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The CW regime

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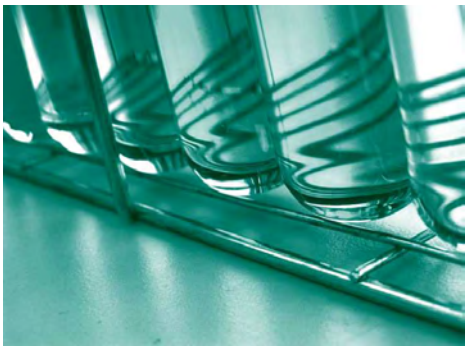

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Editor's note

Kerstin Vignard

The chemical weapons regime receives scant attention in comparison to those dealing with other WMD. The daily efforts of the Organisation for the Prohibition of Chemical Weapons (OPCW) are significant but occur somewhere in the background of the wider public's consciousness. And yet, the rate of scientific and technological advances mean that the CW regime is of more relevance than many people realize—and this relevance will continue to grow. The CW regime must evolve and adapt if it is to remain relevant, yet organizations and treaty regimes are not known for their capacity for rapid response. As the international community prepares for the 2013 CWC Review Conference, which approaches will offer the greatest responsiveness to new and yet imagined developments? Experts contributing to this issue, under the able Guest Editorship of Dr Alexander Kelle, address this question from a range of perspectives.

The next issue of *Disarmament Forum* examines the economics of peacebuilding and explores how economic reconstruction can cultivate security and stability. Wars destroy lives, livelihoods and infrastructure, and a declaration of peace is just the beginning of the restoration of stability. Often the risks of returning to war arise from a failure to meet the economic needs in a volatile post-war environment. The economic health of a state is intertwined with building long-term, sustainable peace, and one cannot survive without the other.

Large-scale peacekeeping operations and economic interventions may unwittingly cause adverse effects far removed from the intended goals. Development programmes need to take into account how local economies are affected by mission spending to avoid further aggravating local inequities, and lessons need to be learned from the schemes that work and those that do not. The issue will also consider the involvement of the private sector and the role foreign direct investment can play, and which additional measures need to be in place to ensure transparency, an absence of corruption and an appropriate degree of corporate social responsibility.

UNIDIR is actively supporting several United Nations processes on conventional weapons. Between July 2010 and July 2012, UNIDIR implemented a project for the European Union to support the arms trade treaty (ATT) process. The project consisted of seven regional seminars, and concluded with a closing event on 17 July in New York in the margins of the ATT negotiation. The objectives of the project have been to support the preparatory process, ensure that the process was as inclusive as possible, allow concrete recommendations to be made on elements of the future treaty, and to support Member States in developing/improving national and regional expertise. Background papers, audios of expert presentations and meeting reports are available at www.unidir.org/ATT.

Once again, UNIDIR and the Small Arms Survey have partnered to produce an analysis of the national reports submitted by states under the United Nations Programme of Action (PoA) on Small Arms and Light Weapons. Member States have consistently used the analyses in crafting measures to improve their own PoA activities and to bolster the regime as a whole. The analysis will be released in August 2012 at a side event to the PoA RevCon.

The International Small Arms Control Standards, a project implemented by the United Nations Coordinating Action on Small Arms (CASA), of which UNIDIR is a Member, will be launched at the end of August during the Programme of Action Review Conference. By providing a clear set of voluntary, technically validated, international standards on small arms control, the ISACS will provide valuable guidance to Member States on the implementation of their commitments under the Programme of Action, the International Tracing Instrument and the Firearms Protocol.

Following the adoption of ISACS, a logical step is to derive from them a mechanism to assist states with measuring, prioritizing and evaluating their national small arms control actions and commitments. UNIDIR and the Monterey Institute of International Studies (MIIS) are evaluating the feasibility of developing a set of indicators to assist implementation of global commitments to small arms controls. If proof of concept is deemed successful, MIIS and UNIDIR will develop a comprehensive, yet easy-to-use software tool that United Nations agencies, Member States and donors can use to monitor, review and evaluate their small arms control efforts.

I would like to take this opportunity to thank *Disarmament Forum*'s first-ever Guest Editor, Dr Alexander Kelle. Dr Kelle brought his substantive knowledge, insight and good humour to bear on the conception of this issue, its development and realization.

While the international community regularly voices concern about the threat of weapons of mass destruction, nuclear and, to a lesser degree, biological weapons seem to receive the lion's share of political and scholarly attention. Chemical weapons, in contrast, are rarely singled out as an imminent cause for concern. The general perception seems to be that with the Chemical Weapons Convention (CWC) in operation since April 1997 and the Organisation for the Prohibition of Chemical Weapons (OPCW) established to oversee CWC implementation, the necessary tools to rid the world of chemical weapons (CW) are in place. And while great progress has been made towards achieving the goal of complete elimination of CW, this particular task for CWC States Parties still awaits completion and others are of an ongoing nature that requires continuous scrutiny. The upcoming Third CWC Review Conference in April 2013 provides a focal point for policymakers and members of civil society alike to engage in a constructive dialogue on issues of CWC implementation.

This issue of Disarmament Forum seeks to make a contribution to this dialogue by looking ahead to the 2013 CWC Review Conference, and by considering some of the remaining and newly emerging challenges. The rapid pace of scientific and technological developments alone means that the CW regime must be agile, forward-looking and practical in nature. Against the background of the convergence of chemistry and biology, Malcolm Dando analyses the role of civil scientists in maintaining and developing the CW prohibition regime that has been created around the CWC. Dando also points to the crucial role of education and awareness-raising of chemists if the resurgence of chemical warfare is to be prevented. Many observers are concerned that one avenue through which new forms of chemical warfare could emerge is related to so-called incapacitating chemical agents (ICA). An important question in this context is whether States Parties to the CWC are prepared to address perceived treaty ambiguities, such as those contained in Article II.9(d) of the Convention relating to the use of ICA for law enforcement purposes. Michael Crowley discusses mid-spectrum agents such as bioregulators and toxins that could have potential utility as ICA, and analyses the regulation of such agents under the CWC. Crowley also proposes a number of measures for consideration by CWC States Parties in preparation for or during the Third CWC Review Conference. He urges CWC States Parties to act now, before the science and technology underlying ICA mature and proliferate.

As Paul Walker reminds us, the OPCW has verified the safe destruction of more than 50,000t of chemical warfare agents and close to four million weapons and containers. This equals the destruction of more than 70% of the CW of possessor states. He traces CW demilitarization efforts up to now and discusses the remaining challenges to complete the task, and also sheds light on issues surrounding old and abandoned chemical weapons and their destruction. He concludes that as the main goal of the CWC—the complete and verified destruction of all CW—may take another decade to fully realize, the focus of CWC States Parties and the

OPCW Technical Secretariat must remain on this goal. However, as the verification of CW destruction activities will be substantially reduced over the coming years, how will this affect the roles and functions of the OPCW? What impact will these shifting priorities have on its organizational structure? Ralf Trapp explores different dimensions of the ensuing evolution of the regime and its implementing organization, the OPCW. Drawing on the work of the Ekeus panel, he discusses challenges in the areas of verification, implementation support, prevention and preparedness, chemical safety and security, and organizational adaptation driven by the need to establish new governance structures. However, it is safe to assume that the OPCW will remain at the centre of global efforts to prevent the re-emergence of CW. In my contribution, I argue that efforts in this area in the first instance have to be based on traditional Article VI inspections under the CWC, but that a broader approach including national implementation measures under Article VII and a rebalancing between the goals of preventing the re-emergence of chemical weapons and the goals of international cooperation and assistance will be needed.

The fact that the latter two of the above topics have not been addressed in separate contributions to this issue of Disarmament Forum points to the limited space available and, admittedly, a somewhat subjective selection of topics on my part as Guest Editor. UNIDIR has to be commended for having taken the initiative to encourage forward-looking analysis of CW-related issues. More generally, international cooperation and assistance will undoubtedly play an important role in the preparation and the conduct of the Third CWC Review Conference. These as well as other issues not addressed here will therefore hopefully be taken up by other scholars, analysts or members of civil society in general. The recent meeting of OPCW Director General Üzümcü with members of the non-governmental organization community is certainly an encouraging sign of the Technical Secretariat's interest in engaging a variety of stakeholders from civil society. It is to be hoped that the Open Ended Working Group for preparation of the 2013 CWC Review Conference will build upon the practice of the run-up to the previous Review Conference in 2008 and will invite civil society contributions to inform its work.

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Guest editor

Science and the "new" Chemical Weapons Convention: multiple roles for civil scientists?

Malcolm Dando

Introduction

The Advisory Panel on Future Priorities of the Organisation for the Prohibition of Chemical Weapons (OPCW) was quite clear about the main issue it wished to address in its report. Despite the delays in completing the destruction of chemical weapons stockpiles, the report's fourth paragraph states:

> the OPCW needs to prepare for a transition from mandates and efforts primarily characterised by the elimination of chemical weapons stockpiles and production facilities to an agency that will have as its main task to ensure that the menace of chemical warfare and the use of toxic chemicals for hostile purposes will never reappear … .[1]

Moreover, it is clear about the importance of considerations related to science and technology during this transition from disarmament to non-proliferation. Paragraph six notes that:

> Today's security environment is very different. Science and technology are advancing at an astounding pace, creating new opportunities but also new risks. The size and shape of the world's chemical industry are undergoing profound change. All these developments create new conditions within which the [Chemical Weapons] Convention has to operate.

International organizations have, of course, found many different ways of incorporating science and scientific considerations into their policy and decision-making,[2] and, as is well known, the OPCW presently has two such mechanisms.

In the first of these mechanisms a Scientific Advisory Board (SAB) of invited experts can be tasked to provide reports on specific issues.[3] However, as the report of the Advisory Panel pointed out:

> Since its establishment in 1998, the SAB has played an important role … . But there have been deficiencies in how the OPCW has called for science advice as well as how it has incorporated such advice into its operations.[4]

Another mechanism is provided through the Five-Year Review Conference as Article VIII, paragraph 22, of the Convention states that such reviews "shall take into account any relevant scientific and technological developments". Meeting this requirement has led to an involvement of civil society as a report has been requested. The report was provided by a meeting organized by the International Union of Pure and Applied Chemistry (IUPAC), and has

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been transmitted to the Review Conference via the SAB and the OPCW Director-General. Yet, it is not clear that the report has been effectively used during the previous Review Conferences or has influenced the outcomes.

In general, as Kelle et al. have suggested, while the CWC regime contains organizational structures and procedures to address scientific and technological change:

> the manner in which these mechanisms have been used by states parties and the way in which existing obligations have been implemented does not bode well for states parties' future willingness and capabilities to adapt to the technological challenges ahead … .[5]

That was the view of the operation of the control regime in 2006 when the need to move from a focus on disarmament to non-proliferation was not as acute as it is today. It was presumably the current pressing need to more effectively address non-proliferation that was, at least in part, behind the recent decision to appoint a Science and Technology Advisor to the OPCW Technical Secretariat. This paper discusses four issues related to the need to involve more of the world's scientific community more effectively in the development of the CWC prohibition regime at this critical juncture in its history.

The convergence of chemistry and biology

As the Advisory Panel on future priorities pointed out in paragraph 79 of its report:

> A relatively new issue is the convergence between chemistry and biology. [This] calls for a closer interaction in the implementation of the Convention, and the Biological Weapons Convention.

Although, the Panel argues that the convergence of the sciences does not necessarily lead to a convergence of the two regimes, it does nevertheless consider that:

> exchanges of experiences and joint technical reviews could be helpful to understand how [convergence] affects the implementation of both treaties at the interface between chemistry and biology.[6]

Clearly, not all aspects of chemistry and biology are converging, but the report indicates at least three important areas where there is little doubt that there is convergence of direct relevance to the two prohibition regimes:

> biological science is increasingly making use of chemistry, to the point where it has become possible to chemically synthesize components of biological systems and simple biological agents such as viruses. … At the same time, the manufacturing of some chemical products makes use of biological processes. Examples include the use of bio-catalysts in chemical synthesis or even the

> use of living organisms (plants and animals) as production vessels for certain chemical products … .[7]

It is clear from the OPCW Director-General's response to the report of the 17th Session of the Scientific Advisory Board that the issue of production by synthesis will be an important aspect of future meetings of the temporary working group on the convergence of chemistry and biology.[8]

Perhaps most interestingly for the future, however:

> the approach in the search for new biologically active chemical compounds (for example medicines or pest control agents) is changing. … [T]he trend is now towards investigation in detail the chemical structure, configuration and functionalities of the biological targets and on that basis to design chemical structures that can specifically interfere with these biological functions.[9]

In this last example it is hard not to acknowledge that biology has become chemistry and vice-versa.

Convergence has also been recognized amongt States Parties to the Biological and Toxin Weapons Convention (BTWC). For example, a working paper prepared by Poland for the Seventh Review Conference of the BTWC in December 2011 argued that:

> To ensure that the norms of the BTWC and CWC are not eroded by new developments, a process of analysis should be initiated so as to better understand the consequences of the convergence of biology and chemistry for the existing norms against both biological and chemical weapons and what measures in bio-chemical security could be introduced.[10]

Unfortunately, it has to be acknowledged that it will be far from straightforward for such analyses to be carried out when the two organizations have such different structures and processes for the review of relevant science and technology.

Like the CWC, the BTWC has (in Article XII) the requirement that the Five-Year Review Conferences should "take into account any new scientific and technological developments relevant to the Convention". A procedure has developed in which State Parties that wish to do so make contributions to a background paper on relevant science and technology, and most recently the Implement Support Unit (ISU) for the Convention has also provided a summary paper on the topic. As with the CWC Review Conferences, it is hard to discern how this input is dealt with by States Parties during the review and what impact, if any, it has on the outcome.

Unlike the CWC regime, however, it is only since 2006, after the Sixth Review Conference, that the BTWC gained its very small (three-person) ISU. Thus it seems inevitable that in any joint consideration of science and technology the OPCW will have to take the main burden of the work. That may not be the most helpful route for such considerations to take because, until very recently, the OPCW has had to concentrate on its designated verification of disarmament

business and has not been markedly open to other stakeholders. The BTWC, on the other hand, being tasked since 2003 in its Intersessional Process with discussing and promoting common understandings and not with negotiating agreements, has been able to be much more creative in involving multiple stakeholders, such as civil scientists and their professional associations, in formal presentations, lunchtime seminars, poster sessions and other mechanisms that have cumulatively greatly increased the kind of outside engagement that will be crucial in achieving the necessary reorientation of the CWC regime.

The latest Review Conference of the BTWC also significantly changes the form of the Intersessional Process through to 2016 and the Eighth Review Conference. There will now be three Standing Agenda Items (SAIs) in the annual expert-level and later States Parties meetings. One of the SAIs will be a "Review of developments in the field of science and technology related to the Convention". The sub-items to be addressed are divided into two sets: seven themes that will run throughout, and a specific scientific subject for each year. The thematic items, for example, include:

> new science and technology developments that have potential for uses contrary to the provisions of the Convention … .[11]

The specific scientific subjects include:

> advances in production, dispersal and delivery technologies of biological agents and toxins (to be considered in 2015) … .[12]

How this new system will work is not yet clear, but some conclusions are possible even at this early stage.

First, as there will be a very limited time for the annual meetings and that the number of items to be dealt with in each of the three SAIs are numerous, it is going to be difficult for the meetings to focus on any one issue for long, and it will be even more difficult for a cumulative understanding to be developed and delivered to the next Review Conference for decisions to be taken in regard to the seven thematic issues under the science and technology SAI. Second, therefore, it seems likely that input from diverse civil stakeholders will be important in helping to provide focus and a cumulative product. Third, it is unlikely that this will sit easily with the OPCW's present mode of operation. Commenting on the increasing importance of engagement with, and contributions from, other stakeholders, the Advisory Panel suggested that:

> Externally, what is needed is for the OPCW to further develop an effective networking approach to reach out to the different stakeholder communities, and also to reach back into their expertise as new challenges emerge.[13]

Yet, the Panel also recognized the difficulty that the OPCW might well have in making such necessary adaptive changes, even raising the question of how it will cope with the lack in The Hague of "the presence of a strong NGO community with a focus on disarmament".[14] Fourth,

it seems likely that the range of fields of science and technology that could come under the purview of these joint considerations is going to get larger and more diverse as the revolution in the life sciences continues and thus that the problem of stakeholder involvement will become more difficult over time.

While there will remain a place for general reviews such as that carried out for the CWC Review Conferences by IUPAC, and similar wide-ranging studies carried out under the auspices of the InterAcademy Panel (IAP) for the BTWC meetings,[15] it seems probable that progressively more intensive specialist studies of more limited fields may also be required to assist the States Parties to deal with advances in science and technology.

Neuroscience

An example of obvious relevance to the future of the CWC prohibition regime is the ongoing advances in neuroscience. As the United Kingdom's contribution to the paper on advances in science and technology for the Seventh Review Conference of the BTWC noted in a section on neuroscience:

> Developments in this area could also result in the identification of compounds with the potential for misuse as biological or toxin weapons agents since drugs acting on the brain to produce toxic or incapacitating effects could also have utility in a BW programme. Methods to facilitate delivery of such agents could also be exploited for harmful purposes, for example, to facilitate the entry of peptide neurotoxins across the [blood–brain barrier].[16]

Given the wide-ranging definition of "toxin" in relation to the Convention, for example including mid-spectrum agents such as bioregulators, the same concerns relate also to the CWC.

The United Kingdom's submission refers to a recent study carried out on the implications of advances in neuroscience for society in general by the Royal Society. Even in the first introductory module of the Royal Society study, the dangers to the CWC prohibition regime were clearly identified in a section on risks.[17] The problem, of course, is the peaceful purpose identified in Article II.9(d) of the CWC which allows "Law enforcement including domestic riot control purposes". Thus the Convention allows for the domestic use of standard riot control agents such as CS, but some have argued that "law enforcement" is a larger category than "'domestic riot control" in the wording of the article and therefore that incapacitating chemicals acting on the central nervous system could also be legally used, for instance in counter-terror operations.

