establishes and monitors the cost of carrying out safeguards activities and enables the costs of different safeguards implementation choices to be compared, resulting in data which can be used in efforts to achieve overall efficiency gains.

Conclusion

The IAEA's statements and reports on its current safeguards strategy reveal a firm intention to improve the regime. This is a welcome fact. However, changes must not only come from the IAEA Secretariat. They also have to be supported by member states. This raises the issue of the need for an increased safeguards budget, but also for a consensus on standard safeguards norms. In this respect, the IAEA's ability to draw sound safeguards conclusions still requires full and universal legal authority; in other words, it requires the universalization of the Additional Protocol.

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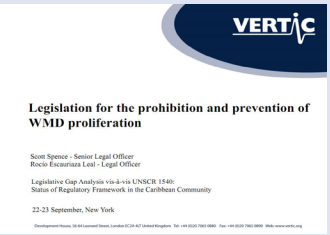
New on the website, July- September 2011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Legislation for the prohibition and prevention of WMD proliferation

Scott Spence - Senior Legal Officer
Rocío Escauriaza Leal - Legal Officer

Legislative Gap Analysis vis-à-vis UNSCR 1540:
Status of Regulatory Framework in the Caribbean Community

22-23 September, New York

VERTIC National Implementation Measures Programme Staff—Scott Spence and Rocio Escauriaza Leal—participated in the CITS CARICOM workshop on 'Legislative Gap Analysis vis-a-vis UNSCR 1540: Status of Regulatory Framework in the Caribbean Community'. The event took place in New York during 22-23 September 2011. The objective of the workshop was to discuss the results of the CITS review of the national legal bases for strategic trade controls in each of the 15 CARICOM member states, with a view to identifying regulatory gaps. VERTIC contributed to the workshop with a presentation on legislation for the prohibition and prevention of WMD proliferation as well as with the handover of legislative analyses for each country, in relation to the BWC and BW-related provisions of UNSCR 1540. All laws and regulations identified for these legislative analyses have been posted on VERTIC's website.


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MULTILATERAL DISARMAMENT VERIFICATION
David Keir, Senior Researcher
55th Annual Regular Session of the IAEA General Conference
Vienna, Austria, 19 September 2011

Introduction
Madam Chair, thank you for giving us the opportunity to once again address this meeting. Much has happened since we last presented to this meeting, in 2009.

I would like to mention some of our activities since then, and focus on a particular area that we wish to pursue.

Earlier this year, to mark its 25th anniversary, VERTIC convened a three-day gathering at the Wilton Park conference venue in West Sussex, England, for a set of discussions under the banner of: *'Uncertain Futures—Where Next for Multilateral Verification?'*

One of the main points to emerge from that conference was that, while progress in multilateral arms control verification is often painstakingly slow, it seems that from time to time 'windows of opportunity'—moments where ideas, technical feasibility and political interests are aligned at both domestic and international levels—may present themselves.

And though they may be few and far between, it is in these windows of opportunity where—assuming that the right preparatory work has been done in the interim periods—meaningful strides forward can be made.

Progress to date
Overall, in spite of the slow rate of advancement, in the 25 years since VERTIC's founding in the mid-1980s there has been a substantial amount of progress in the multilateral verification of arms control.

To name just a few examples, the Chemical Weapons Convention has come into force, the Comprehensive Nuclear-Test-Ban Treaty has been brought into existence and the IAEA has developed the Additional Protocol to its standard nuclear safeguards agreements—with 110 states now implementing the enhanced safeguards measures contained in the model Additional Protocol text (as of 27 July 2011).

There are, of course, tens of thousands of nuclear weapons still in existence, in the arsenals of the five recognised NPT Nuclear-Weapon States and those nuclear-armed states currently outside the NPT.

But, as some of my VERTIC colleagues have written in a forthcoming report on the subject of 'Irreversibility in Nuclear Disarmament', while there is clearly much more to be done with regard to implementation of disarmament obligations the increased political attention on nuclear disarmament seen

In September, VERTIC Senior Researcher Dr David Keir made a presentation to the 54th IAEA General Conference in Vienna, addressing the issue of multilateral disarmament verification—a subject area that the VERTIC Arms Control and Disarmament Programme is particularly active in.

The presentation looks at the importance of verification itself, and the benefits that multilateral involvement in verification can provide. It looks back to the UK-Norway Initiative, a collaborative research effort that VERTIC has in the past been closely involved with, and forward to the potential future roles of non-nuclear-weapon states—and international organizations—in nuclear disarmament verification processes. 'By promoting inclusiveness and equity, effective multilateralism can create order and legitimacy in international affairs', Dr Keir said. 'Effective multilateral disarmament verification research has the potential to build trust among parties, to find a consensus on the key technical and procedural sticking-points, to generate ways of resolving those issues, to further the disarmament cause and to bring new states into the disarmament fold.' The presentation is available in full on VERTIC's website.


"Multilateral verification has evolved drastically over the past 25 years. The transition from theory to reality has provided lessons and experiences for all stakeholders."

VERTIC BRIEF • 15 • AUGUST 2011

B R I E F

Verifying multilateral regimes: uncertain futures

Yasemin Balci

VERTIC

Brief No. 15 'Verifying multilateral regimes: uncertain futures'. This brief, by Yasemin Balci, summarizes the discussions and conclusions of participants attending VERTIC's recently-held 25-year anniversary conference. The meeting, 'Uncertain futures: where next for multilateral verification?', discussed the operation and future direction of multilateral verification regimes. It was hosted by Wilton Park in Steyning, West Sussex, from 1-3 June 2011.

Universalizing the BWC: challenges and opportunities

Achieving universal adherence to the 1972 Biological Weapons Convention (BWC) will be a major topic during the treaty's seventh review conference, which takes place in Geneva from 5 to 22 December of this year.

While the 1993 Chemical Weapons Convention (CWC) currently has 184 parties and the 1968 Nuclear Non-Proliferation Treaty (NPT) has 191, the BWC has only 164. Mozambique was the most recent state to have 'acceded', on 29 March this year. There are still 31 non-states parties to the BWC. This group includes 13 signatories and 18 states that have neither signed nor ratified, spread across all the regions of the world, but mostly located in Africa and in the Pacific, see table 1. So, why is there a delay in progress on universalizing the prohibition against biological weapons?

Through its efforts to promote ratification or accession to the BWC, VERTIC has been able to identify several reasons why universalization of the BWC is progressing slowly. These include a lack of capacity resulting from internal political and administrative difficulties to put in motion the processes needed for joining the convention, and a lack of awareness of the benefits of ratifying or acceding. Finally, some countries have strategic and regional policy reasons for not joining the BWC.

