10. Reducing security threats from chemical and biological materials

JOHN HART AND PETER CLEVESTIG*

I. Introduction

At the international, regional and national levels in 2009 states continued to develop strategies to prevent and remediate the effects of the possible misuse of chemical and biological materials. With some success, the parties to the 1993 Chemical Weapons Convention (CWC) and the 1972 Biological and Toxin Weapons Convention (BTWC) maintained their focus on capacity building, achieving universality of membership and effective implementation of national obligations, including those related to the security of dual-purpose materials.[1] In the United States, President Barack Obama's Administration presented its much anticipated policy on the BTWC in December 2009, while the European Union (EU) worked to develop a communication based on the recommendations of an EU chemical, biological, radiological and nuclear (CBRN) working group.

In 2009 India became the third state party to the CWC to complete the destruction of its chemical weapon stockpile. Iraq joined the convention and declared that it possesses chemical weapons. The parties to the BTWC met in 2009 to consider the enhancement of international cooperation, assistance and exchange in the life sciences and related technology for peaceful purposes, including the promotion of capacity building in disease surveillance, detection, diagnosis and biocontainment.

The implications of disease outbreaks, including those caused by a strain of H1N1 influenza and several anthrax deaths among heroin users in the United Kingdom, were evaluated by security analysts and government officials in the context of preparedness for and response to biological warfare. In 2009 states continued to develop mechanisms to license and oversee scientific research, the chemical industry and biotechnology, including for

[1] For summaries and other details of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction and of the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction see annex A in this volume.

* Dr Ian Anthony is the author of the subsection 'The European Union's Instrument for Stability and the CBRN Action Plan'.

companies that offer gene synthesis services, because of the security implications of these activities.

Section II of this chapter considers the threats posed by chemical and biological material. Sections III and IV discuss arms control and disarmament of, respectively, biological and chemical weapons. Section V reviews allegations of chemical and biological warfare (CBW) violations and prior programmes and activities. Activities related to prevention, response and remediation are considered in section VI. Section VII presents the conclusions.

II. The threats posed by chemical and biological material

Threat perceptions are less focused on the lethality of CBW agents. The threats posed by chemical and biological material can be categorized as those related to state security, population security and the security of critical infrastructure.[2] Each involves a distinct threat and policy response: protection of the state, the population and of critical infrastructure. Many of the specific policy responses arose from civil defence against nuclear weapon attack and have since increasingly been extended to include protection against natural disasters, attack by non-state actors and infectious disease outbreaks. When infectious disease is viewed in terms of population security, the intervention strategies may be formulated according to the requirements of prevention. In contrast, when critical infrastructure is the focus, the response strategy concentrates on preparedness.[3]

Biological threats can also be viewed in the wider context of the overall effects of disease burden, while chemical threats can be considered in terms of environmental pollution (e.g. the effects of toxic industrial chemicals released at low levels into the environment or large-scale releases in industrial accidents).[4] Many chemical and biological materials, even when developed or redirected for CBW purposes, do not ordinarily cause death. This is true of, for example, hallucinogenics such as lysergic acid diethylamide (LSD) and anti-crop agents such as rice blast (*Magnaporthe grisea*). Even CBW agents that are meant to cause death (e.g. *Bacillus anthracis*, the causative agent for anthrax) are generally less deadly than nuclear weapons and some conventional munitions (e.g. fuel air explosives or thermobaric bombs). It is also important to distinguish between acute and chronic toxic

[2] Based on Lakoff, A., 'From population to vital system: national security and the changing object of public health', eds A. Lakoff and S. J. Collier, *Biosecurity Interventions: Global Health and Security in Question* (Columbia University Press: New York, 2008), pp. 36–37.

[3] Lakoff (note 2), p. 37.

[4] Toxic industrial chemicals can be defined as having an LCt_{50} (lethal concentration for half of those exposed) of less than 100 000 mg-min/m^3 and being produced in amounts of over 30 tonnes annually at any given facility. Sun, Y. and Ong, K. Y., *Detection Technologies for Chemical Warfare Agents and Toxic Vapors* (CRC Press: Boca Raton, FL, 2005), p. 9.

effects.[5] For example, in 2004 Ukrainian presidential candidate Viktor Yushchenko was poisoned with a dioxin compound which, arguably, was selected partly because such cases of poisoning are rare and because of possible confusion between acute and chronic toxicity.