The first module of the Royal Society study notes that:

> It is into this grey area between "police" and "military" deployment that some countries have sought to introduce incapacitating chemical weapons with central affects on the brain to induce unconsciousness or sedation.[18]

The module goes on to illustrate the dangers by reference to the use of a derivative of the opioid fentanyl to break the 2002 Moscow theatre siege and makes reference to the concerns that have arisen about the potential erosion of the CWC if advances in neuroscience tempt states (and others) to pursue the development and deployment of new chemical incapacitants.

While the third module of the Royal Society study, *Neuroscience, conflict and security*,[19] deals with the potential benefits from the advances in neuroscience, for example in possibly helping to treat soldiers suffering from Post Traumatic Stress Disorder (PTSD), it gives detailed consideration to the problem of new incapacitants and the danger they might pose to the future of the CWC. This module of the study draws on an International Workshop held in mid-2011 at the Royal Society and discussions with scientists in a number of UK government departments as well as meetings of the independent scientists who produced the module.

The scientific findings of the third module are quite clear. Despite the advances in neuroscience, it states, for example, that:

> it is not technically feasible to develop an absolutely safe incapacitating chemical agent and delivery system combination because of the inherent variables such as the size, health, and age of the target population, secondary injury (e.g., airway obstruction), and the requirement for medical aftercare.[20]

The module later identifies a range of dangers that a search for such agents would produce:

> The development of incapacitating chemical agents also increases the proliferation of these weapons and the risk of acquisition by rogue states, terrorists or criminals. Furthermore, their development could be used as camouflage for an offensive lethal capability, and delivery systems for incapacitating chemicals could be diverted for the use of lethal chemical weapons.[21]

On this basis the authors of the module made a series of recommendations, in particular aimed at achieving a clarification of what is and is not permitted under Article II.9(d) at the Third CWC Review Conference in 2013. It is probable that even more specialized meetings, for example just on the technical and policy questions raised by new issues, such as incapacitants,[22] will also be necessary to help States Parties in their deliberations. But why, it may be asked, should social scientists also need to be involved?

Social scientists

Clearly scholars of international relations and particularly of international regimes bring specialist skills to discussions of the CWC prohibition regime, but it is less frequently realized that there is likely to be an important role for those who study emerging technologies and the disruptive effects they can have on our societies. For example, a technological paradigm can be defined as "a set of concepts, theories and methods that characterize a kind of technology" and a technological development happens when "either the technological paradigm is elaborated in terms of improved concepts, theories, and methods or the instances of the paradigm are improved in terms of efficiency, effectiveness, safety, etc".[23] Such developments occur regularly, but a technological revolution occurs when such a development, like information technology in recent years, has a huge social impact. Furthermore, it is possible to conceive of such revolutions going through a series of stages of societal impact: introduction (when there is little impact on society); permeation (when devices become standardized); and power (when the technology is firmly established and most people are affected directly or indirectly). Clearly, we can see that biotechnology may be on this trajectory, but it has yet to have the impact that information technology already has had.

In the first of the Royal Society's *Brain Waves* modules, Stirling reflected on what we have learned in trying to study the evolution of such technological developments. He pointed, for instance, to seven observable syndromes such as "See no evil", in which:

> A particular technology may realise its initial promise, but this very feasibility may itself create opportunities for deliberate or inadvertent misuse. … Although readily foreseeable in the same terms as benign uses, malign applications are typically understated in regulatory assessments … .[24]

For this and many other reasons it is difficult to forecast the trajectory of a major scientific/technological revolution, but one principle lesson stands out in Stirling's analysis: "The particular paths followed by scientific and technological developments in any given area are not pre-determined by nature".[25] The fact of the matter is that the course of such developments, though dependent on the technology, is contingent on many social and economic factors.[26] So social scientists who study such technological developments also have much to contribute to our understanding.

An important example of this is Kathleen Vogel's work on the tacit knowledge and organizational structures and functions that have to be taken into account in assessing technological capabilities. She contrasts what she terms a simple biotechnology revolution framework with a more complex model which takes socio-technical aspects into account.[27] It is often assumed that simply because a paper is published then anyone can replicate the experiments—by this logic a terrorist group could replicate Wimmer's original chemical synthesis of polio virus, for example. However, when Vogel investigated this synthesis there were crucial tacit knowledge requirements that would not be found in the paper. Similarly,

when she investigated the attempt during the Soviet offensive programme to transfer production of a biological warfare agent to a new plant it proved to be extremely difficult to organize despite the necessary documentation being available.

Awareness and education

It seems reasonable to suggest that natural scientists and social scientists can play a variety of useful roles in helping to maintain and develop the chemical (and biological) weapons prohibition regimes and thus contribute to the protection of benignly intended work from hostile misuse. Some could be invited experts on the SAB, others could bring their expertise to bear in national and international studies and all could ensure that their professional associations and places of work are fully compliant, and are seen to be compliant, with their obligations.[28] Moreover, those who have taken part in such activities will be aware of their importance and will have gathered the necessary understanding of security, in addition to their scientific expertise, in order to contribute effectively.

But those people will be very small in number and an extremely small proportion of the scientific community worldwide that could contribute their expertise if they were also informed and engaged. What do we know of the awareness and education of the vast majority of scientists? For biologists and the BTWC, because it has been the subject of intersessional meetings in 2005 and 2008, we have a clear idea. As a working paper by twelve States Parties for the Seventh Review Conference stated: "Life scientists do not often consciously consider the possibility that their specific work could be of relevance to a biological weapons programme or otherwise misused to cause harm to people, animals, or plants or to render critical resources unusable".[29] This is not surprising, as the paper also noted: "Existing curricula and/or training at universities or research facilities do often contain references to aspects related to (bio-)safety, but rarely contain any aspects related to (bio-)security".[30]

In such circumstances it is hardly surprising that at their meeting in 2008, States Parties agreed on a series of sensible means by which such awareness and education could be improved, and in 2011 at the Review Conference States Parties agreed that, under the new science and technology standing agenda item for meetings between 2012 and 2105, two of the sub-topics would be:

> (d) voluntary codes of conduct and other measures to encourage responsible conduct by scientists, academia and industry;
>
> (e) education and awareness-raising about risks and benefits of life sciences and biotechnology … .[31]

This could provide a basis on which best practice and effective remedial action might be taken by the time of the Eighth BTWC Review Conference in 2016.

We know less about the current state of awareness and education of most chemists because systematic studies have yet to be carried out. However, there is a great deal of anecdotal evidence that suggests that their present level of awareness of and education on the CWC is not much different from that of most biologists about the BTWC. Certainly, the Director-General of OPCW is on record very recently as supporting this assessment when he said, "Many chemists, academics, scientists, engineers, technicians … have little or no exposure during their training and professional life to the ethical norms and regulatory requirements of the CWC …". He continued, "Education and awareness-raising about the norms and principles enshrined in the CWC are therefore becoming increasingly important".[32]

On this basis he hoped that significant attention would be given to such matters at the Third CWC Review Conference in 2013. The recent decision to have a Temporary Working Group of the SAB look at this issue again gives hope for effective remedial action. According to the OPCW press release after its first meeting, the purpose of this group is to "make recommendations for practical and sustainable activities which the OPCW and its Member States can undertake in this area" and it began by examining similar work undertaken by other organisations.[33] Yet, if the experience in regard to biologists and the BTWC is any indicator, progress will not be rapid or easy.

Conclusion

The title of this paper was posed as a question: would there be multiple roles for civil scientists in the "new" Chemical Weapons Convention as it moves its focus from disarmament to non-proliferation? The question was investigated in regard to four specific issues: the convergence of chemistry and biology, neuroscience, social science, and awareness-raising and education. From the first three of these topics it can be concluded that there could be multiple roles for many natural and social scientists in helping to maintain and develop the CWC prohibition regime. However, it can also be concluded from the last topic that without a serious and sustained effort on awareness-raising and education on the CWC, and obligations under the Convention, the CWC will remain at best a marginal issue for most practicing chemists and that this will be to the detriment of our hopes of preventing a resurgence of chemical warfare in the novel and dangerous security situation that will characterize coming decades.

Notes

1. Technical Secretariat, *Note by the Director General: Report of the Advisory Panel on Future Priorities of the Organisation for the Prohibition of Chemical Weapons*, OPCW document S/951/2011, 25 July 2011.
2. C. Rhodes and M.R. Dando, "Options for a Scientific Advisory Panel for the Biological Weapons Convention", in B. Rappert and C. McLeish (eds), *A Web of Prevention: Biological Weapons, Life Sciences and the Governance of Research*, 2007, pp. 95–114.
3. See for example, Scientific Advisory Board, *Report of the Seventeenth Session of the Scientific Advisory Board*, OPCW document SAB-17/1, 23 November 2011.

4. Technical Secretariat, *Note by the Director General: Report of the Advisory Panel on Future Priorities of the Organisation for the Prohibition of Chemical Weapons*, OPCW document S/951/2011, 25 July 2011, para. 72.
5. Chapter 2 on "Science, Technology and the CW Prohibition Regime", in A. Kelle, K. Nixdorff, and M.R. Dando, *Controlling Biochemical Weapons: Adapting Multilateral Arms Control for the 21st Century*, 2006.
6. Technical Secretariat, *Note by the Director General: Report of the Advisory Panel on Future Priorities of the Organisation for the Prohibition of Chemical Weapons*, OPCW document S/951/2011, 25 July 2011, para. 79.
7. Ibid., note 7.
8. Executive Council, *Note by the Director-General: Response to the Report of the Seventeenth Session of the Scientific Advisory Board*, OPCW document EC-67/DG.11, 9 February 2012, paras. 8–10, 12–13.
9. Technical Secretariat, *Note by the Director General: Report of the Advisory Panel on Future Priorities of the Organisation for the Prohibition of Chemical Weapons*, OPCW document S/951/2011, 25 July 2011, note 7.
10. Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, *Strengthening biosafety and security while the convergence of biology and chemistry has increased: building joint responses between the BTWC and CWC regimes against misuse of biological and chemical agents*, UN document BWC/CONF.VII/WP.4, 11 October 2011, para. 5.
11. Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, *Final Document of the Seventh Review Conference*, UN document BWC/CONF.VII/7, 13 January 2012, § III, para. 22(a).
12. Ibid., para. 23(d).
13. Technical Secretariat, *Note by the Director General: Report of the Advisory Panel on Future Priorities of the Organisation for the Prohibition of Chemical Weapons*, OPCW document S/951/2011, 25 July 2011, para. 120.
14. Ibid., para. 121.
15. See The National Academies, *Trends in Science and Technology Relevant to the Biological and Toxin Weapons Convention: Summary of an International Workshop*, 2011.
16. See Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, *New scientific and technological developments relevant to the Convention*, addendum, UN document BWC/CONF.VII/INF.3/Add.1, 23 November 2011, paras. 119–126.
17. S. Rose, "Risks", in The Royal Society, *Brain Waves Module 1: Neuroscience, society and policy*, 2011, pp. 69–76.
18. Ibid., p. 75.
19. The Royal Society, *Brain Waves Module 3: Neuroscience, conflict and security*, 2012.
20. Ibid., p. iv.
21. Ibid., p. 55.
22. S. Mogl (ed.), *Technical Workshop on Incapacitating Chemical Agents: Spiez, Switzerland, 8–9 September 2011*, Spiez Laboratory, 2012.
23. J.H. Moor, "Why we need better ethics for emerging technologies", *Ethics and Information Technology*, vol. 7, no. 3, 2005.
24. A. Stirling, "Governance of neuroscience: challenges and responses", in The Royal Society, *Brain Waves Module 1: Neuroscience, society and policy*, 2011, p. 92.
25. Ibid., p. 89.
26. See, for example, R.M. Price, *The Chemical Weapons Taboo*, 1997.
27. K.M. Vogel, "Framing biosecurity: an alternative to the biotech revolution model?", *Science and Public Policy*, vol. 35, no. 1, 2008, pp. 45–54.
28. G.S. Pearson, E.D. Becker and L.K. Sydnes, "Why Codes of Conduct Matter", *Chemistry International*, vol. 33, no. 6, 2011.

29. See Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, *Possible approaches to education and awareness-raising among life scientists*, UN document BWC/CONF.VII/WP.20, 1 November 2011, para. 7(c).
30. Ibid., para. 7(a).
31. Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, *Final Document of the Seventh Review Conference*, UN document BWC/CONF.VII/7, 13 January 2012, § III, para. 22.
32. Address by the OPCW Director-General, "Perspectives in the Context of the Third Review Conference of the CWC", at the IUPAC Workshop *Trends in Science and Technology Relevant to the Chemical Weapons Convention (CWC)*, Spiez, Switzerland, 20 February 2012.
33. See "Scientific Advisory Board Focuses on Third Review Conference and New Initiative in Education and Outreach", OPCW, 4 May 2012, <www.opcw.org/news/article/scientific-advisory-board-focuses-on-third-review-conference-and-new-initiative-in-education-and-out/>.

Keeping the genie in the bottle: preventing the proliferation and misuse of incapacitants

Michael Crowley

Introduction

As the ongoing revolution in the life sciences has proceeded the boundary between chemistry and biology, and consequently the distinction between certain chemical and biological weapons, has become increasingly blurred. Rather than thinking of chemical and biological weapons threats as distinct, some analysts believe it is more useful to conceptualize them as lying along a continuous biochemical threat spectrum.[1] This paper will focus upon those mid-spectrum agents (pharmaceutical chemicals, bioregulators and toxins) that some researchers have considered as having potential utility as incapacitants, and explore the implications of advances in the life sciences for the regulation of such agents under the Chemical Weapons Convention (CWC).

Although certain states and plurilateral organizations such as the North Atlantic Treaty Organization (NATO) have sought to characterize incapacitants,[2] there is currently no internationally accepted definition for these chemical agents.[3] As a provisional working description, they can be considered as substances whose chemical action on specific biochemical processes and physiological systems, especially those affecting the higher regulatory activity of the central nervous system, produce a disabling condition (e.g. can cause incapacitation or disorientation, incoherence, hallucination, sedation, loss of consciousness) or, at higher dosages, death.[4] Incapacitants should be considered as distinct from riot control agents, which are locally acting chemicals that produce rapid sensory irritation of the eyes, mucus membranes and skin, whose effects disappear shortly after termination of exposure.

There is a wide variety of agents that could potentially be employed as incapacitants, including: anaesthetic agents, skeletal muscle relaxants, opioid analgesics, anxiolytics, antipsychotics, antidepressants and sedative-hypnotic agents,[5] many of which are currently legitimately used by the medical or veterinary professions.[6]

According to publicly available documentation, a number of states previously explored the development of incapacitant weapons utilizing pharmaceutical chemicals or toxins.[7] Although it is difficult to establish the current situation, the International Union of Pure and Applied Chemistry has noted that:

> Many of the chemicals that are being synthesized and screened as part of the drug discovery efforts … will have incapacitating properties that could make them suitable as so-called "nonlethal" agents … . Efforts are reportedly underway in some States Parties to develop weapons with nonlethal properties

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> for use in law enforcement situations. But such weapons may also be thought to have utility in counter-terrorism or urban warfare situations.[8]

According to the International Committee of the Red Cross (ICRC), "There is clearly an ongoing attraction to 'incapacitating chemical agents' but it is not easy to determine the extent to which this has moved along the spectrum from academia and industrial circles into the law enforcement, security and military apparatuses of States".[9]

Potential dangers and proposed utility

Proponents of incapacitants have promoted their development and use as "non-lethal" weapons[10] in certain law enforcement scenarios, such as hostage situations, where there is a need to rapidly and completely incapacitate an individual or a group without causing death or permanent disability. Incapacitants have also been raised as a possible tool for a variety of military operations, especially in situations where combatants and non-combatants are mixed.[11] Such perceptions of utility were noted in the 2011 report of a high-level expert panel convened by the Director General of the Organisation for the Prohibition of Chemical Weapons (OPCW), which stated, "distinctions between law enforcement, counter-terrorism, counter-insurgency and low-intensity warfare may get blurred, and certain types of chemical weapons such as incapacitants may appear to offer tactical solutions to operational scenarios where civilians and combatants cannot easily be separated or distinguished".[12]

A broad range of observers including scientific and medical professionals, arms control organizations, international legal experts, human rights monitors and humanitarian organizations, as well as a number of states, have voiced their disquiet about the development and utilitization of incapacitants. Among the issues raised have been the dangers of "creeping legitimisation" of such agents with the erosion of the norm against the weaponization of toxicity,[13] the potential for camouflaging offensive chemical weapons programmes as law enforcement chemical programmes,[14] the danger that employment of "non-lethal" incapacitants might lead to an escalating cycle of retaliation resulting in use of lethal chemical weapons,[15] risks of incapacitant proliferation to both state and non-state actors,[16] their potential use as a lethal force multiplier, their applicability in the facilitation of torture and other human rights violations,[17] and the militarization of the life sciences.[18]

Feasibility of developing effective "non-lethal" incapacitants

Although proponents of incapacitants highlight the potential benefits of their use as "non-lethal" weapons, many in the medical and scientific communities have questioned the feasibility of developing a truly non-lethal incapacitating agent.[19] The British Medical Association believes that:

> The agent whereby people could be incapacitated without risk of death in a tactical situation does not exist and is unlikely to in the foreseeable future. In

> such a situation, it is and will continue to be almost impossible to deliver the right agent to the right people in the right dose without exposing the wrong people, or delivering the wrong dose.[20]

Similarly, a recent study conducted by the Royal Society concluded that "it is not technically feasible to develop an absolutely safe incapacitating chemical agent and delivery system combination because of inherent variables such as the size, health and age of the target population, secondary injury (e.g. airway obstruction), and the requirement for medical aftercare".[21] However, two processes may potentially affect this widely held position. The first is the danger that "increased interest in incapacitants will generate pressures that lead to the use and proliferation of weapons that are deemed 'good enough'. In other words, if and when 'success' comes, it may be due more to a redefinition of acceptability than to advances in science and technology".[22] The second process that could alter the likelihood of the development of an "acceptable", "non-lethal" incapacitant involves the extremely rapid advances in relevant science and technology, particularly genomics, synthetic biology, medical pharmacology and neuroscience, which could be utilized in state weapons programmes.