Lack of capacity to join the BWC

Some countries lack the necessary human and financial resources to deal with all the multilateral work that needs to be carried out. This might include considering signing and ratifying or acceding to numerous treaties in diverse areas, and fulfilling these agreements' implementation requirements. Human rights, development and environment treaties tend to be the priority areas for those countries that neither possess biological weapons nor carry out activities using biological agents for prophylactic, protective or peaceful research.

Article IV of the BWC requires its parties to take any necessary measures to prohibit and prevent the 'development, production, stockpiling, acquisition or retention' of biological weapons in its territory and anywhere under its jurisdiction, in accordance with their constitutional processes. The BWC is not a self-executing treaty; that is, the convention requires the adoption of implementing measures for it to be effective, but passing legislation is a lengthy process and requires technical expertise.

The constitutional arrangements in some Common Law countries require them to implement treaties prior to ratification or accession: therefore parliaments need to adopt implementing legislation at the same time as they approve the treaty's ratification or accession instrument. These states can facilitate their ratification or accession process by taking advantage of model laws and technical assistance which are available free of charge from assistance providers (see below) and provide countries with the necessary tools to tailor their implementing legislation to their needs.

Some treaties have reporting requirements, which means that states parties have to submit information to a secretariat or equivalent administrative body on a regular—or at least periodic—basis. For example, regular reporting is required by the CWC, which asks states to submit an initial declaration, then annual declarations on certain chemicals and facilities within their respective territories.

States parties to the BWC are politically bound to file 'Confidence Building Measures' (CBMs) every year. The CBM mechanism is meant to enhance transparency on a number of issues, for example through the exchange of data on research centres and laboratories (CBM A), or by declaring relevant legislation, regulations or other measures (CBM E).

Preparing the CBM forms is not an easy task as it requires

gathering a range of information from various ministries and industry—which are often not aware of the BWC obligations and are not necessarily willing to spend time on this matter or to share information. But for a country with little biological-related activity to report, this should not be considered a complicated activity. Again, assistance packages are available for preparing a first CBM return. And once a country has submitted its first CBM return, it can submit its annual return stating only 'nothing new to declare'—if that is the case.

Internal political and administrative difficulties

Administrative hurdles, internal political obstacles and national policy prioritisation can prevent a country's ratification or accession process from getting started, or once in motion, these factors can cause delay, or bring the process to a halt.

Lengthy administrative national procedures can also delay the process significantly—if the approval of numerous ministries is required for ratification or accession, for example. The national champion leading the ratification or accession process might not be aware of the procedure that needs to be followed to join the treaty and they might not be aware of where the instrument should be deposited. In addition, the ratification and accession instrument may not be adequately drafted.

Even once a ratification/accession instrument has been drawn up and signed, it can get lost—especially after a change of government. Countries wishing to join the convention should be aware that even though such issues may arise, support from international partners is available to facilitate the process, upon the countries request (see more on this below).

Political obstacles can emerge throughout the ratification or accession process and freeze it for some time. The national champion (that is the person taking the lead to ratify or accede to the convention) may not find the necessary political will to support the ratification/accession. Changes in government may occur, desk officers might be posted elsewhere causing delays or even the collapse of the process—making previous efforts invalid and often requiring the whole process to be restarted from scratch. National elections may be scheduled, which also can slow down or

Table 1: Non-states parties to the BWC

Region	Signatory states	Neither signed nor ratified
Africa	Burundi, Central African Republic, Côte d'Ivoire, Egypt, Liberia, Malawi, Somalia, South Sudan, United Republic of Tanzania	Angola, Cameroon, Chad, Comoros, Djibouti, Eritrea, Guinea, Mauritania, Namibia
Pacific		Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, Niue, Samoa and Tuvalu
Middle East	Syrian Arab Republic	Israel
Americas/Caribbean	Guyana, Haiti	
Asia	Myanmar, Nepal	
Europe		Andorra

stop the process: indeed, the adjournment of parliament can be particularly detrimental since it falls to such bodies to pass a law or decree approving the country's adherence to international treaties and therefore allowing the ratification/accession of any given treaty.

Lack of awareness

Developing countries may consider that they have more pressing priorities than disarmament—such as tackling disease, drought, poverty, desertification, displacements, debt or internal wars. Scheduling time to fulfil the international disarmament obligations is therefore not always easy or desirable. However, countries are often unaware that implementing the BWC can bring benefits that relieve pressure from at least some of these challenges.

The BWC assist in strengthening national systems to prevent and respond to natural disease outbreaks affecting human, animal and plant health. Strengthening cooperation with international partners could also help in preventing or containing outbreaks in the aftermath of a natural disaster. For instance, the establishment of national reference laboratories complying with international standards, would result in faster diagnoses of contagious diseases (especially endemic diseases) and therefore enable more effective response and containment measures.

Additionally, robust biosafety and biosecurity measures would encourage investment in biological research and biotechnology since effective implementation of BWC obligations would signal the government's commitment to non-proliferation and international standards.

On national security, implementation of the BWC can help to prevent non-state actors from acquiring 'dual-use' material (that is biological agents that can be used both for peaceful legal purposes such as for prophylactic and protective research but also for illicit purposes) that may be used in a biological attack. Implementation of the BWC can also improve the response mechanisms to a potential use of biological weapons within the territory of a state.

Countries' security would also be enhanced if states throughout the region implement similar counter-proliferation measures. Some regions are currently assessing the benefits of having a common approach to implementation and enforcement, as this would result in more effective coordination and better use of relevant resources to respond to a biological attack.

Additionally, non-states parties may wish to consider that implementation of the BWC satisfies the biological weapons related obligations under UN Resolution 1540 (2004). This resolution requires states to 'adopt and enforce appropriate effective laws which prohibits any non-state actors to manufacture, acquire, possess, develop, transport, transfer or use' biological weapons; and to take and enforce 'appropriate and effective' measures that guarantee the accountability and physical protection security of dual use materials as well as measures that ensure border controls and export

Table 2: New BWC parties since 2006

Region	Ratification	Accession
Africa	Gabon (16 August 2008) Madagascar (7 March 2008)	Zambia (15 January 2008), Mozambique (29 March 2011)
Pacific		Cook Islands (4 December 2008)
Middle East	United Arab Emirates (19 June 2008)	
Americas/Caribbean		
Asia		Kazakhstan (28 June 2007)
Europe		Republic of Montenegro (3 June 2007)

controls over such items. Adequate BWC implementation ensures compliance with UNSCR 1540 obligations, which are mandatory for all states.

Strategic and regional policy objections

Those states with strategic and regional policy objections to ratifying or acceding to the BWC are mainly located in the Middle East/North Africa region, where the CWC faces similar issues. The political situation in the region, combined with the fact that some countries are suspected of harbouring biological weapons programmes, is the primary reason why certain states are not willing to ratify or accede to the BWC. Some are deterred from adhering to the BWC by others' choice not to join, perceiving themselves to be at risk from a biological attack against their army and/or population.