The type and nature of possible CBW violations is evolving and becoming more complex; they can be differentiated as technical or fundamental. CBW violation scenarios include: (*a*) traditional state weapon development programmes; (*b*) standby capacity by states for either traditional military or non-traditional agents; (*c*) non-lethal and less-than-lethal agents developed by states for law enforcement, peacekeeping and the like that may also serve as a basis for a standby capacity for faster CBW 'breakout'; and (*d*) non-state actor activity.

The CWC's declaration thresholds for the chemical industry are based on the concept of 'militarily significant' quantities (i.e. hundreds or thousands of tonnes). However, for non-state actors 'significant quantities' of chemical weapons are at the kilogram level. The term 'significant' is thus context dependent. Historically, it has referred to the amount of agent required to generate casualties or deaths with some degree of assurance for a military action or campaign.

Analyses of threats posed by non-state actors focus on capability and intent with ambiguous or competing conclusions.[6] The JASON Defense Advisory Group concluded that 'no credible approach' has been documented to 'anticipate the existence and characterization' of terrorism involving weapons of mass destruction (WMD) and that a 'significant deficiency in applying standard approaches from engineering and science' exists for predicting such events. False alarm rates and signal detection that are obscured by 'massive clutter' are responsible.[7] Chemical and biological terrorism threat assessments are therefore difficult to make due to the lack of intelligence indicators, incomplete data and excessive ambiguous or irrelevant data.

Legal and regulatory regimes can control chemical and biological agents through the use of select agent lists, catch-all clauses or a general purpose

[5] Sorg, O. et al., '2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) poisoning in Victor Yushchenko: identification and measurement of TCDD metabolites', *The Lancet*, 3 Oct. 2009; and McKee, M., 'The poisoning of Victor Yushchenko', *The Lancet*, 3 Oct. 2009.

[6] Non-state actor acquisition and use of toxins is reviewed in Pita, R., 'Toxin weapons: from World War I to jihadi terrorism', *Toxin Reviews*, vol. 28, no. 4 (Nov. 2009), pp. 9–14. On the low frequency of attacks by non-state actors since 2001 see Boyd, D. et al., *Why Have We Not Been Attacked Again? Competing and Complementary Hypotheses for Homeland Attack Frequency*, ASCO Report no. 2008 007 (Defense Threat Reduction Agency, Advanced Systems Concepts Office: Fort Belvoir, VA, June 2008). Anne Stenersen, of the Terrorism and Political Violence Project at the Norwegian Defence Research Establishment (FFI), has reviewed al-Qaeda's CBRN capabilities and intentions based on extensive Arabic-language sources. Stenersen, A., *Al-Qaida's Quest for Weapons of Mass Destruction: The History Behind the Hype* (VDM Verlag: Saarbrücken, 2008).

[7] JASON Defense Advisory Group, *Rare Events* (Mitre Corporation: McLean, VA, Oct. 2009), p. 8.

criterion (GPC). The prohibitions against CBW in the BTWC and the CWC embody a GPC: all activities involving infectious biological material and toxic chemicals are prohibited except for peaceful, non-prohibited purposes. Placing an agent on a control list reflects in part whether it was considered for use as a CBW agent by prior state programmes. Ricin and saxitoxin, for example, were originally developed essentially for assassination purposes, not for their ability to kill large numbers of soldiers in the field.[8] As one analysis concludes: 'Ricin as a toxin is deadly but as an agent of bioterror is unsuitable and therefore does not warrant the press attention and subsequent public alarm that has been created'.[9]

The principal ways in which offensive CBW technologies could be disseminated are: state-to-state military contacts (publicized, discrete or secret); clandestine state programmes that import dual-purpose equipment, material and technology; and efforts by individuals and groups to acquire CBW expertise and material with possible state support. The challenge for arms control, disarmament and non-proliferation measures is how to take all these potential dissemination routes into account in order to ensure that the international prohibitions against CBW are effectively implemented.