Advances in science and technology

A range of scholars have described the revolutionary changes that have taken place in the life sciences over the last 20 years, particularly in those areas concerned with our understanding of the functioning of the brain and other regulatory systems in the human body.[23] Ralf Trapp has highlighted the potential implications of the misuse of such research:

> The explosion of knowledge in neuroscience, bioregulators, receptor research, systems biology and related disciplines is likely to lead to the discovery, amongst others, of new physiologically-active compounds that can selectively interfere with certain regulatory functions in the brain or other organs, and presumably even modulate human behavior in a predictable manner. Some of these new compounds (or selective delivery methods) may well have a profile that could make them attractive as novel candidate chemical warfare agents.[24]

Mark Wheelis and Malcolm Dando had previously surveyed developments and future trends in neurobiology and concluded that there were indications that military interest was already directed towards the next generation of chemical agents affecting the brain and central nervous system:

> In addition to drugs causing calming or unconsciousness, compounds on the horizon with potential as military agents include noradrenaline antagonists such as propranolol to cause selective memory loss, cholecystokinin B agonists to cause panic attacks, and substance P agonists to induce depression. The question thus is not so much when these capabilities will arise—because

> arise they certainly will—but what purposes will those with such capabilities pursue.[25]

Advances in discovery or synthetic production of potential incapacitating agents[26] have occurred in parallel with developments in particle engineering and nanotechnology that could allow the delivery of biologically active chemicals to specific target organs or receptors. The implications of this were highlighted in the 2008 report by the National Research Council on *Emerging Cognitive Neuroscience and Related Technologies*,[27] which warned that nanotechnologies could be used to overcome the blood–brain barrier and thereby "enable unparalleled access to the brain. Nanotechnologies can also exploit existing transport mechanisms to transmit substances into the brain in analogy with the Trojan horse".[28] The report also highlighted the potential threats resulting from developments in nanotechnologies or gas-phase techniques that allow dispersal of highly potent chemicals over wide areas. It noted that at the present time "pharmacological agents are not used as weapons of mass effect, because their large-scale deployment is impractical" as it is "currently impossible to get an effective dose to a combatant". However the report states that "technologies that could be available in the next 20 years would allow dispersal of agents in delivery vehicles that would be analogous to a pharmacological cluster bomb or a land mine".[29]

Incapacitants and the Chemical Weapons Convention

The Chemical Weapons Convention (CWC) prohibits the development, production, stockpiling, transfer and use of chemical weapons "under any circumstances" (art. 1). Although the CWC does not specifically define, nor indeed mention, incapacitating chemical agents it does include "incapacitation" as part of the definition of "toxic chemical" in Article II(2): "any chemical, regardless of its origin or method of production, which, through chemical action on life processes, can cause death, temporary incapacitation or permanent harm to humans or animals".

Article II(1)a defines chemical weapons as including: "toxic chemicals and their precursors, except where intended for purposes not prohibited, as long as the types and quantities are consistent with such purposes." Consequently, chemical agents that temporarily incapacitate their targets are covered under the scope of the Convention. Such incapacitants would be deemed to be chemical weapons (and therefore prohibited) if they were used for purposes other than those described under Article II(9) of the Convention, or if their use was inconsistent with the types and quantities restriction of Article II(1).

Among the "purposes not prohibited" listed in Article II(9) are:

> (c) Military purposes not connected with the use of chemical weapons and not dependent on the use of the toxic properties of chemicals as a method of warfare;
>
> (d) Law enforcement including domestic riot control purposes.

It is therefore clear that the use of incapacitants as a "method of warfare" is prohibited, as is the development, production, acquisition, stockpiling, retention or transfer of incapacitants for such purposes (under Article I of the CWC). However, ambiguities in the Convention surrounding Article II(9)d, including no agreed definition of "law enforcement", have led to differing interpretations by legal scholars as to whether incapacitants can ever be used for law enforcement purposes, and if so under what circumstances.[30] Furthermore, the demarcation between potentially permissible "law enforcement" activities and prohibited "methods of warfare" under the Convention remains unresolved. To date, no OPCW policy-making organ has made any interpretative statement defining incapacitants or elaborated how such chemicals are regulated under the Convention.[31] It is therefore left to individual States Parties to interpret the scope and nature of their obligations in this area, with the consequent danger that state practice will establish a "permissive" interpretation, which in turn will lead to widespread proliferation and misuse of such agents.

Certain States Parties have sought to raise the issue within the OPCW. For example, during the Second Review Conference the Swiss Government declared that "the uncertainty concerning the status of incapacitating agents risks to undermine the Convention. A debate on this issue in the framework of the OPCW should no longer be postponed".[32]

Similarly, in its statement to the Review Conference, Pakistan declared that:

> We are particularly concerned about the question of what have on different occasions been called either non-lethal agents or incapacitating agents. Irrespective of the terminology used, it is important to bear in mind that the influence of advanced military technologies has often led to a search for exploiting real or perceived loopholes in legal instruments in order to circumvent their prohibitions. It would be unfortunate if the CWC were to be subjected to similar treatment. We believe this issue needs more attention than has so far been devoted to it.[33]

In November 2009, at the 14th Conference of the States Parties (CSP), the OPCW Director-General highlighted:

> growing interest on the part of some governments and civil society, in developments related to matters where the Convention might be—perhaps purposely—ambiguous or have lacunae, and which might impact on the ultimate effectiveness of the ban on chemical weapons. **Incapacitants or non-lethal weapons is one such area when it comes to the exact types and quantities of chemicals and their permitted use. The Scientific Advisory Board could help shed some light on this matter and the Third Review Conference might offer the appropriate context for an initial formal look into it.**[34] [emphasis added]

Incapacitants and the 3rd CWC Review Conference

It is important that the international governmental community begin the process of establishing and applying clear mechanisms for the regulation or prohibition of incapacitants. If it does not do so in the near future there is a danger that advances in relevant scientific disciplines, together with current and potential future state development of incapacitants, may lead to proliferation and misuse of such agents.

The forthcoming 3rd CWC Review Conference, to be held in April 2013, with its mandate to look at long-term issues of concern to the Organisation in a strategic manner and to "take into account any relevant scientific and technological developments",[35] is an appropriate forum for such considerations. Although States Parties are unlikely to agree a "solution" to the problem of incapacitants at the 3rd Review Conference, it is important that they begin a process to address this issue. It would be beneficial if those CWC States Parties concerned about the development and use of incapacitants prepared the ground for fruitful and informed discussions at the Review Conference by setting out their concerns in statements, reports, etc. and raising the issue in suitable fora such as the 17th CSP and the Open Ended Working Group preparing for the 3rd Review Conference.

The Bradford Non-Lethal Weapons Research Project has recommended that CWC States Parties consider the following processes for addressing the regulation of incapacitants and their means of delivery:

(a) Affirm existing CWC provisions applicable to incapacitants

The CWC States Parties could agree "common understandings" clearly annunciating an agreed interpretation of the Convention and affirming that:

- incapacitants—whether they are pharmaceutical chemicals or chemicals of biological origin such as toxins, proteins, peptides and bio-regulators—fall within the definition of "toxic chemicals" under Article 2(2) and consequently are covered by the Convention;
- the use of the toxic properties of chemicals (including incapacitants) as a method of warfare is prohibited under the Convention, as is development, stockpiling and transfer of toxic chemicals for such ends;[36] and
- the use of toxic chemicals for law enforcement including domestic riot control is permissible only as long as the types and quantities of toxic chemicals are consistent with such purposes. Furthermore, such use should be in conformity with the "principles and applicable norms of international law".[37]

(b) Introduce a moratorium on the development, transfer and use of incapacitants for law enforcement purposes

Such a moratorium would not be designed to restrict development, transfer or use of agents legitimately employed for medical or veterinary purposes, but solely those intended for employment in law enforcement.[38] It could be introduced at the same time as a process to review the status of incapacitants under the Convention (see below), the moratorium remaining until the status of these agents is resolved by the CWC States Parties. Such a moratorium could be binding in nature or, alternatively, the Review Conference could request that State Parties consider adopting a voluntary moratorium and associated voluntary reporting and transparency measures. If requisite agreement for this were not forthcoming individual States Parties or a group of like-minded states could introduce a moratorium on such agents at the national or plurilateral level.

(c) Initiate a mechanism to explore the status of incapacitants under the CWC

In a working paper presented to the 2nd CWC Review Conference, Switzerland called for "a mandate for a discussion of, inter alia, an agreed definition of incapacitating agents, the status of incapacitating agents under the Convention, and possible transparency measures for incapacitating agents".[39] If such a proposal were to be introduced and agreed at the 3rd Review Conference, an open ended working group or some other formal mechanism could be established to make recommendations on these issues for consideration by a future CSP or Review Conference. Such formal processes would be open to all States Parties that wished to participate and would reach their conclusions by consensus.

Alternatively, State Parties could initiate a process of informal meetings of experts similar to the model developed by the Biological Weapons Convention States Parties in 2002 to "discuss and promote common understandings and promote effective action" on implementation measures.[40] As part of this informal process, expertise could be drawn from a range of relevant state sectors including national implementation officials, law enforcement officials, experts in international law, and scientific advisors. These informal expert meetings could run in parallel or prior to the formal mechanism and could present recommendations to the formal mechanism or directly to an appropriate OPCW body. In addition to any OPCW process, it would be highly beneficial if informal inter-governmental consultation mechanisms on this issue were established.

(d) Review relevant science and technology

Although a range of distinguished medical and scientific bodies have disputed the feasibility of developing truly safe incapacitants and highlighted the dangers of state research in this area, these bodies have no formal standing within the OPCW. The Scientific Advisory Board (SAB) which was established under the CWC to provide specialized advice to the OPCW in

areas of science and technology relevant to the Convention,[41] could be tasked with reviewing relevant science and technology to:

- determine whether it is possible from a toxicological perspective to distinguish between an incapacitant and a classical chemical warfare agent;
- determine whether any chemical agents currently exist that could be considered as safe incapacitants for law enforcement—given the necessity of ensuing effective but not lethal dosage per targeted individual under operational conditions;[42] and
- explore the feasibility from a technological perspective of establishing effective verification measures for incapacitants.

(e) Develop reporting and transparency mechanisms for toxic chemicals utilized in law enforcement

A suitable mechanism, such as an open ended working group, could develop recommendations for extending the existing riot control agent reporting and transparency obligations[43] to cover all toxic chemicals held by states for law enforcement purposes.[44] The working group could also consider whether existing information requirements are adequate or should be expanded to include, for example:

- name/registry number of each type of toxic chemical and quantities held;
- nature and quantities of the associated munitions, means of delivery or dispersal;
- authorities holding stockpiles and permitted to use toxic chemicals and associated munitions, means of delivery or dispersal;
- nature of intended use, e.g. riot control, hostage situations, judicial execution; and
- decisions by States Parties not to introduce certain toxic chemicals (e.g. incapacitants) for law enforcement purposes and their rationale.

Such reporting and transparency mechanisms could be introduced as voluntary confidence-building measures—similar to the measures utilized by Biological Weapons Convention States Parties. Alternatively the CWC could be amended to include the relevant reporting requirements.

(f) Utilize existing CWC consultation, investigation and fact-finding mechanisms

Existing mechanisms can be used when activities of potential concern are reported, such as the development or use of incapacitants by law enforcement, security or military forces, particularly if human rights violations or breaches of international humanitarian law have been alleged. If bilateral consultations with the relevant states are not fruitful, concerned States Parties should consider a formal request under Article IX of the CWC.

(g) Explore the regulation of incapacitants and related means of delivery under relevant international law.

Given the nature of the chemical agents under consideration and the proposed contexts for their use (ranging from law enforcement to certain military operations), the applicability of the following instruments and law should be explored: the Geneva Protocol, the Biological Weapons Convention, international human rights law and international humanitarian law (particularly the Geneva Conventions and Additional Protocols), the Rome Statute of the International Criminal Court, the Single Convention on Narcotic Drugs and the Convention on Psychotropic Substances.[45]

Conclusion

The international community's response to advances in weapons-related science and technology has often been inadequate and late, introducing partial and ineffective controls (if any are introduced at all) long after a new weapons technology has spread to and been employed by state and non-state actors. With the issue of incapacitants—because the relevant technologies have yet to come to fruition—there is still time to act. There is now an opportunity for the international community, and in particular the OPCW, to take a precautionary and preventative approach, and prohibit or severely restrict development and use of incapacitants before the technology has had a chance to mature and proliferate. It is an opportunity that must not be squandered.

Notes

1. See P. Aas, *The Threat of Mid-Spectrum Chemical Warfare Agents*, *Prehospital and Disaster Medicine*, vol. 18, no. 4, 2003, pp. 306–12; M. Dando, "Scientific outlook for the development of incapacitants", in A. Pearson, M. Chevrier and M. Wheelis (eds), *Incapacitating Biochemical Weapons*, 2007, p. 125; N. Davison, *Non-lethal weapons*, 2009, pp. 106–107; and G. Pearson, "Relevant Scientific And Technological Developments For The First CWC Review Conference: The BTWC Review Conference Experience", First CWC Review Conference Paper no. 1, Department of Peace Studies, University of Bradford, 2002.
2. See *NATO Glossary of Terms and Definitions (English and French)*, NATO document AAP-6(2012), 2012, p. 2-I-2.
3. Indeed a range of experts believe that such a technical definition is not possible. A report of an expert meeting organized by Spiez Laboratory concluded that: "…because there is no clear-cut line between (non-lethal) ICA [incapacitating chemical agents] and more lethal chemical war-fare agents, a scientifically meaningful definition cannot easily be made. One can describe several toxicological effects that could be used to 'incapacitate', but in principle there is no way to draw a line between ICAs and lethal agents". See S. Mogl (ed.), *Technical Workshop on Incapacitating Chemical Agents, Spiez, Switzerland, 8–9 September 2011*, Spiez Laboratory, 2012, p. 10; The Royal Society, *Brain Waves Module 3: Neuroscience, conflict and security*, 2012, pp. 44-45.
4. Adapted from A. Pearson, M. Chevrier and M. Wheelis (eds), *Incapacitating Biochemical Weapons*, 2007, p. xii.
5. See for example J. Lakoski, W. Murray and J. Kenny, "The advantages and limitations of calmatives for use as a non-lethal technique", College of Medicine Applied Research Laboratory, Pennsylvania State University, 3 October 2000.

6. See P. Aas, "The Threat of Mid-Spectrum Chemical Warfare Agents", *Prehospital and Disaster Medicine*, vol. 18, no. 4, 2003, p. 309.
7. See, for example, The Royal Society, *Brain Waves Module 3: Neuroscience, conflict and security*, 2012; M. Crowley, *Dangerous Ambiguities: regulation of riot control agents and incapacitants under the Chemical Weapons Convention*, 2009; M. Dando and M. Furmanski, "Midspectrum Incapacitant Programs", in M. Wheelis, L. Rózsa and M. Dando (eds), *Deadly Cultures: Biological Weapons Since 1945*, 2006; N. Davison, *Non-lethal weapons*, 2009; M. Furmanski "Historical military interest in low-lethality biochemical agents", in A. Pearson, M. Chevrier and M. Wheelis (eds), *Incapacitating Biochemical Weapons*, 2007; A. Pearson, "Incapacitating Biochemical Weapons: Science, Technology, and Policy for the 21st Century", *Nonproliferation Review*, vol. 13, no. 2, 2006.
8. M. Balali-Mood, P. Steyn, L. Sydnes and R. Trapp, *Impact of Scientific Developments on the Chemical Weapons Convention (IUPAC Technical Report)*, International Union of Pure and Applied Chemistry, 2008, p. 185.
9. International Committee of the Red Cross, *Expert Meeting: Incapacitating chemical agents, implications for international law*, Montreux, Switzerland, 24–26 March 2010, p. 3.
10. There is continuing controversy over the nature and scope of the term "non-lethal". In recognition of this, the term will be placed in quotation marks. Such weapons have also been termed "less lethal", "sub-lethal" or "disabling" weapons.
11. See, for example, G. Fenton, "Current and prospective military and law enforcement use of chemical agents for incapacitation", in A. Pearson, M. Chevrier and M. Wheelis (eds), *Incapacitating Biochemical Weapons*, 2007, pp. 103–23.
12. Technical Secretariat, *Note by the Director General. Report of the Advisory Panel on Future Priorities of the Organisation for the Prohibition of Chemical Weapons*, OPCW document S/951/2011, 25 July 2011, para. 13.
13. J. Perry Robinson, "Categories of Challenge now facing the Chemical Weapons Convention", discussion paper for the 52nd Pugwash CBW Workshop, *10 Years of the OPCW: Taking Stock and Looking Forward*, Noordwijk, The Netherlands, 17–18 March 2007, p. 20.
14. Ibid., p. 31.
15. A. Pearson, "Incapacitating Biochemical Weapons: Science, Technology, and Policy for the 21st Century", *Nonproliferation Review*, vol. 13, no. 2, 2006, p. 170.
16. Ibid., p. 172; M. Wheelis and M. Dando, "Neurobiology: A case study of the imminent militarization of biology", *International Review of the Red Cross*, vol. 87, no. 859, 2005, p. 564.
17. M. Crowley, *Dangerous Ambiguities: regulation of riot control agents and incapacitants under the Chemical Weapons Convention*, 2009, pp. 61–62.
18. British Medical Association, *The use of drugs as weapons: The concerns and responsibilities of healthcare professionals*, 2007, p. 1; M. Wheelis and M. Dando, "Neurobiology: A case study of the imminent militarization of biology", *International Review of the Red Cross*, vol. 87, no. 859, 2005, pp. 553–71.
19. See, for example, L. Klotz, M. Furmanski and M. Wheelis, "Beware the Siren's Song: Why 'Non-Lethal' Incapacitating Chemical Agents are Lethal", Federation of American Scientists, 2003, p. 7.
20. British Medical Association, *The use of drugs as weapons: The concerns and responsibilities of healthcare professionals*, 2007, p. 1.
21. The Royal Society, *Brain Waves Module 3: Neuroscience, conflict and security*, 2012, p. iv. See also S. Mogl (ed.), *Technical Workshop on Incapacitating Chemical Agents, Spiez, Switzerland, 8–9 September 2011*, Spiez Laboratory, 2012.
22. A. Pearson, "Could incapacitating weapons become 'everyday' weapons?", *Bulletin of the Atomic Scientists*, 18 March 2008, <www.thebulletin.org/web-edition/roundtables/the-expanding-range-of-biowarfare-threats#rt569>.
23. See, for example, The Royal Society, *Brain Waves Module 3: Neuroscience, conflict and security*, 2012; The Royal Society, *Brain Waves, Module 1: Neuroscience, society and policy*, 2011; N. Andreasen, *Brave New Brain: Conquering Mental Illness in the Era of the Genome*, 2004; "Neuroscience 2000: A New Era of Discovery", symposium organized by the Society of Neuroscience, Washington DC, 12–13 April 1999.