If countries with biological weapons programmes were to join the convention, they would have to destroy their stockpiles and shut their programmes down. They would also have to provide a full account of their past programmes' activities through the CBMs mechanism (see above). And, by committing to the BWC, they would be agreeing not to develop or possess biological weapons in the future. Other parties hold concerns about the commitment to BWC obligations—especially on disarmament—of new treaty members with suspected weapons programmes. The lack of an effective verification system is consequently a significant issue.

Simultaneous adherence actions would be a potent confidence-building measure: a regional common approach when considering ratification or accession to the BWC would be desirable, as it would generate confidence among countries and compliance with the convention's obligations.

Universality efforts

Since the 2006 BWC Sixth Review Conference, different actors, mainly the BWC Implementation Support Unit, governments and civil society, have engaged in activities to increase the number of BWC ratifications/accessions with a view to achieving universal adherence to the convention. As a result of these efforts, the convention has gained eight new member states (see table 2) . But most of these joined soon after the 2006 Sixth Review Conference ended: there were no new members during 2009 or 2010, and so far, only one new member state in 2011.

Further sustained efforts are required to raise the numbers of the BWC's membership: dedicated time needs to be allocated to this goal (instead of being an ad hoc activity) and existing cooperation between the different actors needs to be reinforced. Regional awareness-raising workshops for non-states parties can be very helpful in efforts on BWC universality. They should be organized more frequently both to ensure that non-states parties are fully aware of the existence of the norm against biological weapons and of the benefits of its implementation.

Other initiatives include regular bilateral consultations in the margins of relevant meetings in which non-states parties to the BWC are participating. For example, delegates could be approached during the Conference of States Parties for the CWC or at the General Conference of the International Atomic Energy Agency. Embassies located in non-states' parties' capitals could be used for diplomatic demarches.

In-country visits could also be arranged to raise awareness among key national stakeholders and to provide the necessary technical assistance. These measures can help to generate the political support required at the national level to move forward with ratification/accession. Regular follow-up with the national champion is also needed to capitalize on any momentum generated.

The political approach to universalization is essential, but needs to be complemented with the necessary practical approach. Practical tools can be provided to non-states parties to facilitate ratification or accession; these could include information about the BWC, model instruments of ratification/accession, points of contact to turn to for additional information and technical assistance that can be delivered in-country. Governments should be approached in their native language, to ensure clarity, efficiency, thoroughness

and ownership by the state. However, countries considering joining the BWC also need to be aware that their instrument of ratification/accession should be deposited in one of the official languages of the convention (English, Russian, French, Spanish and Chinese). And. crucially, the instrument must be signed by the head of state or minister of foreign affairs.

Assistance

There are a number of assistance programmes available free of charge that aim to assist states with ratification and implementation of the BWC. The BWC Implementation Support Unit and the BWC depositary states—that is, the Russian Federation, the United Kingdom and the United States—are in a position to provide non-states parties with the necessary support. Additionally, state parties can benefit from other legislative assistance and programmes aimed at strengthening national capacities and training. Assistance providers can address interested governments' needs through the development of tailored solutions in cooperation with them.

Conclusion

We encourage non-states parties to consider the ratification/accession of the BWC before the Seventh Review Conference, to signal their strong commitment to biological disarmament and to help strengthen global security. This should not be considered as an onerous task and they could benefit from the assistance available to them to become a state party.

We also encourage the conference of states parties to adopt a firm decision on their commitment to achieve universality of the BWC, or an action plan to move towards this goal more quickly. While some efforts have been carried out by different actors such as the different chairs of the BWC annual meetings, the BWC Implementation Support Unit, the depositary states, states parties, the European Union Joint Action on the BWC and civil society (including VERTIC), these efforts need to be continuous and sustainable.

For more information and assistance on ratification or accession to the BWC, states can contact the convention depositaries as well as the BWC Implementation Support Unit or VERTIC. And for more information on the implementation of the convention, states can contact the assistance facilitators: the BWC Implementation Support Unit (www.unog.ch) and the United Nations Security Council Committee 1540 (www.un.org/sc/1540/assistance.shtml). VERTIC (www.vertic.org) provides assistance on the adoption of legislative measures implementing the Biological Weapons Conventions, VERTIC can also provide further information in this regard.

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Verification Watch

COP17: the agenda for Durban

From 28 November to 9 December 2011, the 17th Conference of Parties (COP17) under the United Nations Framework Convention on Climate Change (UNFCCC) will be held in Durban, South Africa. There is substantial pressure on COP17 to make progress on previous conference decisions. The South African hosts are very aware of this, noting: 'Durban is clearly the end of the line for the postponement of key political issues'. To achieve an outcome that makes progress on adaptation and mitigation they are seeking operationalization of the Cancun Agreements and a commitment by states to deal with unfinished business from the Bali Roadmap and Action Plan (discussed in detail by Achala Chandani in *Trust & Verify* Issue 132).

The Cancun Agreements established a number of new institutions and mechanisms including the Adaptation Committee, Technology Mechanism, the Standing Committee on Finance and the Green Climate Fund. In addition, the agreements lay out a framework for the treaty's verification procedures—including sets of measurement, reporting and verification (MRV) requirements for developing and developed countries. At the climate change conference in Bonn in June of this year, some progress was made on the Technology Mechanism, but little else moved forward.

The details of how to implement the institutional framework outlined in Cancun are still somewhat vague. Clarifying these issues, particularly on the Green Climate Fund and MRV mechanisms, will be a priority for parties at COP17. In addition, parties will be faced yet again with negotiating the way forward for both developed and developing states' mitigation and adaptation requirements. This debate has already begun. According to press coverage of an informal ministerial meeting in Pretoria on 16 September, Indian Environment Minister Jayanthi Natarajan said that developed countries will need to commit to greater emissions reductions before India will agree to further commitments.

Ominously, the first commitment period of the Kyoto Protocol–which contains legally binding emission reduction targets for most developed country parties–expires at the end of 2012. Its future is up for debate in Durban, as it has been at many previous climate conferences. Many commentators say that there is little hope for agreement to a second commitment period in Durban; Canada, Japan and Russia have already declared that they will not support this option. Others, such as the European Union, want the protocol to continue, with the proviso that other major emitting countries commit to their share of emissions reductions. Such opposing views make agreements on an extension of the protocol seem unlikely in South Africa.

As past climate change conferences have shown, parties intent on pulling in opposite directions only exacerbate the inherent social and economic challenges and complexities of taking effective action on climate change. So, countries will need to focus on ensuring that the negotiations in Durban make concrete progress on the agenda and maintain a collaborative spirit between countries to facilitate work in the year ahead.

Kate Farrell and Rebecca Pryce, London

UN Secretary-General urges CTBT entry-into-force

The 'International Day against Nuclear Tests', held on 29 August 2011, saw UN Secretary-General Ban Ki-moon urging all states that have not yet signed or ratified the Comprehensive Nuclear-Test-Ban Treaty (CTBT) 'to do so as matter of priority'. The world urgently needs to make new progress in reaching the goal of a world free of nuclear tests and nuclear weapons, Mr Ban said. As a 'major element of the international disarmament and non-proliferation regime', the CTBT's entry-into-force is required 'as soon as possible.'

The CTBT, to which 182 states have now signed up, and 154 ratified, currently requires nine more key ratifications for it to come into force. These key ratifications are those of the

so-called Annex II states—referring to states with nuclear power programmes at the time of the treaty's negotiation.

Despite not being in force, however, the globe-spanning verification systems for the CTBT are largely in place. 'The treaty's verification regime has proven to be a valuable instrument for international cooperation,' Mr Ban argued. 'I am fully confident of its future ability to provide an independent, reliable and cost-effective means of verifying—and, therefore, deterring—any violation of the treaty's provisions.'

August also saw the United States (an outstanding Annex II state, which tried and failed to push ratification through the US Senate in 1999) pledge a voluntary, in-kind contribution of $8.9m to the Preparatory Commission of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO).

According to the CTBTO, which was founded in 1996, the pledge represents the largest single contribution of its kind to the organization to date. The funds are to underwrite projects implemented by US agencies, in coordination with the CTBTO, in support of the 'further development of the full range of CTBTO verification and monitoring activities.' Envisaged developments include enhancing the CTBTO's radionuclide and noble gas detection technologies (both types of emissions can provide evidence of nuclear explosions), refining seismic detection techniques and supporting seismic stations around the world.

In September, during a press conference held ahead of the CTBT's Conference on Facilitating the Entry into Force of the CTBT, Annika Thunborg—Chief of Public Information for the CTBTO—noted that the US is 'very supportive' of the treaty. The current US administration has pledged to again work to secure ratification of the CTBT, although there are no plans to resubmit the treaty to the Senate in the immediate future.

Ms Thunborg identified the Middle East and Asia as two regions where securing further ratifications is especially complex. In the Middle Eastern region, the crucial Annex II ratifications of Egypt, Iran and Israel remain outstanding; in Asia, the ratification of North Korea is still required. Ms Thunborg noted that the reasons for states not agreeing to ratify the treaty were a mixture of domestic factors, perceived security threats and—in some cases—linkages between ratification by one country with ratification by another.

David Cliff, London

Chemical weapons case reaches US Supreme Court

The 1993 Chemical Weapons Convention (CWC) requires every state party to adopt certain penal provisions. Not only is a state party obliged to never use a chemical weapon, it is also required to prohibit such use by 'natural' and 'legal' persons. To comply with this requirement, the United States—which became a party to the CWC in 1997—adopted the 'CWC Implementation Act' of 1998. This act criminalizes a broad range of activities including the possession and use of chemical weapons by any person.

In 2007, this act was used to prosecute microbiologist Carol Anne Bond when US postal inspectors discovered that she had put chemicals on the car door handles, doorknob and mailbox of her friend, Ms Haynes, on at least 24 occasions—after finding out that Haynes was pregnant with the child of Bond's husband.

Ms Bond had stolen a substance known as '10-chloro-10H-phenoxarsine' from her workplace, a chemicals manufacturing company, and ordered potassium dichromate online. Half a teaspoon of 10-chloro-10H-phenoxarsine is lethal to an adult if ingested. Less than a quarter of a teaspoon of potassium dichromate would have the same effect. A few crystals of either chemical are highly toxic. However, Ms Haynes discovered the presence of the chemicals before she could ingest them, and instead only burned her thumb.

Ms Bond was sentenced to six years imprisonment and a fine. However, Ms Bond believes she should never have been prosecuted under a federal crime meant for prosecuting terrorists. If she had been sentenced under a state crime, her imprisonment would not have exceeded two years. During the proceedings at the US Supreme Court in February

2011, Ms Bond argued that she had standing (that is, the legal ability to bring her case) to challenge her conviction. Only if she has standing will she, in the words of Justice Scalia, a member of the Supreme Court of the United States, be able 'to make the argument that this is a strictly State, local crime, and that any attempt by the Federal Government to convert it into a treaty-based terrorism crime is erroneous.' However, CWC legislation applies not only to terrorists and state agents, but also to any crimes involving chemicals, regardless of who commits them.

The US Supreme Court delivered its judgment in June 2011. It accepted unanimously that Ms Bond has standing to challenge the CWC Implementation Act, but was silent on the act itself and treaty implementation in general. Another court will now review Ms Bond's case and consider the role of the act in her prosecution.

Yasemin Balci, London

IAEA General Conference held in Vienna

From 19-23 September 2011 the 55th Annual International Atomic Energy Agency (IAEA) General Conference was held in Vienna, Austria. In the aftermath of the Fukushima nuclear power plant accident in Japan, nuclear safety was one of the main topics of this year's conference. Also on the agenda was nuclear security, the application of safeguards in the Democratic People's Republic of Korea (DPRK) and the Middle East, nuclear security and IAEA safeguards.

The IAEA Programme and Budget for 2012-2013 was adopted by the General Conference. The total proposed budget for 2012 is €341.4 million which represents a 2.1% increase, plus a 1.1% price adjustment. This differs from the Director-General's original proposal to the Board of Governors of a 2.8% increase. Of this regular budget, 39% is allocated to nuclear verification. In addition, voluntary contributions can be made by member states to specific funds such as the Technical Cooperation and Nuclear Security Funds.

A resolution on the 'Implementation of the NPT safeguards agreement between the Agency and the Democratic People's Republic of Korea' was adopted by consensus at the conference. The resolution was submitted to the General Conference by Australia, Canada, France, Germany, Japan, Republic of Korea, the United Kingdom and the United States, with the support of 44 states, including all IAEA members of the North Korea Six-Party Talks. Introducing the resolution, Canada strongly urged the DPRK to abandon its nuclear programme, to come into full compliance with the NPT and to cooperate with the Agency on the implementation of comprehensive safeguards.

A resolution on the implementation of safeguards in the Middle East was more contentious. Paragraph two of the resolution—which 'calls upon all States in the region to accede to the Treaty on the Non-Proliferation of Nuclear Weapons'—was voted on separately. The paragraph passed with 111 votes in favour, 10 abstentions, and one 'no' (from Israel). The full resolution on application of safeguards in the Middle East, submitted by Egypt, was also passed—with three abstentions from the United States, Colombia and the Marshall Islands.

The issue of Israeli nuclear capabilities were debated as an agenda item, but no specific resolution was tabled. The Arab League and the Non-Aligned Movement expressed concerns that Israel had not yet acceded to the NPT and placed all its nuclear facilities under safeguards while independent reports had established that the country possesses a nuclear arsenal. Lebanon, speaking for the Arab League, said that for the sake of giving a final chance to international efforts, they decided not to table the resolution this year (it was tabled, and defeated, last year) and to postpone its discussion. This decision was made with particular reference to the November 2011 IAEA Forum on Experience of Possible Relevance to the Creation of a Nuclear-Weapons-Free Zone in the Middle East. The forum, to be chaired by Norway, will be held in November 2011, in Vienna in preparation for the 2012 conference on the subject.