24. R. Trapp, "'Incapacitating chemical agents': some thoughts on possible strategies and recommendations", in International Committee of the Red Cross, *Expert Meeting: Incapacitating chemical agents, implications for international law*, Montreux, Switzerland, 24–26 March 2010, p. 66.
25. M. Wheelis and M. Dando, "Neurobiology: A case study of the imminent militarization of biology", *International Review of the Red Cross*, vol. 87, no. 859, 2005, p. 562.
26. For discussion see S. Mogl (ed.), *Technical Workshop on Incapacitating Chemical Agents, Spiez, Switzerland, 8–9 September 2011*, Spiez Laboratory, 2012, pp. 15–16, 26–30; and The Royal Society, *Brain Waves Module 3: Neuroscience, conflict and security*, 2012, pp. 43–52.
27. National Research Council, *Emerging Cognitive Neuroscience and Related Technologies*, 2008, <www.nap.edu/openbook.php?record_id=12177>.
28. Ibid., p. 135.
29. Ibid., p. 137.
30. For an interpretation potentially permitting use of incapacitants in certain "extreme" law enforcement situations, see D. Fidler, "Incapacitating Chemical and Biochemical Weapons and Law Enforcement under the Chemical Weapons Convention", in A. Pearson, M. Chevrier and M. Wheelis (eds), *Incapacitating Biochemical Weapons*, 2007, pp. 171–94; for a more restrictive interpretation, see A. Chayes and M. Meselson, "Proposed Guidelines on the Status of Riot Control Agents and Other Toxic Chemicals Under the Chemical Weapons Convention", *Chemical Weapons Convention Bulletin*, no. 35, 1997, pp. 13–18; and W. Krutzsch and A. Von Wagner, "Law enforcement including domestic riot control: The interpretation of Article II, paragraph 9(d)", 2008.
31. An analysis was undertaken of all OPCW documents publicly available on the OPCW website up to 17 July 2012.
32. Statement by Amb. Dominik M. Alder, Permanent Representative of Switzerland to the OPCW, Second Review Conference of the Chemical Weapons Convention, General Debate, 8 April 2008.
33. Statement by Mrs. Kehkeshan Azhar, Acting Permanent Representative of Pakistan, Second Review Conference of the Chemical Weapons Convention, 7–18 April 2008, p. 5.
34. Conference of the States Parties, *Opening Statement by the Director General to the Conference of the States Parties at its Fourteenth Session*, OPCW document C-14/DG.13, 30 November 2009.
35. CWC, Article VIII(22).
36. Such an affirmation would extend and complement the 2nd Review Conference's affirmation of "the undertaking of States Parties not to use riot control agents as a method of warfare"; Conference of the States Parties, *Report of the Second Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (Second Review Conference), 7–18 April 2008*, OPCW document RC-2/4, 18 April 2008, p. 5, item 9.2.
37. The First and Second CWC Review Conferences both recognized the existence of "principles and applicable norms of international law" of relevance to the use of chemicals for purposes not prohibited, but did not elaborate upon them nor explicitly require that states adhere to them. See for example ibid., p. 6, item 9.6. If agreement was forthcoming, the Third CWC Review Conference could also initiate an appropriate mechanism to develop an indicative list of the principles and applicable norms of international law.
38. The development, stockpiling, transfer or use of incapacitants intended as a method of warfare is already prohibited under Article I and Article II(1) of the CWC.
39. Conference of the States Parties, *Switzerland: Riot Control and Incapacitating Agents Under the Chemical Weapons Convention*, OPCW document RC-2/NAT.12, 9 April 2008, p. 5.
40. The utility of such a model for addressing CWC-related issues requiring clarification has previously been proposed. See, for example, R. Mathews, "Convergence of biology and chemistry: implications for the verification regime of the Convention, including potential role of the other chemical production facilities regime", seminar on the OPCW's Contribution to Security and the Non-Proliferation of Chemical Weapons,

11–12 April 2011, OPCW Headquarters, The Hague; and S. Mogl (ed.), *Technical Workshop on Incapacitating Chemical Agents, Spiez, Switzerland, 8–9 September 2011*, Spiez Laboratory, 2012, p. 7.

41. Chemical Weapons Convention, art. VIII(21)h.
42. The criteria used for determining such safe agents would also need to be established. See, for example, International Committee of the Red Cross, *Expert Meeting: Incapacitating chemical agents, implications for international law*, Montreux, Switzerland, 24–26 March 2010, p. 71.
43. CWC, Article III(1)e.
44. The permissibility of developing, stockpiling, transferring and using toxic chemicals other than riot control agents for law enforcement is contested and would remain so until States Parties establish their status under the Convention.
45. For further discussion see M. Crowley, *Dangerous Ambiguities: regulation of riot control agents and incapacitants under the Chemical Weapons Convention*, 2009, pp. 92–102; and M. Crowley, "Potential implications for disarmament and other areas of international law", in International Committee of the Red Cross, *Expert Meeting: Incapacitating chemical agents, implications for international law*, Montreux, Switzerland, 24–26 March 2010, pp. 42–53.

The global abolition of chemical weapons

Paul F. Walker

In November 2012 the Organisation for the Prohibition of Chemical Weapons (OPCW) will host its 17th annual Conference of the States Parties in The Hague to review recent progress in the global elimination of chemical weapons. As the international implementing agency for the Chemical Weapons Convention (CWC), the OPCW has overseen the safe and verified demilitarization of more than 50,000t of chemical agents and almost four million weapons and containers in six countries since the CWC's entry into force in April 1997.

This represents about 71% of the declared chemical weapons stockpiles—72,669t—in seven possessor countries. The great bulk, 95%, of these stockpiles resided in the United States and the Russian Federation, which had declared 28,577t and 40,000t respectively. The remaining 4,052t were declared primarily by India and the Republic of Korea, with Albania declaring 16t and Libya 24t.[1]

United States

Both the Soviet Union and the United States had agreed bilaterally in the late 1980s to destroy their existing chemical weapons stockpiles, recognizing that the munitions were expensive to secure and maintain, that they were risky with occasional leakage of agent from the aging weapons, were mostly obsolete without modern launch systems, and were subject to terrorist attack and possible proliferation. The United States declared it had nine stockpiles with the largest, at Tooele, Utah, holding 44% (12,353t) of the munitions. The Soviet Union declared seven stockpiles, all holding 14–18% (5,400–7,500t) except the smallest site, Gorny in Saratov Oblast, with 1,143t.[2]

The United States opened its first prototype incinerator on Johnston Atoll in 1990 and 1,202t of agent were burned there prior to CWC entry into force in April 1997. The United States had also begun construction of several follow-on incinerators in the continental United States, with the second one at Tooele, Utah, beginning operations in 1996 and destroying 232t before CWC entry into force. It also had begun construction of three more incinerators in Alabama, Oregon and Arkansas, all to open in the early 2000s.

The US Army had initially planned to construct three centralized destruction facilities, one on Johnston Atoll and two in the continental United States, and to ship chemical weapons from the other six stockpiles to these plants for destruction. The target date for finishing full destruction was 1994, well ahead of even the CWC entry into force. The US Congress,

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upon hearing of the shipment options, became concerned over the potential risks to local communities along the shipment routes and quickly banned movement of the stockpiles off-site and across state borders, necessitating a change in plans for on-site destruction. This was the first major obstacle to a much quicker process and lower budget for the chemical weapons destruction process in the United States. After the congressional ban, the US Army agreed to construct nine incinerators, one at each stockpile, thereby precluding the need for any major shipment off-site, but increasing both schedule and budget for the programme.

The other major mistake early in the US chemical weapons destruction programme was the assumption that one major technology—incineration—would be widely accepted. The US Army had judged high-temperature incineration as the "most mature" and "most cost-effective" of all options for safely destroying dangerous chemical agents, rocket propellants, explosives, metal parts, and dunnage (everything else, including wood, fibreglass, and plastic). The National Academy of Sciences special committee on munitions demilitarization, consisting mostly of thermal engineers, supported this decision. However, this early judgment completely overlooked the fact that incineration was quickly becoming a "red flag" for public health and environmental regulators, along with the public at large, given growing questions about toxic atmospheric emissions.

Public opposition arose in the mid-1990s to the US Army plan for nine incinerators, and by the late 1990s almost every stockpile state was involved in public hearings focused on potential toxic emissions from the planned incinerators. At the same time, the US Congress passed a bill which mandated a Department of Defense programme to test and evaluate "non-baseline incineration technologies" for chemical weapons destruction. Dubbed the Assembled Chemical Weapons Assessment Program (ACWA), under auspices of the Secretary of Defense's office rather than the Army, this effort garnered a $40 million appropriation in its first year and began searching for destruction technologies that could be more acceptable to the states and local communities. The US Army actively opposed this effort but could not overcome the mandate of Congress and the wishes of many of the states and local citizens.[3]

An interesting part of the ACWA was the congressional mandate that a "National ACWA Dialogue" be established as an integral part of this process; this dialogue would meet four to six times annually and would include representatives from the US Army, from technology providers, from governors' offices and state regulators, and local citizens including public health and environmental experts. Also indicative of this growing battle over technologies and toxic emissions was the fact that the White House under President Bill Clinton agreed to an amendment to the articles of ratification of the CWC in 1997 that required that a priority be placed on protection of public health and the environment in the chemical weapons destruction programme, and that alternative, non-incineration technologies be fully investigated for implementation.

In the end, after many contentious ACWA Dialogue meetings and site visits, and after many congressional initiatives and conditions, the US effort was implemented with incinerators at five sites (Alabama, Arkansas, Johnston Atoll, Utah and Oregon), while four stockpile sites (Colorado, Indiana, Kentucky and Maryland) decided to use chemical neutralization and varied secondary treatments for their chemical munitions.

With the establishment of ACWA in the mid-1990s, the US chemical weapons destruction programme was split in two—the Program Manager for Chemical Demilitarization (PMCD), under the US Army, managed seven sites, while ACWA, under the Secretary of Defense, managed two sites, Colorado and Kentucky. These were the two sites with weaponized agents (chemical agents in weapons systems, including explosives and propellants) that decided to use neutralization rather than incineration, while two other sites (Indiana and Maryland), which also decided on neutralization, would be managed under PMCD because their agents were stored in bulk.

One of the factors in driving the decision to use neutralization, that is, mixing the drained agent with another liquid reagent to chemically neutralize it, was the realization early in the programme that mustard agent would neutralize well with hot water. This was reportedly learned in the 1990s from French colleagues who had been using steam to treat on-site old weapons found buried and unexploded in Europe.

Seven of the nine US stockpiles have now finished their destruction programmes, totalling about 90% of the original US stockpile. The largest US stockpile, over 12,000t at Tooele, Utah, was the last to complete its mission, on 21 January 2012. Three other stockpiles completed their destruction programs in 2011—Alabama, Arkansas and Oregon. While Tooele had operated over 15 years, the other three had operated 6 to 8 years. Their average annual tonnage destroyed varied widely, from 250t to over 800t per year; this was dependent on the type of weapon and agent being burned. But the important point is that all the stockpiles were successfully destroyed without any major injuries or deaths recorded due to agent release.

The other two stockpiles in Maryland and Indiana, both neutralized rather than burned, operated 2003 to 2005 and 2005 to 2008, respectively. Destruction at the Maryland site was rushed into operation in 2003 due to public and military concerns about its vulnerability to terrorist attack after the 11 September 2001 attacks. The simple drainage and neutralization of this stockpile with hot water was a demonstration of the excellent applicability of neutralization to mustard agent. The resultant toxic mix was shipped to a private industrial waste treatment facility. This went very smoothly, likely due to public concern that any terrorist risk be dealt with quickly rather than delayed.

The neutralization of the Indiana nerve agent stockpile was more controversial. The stockpile held 1,152t of VX nerve agent which had been produced for decades on-site. A caustic neutralization process destroyed the VX but produced a liquid product. The agreement with the US Army and the local Citizens' Advisory Commission was that the second-stage treatment

process would be by super-critical water oxidation (SCWO), a high-tech, high-temperature and high-pressure treatment, on-site. However, the US Army, in an effort to save funds and to meet an interim CWC deadline for 45% stockpile destruction by 29 April 2007, decided to ship this toxic liquid in 2006 to an industrial waste incinerator in Texas. This catalyzed much local and national debate, alleging violation by the US Army of past agreements for on-site treatment and of congressional restrictions on off-site and cross-border shipments of live agent (it was alleged that miniscule amounts of live VX agent remained in the neutralized liquid). After months of legal wrangling and court injunctions, the incineration in Texas went forward.

But the United States has made very good progress over its 20-plus years of operations to date—90% of its declared chemical weapons stockpiles safely and permanently destroyed, seven of its nine stockpiles closed and undergoing remediation, and the last two sites in Colorado and Kentucky under construction. These will begin operating in the next 5 to 7 years, after thorough systemization and testing. The Colorado stockpile of 2,369t of mustard agent is most recently projected to finish in 2019, while the Kentucky stockpile of 475t of nerve and mustard agents may take until 2023. Thus the United States will be a decade or more behind the CWC legal deadline for completion of its stockpile destruction programme.[4]

Russian Federation

The Russian Federation is the largest possessor state, having declared 40,000t at seven stockpile sites. When the Russian Federation signed the CWC in 1993 (ratified in 1997), it stated to the CWC states parties that it would need financial and technical support to undertake its chemical weapons destruction programme in a safe and timely way. The United States was the first to offer support and began with an on-site inspection of the stockpile near Shchuch'ye in Kurgan Oblast. The US delegation for this 1994 visit included congressional representatives (including the author who was a congressional staffer at the time) and an Assistant Secretary of Defense, Harold Smith, who offered during the visit to build the Russian Federation an incinerator based on the Johnston Atoll and Tooele models. The Russian Federation refused the offer, declaring incineration too costly, complex and contentious, and opted instead to investigate other options for destruction.

A joint research and evaluation effort by the United States and the Russian Federation was established and over 30 technologies were evaluated. Several years later the Russian Federation agreed to pursue chemical neutralization for its stockpiles, not dissimilar to what ACWA was pursuing, and planning began for constructing a joint facility at Shchuch'ye, to be replicated later at a similar stockpile at Kizner. The United States proposed that Shchuch'ye be the first to construct because it and Kizner were the only weaponized stockpiles of small calibre weapons—artillery shells—which might be subject to theft and diversion. The Shchuch'ye stockpile was also the closest to foreign borders in Central Asia where much concern was building over possible terrorist operations in the mid-1990s.

The 1994 inspection by the United States of the Shchuch'ye stockpile had revealed several things: that the Russian stockpile was battlefield-ready with two million artillery shells and several hundred short-range missile warheads with mini-munitions inside; that both good storage inventories and stockpile security were lacking; and that the Russian Federation was ready for a joint effort with the United States to address its stockpile programme. The United States was concerned over the proliferation risk at these stockpiles, and anxious to move forward with improved perimeter security and destruction facility planning.

Although planning began in the mid-1990s, it took until 2002 for the first chemical weapons destruction facility to open, not at Shchuch'ye, but rather at Gorny in Saratov Oblast. This was a much smaller lewisite stockpile stored in drums, and Germany had agreed in the late 1990s to design and construct the neutralization facility, in partnership with the Russian Federation.

Construction would begin the following year at Shchuch'ye, but there was constant disagreement between the American and Russian partners over schedule, procurement and costs. The Russian Federation was anxious to have the facility up and running by 2005; the United States was convinced that 2008 was the earliest it could operate. Construction costs, originally estimated at almost $800 million, escalated to $1.5 billion (US facility costs were escalating to over $3 billion per facility).

In the meantime, the Gorny facility finished its first-stage process in December 2005, and the larger facility constructed by Germany at Kambarka in Udmurtia began operating the same month. The next year the Russian Federation's third facility opened in Maradikovsky in Kirov Oblast for nerve agent neutralization, and in 2008 a fourth facility in Leonidovka in the Penza Oblast.

The fifth Russian chemical weapons destruction facility to open was at Shchuch'ye in March 2009, when Russian authorities started up the first of two main destruction lines at the plant. However, the second main destruction line has yet to open, although the Russian Federation has recently said that it is likely to open by the end of 2012. The sixth Russian facility to open was at Pochep in Bryansk Oblast in November 2010, while the seventh and last at Kizner in Udmurtia is scheduled to begin operations in 2013, about four years behind its original projected opening in 2009.

To date, the Russian Federation has neutralized about 60% of its stockpile, some 24,000t, very close to the same tonnage as the United States.[5] The Russian Federation has accomplished this in less than eight years, over 3,000t per year; the United States has taken 22 years, averaging over 1,000t per year. The major differences here have been the fact that the Russian stockpile, a third larger than the US stockpile, has not included explosives or propellant and has therefore been much safer to handle; it has held a higher percentage in bulk storage rather than individual munitions, thereby making processing much quicker; and that it has been given credit for destruction by the OPCW after its first-stage neutralization process, whereas the United States has requested credit only after a two-stage process at its neutralization sites.