A resolution addressing nuclear security was adopted by consensus after controversies over the mention of nuclear security summits in the preamble were finally overcome. Some delegations raised questions over the legitimacy of

such events, which, according to them, only gather a minority of states. The final text reflected this position in emphasising 'the need for the involvement of all member states of the Agency in nuclear security-related activities and initiatives in an inclusive manner.' Explicit reference is at the same time made to 'the role that international processes and initiatives, including nuclear security summits and the one to be held in Seoul in 2012, could play in facilitating synergy and cooperation in the area of nuclear security.'

The resolution titled 'Strengthening the effectiveness and improving the efficiency of the safeguards system and application of the Model Additional Protocol' was discussed at considerable length at the conference. The main issues were those regarding the language of the Additional Protocol, the Agency's authority to give assurances on the correctness and completeness of state declarations, the confidentiality of safeguards information and the mention of an 'information-driven' and 'objectives-based' safeguards system. In the end, no consensus was reached. It was decided that the Director General should report on this issue to the 56th IAEA General Conference, but no text was adopted.

On Friday 23 September the 55th session of the IAEA General Conference drew to a close. Developments on the Middle East nuclear weapons free zone and resolving issues on safeguards are issues to watch over the coming year.

Kate Farrell, London and Vienna

Regional actors taking a proactive approach

From 27 June to 1 July, the Philippines hosted a regional 'BWC Conference Week for East Asia and the Pacific'. The meeting was held to prepare for the Seventh Review Conference of the 1972 Biological Weapons Convention, which will take place from 5 to 22 December of this year. International organizations and governments from all the countries in the South East Asian region, and representatives from VERTIC, participated in the five-day discussions. The aim of the 'Super-week' was to raise political awareness on the importance of the convention, share ideas on ways to strengthen it, and to help countries in East Asia and the Pacific region to prepare positions for the upcoming review conference.

A 'Regional Workshop on National Implementation of the BWC in East Asia and the Pacific', organized by the European Union Joint Action (EUJA) programme, was held at the beginning of the week. This workshop concentrated on seven key topics: (1) national implementation; (2) confidence building measures (CBMs) and EUJA assistance; (3) building capacity for disease surveillance; (4) key issues for the Seventh Review Conference; (5) complementarity in BWC and UNSCR1540 implementation; (6) awareness-raising on dual-use issues; and (7) regional health security.

The workshop provided an overview of BWC obligations and requirements while the discussions detailed the infrastructure and mechanisms that would be needed to effectively implement the convention.

A major objective of the workshop was to strengthen the CBM transparency mechanism by highlighting its importance in a regional context—since many BWC parties do not file their CBM declarations on a regular basis.

VERTIC representatives Angela Woodward and Rocio Escauriaza Leal presented on BWC national implementing obligations. VERTIC staff were also involved in the plenary debate and led two breakout sessions to discuss definitions, criminal provisions and enforcement measures; biosecurity/biosafety provisions and import/export/transit controls.

Emerging from the discussions, it became clear that many countries were faced with similar difficulties in trying to undertake BWC national implementation as well as preparing CBMs returns. Representatives discussed how sharing experiences and information on a regional basis could be an important tool in enabling individual countries to submit CBMs, and implement the necessary infrastructure, as well as to build trust and communication.

This meeting was followed by a 'Workshop on Building Capacity for Prevention, Preparedness and Response' which was organised by the US Department of State. It saw pres-

entations on biosafety, biosecurity, disease surveillance and proposals for strengthening Article X of the BWC, which addresses the peaceful applications of bacteriological activities. Breakout sessions focused on building capacity for 'prevention and implementation' and 'disease surveillance, preparedness and response'.

The final component of the 'Super-week' was the 'Regional Workshop on Preparations for the Seventh Review Conference of the Biological Weapons Convention'. This workshop, co-chaired by Australia and the Philippines, provided participants from the East Asian and Pacific regions with the opportunity to share and discuss ideas ahead of the Review Conference. The discussions focused on (1) universality, (2) CBMs, (3) the next inter-sessional process, (4) compliance, (5) advances in science and technology (6) the BWC Implementation Support Unit, (7) assistance in the case of an alleged use and (8) international cooperation. Countries expressed the opinion that it would be unhelpful for the review conference to call for a legally binding verification instrument, after the attempt of negotiating a protocol to strengthen compliance failed in 2001. One possible solution that emerged from the discussions was the suggestion of a 'Compliance Working Group' to discuss current problems with BWC compliance and make recommendations for action.

Rebecca Pryce, London

OPCW training paves the way for chemical transfers

From 18-22 July, 2011, the Organisation for the Prohibition of Chemical Weapons (OPCW) and the Republic of Ukraine held a regional training course for customs authorities in Eastern Europe. Twenty participants from 16 states gathered in Kiev to explore technical aspects of the Chemical Weapons Convention (CWC) transfers regime. Opening the training course, Mr Ruslan Nimchynskyi, Acting Head of Arms Control for the Ministry of Foreign Affairs of Ukraine, noted that the fullest exchange of chemicals for peaceful purposes requires effective implementation of the CWC transfers regime.

There are several practical, and quite technical, challenges related to the implementation of chemical transfers under the CWC. For example, customs terminology may not apply specifically to the convention. In addition, different customs officials may use different codes identify a given chemical. The training programme is set up to help states coordinate such national control systems. It is also beneficial to the OPCW itself as the organization benefits from having uniform national systems in all its member states.

The training course in Kiev included lessons on the monitored chemicals themselves, import and export licensing, controlling transhipments and transits, illegal trading and smuggling and risk assessments. The OPCW also uses these training courses to exchange information on best practices. National authorities share real-world experiences through case-studies and roundtable discussions. This approach gives member states the opportunity to learn from their neighbours and develop a comprehensive understanding of the problems they face within the region.

Alongside regional training courses, the OPCW offers different methods of capacity-building, designed to strengthen wider non-proliferation efforts. With an active outreach agenda, the OPCW Secretariat has six training events scheduled for August and September. The value of such events have been recognized by independent experts as well. In its recent final report, the Advisory Panel on Future OPCW Priorities stressed the role of the Technical Secretariat in continuing to help States Parties with technical assistance and sharing of best practices. To document the training courses from an insider's view, the CWC Implementation Support Branch is now blogging reflections from each course.

Often, countries may need advanced technical knowledge and expertise to implement arms control agreements. Outreach and training plays a critical role in developing skills and building awareness within government and industry to strengthen capacity for full compliance and implementation. The OPCW's continuing outreach efforts, particularly with developing states, are a valuable tool for promoting cooperation and building state capacity to implement the CWC.