India and the Republic of Korea

India and the Republic of Korea have been very secretive about their chemical weapons stockpiles, including location, weapons types, chemical agents, tonnage and destruction technologies. The Republic of Korea has even invoked its confidentiality privileges under the CWC and refused its name to be used by the OPCW when listing possessor states.[6] The OPCW has resorted to listing all possessor states parties by name, and then adds "and another State Party".

Estimates place about 2,000t of mustard agent in India's stockpile, and 2,000t of binary nerve agent weapons in the Republic of Korea's stockpile. The Republic of Korea completed its destruction programme in 2008 and India in 2009, the second and third possessor states to complete elimination of their chemical weapons stockpiles under OPCW verification. It is alleged that India used incineration, and some observers believe that the Republic of Korea did likewise. Indian officials have stated privately that they did not want any publicity given to their programme due to possible civil law suits and public opposition. Officials of the Republic of Korea refuse to talk at all about their programme, but observers speculate that the official silence may be due to the high degree of political sensitivity on the Korean peninsula, with the Democratic People's Republic of Korea an acknowledged possessor state but non-member of the CWC. Some observers also speculate that the Republic of Korea's binary weapons were almost identical to the most modern in the US arsenal, and sensitivity over this alliance and trade in chemical weapons was very high.

Albania

Albania joined the CWC in 1994 yet did not declare itself as a possessor state. A decade later it acknowledged that it held a relatively small stockpile (nearly 17t) of bulk mustard, lewisite, mustard–lewisite mixture, adamsite, and chloroacetophenone agents in an insecure location. Albania's ambassador to the OPCW explained that this discovery only arose during an inventory of military assets left behind by the prior regime.[7]

With the financial help of the United States and the technical support of Germany, as well as several other states, Albania began its destruction process with a small incinerator in 2007, expecting to meet the 29 April 2007 CWC deadline for full destruction. However, the facility engineers underestimated the temperatures in the process and burned a hole in the furnace with the very first barrel of agent. It took several weeks to repair the equipment, and Albania finished operations in July, 10 weeks after the CWC deadline.

This was therefore the first case before the OPCW Executive Council where a state party and possessor state had violated the treaty. The Executive Council acknowledged the technical difficulty in the process and did not reprimand Albania for any intentional violation. Rather, the OPCW Director-General Rogelio Pfirter commended Albania for being the first state party to

complete its destruction programme, albeit with the help of several other states parties and by far the smallest stockpile declared at that time.

Libya

Libya joined the OPCW, as well as the other multilateral arms control and disarmament regimes, in 2004 and subsequently declared a chemical weapons stockpile estimated initially at 24.7t, subsequently more precisely estimated at 23.69t. It also declared 1,390t of precursor chemicals, 3,563 unfilled aerial bombs, and 3 chemical weapon production facilities.[8]

In March 2004, OPCW inspectors verified Libya's declared weapons inventory on-site and witnessed the complete destruction of its unfilled aerial bombs.[9] Discussions soon began about how best to destroy its mustard agents and precursor chemicals, with both the United States and Italy offering their support. After a few false starts, including the construction of an incinerator by the United States but the failure to transfer it to Libya, Libya began to neutralize its mustard agents stored in bulk containers in late 2010. Unfortunately, after about 13t had been neutralized, a major part failed in February 2011, just prior to the outbreak of the civil war. OPCW inspectors on-site were pulled out of the country, and an attempt to ship a replacement part from Italy was stopped by the NATO blockade. This left some 10t of chemical agents, and over 800t of precursor chemicals, in a potentially insecure stockpile in Libya, with much concern about potential use in the conflict.

On 28 November 2011, the new Libyan government, the National Transitional Council, surprised everyone by declaring a second stockpile of chemical agents.[10] The OPCW inspected this stockpile, reportedly of weaponized mustard agent, in January 2012, and demanded a full plan and schedule for destruction by April 2012. Not only did this mean that Libya would be the third possessor states (along with the United States and Russia) to miss the final CWC destruction deadline, but it would be the first state party to admit to intentionally violating its legal obligations under the treaty by retaining a secret weapons stockpile.

The OPCW stated that "[t]he new government in Tripoli, which has been recognized by the United Nations, inherits Libya's obligations as a State Party to the CWC to destroy the remaining stockpiles in their entirety under international verification by OPCW inspectors."[11] The secret, undeclared chemical weapons stockpile shocked many states parties who pointed to the need to strongly reprimand Libya; other OPCW members perceived this situation as the fault of the prior Libyan leader, not the transitional government, and emphasized the transparency and full cooperation that the new government was seeking to implement. Reportedly a final statement has now been crafted and mediated by the OPCW Executive Council Chairman, Ambassador Peter Goosen from South Africa, and was to be considered at the May 2012 Executive Council meeting. However, the important point will be to emphasize that no state party can harbour a secret chemical weapons stockpile or other related facility without

some degree of punishment from the OPCW and states parties responsible for effective implementation of the Convention.[12]

Iraq

In January 2009 Iraq became the 186th state to join the CWC. Iraq declared two large bunkers filled with old and unknown quantities of chemical weapons and agents. These bunkers, which reportedly stand three stories high and are the size of a football field, were sealed by United Nations inspectors in the 1990s.

OPCW experts had visited Iraq as early as 1999 when they helped close the United Nations chemical laboratory, part of the Baghdad Monitoring and Verification Center, and helped to destroy mustard agent samples.[13] The first OPCW Director-General Jose Bustani had also discussed Iraq's accession to the CWC in the following years, but these discussions stopped in 2002.

At the 16th OPCW Conference of the States Parties in 2011, the director of the Iraq Foreign Ministry's International Organization Department quoted from the new Iraqi constitution to emphasize Iraq's commitment to disarmament: "The Iraqi Government shall respect and implement Iraq's international obligations regarding the non-proliferation, non-development, non-production, and non-use of nuclear, chemical, and biological weapons, and shall prohibit associated equipment, materiel, technologies, and delivery systems for use in the development, manufacture, production, and use of such weapons."[14]

But the question remains about how best to deal with a potentially costly and dangerous demilitarization effort. One solution discussed has been to further encase the two bunkers into a more permanent burial site, with environmental monitoring for soil and ground water seepage. Other observers have noted that the CWC, under the Verification Annex, prohibits dumping and burial of chemical agents.[15]

Iraq was not bound by the 29 April 2012 destruction deadline, and the OPCW has asked for a full plan and schedule this year for its destruction process.

Conclusions: continued focus on CW destruction

Great headway has been made globally in abolishing chemical weapons since the Chemical Weapons Convention entered into force 15 years ago. The fact that over 50,000t and millions of munitions, representing over 70% of declared stockpiles, have been safely destroyed is alone an extraordinary step forward in improving international security. Likewise, over 1,100 chemical industrial facilities have been inspected in 81 states parties, lending much more confidence as to the non-proliferation and non-diversion of dual-use chemicals.

But much remains to be done to fully achieve a world free of chemical weapons—the main goal of the CWC: some 20,000t of Category 1 chemical weapons remain to be destroyed in four states parties—the Russian Federation (16,000t), the United States (2,844t), Libya (amount unknown), and Iraq (amount unknown). We know now that this will take at least another decade, perhaps longer, so the OPCW's and States Parties' focus must remain on its primary goal. This needs to include strict reporting requirements, transparency, and accountability by the possessor states, as agreed to at the 16th Conference of the States Parties.[16]

Also related to stockpile destruction is the elimination or conversion of former chemical weapons production facilities. Of the 70 facilities declared by 13 States Parties, 43 have been destroyed and 21 have been converted to commercial purposes. However, the remaining six must be addressed in two States Parties, and all of these converted facilities must remain on the list of commercial facilities that face ongoing inspections.

A secondary goal in support of CW disarmament is related to the CWC's number of States Parties (currently 188). As OPCW Director-General Ahmet Üzümcü stated in his report to the 16th Conference of the States Parties in November 2011, "Without universality, we face a paradoxical situation in which there is the complete elimination of chemical weapons by those that have chosen to join the Convention, without the assurance that chemical weapons have been eliminated from the world. Attaining the universality of the Convention must therefore remain a high priority".[17]

As the OPCW gradually shifts from on-site inspection of chemical weapons stockpile destruction over the next decade, it will become all the more important that its industry verification and challenge inspection regimes maintain excellent capability to inspect all chemical industry facilities capable of dual-use chemical research, development and production. The inspectorate must also be capable of responding in a timely way to any request by a state party for a challenge inspection of suspicious activities in a state party.

Last, but not least, the hundreds of thousands of tons of chemical agents and weapons dumped or buried before international and national environmental, public health and arms control regimes prohibited these practices require continued attention. The CWC explicitly prohibits the dumping or burial of chemical weapons, but has sections on "old" (produced before 1925) and "abandoned" (left in foreign territory after 1 January 1925) chemical weapons. Essentially, a state party is not responsible for these weapons unless they are unearthed or raised; if so, the OPCW must then verify them and oversee their timely destruction.

The largest project under OPCW auspices is the Japanese agreement with China to unearth and destroy hundreds of thousands of abandoned Japanese chemical weapons left in China during the last century. This will be a long, expensive and dangerous process, likely to last decades. However, chemical weapons seem to emerge almost weekly throughout the globe, largely in Europe, and several states—Belgium, France, Germany, Italy and others—remain actively engaged in the verified destruction of these old weapons. The United States has

identified over 200 suspected sites nationally with buried chemical weapons and has spent almost two decades remediating a burial site, Spring Valley, in northwest Washington DC.

Over 300,000t of chemical weapons have been dumped into all oceans of the world except the Antarctic. These munitions have become a larger concern over the last two decades as some have begun washing up on shore from shallower dump sites, and many have endangered and injured fishermen in Europe, the United States and Japan. While the CWC does not directly address sea-dumped munitions, it will clearly have to discuss this growing problem and determine next steps in better understanding the public health, environmental and proliferation impacts of this legacy.[18]

The Chemical Weapons Convention remains the best international model to date for verified abolition of a whole class of weapons in a non-discriminatory way. Other arms control agreements such as the Nuclear Non-Proliferation Treaty have been accused of a double standard for those states with and without nuclear weapons capability, while the Biological Weapons Convention lacks staffing for full implementation and any verification regime. As the world begins to recognize that weapons of mass destruction—nuclear, chemical and biological—and some conventional munitions, such as anti-personnel landmines and cluster bombs, are inhumane, the CWC serves as a very important, essential regime for both verified abolition and non-proliferation. The world is already a much safer and secure place after 15 years of CWC implementation, and will be even more safe and secure as the treaty is fully implemented.

Notes

1. Note that these figures have varied a bit over time, sometimes due to confusion about metric versus US tons, sometimes due to more accurate measurements as stockpiles are destroyed, and sometimes due to assumptions about original stockpile size—either at CWC entry into force in 1997 or original stockpile figures from 1990.
2. The United States and Soviet Union met at Jackson Hole, Wyoming, in 1989 and signed a Memorandum of Understanding to undertake bilateral data exchanges and on-site inspections of chemical weapons stockpiles and facilities. This MoU was signed by US Secretary of State James Baker and USSR Foreign Minister Edward Shevardnadze on 23 September 1989. Interestingly, the MoU states that neither state shall have an "aggregate quantity of chemical weapons" larger than "5,000 agent tons" by the end of 2002, and shall have destroyed at least 50% by 1999; see <www.acq.osd.mil/tc/treaties/bda/text.htm>.
3. The initial proposal to Congress was for a $60 million appropriation; US Army opposition to the ACWA legislation caused the House of Representatives to reduce this to $20 million, but the US Senate stuck with the $60 million request from the Clinton Administration. The House–Senate compromise was $40 million.
4. For the most recent US Department of Defense press release on the ACWA schedule, see <www.pmacwa.army.mil/>; see also Chris Schneidmiller, "U.S. Chemical Weapons Disposal Schedule 'No Surprise,' Expert Says", *Global Security Newswire*, 18 April 2012.
5. See "Russia destroys over 60 percent of chemical weapons", *Itar-Tass*, 21 March 2012. This article, however, mistakenly alleged that the Russian Federation would complete its destruction process by 29 April 2012, five weeks after the article was published, while it also acknowledged that most facilities were still operating or under construction.

6. The Confidentiality Annex to the Chemical Weapons Convention states: "Information shall be considered confidential if it is so designated by the State Party from which the information was obtained and to which the information refers".
7. See "Albania the First Country to Destroy All of its Chemical Weapons", *Chemical Disarmament Quarterly*, November 2007, p. 9. See also Conference of the States Parties, *Request by Albania for Extensions of the Intermediate Deadlines for the Destruction of its Category I Chemical Weapons Stockpiles*, OPCW document C-9/DEC. 8, 30 November 2004.
8. See OPCW, "Libya: Facts and Figures", <www.opcw.org/the-opcw-and-libya/libya-fact-and-figures/>.
9. See OPCW, "Initial Inspection in Libya Completed", 22 March 2004, <www.opcw.org/news/article/initial-inspection-in-libya-completed>.
10. See OPCW, "OPCW Inspectors Verify Newly Declared Chemical Weapons Materials in Libya", 20 January 2012,<www.opcw.org/news/article/opcw-inspectors-verify-newly-declared-chemical-weapons-materials-in-libya/>.
11. See OPCW, "Captured Chemical Weapons in Libya were Declared to the OPCW by Former Government", 28 September 2011, <www.opcw.org/news/article/captured-chemical-weapons-in-libya-were-declared-to-the-opcw-by-former-government/>.
12. For a recent update, see Chris Schneidmiller, "Libya Moves to Resume Chemical Weapons Disposal", *Global Security Newswire*, 24 April 2012.
13. See OPCW, "OPCW Experts Mission to Iraq," 20 July 1999, <www.opcw.org/news/article/opcw-experts-mission-to-iraq-an-update/>.
14. Conference of the States Parties, *Statement by H.E. Ahmed Bamerni*, OPCW document C-16/NAT. 26, 28 November 2011, pp. 1–2.
15. Part IV(A), § C, para. 13, of the CWC Verification Annex states: "Each State Party shall determine how it shall destroy chemical weapons, except that the following processes may not be used: dumping in any body of water, land burial or open pit burning. It shall destroy chemical weapons only at specifically designated and appropriately designed and equipped facilities".
16. See sub-item 9(d), "Issues related to meeting the final extended deadline and other destruction-related issues", in Conference of the States Parties, *Report of the Sixteenth Session of the Conference of the States Parties 28 November – 2 December 2011*, OPCW document C-16/5, 2 December 2011, p. 5; and Conference of the States Parties, *Decision: Final Extended Deadline of 29 April 2012*, OPCW document C-16/DEC.11, 1 December 2011.
17. Conference of the States Parties, *Opening Statement by the Director-General to the Conference of the States Parties at its Sixteenth Session*, OPCW document C-16/DG.18, 28 November 2011, p. 4.
18. Lithuania has established an International Scientific Advisory Board on sea-dumped munitions (of which this author is a member), and the United Nations General Assembly passed a resolution in December 2010 on "Cooperative measures to assess and increase awareness of environmental effects related to waste originating from chemical munitions dumped at sea"; see A/C.2/65/L.32/Rev.1.

The OPCW in transition: from stockpile elimination to maintaining a world free of chemical weapons

Ralf Trapp

While the Organisation for the Prohibition of Chemical Weapons (OPCW) prepares for the Third Review Conference of the Chemical Weapons Convention (CWC) in 2013, and as the deadline for completion of the elimination of chemical weapons stockpiles by the States Parties of the CWC passed at the end of April 2012, questions about the future of the OPCW have come to the fore. During its initial decade, much of the OPCW's resources and expertise were devoted to the verification of declared chemical weapons (CW) stockpiles and former CW production facilities, and of their destruction or conversion for permitted purposes. Around three quarters of the OPCW's verification resources have been devoted to these tasks. Although the elimination of declared CW stockpiles will not be completed by 2012 (and there remain several states outside the Convention that are suspected to possess chemical weapons), the intensity in CW destruction and related verification measures will drop considerably in coming years, marking the beginning of a transition of the regime (and its enforcement agency) to one with a different focus and new priorities.

This transition will put considerable political and managerial strain on the OPCW. Its inspectorate is expected to shrink to well below 100 inspectors, and the original balance in the budget—with more than half of all OPCW expenditures allocated to verification—has already begun to change.[1] How will these changes affect the OPCW? How will they impact on its ability to maintain core competence and capacity to implement its day-to-day routine missions and to deal with non-routine tasks such as the conduct of challenge inspections and investigations of alleged use, or the "coaching in" of new states parties (in particular if they had CW programmes in the past)?

These pressures come at a time when the OPCW is already facing challenges with regard to the need to adapt to changing external conditions. Advances in science and technology call for adaptation of the way national implementation measures and verification are being applied to prevent the recurrence of CW capabilities. Changes in the security environment create new threats (for example the threat that terrorists may use toxic chemicals) and uncertainties (for example the possible acquisition of incapacitating chemical agents for law enforcement purposes). Changes in chemicals manufacturing and trade alter the conditions under which the CWC is operating and may require adaptations of implementation processes in a variety of ways.

It was against this background that the OPCW Director-General, Ambassador Üzümcü, asked a panel of independent experts under the leadership of Rolf Ekeus of Sweden to analyse

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these challenges and prepare recommendations on future OPCW priorities. The Ekeus panel submitted its report to the Director-General in July 2011. The following reflections are inspired by the observations and recommendations submitted by the panel and provide additional thoughts on the transition of the OPCW.

New and changing objectives

The OPCW transition is occasionally portrayed as a "shift from disarmament to non-proliferation". This is not only a simplification but also a misrepresentation of its nature. The Ekeus panel choose instead to speak of:

> a transition from mandates and efforts primarily characterised by the elimination of chemical weapons stockpiles and production facilities to an agency that will have as its main task to ensure that the menace of chemical warfare and the use of toxic chemicals for hostile purposes will never reappear, and that international cooperation and assistance in the field of peaceful uses of chemistry can flourish.[2]

In short, this is not a shift from disarmament to non-proliferation, but a shift in emphasis and perspective from creating to preserving a world free of chemical weapons. This rebalancing will be gradual as long as there remain chemical weapons stockpiles and production capabilities to be destroyed, but it is nevertheless starting to affect the practical work of the OPCW today.