Kate Farrell, London

Science & Technology Scan

'Megaports Initiative' reaches Barcelona

On 26 July 2011, the US DOE's National Nuclear Security Administration (NNSA) announced that it had installed radiation detection equipment at the Port of Barcelona as part of the 'Megaports Initiative'. Here 'Megaports' refer to major international seaports. The NNSA also trained Spanish officials to use the equipment. There are two other ports in Spain which already have the equipment in place, including the Port of Algeciras and the Port of Valencia. Other countries have similar programmes, including the UK's Project Cyclamen.

The Megaports Initiative was implemented by the NNSA in 2003 to deter nuclear and radiological smuggling threats by increasing international detection capabilities. The initiative is based on the premise that ports with superior detection systems will be less vulnerable, because any radioactive materials will be detected effectively and staff will be able to respond to alarms from the detectors and safely take control of dangerous radioactive material. In addition, the presence of the detector systems should act as a deterrent. By equipping them with the appropriate radiation equipment, ports under the initiative should be able to scan the majority of container traffic without disturbing commercial flows.

Under the initiative, portal detectors are placed at the entrances and exits to the ports, though this does not always ensure that cargo that does not leave the port for the hinterland—referred to as transhipment cargo—passes through portal detectors. To try to increase overall coverage at ports, as opposed to only at port entrances and exits, the initiative also supplies them with other types of equipment. These include Radiation Detection Straddle Carriers and vehicle-mounted Mobile Radiation Detection and Identification Systems (MRDIS). A Spreader Bar Detection Prototype is also being field tested.

Megaports also use secondary inspection equipment, additional to the front-line portals, usually operated by personnel on a case-by-case basis. These include Personal Radiation Detectors, hand-held Radioisotope Identification Devices (RIIDs) and Radiation Survey Meters and also equipment capable, in skilled hands, of accurately identifying radioactive materials via high-resolution gamma spectra (High Purity Germanium Detectors).

The initiative has installed similar technology at 375 sites and 38 Megaports, beginning with the Port of Algeciras in June 2006. They hope to equip 100 ports with monitors by 2018, and, by then, to scan up to 50 per cent of all global maritime traffic and over 80 per cent of all US-bound cargo.

The Megaports project is part of the NNSA's larger 'Second Line of Defence' (SLD) programme. The SLD programme was created to secure vulnerable nuclear material internationally, at ports external to the US, by working with foreign governments.

The SLD also has two other programmes. The first, called the Core Program, installs detection technology at borders, airports and ports in Russia, Eastern Europe and other 'crucial' countries. The Core Program provides 'fixed and handheld radiation detection equipment, related communications tools, and training for personnel to enhance sustainability of equipment use and interdiction procedures at borders and crossing points.' It hopes to equip 350 Russian border crossings by 2011. The programme aims to eventually equip 650 sites in around 30 countries by 2018.

The second programme, which deals with sustainability, helps countries who receive radiation scanning equipment to learn how to operate and take care of it. The sustainability programme provides local maintenance, refresher training and a help desk to resolve any issues that a host country might face and is currently working with 400 sites.

Isadora Blachman-Biatch, London

Tree barcoding begins in Liberia to tackle illegal logging

Liberia, which contains roughly two-thirds of West Africa's remaining rainforests, has recently begun to implement a new programme to tackle illegal logging. The programme requires loggers to place a unique barcode on each tree to show that it meets a number of established legality criteria.

At each subsequent step in the timber supply chain, these barcodes can be scanned to record each tree's status in the logging process. This information is transmitted to a database where loggers, officials or businessmen—in Liberia or abroad—can check that the timber they buy is legal and trace it all the way back to its stump of origin. The system can tell suppliers which trees are still growing, chopped down or processed into boards. The system should automatically flag any discrepancies and alert authorities.

The scheme's potential strength lies in the fact that it does not rest on a single auditor but allows everyone involved to continually verify the status of their timber. It will be interesting to assess how well the system works in practice, and if any lessons can be learned for improving it further and for its use elsewhere in the world.

As the Sustainable Development Institute (a Liberian NGO) indicates, the government could further strengthen the scheme by monitoring timber companies' activities so that it does not award further contracts to those who buy or supply illegal logs.

The barcode tags used by the scheme are supplied by the Société Générale de Surveillance (SGS), a Swiss company that provides verification and monitoring systems internationally. Helveta Ltd., a company that designed the tracing software, will help by providing both software and services, such as database technology, software applications and hardware components. The software can also generate inventory maps, management reports and audit histories. The Liberian Forest Initiative (LFI), a coalition devoted to protecting the Liberian Forests, is paying for the services.

Members of the LFI include the World Bank and the US Agency for International Development. Another grouping,

Verification Quotes

'We are still hiring ... There are so many projects out there and not enough qualified people to do the job.' —Stein Bjørnar Jensen, director of operation at DNV's Climate Change and Environmental Services' sustainability and innovation division. Det Norske Veritas (DNV) has a 150-strong team involved in the validation and verification of emissions reduction projects, the majority of which involve registration to the UN-administered Clean Development Mechanism. Optimism prevails despite an uncertain outlook for a second committment period under the Koyto protocol.

'Promoting civil nuclear energy must go hand in hand with strengthening the nuclear nonproliferation regime by making international safeguards more efficient and more effective. But we cannot expect the IAEA to succeed in that mission without adequate resources and the support of its members.'—U.S. Energy Secretary Steven Chu explains that an organization needs support, but above all cash, to function properly. The IAEA recently recieved an above-inflation budgetary boost.

'Always at the end of the day it takes you back to the true boots on the ground—crawling over the rocks to ground-truth.' —Jason Box, an associate professor of geography at the Ohio State University's Byrd Polar Research Center, is focused on rectifying an embarrassing error made by cartographers at a HarperCollins subsidiary. Climate scientists castigated the publisher over the extent to which Greenland's ice sheet has retreated. *Trust & Verify*'s editorial team expresses its sympathy, and notes that dealing with scientists never gets easier. Especially if they're angry.

'I don't believe engagement is the antithesis of strength and verification. I believe that engaging with leaders is a way to test them, to see if in fact the commitments they've made, they're going to keep.'—Ms Wendy Sherman, Obama's choice for Undersecretary of State for Political Affairs, lays out her views on verification. We agree. It is indeed possible to both trust and verify at the same time.

'We need to verify claims, facts and evidence. Until we do that, we can't say there is nothing'—Kristen Tabar, general manager of electronic systems at the Toyota Technical Center in Ann Arbor, Michigan, USA, invites independent researchers to review some of her companies fixes on cars that experienced 'unintended acceleration'. Perhaps there are transferable lessons from the private sector to nuclear arms control?

the Extractive Industries Transparency Initiative, will help monitor forest-related business activity in Liberia.