Disarmament will remain at the heart of the CWC, and thus the OPCW, in a three-fold sense: (1) working towards the earliest possible completion of the elimination of all declared CW stockpiles and former production capacities, (2) bringing into the realm of the Treaty all remaining states not (yet) party and ensuring that those that possess CW capabilities disarm, and (3) preventing the recurrence of CW in whatever form. From this perspective, the transition is essentially a shift in emphasis: while the earliest possible completion of the elimination of all CW stockpile remains paramount, other tasks gain in importance as the OPCW is getting closer to completing the first.

Verification

The raison-d'être of the OPCW is CW disarmament under strict international verification. As chemical weapons stockpiles disappear, the verification of their continued non-production will remain a key assurance of treaty compliance. The manner in which this verification is conducted must evolve to reflect the changing environment in which the CWC operates, taking account of new security conditions, advances in science and technology as well as trends in chemicals manufacturing and trade. This will not merely require an increase in inspection numbers in the chemical industry but a more intelligent selection of chemical plant sites for inspection and a shift in emphasis from quantitative to qualitative verification approaches.

The verification of the declaration and elimination of CW stockpiles and production facilities was based on relatively straight-forward technical principles which included inventory controls, measurements, statistical tests and visual observations during on-site inspections. The basic approach was a combination of material balance verification, verifying the integrity of the physical boundaries of the facilities, ensuring the integrity of destruction processes, authenticating and tracking chemical weapons and items of specialised equipment, and using chemical analysis to confirm declarations and demonstrate the absence of undeclared materials.

Industry verification also has been driven primarily by checks on declared data: declarations are evaluated for internal consistency and compared to other declared data sets, and discrepancies are sought to be resolved with the states parties concerned. On-site inspections check on the accuracy of the information submitted in declarations and attempt to identify possible diversions through material balance techniques. In addition, analytical tests are conducted from time to time to confirm the absence of undeclared scheduled chemicals. This approach has merits in the context of past chemical weapons programmes, which are reflected in the Schedules of chemicals that form the basis of the current industry verification system. As long as there remain concerns about "traditional" chemical weapons programmes, this type of industry verification will remain important.

Yet the farther the world moves away from the CW programmes of the Cold War era, the less will traditional verification approaches reflect contemporary security concerns with regard to the possible re-emergence of chemical warfare threats. There appears to be a broad consensus that the threats of tomorrow will not mirror past CW programmes, which involved the acquisition of huge stockpiles of lethal agents. Instead, new actors and different scenarios have to be considered, and the possible emergence of new types of chemical warfare needs to be addressed.

The attacks of 11 September 2001 and the Amerithrax investigation following soon after focused minds on the threat that non-state actors such as terrorists may attempt to acquire and use weapons of mass destruction (WMD), prompting Security Council decisions (notably Security Council resolution 1540) as well as complementary measures adopted by a number of international agencies, including the OPCW,[3] to prevent WMD proliferation to non-state actors and to mitigate the consequences of their use. CWC implementation can make a contribution to this risk management provided it is adapted to the specifics of the underlying acquisition processes. That, for example, will require extending the reach of OPCW verification measures beyond the chemicals listed in the Schedules of the CWC (which are anchored in past state programmes) to also address risks associated with other types of agents that are more likely to be acquired by non-state actors.

New challenges also emanate from advances in science and technology. In a changing security environment where military forces operate in traditional battlefields as well as urban

scenarios and operations range from "traditional" combat missions to peacekeeping and counter-insurgency operations, demands are emerging for types of weapons better suited to these new circumstances. This has created pressures for the acquisition of non-lethal weapons, including certain incapacitating toxic chemicals as weapons for law enforcement (in war, these would be chemical weapons and thus prohibited under the 1925 Geneva Protocol as well as the CWC; the debate about their legality in law enforcement has so far remained inconclusive[4] but serious concerns remain about the possibility that such developments will undermine the CWC regime). This, again, calls for taking a verification approach that is not constrained by the CWC Schedules but also takes account of other types of chemical agents (non-traditional and novel agents, toxic industrial chemicals).

Such an evolution was in fact anticipated by the drafters of the CWC, in the regime for "Other Chemical Production Facilities" (OCPFs). That verification sub-regime is essentially open-ended and the verification goals are broadly designed to confirm that activities at an inspected facility are consistent with the obligations undertaken under the CWC. But to accomplish that goal, verification has to move beyond simply checking and confirming declared data points, and attempt to evaluate whether activities and features encountered in inspections are consistent with the obligations undertaken under the CWC. This is a reflection of the General Purpose Criterion built into the CWC, which ensures the comprehensive coverage of all toxic chemicals and their precursors under the prohibitions of the CWC unless these chemicals are intended for legitimate purposes and as long as their types and quantities correspond to such legitimate purposes. It requires the OPCW and its states parties to look beyond the control lists set out in the Schedules and to address the potential for misuse of toxic chemicals in what is essentially a risk-assessment and risk-management approach.

Verification, seen in this broader context, will also require the evaluation of information collected in inspections and extracted from declarations against other information available in the public domain, and a systematic monitoring and assessment of new scientific and technological developments that may impact on compliance with the CWC. At the same time, the OPCW will need to strengthen its capacity to undertake verification activities related to non-compliance concerns (both informal fact-finding processes and formal clarification procedures including challenge inspections and investigations of alleged uses of chemical weapons).

Some of these adaptations in the verification system of the OPCW are likely to meet with resistance, similar to if perhaps less profound than the opposition with which some states approached the additional safeguards protocol in nuclear safeguarding. But without such a transition, the contribution of the CWC verification system to international security is likely to fade over time. It would less and less reflect contemporary CW threats, remain stuck in the past and eventually lose its relevance for ensuring the collective security of the CWC states parties.

Implementation support

It is not merely the verification system of the CWC that will need to be adapted to change. National implementation systems are needed to make the CWC work. Many states, however, have failed to take the measures required to establish such implementation systems or lacked capacity to apply the CWC requirements effectively. After the First Review Conference in 2003, the OPCW began a concerted effort to fill these gaps. It encouraged states parties that had not yet done so to establish National Authorities and enact implementing legislation, and organized a programme of technical assistance (legal, institutional, training) to help build capacity at the national and regional levels.

The emerging threat of non-state actors acquiring and using toxic chemicals has added urgency to this task: mitigating these risks requires robust national systems to prevent, deter and respond to attempts to acquire and use toxic chemicals as weapons, from legislation to regulations, enforcement, administrative measures and stronger preparedness and response systems. These requirements are already implied by the provisions of the CWC and were further detailed in Security Council resolution 1540.

Helping States Parties build and maintain this capacity, adopt measures that fit their specific needs and conditions, and ensure their sustainability will remain a crucial aspect of the OPCW's work in coming years. This work is undertaken in concert with many other international, regional, governmental and non-governmental organizations that implement similar technical cooperation and assistance programmes. This calls for a systematic and well-coordinated strategic approach that avoids conflicting messages and advice and draws on the synergy of the different technical assistance programmes. At the national level, it requires a holistic, all-government all-risks approach based on a sober and comprehensive needs assessment. The demand so placed on states receiving technical assistance can be significant, and might lead to "assistance fatigue" and systems overload. This is where regional approaches to technical assistance could be important to more effectively manage needs assessments, programme execution and results evaluation. A new example for such regional approaches is the establishment of regional Centres of Excellence on chemical, biological, radiological and nuclear (CBRN) risk management sponsored by the European Union,[5] supported with technical advice by the OPCW, the International Atomic Energy Agency and other partners.

The OPCW has achieved a fair degree of recognition in this field of implementation support. Since the adoption in 2003 of its Action Plan for national implementation, the OPCW has provided expert advice, training and legislative support to a large number of states. It has forged strategic alliances with a number of other organizations with technical support programmes in such areas as: legislative assistance; outreach to stakeholders in parliaments, academia and industry; work with customs organizations; emergency response to chemical incidents; and chemical analysis for regulatory as well as investigative purposes, to mention just a few. This engagement in technical support and national as well as regional capacity-

building will remain a strategic task for the OPCW that will place demands on its expertise and resources for the years to come.

Prevention and preparedness

Closely related to these capacity-building measures is the OPCW's role with regard to preparedness for and response to the use of chemical weapons. When the provisions on assistance and protection were incorporated into the CWC, the emphasis was on establishing an international mechanism for the investigation of allegations of CW use and for the delivery of assistance and protection to victims of chemical attacks under a coordinated international emergency response mechanism. After 11 September 2001, the OPCW clarified that this same mechanism could also be invoked in cases when terrorists used toxic chemicals. It is worth noting in this context that recent exercises of investigations of alleged CW use and the delivery of assistance through the OPCW in Ukraine (field exercise, 2005), Poland (table-top exercise, 2010) and Tunisia (field exercise, 2010) all used a terrorist attack with improvised chemical weapons or the release of an industrial toxic chemical as the exercise scenario.

This context of investigation of alleged use and delivery of assistance in the form of protection (including medical countermeasures and decontamination) is, however, different from the type of scenario originally envisaged by the drafters of the Convention. One important difference is that while the drafters of the Convention focused on establishing a unique international response mechanism to provide protection and assistance to victims of chemical weapons, it has become clear that, in practice, the OPCW is not the only international organization that has a mandate to assist a state under attack. A second difference is that, for this type of scenario, the local response capacity is paramount. The scenarios that were on the minds of negotiators when the Convention's provisions for assistance and protection were developed involved repeated large-scale battlefield use of chemical agents rather than more localized and lower-intensity terrorist threats—quite different from today's realities.

The complexities potentially involved in international response to such an attack became apparent in a recent study published by the United Nations Counter-Terrorism Implementation Task Force (CTITF).[6] It was observed that "there are a large number of UN and other international agencies and organizations that have partial mandates and undertake certain activities in the area of prevention of, preparedness for and response to possible terrorist attacks with chemical or biological weapons or materials".[7] Coordination among the agencies involved, information-sharing and compatibility of their operational protocols were identified as key issues, and the study recommended that:

> with respect to the emergency relief response to situations involving the use of chemical or biological weapons that have a potential of causing mass casualties, the United Nations Disaster Assessment and Coordination (UNDAC) mechanism should be formally adopted as the mechanism for coordinating relief efforts,

> and arrangements should be made accordingly involving OPCW, the World Health Organization (WHO), the International Criminal Police Organization (INTERPOL) and the UN Office for the Coordination of Humanitarian Affairs (OCHA).[8]

The use of the UNDAC mechanism would also ensure effective coordination among the local emergency response system, the OPCW and other actors on the scene, such as states that are dispatching emergency assistance, or emergency teams dispatched by the International Committee of the Red Cross and non-governmental organizations. Other areas identified by CTITF as requiring more attention included stronger (sub)regional coordination; more exercises and training; the enhancement of early warning systems; good coordination between emergency response, investigations of alleged CW use and law enforcement; and better coordination of public information management through a Crisis Communications Group with pre-agreed modalities and operational protocols. But the most important aspect of this approach to emergency response is the focus on developing the capacity of the local (and national) response systems. This is particularly pertinent in the case of attacks with toxic chemicals, because the response times in such incidents measure in hours rather than days or weeks given the characteristics of toxic chemical agents. This is different from a response to biological or radiological incidents, where the impact of an attack is often delayed and response measures are stretched out over longer periods of time.

For the OPCW, this requires a shift in emphasis from strengthening the international response capacity to helping to strengthen national and regional response systems. While international assistance in emergency response will remain important, it will be even more important that states themselves strengthen their internal response systems at the national and local levels to deal with natural catastrophes, accidents as well as hostile acts involving the release of toxic, infectious or radiological materials. They also must develop and exercise protocols for information-sharing and coordination of response measures with their neighbours. These measures, furthermore, cannot be limited to chemical threats; rather, a holistic, all-risks approach will be required. As for its chemical aspect, the range of threat agents that states and the OPCW need to address with their preparedness measures needs to reach well beyond the traditional chemical warfare agents and include non-traditional agents such as toxic industrial chemicals.

At the same time, the OPCW needs to maintain its capacity to investigate allegations of CW use. With a shrinking inspectorate the OPCW may find it challenging to maintain a critical mass of well-trained inspectors with the right mix of technical skills and expertise to conduct such investigations. The Ekeus panel observed that:

> As the overall demand for inspectors with chemical weapons expertise and skills related to work in chemical warfare environments declines given the decline in chemical weapons destruction activity, the Technical Secretariat may have to develop new concepts for how it can maintain readiness to conduct

investigations of alleged use (such as stronger reliance on expertise outside the Inspectorate; more reliance on the Qualified Experts designated by the Director-General for investigations of alleged use, as envisaged by the Convention).[9]

There also will be a need to further improve coordination with the investigation mechanism of the UN Secretary-General for investigations of alleged use of chemical and biological weapons, and with law enforcement organizations such as INTERPOL.

International cooperation, chemical safety and chemical security

While the OPCW adapts to evolving security concerns related to toxic chemicals, it will also need to more clearly delineate its contribution to international cooperation and assistance in the field of peaceful chemical activities. The debate about the balance between the security and development aspects of the CWC is not new, and many practical steps have already been taken by the OPCW to put into place meaningful and effective international cooperation programmes to promote international cooperation in the peaceful application of chemistry. An OPCW workshop conducted in November 2010 identified a wide range of possible approaches and practical steps towards enhancing these programmes, and the 16th session of the Conference of the States Parties in 2011 took a programmatic decision on the future implementation of Article XI of the CWC.[10] That decision identified key aspects ("components") of an agreed framework for the full implementation of Article XI. It included a catalogue of proposed measures in such areas as (1) national capacity-building for the research, development, storage, production and safe use of chemicals for purposes not prohibited under the Convention; (2) the promotion of networking and exchange among scientific communities, academic institutions, chemical-industry associations, non-governmental organizations and regional and international institutions; (3) the enhancement of the effectiveness of current international-cooperation programmes of the OPCW; and (4) measures to facilitate States Parties' participation in the fullest possible exchange of chemicals, equipment and scientific and technical information relating to the development and application of chemistry. The decision also included provisions on how to finance these measures and on how to ensure proper oversight.

This new OPCW guideline starts from the appreciation that effective international cooperation and technical assistance need to be based on accurate assessments of the needs of the states involved. This "no one size fits all" principle has become the gold standard in technical assistance and capacity-building programmes across the board; it also applies in the CWC context. The approach also recognizes the need for and benefit of broad stakeholder involvement and networking. At the same time, it emphasizes practical measures directed at specific technical capacities that relate directly to the knowledge base and technical competence of the OPCW and its Technical Secretariat.

This is important as it allows maintaining a balance between the OPCW's contribution to security and disarmament and its broader involvement in international cooperation and development. The OPCW is not going to turn into a development agency, but it will and should make specific contributions to the evolution of an international environment that promotes compliance with disarmament norms and security requirements in the chemical field, and thereby helps to foster scientific, technological and industrial exchanges among States Parties.

An area that is receiving growing attention by the OPCW is chemical safety and security. In September 2011, as a contribution to the International Year of Chemistry, the OPCW organized a conference on international cooperation, chemical safety and chemical security, which brought together a wide range of stakeholders from science, academia, industry and government. This meeting was both a showcase of OPCW activities in the field of international cooperation and an opportunity to discuss future directions of the technical assistance programmes implemented by the OPCW. With regard to chemical safety, the conference concluded that the global handling, storing, processing and transportation of hazardous chemicals, in particular at industrial facilities, should be managed in a holistic public–private risk-management framework. The conference also confirmed that the OPCW was well placed to serve as a forum for governments and industry to discuss issues related to chemical security.[11]

To do so will require the OPCW to review its own technical expertise and activity in the light of activities of other organizations that have mandates in this field. For example, the United Nations Economic and Social Council's (ECOSOC) Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals has been developing Recommendations on the Transport of Dangerous Goods since the 1950s. Since 2003, these Model Regulations contain, in addition to the safety provisions, security provisions applicable to the transportation of all kinds of dangerous goods and applicable to all persons engaged in such. There are special provisions for security awareness training and for the adoption of security plans in the transportation of "high-consequence dangerous goods", which have the potential for misuse in a terrorist incident that could result in serious consequences such as mass casualties or mass destruction. Examples of such high-consequence dangerous goods are compiled in an indicative list that includes, for example, explosives, flammable liquids in tanks, certain radioactive material, toxic gases and Category A infectious substances.[12]

With regard to the safety and security of chemicals throughout their life cycle, the International Conference on Chemicals Management adopted in 2006 the Strategic Approach to International Chemicals Management (SAICM) as a policy framework for the sound management of chemicals.[13] SAICM was developed jointly by the United Nations Environment Programme, the Inter-Organization Programme for the Sound Management of Chemicals (IOMC) and the Intergovernmental Forum on Chemical Safety in a process that involved representatives of government, intergovernmental organizations and civil society including

agriculture, environment, health, industry and labour. A range of practical capacity-building projects have since been implemented under a global action plan. Although its primary focus is on sound chemicals management and concerns unintended releases rather than hostile uses of chemicals, SAICM also addresses objectives with direct security relevance, such as the prevention of illegal traffic in toxic and dangerous goods and the formulation of prevention and response measures to mitigate environmental and health impacts of emergencies involving chemicals.

Governments such as the United States and regional organizations such as the European Union have developed guidelines and compliance mechanisms to enhance the security of chemical operations and facilities.[14]

The International Council of Chemical Associations, in the meantime, has developed its own standards and compliance mechanisms under its Responsible Care programme.[15] For example, it has developed tools for plant operators to undertake security vulnerability assessments and ensure compliance of chemical operations and facilities with established security requirements.