The barcoding programme builds on progress made earlier in the year—as noted in *Trust & Verify* Issue no.133—when Liberia signed a Voluntary Partnership Agreement (VPA) with the EU. VPAs prevent the import of non-licensed timber from partner countries into the EU market and thereby help to suppress illegal logging in those states.

At the same time as it signed the VPA, Liberia announced that the 'Legality Assurance System' it is developing for implementing the agreement would work with LiberFor, the existing national wood tracking system, which began operations in 2008. According to the BBC, the VPA agreement solved the substantial financial hurdles that LiberFor had previously faced and the new technology from SGS and Helveta should help revitalize the system.

Isadora Blachman-Biatch, London

Satellite Monitoring in Congo

The Democratic Republic of Congo has recently been given access to satellite monitoring technology that was originally developed by the Brazilian National Institute for Space Research (INPE) to monitor deforestation and degradation in the Amazon.

The technology was made available to the DRC through a partnership between a UN forest and climate change programme and INPE to help developing countries implement policies to reduce deforestation.

The DRC, which has 100 million hectares of rainforest, covering over 45 percent of the country, is the first to adopt this technology through the United Nations programme known as UN-REDD (Reducing Emissions from Deforestation and Forest Degradation). This programme assists developing countries in their preparations for taking part in the REDD mechanism—an international scheme that offers financial incentives or compensation to countries to reduce deforestation and thereby lower carbon emissions.

To make this scheme workable and credible, it will require governance at the domestic and international level using thorough but affordable measurement, reporting and verification (MRV) systems. Having reliable measurements of emissions is important since this data can guide policy development and implementation and because this information can be used to guide the level of compensation received. Satellite monitoring is a key component in running effective forest MRV systems—and therefore a fundamental part of the REDD scheme also.

The Brazilian satellite monitoring technology, first used in the Amazon basin, is capable of large-scale monitoring of deforestation and forest degradation. It uses the 'TerraAmazon' satellite monitoring software developed by INPE, which includes geographic information systems to assess ground conditions and create models, image processing and analysis and database management.

In addition to supplying the technology, INPE provides technical training in how to use it. It has set up a centre, in partnership with UN Food and Agriculture Organization (FAO), for instructing foreign technicians in Belem, Brazil. The FAO provides in-country training and implementation. Training is an important aspect of the initiative because the country using the technology, in this case Congo, is responsible for data interpretation and analysis.

The adoption of this technology by the DRC signals that progress is starting to be made in this area. However, forest MRV systems remain insufficient in many countries throughout the rest of Africa, as well as South America and Asia. Collaborative work, such as the partnership between INPE, REDD and the DRC, offers a practical and efficient means of getting vital advanced technologies to where they are needed most.

Kate Farrell and Rebecca Pryce, London

Improving communications from space

Today, space-based satellite monitoring systems face a problem. Their sensors, which are become ever more sophisticated, produce more information than can be easily transmitted back to earth. Installing better computing equipment on the satellites could break this bottleneck. But can today's complicated chips withstand one of the great hazards of orbit, space radiation?

To find out, the National Nuclear Security Administration (NNSA) set up the SEU Xilinx-Sandia Experiment. The present iteration of the project is called SEUXSE II (or 'Suzie-2'). It was developed to test how possible space-based monitoring systems will stand up to the rigors of space radiation. The system was installed on the hull of the International Space Station on 18 May 2011, as part of the Material International Space Station Experiment-8 mission.

The results seem encouraging. On 11 July 2011 the NNSA announced that SEUXSE II had successfully begun broadcasting data, and proving that it is able to cope with radiation levels in space. This system works by monitoring and characterizing single event upsets on off-the-shelf commercial computer chips. These single event upsets are caused by cosmic rays, the effects of which are currently unknown on computer chips; making SEUXSE II vitally important in testing whether these computer chips can be integrated into space-based operating systems or not.

SEUXSE II has replaced SEUXSE I, which had been successfully monitoring single event upsets on computer chips for the past 18 months. The main difference between the two devices is an upgraded, space-qualified computer chip. The hope is that this newer version will provide a deeper insight into the effects of space radiation on these computer chips—thereby enabling appropriate modifications to be incorporated in future designs.

These new computer chips are 'Field Programmable Gate Arrays' (FPGAs). An integrated circuit can be configured, changed, by the customer after it has been manufactured. In other words, it is able to be programmed in the field. These types of chips are very useful for space technology. Because these chips are reconfigurable they can change task once a different configuration of circuitry is compiled, allowing satellites to change task mid-mission. Also, these chips can be assigned to a number of different tasks without interruption from other logic blocks within the circuit. In addition, FPGAs are increasingly being used in security and defence. Their high performance and configurability make them popular in electronic warfare, image processing and global positioning systems.

Data collected by SUESXE II will further help scientists to determine the possible use of FPGAs in space. In particular, the technology may be useful for space-based monitoring of nuclear test explosions. Satellites have been used by states to monitor nuclear testing for more than half a decade. For political reasons, satellites were not allowed to form part of the CTBT verification regime. However, state parties to the future Comprehensive Nuclear Test Ban Treaty (CTBT) may use information collected by satellites when raising compliance concerns. Other state parties pledge not to interfere with this data collection (see articles IV.A.5 and 6 of the CTBT). Moreover, additional monitoring technologies may be included in the multilateral verification regime at a future date (see CTBT article IV.A.11).

For now, though, the technology will enhance the United States' national technical means to detect nuclear testing. In the words of Anne Harrington, the NNSA Deputy Administrator for Defense Nuclear Nonproliferation, 'this research is a vital investment in our ability to detect, localize, and analyze the global proliferation of weapons of mass destruction and ensure treaty compliance in the future.'

Rebecca Pryce, London

VERTIC News & Events

National Implementation Measures Programme

During this quarter, the NIM team completed 15 legislative surveys and one drafting workshop.

On 28 July, NIM staff gave a presentation on WMD issues to the Probus Group in Christchurch, New Zealand, and participated in the Council for Security Cooperation in the Asia Pacific (CSCAP) New Zealand National Forum Meeting on 9 August in Wellington, New Zealand. On 11 August, during an event in Wellington to commemorate the first anniversary of the Cluster Munitions Convention, Angela Woodward delivered the statement of the Ambassador of Lebanon (the host country for the Convention's second Meeting of States Parties, held between 12-16 September) ,who was unable to attend the event.

From 22 August to 2 September, Scott Spence participated in the International School of Nuclear Law Summer Session on Nuclear Energy Law in Montpellier, France (see ACD news for more information). Angela Woodward was appointed to the Public Advisory Committee on Disarmament and Arms Control (PACDAC) by the New Zealand Minister for Disarmament and Arms Control, Hon. Georgina te Heuheu QSO and on 31 August spoke to the New Zealand Institute of International Affairs' Christchurch Branch on topical biological and chemical weapons issues.