For the OPCW to take on a useful role in chemical safety and security will require it to clearly define how its knowledge base, technical competence and multilateral experience can add value to these already extensive and diverse activities. The OPCW's contribution to chemical safety and security should draw on its strengths, which include its global reach under a treaty that has become almost universal, its multilateral experience in resolving difficult security-related issues, its understanding of the operations of the chemical industry worldwide, its links with the international science community, and its proven track record in providing a platform for multilateral and multidisciplinary exchanges and practical work at the intersection of disarmament, security and development in the chemical field. Its technical competence in such areas as chemical analysis, health and safety of chemical operations and protection against toxic chemicals, management of emergency response operations and investigation of alleged CW use are all relevant to enhancing chemical safety and security and facilitating global collaboration on these issues.

The need for new governance approaches

The transition of the OPCW will only succeed if it can evolve into a knowledge-based, learning organization that works together with other stakeholders in an open and transparent manner. To be fair, it has already progressed some way towards this goal. The Ekeus panel observed that it has become the global repository of knowledge and a centre of operational and technical expertise with regard to the prevention of chemical warfare, the elimination of chemical weapons, and international verification. But the panel also cautioned that there was a need for institutional change and managerial adaptation. It identified the preservation and expansion of institutional competence, knowledge and professionalism as key requirements to this end.

This will require a careful application of such internal instruments as the OPCW tenure policy to prevent the loss of institutional memory, and the development of strategies that aim at strengthening the knowledge base of the OPCW through learning from others and from its own results. It will also require overcoming internal institutional barriers to make the best use of the experience of the OPCW's staff, advisory bodies and partners in states parties and other organizations.

This will become ever more important as science, technology and industry advance at an astonishing pace. This happens in an environment where several scientific disciplines are converging under the roof of what is usually called the life sciences, thereby increasingly blurring the traditional borders between chemistry and biology, and also drawing on principles and methods from other disciplines such as mathematical modelling, engineering and information technology.[16] Such work at the interface of different scientific disciplines often leads to new and sometimes unexpected discoveries and insights. There are high expectations that these advances may lead to new medicines, means of pest control and food production, and renewable energy sources, to mention just a few. But these same developments also carry risks, including with regard to the potential for hostile uses.

In the context of the preparations for the 2011 Biological Weapons Convention (BWC) Review Conference—but equally pertinent to the issue of CW disarmament—arguments have been advanced that in this current environment new governance approaches should be sought. McLeish and Trapp argue that:

> From an arms control perspective, these factors [i.e. the advances in the life sciences, the increasing global distribution of life science research and the growing interdependence of life science research centres] translate more and more into a post-proliferation world. In such a world, traditional models of proliferation control are certain to fail, and the traditional top-down government approaches no longer seem appropriate. From a broader regulatory perspective, the role of governments is changing. The state alone is no longer able to control the way that life sciences discoveries are used. The circumstances beg instead for a governance system that brings together all stakeholders—science, industry, government, and the public—and broadens as well as deepens the basis for compliance with the safe and responsible conduct and utilization of science, thus supporting the norm against biological weapons.[17]

The OPCW has already established strategic relationships with some key actors in civil society. Examples are its association with the international science union in the field of chemistry, the International Union of Pure and Applied Chemistry, and its somewhat hesitant engagement with non-governmental organizations through such mechanisms as the Open Forum held alongside Review Conferences, the Academic Forum, the Industry and Protection Forum and most recently the Conference on International Cooperation and Chemical Safety and

Security. It has also further developed its relationship with the chemical industry and its trade associations—although the Ekeus panel observed that there was a need to renew this partnership and render it less bureaucratic and more constructive.

The impression remains that the OPCW is somewhat reluctant to fully engage with other stakeholders. This has begun to change, and the OPCW and its new Director-General are placing stronger emphasis on public diplomacy and deeper interaction with civil society as well as organizations representing chemical industry, research and teaching.

All these efforts have allowed a growing number of stakeholders to make their contributions to the discussion of future OPCW and CWC priorities and objectives. But to manage this process and provide strategic guidance and leadership, the OPCW (states parties as well as the OPCW's institutions) will need to do more to create an environment in which stakeholders are able to bring in their views and proposals and participate more effectively in shaping the future implementation of the CWC.

In this respect, the OPCW can learn from the mechanisms developed by the BWC as well as other multilateral arms control and disarmament instruments in recent years. In the BWC context, for example, the intersessional process developed over the last decade has enabled a multitude of stakeholders from industry to academia and research to participate in the discussions about how to implement the BWC in the future. Non-governmental organizations, other organizations and even individuals have been able to make presentations to BWC expert meetings and the annual forum of states parties, share their views and present suggestions. These processes have also led to practical measures such as the support offered by some non-governmental organizations with regard to universalization as well as technical assistance in the adoption of national implementation measures (legislation, biosecurity measures and the like). All this has created a framework for stakeholder participation and involvement that is far more evolved and effective than the steps taken by the OPCW in the past. As the transition of the OPCW to its new priorities and mandates progresses, there will be a need to broaden and deepen its collaboration with all relevant stakeholders, as other organizations and mechanisms have done already.

Notes

1. See Conference of the States Parties, *Decision. Programme and Budget of the OPCW for 2012*, OPCW document C-16/DEC.12, 2 December 2011.
2. See Technical Secretariat, *Note by the Director General. Report of the Advisory Panel on Future Priorities of the Organisation for the Prohibition of Chemical Weapons*, OPCW document S/951/2011, 25 July 2011, annex 2.
3. The First CWC Review Conference recalled the request of the UN Security Council that international organizations evaluate ways in which they can enhance the effectiveness of their action against terrorism, in particular those organizations whose activities relate to the control of the use of or of access to chemical and other deadly materials (see Security Council resolution 1456), and reaffirmed the decision of the Executive Council on the OPCW's contribution to the global struggle against terrorism, including through its working group on terrorism (see OPCW document RC-1/5, May 2003, para. 7.10). Additional emphasis

on this objective was endorsed by the Second Review Conference (see OPCW document RC-2/4, 18 April 2008, section on agenda item 9(c)(vii): assistance and protection against chemical weapons).

4. International Committee of the Red Cross, Proceedings of the expert meeting "Incapacitating chemical agents—implications for international law", Montreux, Switzerland, 24–26 March 2012; S. Mogl (ed.), *Technical Workshop on Incapacitating Agents: Spiez, Switzerland, 8–9 September 2011*, Spiez Laboratory, 2012.
5. The CBRN Centres of Excellence programme is implemented by the United Nations Interregional Crime and Justice Research Institute and the EU Joint Research Centre, and financed through the European Union's Instrument for Stability (see Regulation (EC) no. 1717/2006). For details see <www.cbrn-coe.eu/>.
6. United Nations Counter-Terrorism Implementation Task Force, *Interagency Coordination in the Event of a Terrorist Attack Using Chemical or Biological Weapons or Materials*, 2011.
7. Ibid., p. vii.
8. Ibid., p. viii.
9. Technical Secretariat, *Note by the Director General. Report of the Advisory Panel on Future Priorities of the Organisation for the Prohibition of Chemical Weapons*, OPCW document S/951/2011, 25 July 2011, annex 2, para. 68.
10. Conference of the States Parties, *Components of an Agreed Framework for the Full Implementation of Article XI*, OPCW document C-16/Dec.10, 1 December 2011.
11. See OPCW, *OPCW Conference on International Cooperation and Chemical Safety & Security. Outcome Document*, 2011.
12. *Recommendations on the Transport of Dangerous Goods—Model Regulations*, UN document ST/SG/AC.10/1/Rev.17, 2011, chp. 1.4.
13. See *Strategic Approach to International Chemicals Management. SAICM texts and resolutions of the International Conference on Chemicals Management*, United Nations Environment Programme, 2006, <www.saicm.org/documents/saicm%20texts/SAICM_publication_ENG.pdf>.
14. See for example the Chemical Security Assessment Tool of the US Department of Homeland Security (<www.safetec.net/ehs-exclusive/csat-chemical-security-assessment-tool/>) and the measures set out in the European Union's CBRN Action Plan adopted in 2009 (see Council of the European Union document 15505/1/09 REV 1, 12 November 2009).
15. See <www.icca-chem.org/en/home/responsible-care/>.
16. For a detailed discussion see "Chapter 4: Integration of multiple disciplines in life science research", in *Life Sciences and Related Fields: Trends relevant to the Biological Weapons Convention*, National Research Council of the National Academies, 2011, pp. 81–92.
17. Caitríona McLeish and Ralf Trapp, "The Life Sciences Revolution and the BWC", *The Nonproliferation Review*, no. 18, vol. 3, p. 540.

Non-proliferation and preventing the re-emergence of chemical weapons

Alexander Kelle

Over the past 15 years of implementation of the Chemical Weapons Convention (CWC) the destruction of existing chemical weapons (CW) stockpiles by possessor states and the verification of these destruction activities through the inspectorate of the Organisation for the Prohibition of Chemical Weapons (OPCW) has received the greatest attention and bound the most resources of the organisation. With CW destruction being wound down, this is bound to change substantially. As a matter of fact, first signs of this reorientation of the OPCW are already visible in the organisation's programme and budget for 2011 and 2012, the latter of which was agreed at the 16th session of the Conference of the States Parties (CSP) last December, with fewer resources devoted to the inspection of CW destruction activities and a higher number of inspections of so-called other chemical production facilities (OCPF) agreed.[1] Although there is no consensus yet among States Parties on how the future OPCW and its portfolio of key tasks will exactly look, it is clear that non-proliferation or, as it is increasingly called, the prevention of the re-emergence of chemical weapons will form a central component of future OPCW activities. Taking a broader perspective, prevention of the re-emergence of CW can in turn usefully be subdivided into different components: first, so-called Article VI activities by States Parties, which need to be monitored so as to ensure that peaceful activities do not conceal CW acquisition efforts; second, effective national implementation according to Article VII, which is required to close remaining loopholes for would-be proliferators; and third, the CW-related transfers that could feed into acquisition efforts need to be prevented, so that CWC state parties are in compliance with their obligations under Article I of the Convention. The following three sections will discuss each of these components of a comprehensive CW non-proliferation policy in turn. The final part of the article will summarize the argument and turn to steps that could usefully be taken in the run-up to the third CWC Review Conference in April 2013 in order to strengthen the CW prohibition regime in preventing the re-emergence of CW.

Preventing CW acquisition under cover of Article VI activities

In light of the dual-use nature of much of the chemistry involved in offensive CW activities, the CWC contains provisions to safeguard international trade and the technological development of the international chemical industry and to preserve the right of States Parties to engage in legitimate preventative and protective activities. According to CWC Article VI, States Parties retain the right "to develop, produce, otherwise acquire, retain, transfer and use toxic chemicals and their precursors" for either peaceful, non-chemical-weapon-related or military or defensive purposes. The rules and procedures to be followed in this regard are contained

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in this article as well as Parts VI to IX of the Verification Annex. States Parties have to submit regular declarations, and have to accept data monitoring and on-site verification of declared facilities through the OPCW inspectorate.

In order to allow the OPCW Technical Secretariat to manage the verification activities with respect to the chemical industry, the CWC distinguishes between four different sets of chemicals and facilities dealing with these. The first three sets of chemicals are captured in the so-called Schedules that are contained in an annex to the CWC. Schedule 1 chemicals pose a high risk to the Convention. Many have been developed, produced, stockpiled or used as CW in the past and they have few if any peaceful uses. A chemical may also be listed in Schedule 1 if it is a final stage precursor to another Schedule 1 chemical. These chemicals cannot be retained by States Parties except in small quantities for medical or defence research purposes. Schedule 2 chemicals pose a significant risk to the Convention either because they can be used themselves as chemical weapons or as a consequence of their role as precursors to Schedule 1 or 2 chemicals. Schedule 2 chemicals also are not produced commercially on a large scale. Finally, Schedule 3 chemicals are produced in large quantities commercially but pose a risk to the Convention due to their toxicity, which makes them suitable as a CW or because of their role as precursors to either Schedule 1 or Schedule 2 chemicals. The numbers of facilities that are handling scheduled chemicals have been fairly static and so have inspections of these facilities.

Rules and procedures for the fourth category of chemicals that may pose a risk to the object and purpose of the Convention, so-called discrete organic chemicals (DOCs), and the related "other chemical production facilities" (OCPFs) are detailed in Part IX of the Verification Annex. It is the verification of these OCPFs that has been a bone of contention among CWC States Parties during the past decade. Since entry into force, almost 4,300 inspectable DOC-producing OCPFs have been declared by States Parties. After recently agreed increases in OCPF inspection numbers, the OPCW announced in March 2012 that the overall number of such inspections since entry into force of the CWC had reached 1,000, or around 23% of inspectable facilities.[2] Yet, assuming the continuation of the increased rate of OCPF inspections agreed for 2014, i.e. 157 per year, it will take the OPCW at least another 20 years to visit the remaining facilities in this category at least once.[3] Furthermore, those facilities that are of greater concern would have to be reinspected, further prolonging this process. This prospect is problematic as already, before the first CWC Review Conference in 2003, the OPCW Technical Secretariat concluded that early OCPF inspections undertaken had:

> shown that there are … some [facilities] that are highly relevant to the object and purpose of the Convention. These facilities produce chemicals that are structurally related to Schedule 1 chemicals. Of particular relevance to the Convention are facilities that combine this kind of chemistry with production equipment and other hardware designed to provide flexibility and containment.[4]

The recognition of these new developments in the chemical industry has since then led to calls for a shift in emphasis in implementing the industry verification regime. However, it has also become clear that this goal is not universally shared by States Parties. Already during the General Debate of the first Review Conference, Pakistan demanded that an "Increase in emphasis on verification … of facilities producing relatively harmless discrete organic chemicals (DOCs) should not be at the expense of higher risk Schedule 1, 2 and 3 chemicals listed in the Annex to the CWC".[5] In the Political Declaration of the Conference the "need to ensure adequate inspection frequency and intensity" for each category of Article VI facilities was affirmed.[6] Proponents of expanded and more focused OCPF inspections could interpret this as allowing the redirection of industry inspection towards the group of OCPFs that pose the greatest risk to the objects and purposes of the Convention. At the same time, this wording allowed those States Parties, such as Pakistan, who see the CWC as containing a fixed risk-hierarchy with Schedule 1 chemicals and facilities topping this list and OCPFs being of a much lower concern, to claim victory.

As a result of this ambiguous wording, the debates about OCPF inspections continued and resurfaced during the Second CWC Review Conference in 2008. During the general debate, Cuba on behalf of the Non-Aligned Movement (NAM) and China emphasized that:

> the Convention clearly sets out the hierarchy of risks posed by different chemicals to its object and purpose. The verification regime under Article VI must therefore correspond to the hierarchy of risks inherent to the respective category of chemicals.[7]

In other words, industry verification continued to be interpreted by the NAM and China as being based on a fixed definition of risks inherent in different types of chemicals and facilities. Given the large numbers of OCPFs declared by China (over 1,400) and India (over 500), this position does not come as a complete surprise. The statement by the United States in contrast stressed the:

> need to improve our approach to [OCPFs], both by increasing the percentage of facilities that are inspected annually and by improving identification of the specific facilities that should be inspected. Some of these facilities incorporate technologies and features that are highly relevant to the Convention.[8]

This call for focusing OCPF inspections on those facilities was taken up in a detailed Swiss national paper submitted to the Second Review Conference. The paper makes the case for a detailed risk assessment of OCPFs and for the introduction of a weighing mechanism for those facilities that pose the highest risk to the object and purpose of the CWC. Applying such a formula, it concludes that multipurpose batch plants that produce so-called PSF (phosphorus, sulphur and fluorine) chemicals in excess of 200 tons annually pose the highest risk among OCPF.[9] In order to address the diverging views on inspection modalities for OCPFs, the final document of the Second Review Conference calls for "early resumption of consultations on

the OCPF site selection methodology with a view to reaching a decision by States Parties, in accordance with Part IX, paragraphs 11 and 25, of the Verification Annex to the Convention".[10]

In parallel to these political debates, the OPCW Technical Secretariat had to start implementing a verification mechanism for OCPFs according to Part IX, paragraph 22, of the Verification Annex beginning in May 2000. For the first seven years, site selection for inspections was carried out in a two-step process in which initially the country was selected and only then was the plant site for inspection selected. This temporary mechanism was replaced by an interim algorithm introduced by the Technical Secretariat in May 2007, which allowed for the selection of plant sites in a single step and sought to direct the process towards relevant facilities. Following the above-mentioned call by the Second Review Conference, such consultations among States Parties in 2010 and 2011 resulted in an updated interim selection methodology which has been implemented by the Technical Secretariat in selecting plant sites for inspections since the beginning of 2012. Although the improved algorithm allows the Technical Secretariat to focus on facilities of greater relevance, it still leaves out the third weighing factor specified in Part IX of the Verification Annex, i.e. the "proposals by states parties". A mechanism for how such proposals could be integrated into the OCPF site selection methodology still needs to be negotiated—more than a decade after OCPF inspections were begun.

National implementation in support of preventing the re-emergence of CW

Activities related to the declarations under Article VI by States Parties individually and inspections by the OPCW Technical Secretariat constitute just one element of a comprehensive strategy to prevent the re-emergence of CW. Such Article VI activities need to be complemented by broader national implementation measures. The basis for such measures is provided by Article VII of the CWC, according to which each State Party must ensure that no one on its territory or anywhere under its jurisdiction is undertaking any of the activities prohibited by the CWC to States Parties. In addition, each State Party must establish a National Authority to allow for effective and efficient communication with the OPCW and, according to Article VII(5), "shall inform the Organization of the legislative and administrative measures taken to implement this Convention". Issues surrounding the implementation—or rather, the lack thereof—in relation to some of the Convention's key provisions, most notably the requirement to enact implementing legislation on the national level, have attracted increasing attention. Writing in 2004, Tabassi and Spence pointed out that:

> In the seven years since the CWC entered into force, the OPCW's policymaking organs have moved from benign lack of interest in CWC national implementing legislation to being fully engaged with the issue. The Conference of the States Parties (CSP) and the Executive Council have adopted a series of decisions encouraging states parties to comply with their implementation obligations, motivating them to be more active in assisting each other with that task,

assigning a more hands-on role to the OPCW Technical Secretariat and providing increased funding for this area of work.[11]

A major catalyst for activities related to Article VII was the adoption of the OPCW Action Plan on national implementation. The Action Plan was adopted by the CSP at its eighth session in October 2003[12] and foresaw several measures that aimed to "incorporate the CWC's prohibitions into the legal frameworks of its states parties".[13] Optimistically timed to focus state and OPCW action in this area for a two-year period, it called upon OPCW States Parties to comply with their national implementation obligations, "no later than the Tenth Session of the Conference of the States Parties, scheduled for November 2005".[14]

The Article VII Action Plan, and subsequent extensions of the measures agreed in it, also foresaw the regular reporting by the Technical Secretariat to the Executive Council and CSPs on the progress achieved in relation to Article VII implementation. As the latest available reports show, there are still substantial gaps in the implementation record of a majority of OPCW States Parties, most importantly with respect to the comprehensive nature of the Article VII(5) data on national legislative measures. As table 1 shows, as of 29 July 2011 there are still three States Parties that have not established or nominated their national authority for CWC implementation. Equally, if not more importantly, only 88 of 188 States Parties have implemented key national legislation to implement all key provisions of the CW prohibition regime on their territory.[15] This leaves the domestic coverage of key obligations undertaken by States Parties a goal still to be achieved by 100 of them. Not surprisingly, in light of the decreasing rate of improvements in national implementation, the 14th session of the CSP in late 2009 decided to extend once more many of the activities originally agreed upon in the 2003 Action Plan and also managed to put the assistance and reporting activities of the Technical Secretariat on a more permanent basis that does not necessarily require an annual decision of the Conference to this effect.[16] Table 1 gives an overview of the development of national implementation measures since 2003.

Table 1: Implementation of CWC Article VII[17]

Cut-off date	Number of States Parties	National authorities	Article VII(5) declaration submitted	Legislation covering all key areas
2003	154	126 (82 %)	94 (61 %)	51 (33 %)
2006	181	172 (95 %)	112 (62 %)	72 (40 %)
2008	184	177 (96 %)	126 (68 %)	82 (45 %)
19/08/2009	188	181 (96 %)	128 (68 %)	86 (46 %)
30/07/2010	188	185 (98 %)	135 (72 %)	87 (46 %)
29/07/2011	188	185 (98 %)	139 (74 %)	88 (47 %)

Transfer controls in support of preventing the re-emergence of CW

The third area of importance for preventing the re-emergence of CW is related to the prevention of transfers that may be misused in offensive CW programmes, either by state or non-state actors, i.e. terrorists. CWC provisions expressing this non-transfer norm are contained in Articles I(1) and VI(2). In addition, the non-transfer norm is supported by the guidelines and activities of the Australia Group and parts of United Nations Security Council resolution 1540. Although the latter two mechanisms have not been universally embraced by CWC States Parties, they are useful additions to the provisions contained in the CWC that support the goal of preventing the re-emergence of CW.

The CWC Verification Annex contains more detailed transfer guidelines to help operationalize the non-transfer norm in Parts VI, VII and VIII. According to Part VI "a State Party may transfer Schedule 1 chemicals outside its territory only to another State Party and only for research, medical, pharmaceutical or protective purposes. … Chemicals transferred shall not be retransferred to a third State". In Part VII of the Verification Annex the regime for Schedule 2 chemicals and related facilities is spelled out. The section on transfers stipulates that from three years after entry into force of the CWC, i.e. April 2000, Schedule 2 chemicals shall only be transferred to or received from States Parties. During the interim three-year period, each State Party had to require an end-user certificate for transfers of Schedule 2 chemicals to states not party to the CWC. Similarly, Part VIII of the Verification Annex contains the regime for Schedule 3 chemicals and related facilities and requires each State Party, when transferring Schedule 3 chemicals to states not party to the CWC, to adopt the necessary measures to ensure that the transferred chemicals are used only for purposes not prohibited under the CWC, and to demand an end-use certificate from the recipient state. Five years after the CWC's entry into force, i.e. April 2002, the Conference of States Parties had to consider the question of whether to establish other measures regarding transfers of Schedule 3 chemicals to states not party. However, CWC States Parties did not show any desire to further restrict trade in Schedule 3 chemicals. Rather, reflecting many States Parties' interest in the chemical trade, April 2002 came and went without any additional measures being agreed upon.

The evolution of debates on and implementation of transfer controls since then can be traced on the one hand by figures available on the national implementation of the non-transfer norm through the monitoring of national implementation more broadly. On the other hand, there has always been a tension—at least in the view of some CWC States Parties—between the non-transfer activities of Australia Group participants and international cooperation provisions of the CWC.[18] With respect to the former, the above-mentioned Action Plan on national implementation also had a positive effect on States Parties adopting transfer controls for scheduled chemicals involving non-States Parties. As table 2 shows, the number of States Parties having implemented the non-transfer provisions of the CWC in full has risen from 64 in 2004 to 108 in 2011. While this is clearly a positive development, it cannot be overlooked that since 2009 progress has become much slower, with the percentage of States Parties having

any national implementation measures in this area hovering around the 60% mark. Many of the remaining 40% of States Parties without any implementing measures in this area can be assumed not to be involved in transfers of scheduled chemicals. Yet, they leave themselves open to being misused as transshipment points and thus weaken the global reach of the CW prohibition regime.

Table 2: Transfer Controls for Scheduled Chemicals in CWC States Parties[19]

Year	Number of States Parties	States Parties with transfer controls for scheduled chemicals	Percentage of States Parties
2004	166	64 in full	39 %
		15 in part	9 %
2006	181	84 in full	46 %
		14 in part	8 %
2008	184	90 in full	49 %
		21 in part	11 %
2009	188	91 in full	48 %
		23 in part	12 %
2010	188	104 in full (Schedule 1)	55 %
		8 in part (Schedule 1)	4 %
		105 in full (Schedule 2)	56 %
		6 in part (Schedule 2)	3 %
		105 in full (Schedule 3)	56 %
		6 in part (Schedule 3)	3 %
2011	188	108 in full (Schedule 1)	57 %
		7 in part (Schedule 1)	4 %
		108 in full (Schedule 2)	57 %
		6 in part (Schedule 2)	3 %
		108 in full (Schedule 3)	57 %
		6 in part (Schedule 3)	3 %

A related issue that it is somewhat more difficult to grasp in quantitative terms concerns transfer discrepancies arising from declarations of exporting and importing States Parties. Reportedly, such discrepancies are still numerous. As they often are based on different reporting procedures, many of these transfer discrepancies are easily resolved between the two States Parties concerned. However, resolution depends on the initiative of States Parties and, as there is no centralized and comprehensive follow-up once States Parties have been notified of a discrepancy, unresolved transfer discrepancies and the largely administrative treatment they have received over the past few years may constitute a blind spot in efforts to prevent the re-emergence of CW.

Summary and conclusions

This article set out to discuss the role of non-proliferation measures as part of the overall set of aims of the CWC and analyse implementation of three indicators for assessing the effectiveness of non-proliferation efforts up to now. The first key indicator, related to the declaration of and inspection of OCPFs, shows a trend towards the focusing of these inspections on the most relevant facilities. Yet, it would seem that the recently fine-tuned selection algorithm for facilities to be inspected is close to the most that can be achieved short of a political agreement of States Parties on the remaining weighing factor foreseen in Part IX of the Verification Annex, i.e. the proposals by States Parties themselves. Given the controversial nature of this factor, which goes back to the negotiations of the CWC in the late 1980s,[20] one should not expect this issue to be resolved anytime soon. In purely non-proliferation terms it also remains somewhat unclear what benefits would be derived from an agreement on such proposals, as the underlying concern that would motivate a State Party to take such a step, i.e. that a treaty violation might occur at an OCPF, could be addressed more adequately under provisions provided by Article IX of the CWC on consultation, cooperation and fact-finding. It might therefore be worthwhile for the Executive Council of the OPCW to consider putting the third weighing factor for OCPF site selection to rest, acknowledging that concerns that States Parties might have about individual OCPFs can be dealt with through other mechanisms foreseen in the CWC.

As the above discussion of preventing the re-emergence of CW in the wider context of national implementation measures has shown, there seems to be a division emerging in which one group of between 45% and 60% of CWC States Parties is in a position to implement and has implemented key measures of relevance for the prevention of the re-emergence of CW. Although there is some variation in the different indicators reviewed, this leaves between 40% and 55% of States Parties in a position where they are currently not implementing key Article VII provisions. In the interest of preventing the re-emergence of CW, this gap needs to be closed.

It is safe to assume that many of the States Parties that have not yet fully implemented the key national implementation provisions do not have a sizeable chemical industry, and thus not a lot of experience in submitting declarations and receiving inspections—which would be important for regular interactions with the OPCW and the development of a strong non-proliferation commitment or culture.[21] In the absence of such a culture, the question arises how to keep these mostly developing states involved in the CWC and its non-proliferation dimension. One possibility for this presents itself through the international cooperation and assistance (ICA) provisions of the CWC. As with non-proliferation and national implementation measures, ICA has been an important and on-going part of the OPCW's activities since the CWC's entry into force. While some developed States Parties would like to see ICA focused more on national implementation measures, in order to put more States Parties in a position to fulfil all their core obligations under the CWC, such conditionality is rejected by some recipients

of ICA measures. As with the balance that will need to be established between the remaining CW destruction and related verification tasks on the one hand and measures to prevent the re-emergence of chemical weapons on the other, there is a need to strike a balance between Article VII-related and broader ICA measures to create enough of an incentive for States Parties to embrace more fully the non-proliferation dimension of the CWC.

Ideally, the Open Ended Working Group (OEWG) set up to prepare the Third Review Conference would achieve some of the required rebalancing of the different goals of the CWC in the forward-looking part of its work. While taking stock of the achievements of the past five years will undoubtedly represent the majority of the OEWG's work, it will be essential that it also generates a set of proposals or recommendations that will allow the Review Conference in April 2013 to decide on the path forward from the Third to the Fourth Review Conferences. These proposals should establish the relative weight of the different goals enshrined in the Convention, and at least indicate measures to achieve them. Given political differences among States Parties, this will be a challenging task. However, only with such a medium-term strategic plan will the OPCW be able to move beyond the short-term budget-focused planning cycles of the past.

With the delays in CW destruction addressed by the 16th CSP in 2011, this not only allows, but requires, CWC States Parties to chart the course for the OPCW for the next phase of its operation. It is beyond doubt that preventing the re-emergence of CW will be a central task in this. As this article has sought to lay out, focusing on Article VI inspections—the numbers of which might have to be increased somewhat beyond those currently foreseen—will be essential, but not sufficient. Striking the right balance between non-proliferation and both the remaining CW-related tasks and ICA activities to generate maximum buy-in from as great a number of States Parties as possible will be equally important.

Notes

1. Conference of the States Parties, *Decision. Programme and Budget of the OPCW for 2012*, OPCW document C-16/DEC.12, 2 December 2011.
2. See "OPCW Inspects 1000th OCPF Plant Site", OPCW, 15 March 2012, <www.opcw.org/news/article/opcw-inspects-1000th-ocpf-plant-site/>.
3. This is a largely theoretical value that assumes the even distribution of OCPFs across states parties. However, since a few states—such as China and India—have declared a disproportionally large number of OCPFs, and taking into account the cap for Schedule 3 and OCPF facilities of a maximum of 20 inspections per country per year as contained in paragraph 13 of Part IX of the CWC's Verification Annex, the process is bound to take considerably longer.
4. Conference of the States Parties, *Note by the Director General to the First Review Conference*, OPCW document RC-1/DG.1, 17 April 2003, p. 12.
5. *Statement to the First Special Session of the Conference of States parties to Review the Operation of the Chemical Weapons Convention by Mr. Mustafa Kamal Kazi, Ambassador and Permanent Representative of Pakistan to the OPCW*, The Hague, 30 April 2003, para. 12.

6. Conference of the States Parties, *Political Declaration of the First Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (First Review Conference)*, OPCW document RC-1/3, 9 May 2003, p. 3.
7. Conference of the States Parties, *Statement by Dr. José A. Díaz Duque, Deputy Minister of the Ministry of Science, Technology and Environment of the Republic of Cuba, on behalf of the States Parties of the Non-Aligned Movement to the Chemical Weapons Convention and China, at the Second Special Session of the Conference of the States Parties to review the Operation of the Chemical Weapons Convention*, OPCW document RC-2/NAT.5, 7 April 2008, p. 4.
8. *Statement by Ambassador Eric M. Javits, United States Delegation to the Second Review Conference of the Chemical Weapons Convention*, The Hague, 7 April 2008, pp. 5–6.
9. Conference of the States Parties, *Switzerland. Risk Assessment of the Different Types of Plant Sites/Facilities under Article VI of the Chemical Weapons Convention (CWC)*, OPCW document RC-2/NAT.11,9 April 2008, p. 15.
10. Conference of the States Parties, *Report of the Second Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (Second Review Conference)*, OPCW Document RC-2/4, 18 April 2008, p. 16.
11. L. Tabassi and S. Spence, "Improving CWC implementation: the OPCW Action Plan", in T. Findlay (ed.), *Verification Yearbook 2004*, VERTIC, 2004, p. 45.
12. Conference of the States Parties, *Decision. Plan of Action Regarding the Implementation of Article VII Obligations*, OPCW document C-8/DEC.16, 24 October 2003.
13. D. Feakes, "The In-Depth Implementation of the Chemical Weapons Convention and the Second Review Conference", in R. Trapp (ed.), *OPCW Academic Forum. Conference Proceedings*, OPCW, Netherlands Institute of International Relations Clingendael, TNO Netherlands Organisation for Applied Scientific Research, 2007, p. 110.
14. Conference of the States Parties, *Decision. Plan of Action Regarding the Implementation of Article VII Obligations*, OPCW document C-8/DEC.16, 24 October 2003, para. 11.
15. Conference of the States Parties, *Note by the Director General. Report to the Conference of the States Parties at its Sixteenth Session on the Status of Implementation of Article VII of the Chemical Weapons Convention as at 29 July 2011: Further Obligations Pursuant to Article VII*, OPCW document C-16/DG.11, 29 August 2011.
16. Conference of the States Parties, *Decision. On National Implementation Measures of Article VII Obligations*, OPCW document C-14/DEC.12, 4 December 2009.
17. Data compiled from Conference of the States Parties, *Note by the Director General. Report to the Conference of States Parties at its Fourteenth Session on the Status of Implementation of Article VII of the Chemical Weapons Convention as at 19 August 2009*, OPCW document C-14/DG.9, 21 October 2009; Conference of the States Parties, *Note by the Director General. Report to the Conference of the States Parties at its Fifteenth Session on the Status of Implementation of Article VII of the Chemical Weapons Convention as at 30 July 2010: Article VII(1)(A) to (C) and Other Obligations*, OPCW document C-15/DG.9, 27 October 2010; and Conference of the States Parties, *Note by the Director General. Report to the Conference of the States Parties at its Sixteenth Session on the Status of Implementation of Article VII of the Chemical Weapons Convention as at 29 July 2011: Further Obligations Pursuant to Article VII*, OPCW document C-16/DG.11, 29 August 2011.
18. See Alexander Kelle, "Chemical and Biological Weapons Export Controls. Towards Regime Integration?", in D. Joyner (ed.), *Multilateral Export Control Regimes*, 2006, pp. 101–118.
19. Data compiled from OPCW documents C-14/DG.9 and C-15/DG.9 (see note 17); and Conference of the States Parties, *Note by the Director General. Report to the Conference of the States Parties at its Sixteenth Session on the Status of Implementation of Article VII of the Chemical Weapons Convention as at 29 July 2011: Article VII(1)(A) to (C) and Other Obligations*, OPCW document C-16/DG.10, 29 August 2011.
20. See Walter Krutzsch and Ralf Trapp, *A Commentary on the Chemical Weapons Convention*, 1994, pp. 460ff.
21. The OPCW website for example states that, since entry into force of the CWC, only 81 out of 188 states parties have received any inspections; see <www.opcw.org>.

New publication

A Decade of Implementing the United Nations Programme of Action on Small Arms and Light Weapons: Analysis of National Reports

Sarah Parker and Katherine Green (UNIDIR, 2012, 478 pages, English, free of charge)

The purpose of the Second Review Conference in 2012 is to review progress made in the implementation of the Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects (PoA) and the International Tracing Instrument. This report seeks to quantify efforts to implement the national-level commitments contained in the PoA and the International Tracing Instrument, in order to identify areas where implementation has been strong and where examples of best practice may be available, as well as to identify gaps in implementation and areas where implementation efforts have been weak or have faced difficulties. The analysis was conducted on a regional and subregional basis to identify trends and patterns with respect to implementation efforts at these levels.

The Second Review Conference provides an opportunity to assess the state of overall implementation of the PoA and the International Tracing Instrument, and set the agenda for the next six-year cycle. This report is intended as a resource to help states and practitioners prepare for the Second Review Conference by providing a detailed overview of states' efforts to implement the PoA since its adoption in 2001, and the International Tracing Instrument since 2005, based on states' own assessment of their implementation efforts, as contained in national reports.

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New project

Facilitating the Process for the Development of an International Code of Conduct for Outer Space Activities

The development of norms of behaviour for outer space activities is essential for the long-term stability, predictability and sustainability of the outer space environment. As space becomes ever more crowded and more actors seek to benefit from access to space, it is essential that norms of behaviour and best practices be established and propagated.

With the support of the European Union, UNIDIR is launching a project to facilitate the development of an international code of conduct for outer space activities.

The objectives of the project are as follows:

- to consult with as many states as possible to discuss the proposal of a code of conduct and gather their views, including through four regional seminars and two framing meetings in the context of the multilateral diplomatic meetings on the European proposal for an international code of conduct; and
- to engage expert support for the development of an international code of conduct, and to coordinate a consortium of non-governmental experts.

To facilitate well-informed, substantive discussion, a series of background research papers will be commissioned to focus on states' uses of space. It is hoped that the project will result in increased awareness, knowledge and understanding of space sustainability and security among UN Member States, along with wider and more substantive participation in multilateral discussions in the context of a code of conduct.

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