In addition, NIM staff participated in the Wilton Park conference on the Biological Weapons Convention (BWC) 7th Review Conference from 12 to 13 September held at the Netherlands Ministry of Foreign Affairs in The Hague and attended the Organization for the Prohibition of Chemical Weapons (OPCW)'s Conference on 'International Cooperation and Chemical Safety and Security' in The Hague on the same days. They also contributed to a workshop organized by the Center for International Trade & Security on 'Legislative Gap Analysis vis-à-vis UNSCR 1540: Status of Regulatory Framework in the Caribbean Community' in New York from 22 to 23 September, and in a 'Workshop on the Implementation of the UNSC Resolution 1540 (2004)' held in Astana, Kazakhstan, from 27 to 29 September, organized by the UNODA, the OSCE and the government of the Republic of Kazakhstan.

The NIM team wishes to thank Isadora ('Izzi') Blachman-Biatch for her assistance to the NIM Programme during her internship.

Arms Control and Disarmament Programme

In July, Andreas Persbo travelled to Sofia, Bulgaria, to participate in a verification exercise funded by the US Department of Energy. This exercise—part of the so-called Colombo Initiative—focused on the verified dismantlement of short-range ballistic missiles and involved participants from across South Asia. Throughout July and into August the VERTIC arms control team also worked on research and analysis for a funder. This project was delivered in late August.

August also saw VERTIC's Senior Legal Officer Scott Spence and Legal Consultant Samir Mechken attend the 2011 Session of the International School of Nuclear Law (ISNL) in Montpellier, France. Both are now currently working to complete their Montpellier diplomas—at which point, with Andreas Persbo having attended the school in 2008, VERTIC will be home to three graduates of the University of Montpellier 1.

In September, Andreas Persbo participated in a meeting on Protecting Sensitive Nuclear Information at the Wilton Park conference venue in West Sussex. This conference discussed the nuclear security summit in Seoul, South Korea, due to be held in March 2012.

September also saw VERTIC welcome Dr David Keir to the VERTIC Arms Control and Disarmament team. Dr Keir has a background in chemistry, but has spent many years focusing on nuclear arms control and disarmament verification issues at the UK Atomic Weapons Establishment. Prior to joining VERTIC as a full-time staff member,

Dr Keir also served as a member of the VERTIC Advisory Network for over a year.

Later in the month, the full ACD team—including consultants Samir Mechken and Sonia Drobysz as well as our intern Kate Farrell—travelled to Vienna to attend the 55th General Conference of the International Conference. The week-long conference presented an opportunity to promote current VERTIC projects as well as to reconnect with members of the arms control and non-proliferation community The General Conference also saw Dr Keir deliver a presentation to a meeting of inter- and non-governmental representatives on the importance of multilateralism in nuclear disarmament verification (see p7 of the this edition and the VERTIC website).

At the conference, VERTIC hosted an evening reception to mark the 25th anniversary of the organisation, with Jill Cooley from the IAEA Department of Safeguards delivering welcoming remarks. The event was well-attended, despite a late night of negotiations over resolutions elsewhere in the Vienna International Centre, and we are grateful to all those who came to celebrate our 25th anniversary with us.

The Environment Programme

The environment programme focused on fund-raising throughout the last quarter. Larry MacFaul met with Chatham House to continue discussions on the future of the illegal logging project. In addition, the programme contributed frequently to the VERTIC blog. Discussions focused on the November conference of UNFCCC parties in Durban, South Africa, the United Nations Security Council's role in combating climate change, ways to restrict and control maritime pollution, as well as Arctic issues.

Director's reflections

Planes, trains and automobiles is the name of John Hughes' 1987 comedy featuring Steve Martin and John Candy. Working at VERTIC also means often using the same three modes of transport. We do not often have to endure the company of an 'obnoxious slob of a shower ring salesman' (as the Internet Movie Database puts it). On the contrary, many of those we work with are exceptionally pleasant people. That does not mean that the challenges we face, or the choices we make, are any easier than those facing Steve Martin in the film.

Our last quarter has been hectic. We have, for instance, been working to finalize our forthcoming report on Irreversibility in Nuclear Disarmament: Practical steps against nuclear rearmament. It is relatively thick, and contains much information, but is nevertheless one of very few studies that attempts to grapple this elusive concept from a technical perspective. Its conclusions may be harsh; in order to safeguard against rearmament, all countries need to forego several sensitive fuel cycle technologies. As long as states retain nuclear capability, they may be unarmed, but they are hardly disarmed. Therefore, the analysis strongly suggests that multilateral fuel cycle initiatives are the way forward.

Each summer we see the effect of climate change as Arctic ice declines at an unprecedented rate. Satellite, on-ice, and under-sea observation techniques provide us with clear evidence of this. We, as a species, have gone beyond a point of no return here. In the meanwhile, deforestation continues. We still have plenty of opportunity and ideas to reverse the latter, while protecting the livelihoods of vulnerable local communities. More funding is need to support such work.

Grants and Administration

Over the last three months, the Norwegian Ministry of Foreign Affairs awarded VERTIC a grant of NOK 2,160,000 (£244,406) for a project on multilateral nuclear disarmament verification and the potential future role of international organisations in this field. VERTIC also secured a grant of US$199,455 (£128,000) from the US Department of State for a project under the Biosecurity Engagement Program. The organization also performed work for the UNICRI/JRC CBRN Centres of Excellence as designated legal experts. VERTIC is grateful to its funders for their continued support.

On 12 September 2011, VERTIC held a Board meeting where we welcomed the Rt. Hon. James Arbuthnot as a new Trustee. Mr Arbuthnot has been a Member of Parliament in the UK since 1987, and is the current chairman of the House of Commons Defence Select Committee. He is also a member of the Top Level Group of Parliamentarians for Multilateral Nuclear Disarmament and Non-Proliferation. We are also pleased to welcome Dr David Keir as a new staff member to the Arms Control and Disarmament Programme. Originally a research chemist in British academia, followed by a decade in the civil nuclear industry, Dr Keir joins VERTIC from the Arms Control Verification Research programme at the UK Atomic Weapons Establishment. Prior to joining VERTIC as a staff member, Dr Keir also previously served on VERTIC's Advisory Network. Finally, we would like to thank our outgoing interns Kate Farrell and Isadora Blachman who complete their internships at the end of this month, as well as Rebecca Pryce who completed her internship with VERTIC at the end of August. All three have made outstanding contributions to the organization.

building trust through verification

VERTIC is an independent, not-for-profit nongovernmental organization. Our mission is to support the development, implementation and effectiveness of international agreements and related regional and national initiatives. We focus on agreements and initiatives in the areas of arms control, disarmament and the environment, with particular attention to issues of monitoring, review and verification. We conduct research and analysis and provide expert advice an information to governments and other stakeholders. We also provide support through capacity building, training, legislative assistance and cooperation.

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