III. Biological weapon arms control and disarmament

In 2006 the Sixth Review Conference of the Biological and Toxin Weapons Convention agreed an inter-sessional process for 2007–10 which consists of four meetings to be held in that period. In 2009 the Meeting of Experts took place on 24–28 August, and the Meeting of States Parties was held on 7–11 December.[10] The mandate of the 2009 meetings was to 'discuss, and promote common understanding and effective action on promoting capacity building in the fields of disease surveillance, detection, diagnosis, and containment of infectious diseases'.[11] The participants focused on the

[8] The Bulgarian dissident writer Georgi Markov was assassinated in London in 1978 by an unknown assailant using an imbrella to implant a pellet filled with ricin into his leg. Poli, M. A. et al., 'Ricin', ed. Z. F. Dembek, *Medical Aspects of Biological Warfare* (US Army, Office of the Surgeon General, Borden Institute: Washington, DC, 2007), p. 328; and US Senate, 'Unauthorized storage of toxic agents', Hearings before the Select Committee to Study Governmental Operations with Respect to Intelligence Activities, 16–18 Sep. 1975, <http://www.aarclibrary.org/publib/contents/church/contents_church_reports.htm>.

[9] Schep, L. J. et al., 'Ricin as a weapon of mass terror: separating fact from fiction', *Environment International*, vol. 35 (2009), p. 1270.

[10] See the website of the United Nations Office at Geneva <http://www.unog.ch/bwc>; and the 'Biological and Toxin Weapons Convention' website <http://www.opbw.org>. Daily reports and summaries of the Meeting of Experts and the Meeting of States Parties are available on the website of the BioWeapons Prevention Project, <http://www.bwpp.org/reports.html>. The parties have agreed to hold annual technical and political meetings between the 6th and 7th review conferences.

[11] BTWC Meeting of States Parties, 'Report of the meeting of states parties', document BWC/MSP/2009/5, 16 Dec. 2009.

recognition of infectious diseases as a global threat with potential severe implications for all states, regardless of whether such diseases have natural, deliberate or accidental causes.

Since the inception of confidence-building measure (CBM) data exchanges in 1986, 103 parties have participated; 62 parties submitted data on CBMs in 2009 (as of 1 November).[12] The Center for Arms Control and Non-Proliferation report on the biodefence programmes of selected states noted that annual US funding for research and development on countermeasures against biological agents had increased from $580 million in 2001 to over $3 billion by 2007. It also noted that the USA has spent or allocated almost $50 billion since 2001 to address biological weapon threats.[13]

The chairman of the Meeting of States Parties reported that no further states had joined the BTWC since 2008.[14] Various plenary statements referred to the importance of fully implementing Articles III and X of the BTWC. Developing states, in particular, have long emphasized the importance of the latter article, under which the parties undertake to facilitate and have the right to participate in the 'fullest possible exchange' of equipment, material and technology for peaceful purposes. Article III contains the prohibition against biological warfare, in which the parties undertake not to transfer directly or indirectly nor to assist, encourage or induce any actor to manufacture or acquire biological weapons.

A synthesis paper presented at the Meeting of States Parties itemizes the aims of enhancing international cooperation, assistance and exchange on the theme of the 2009 inter-sessional process topics. In addition it recognizes the necessity of: (*a*) addressing the problems, challenges and needs in developing international cooperation; (*b*) developing CBMs and international, regional and bilateral cooperation to address the threats posed by infectious diseases; (*c*) creating the necessary infrastructure to support the establishment of core national public health capacities as required under the revised International Health Regulations (IHR) of the World Health Organization (WHO);[15] (*d*) developing human resources in conjunction

[12] Hamburg University, Research Group for Biological Arms Control, '2009 reader on publicly available CBMs', Dec. 2009, <http://www.biological-arms-control.org>, p. 1. See also McLaughlin, K. and Nixdorff, K. (eds), *BWPP Biological Weapons Reader* (BioWeapons Prevention Project (BWPP): Geneva, 2009); and BWPP, *Building a Global Ban: Why States Have Not Joined the BWC* (BWPP: Geneva, Apr. 2009).

[13] Center for Arms Control and Non-Proliferation, 'Ensuring compliance with the Biological Weapons Convention', Washington, DC, July 2009, <http://www.armscontrolcenter.org/policy/biochem/articles/081709_ensuring_bwc_compliance/>.

[14] For a list of parties and signatories see annex A in this volume. The states that had neither signed nor ratified the convention were Angola, Cameroon, Chad, Comoros, Djibouti, Eritrea, Guinea, Israel, Kiribati, Marshall Islands, Mauritania, Micronesia, Mozambique, Namibia, Nauru, Niue, Samoa and Tuvalu.

[15] World Health Organization (WHO), *International Health Regulations (2005)*, 2nd edn (WHO: Geneva, 2005).

with infrastructural developments; and (*e*) improving standard operating procedures to enhance sustainability, support capacity building, and enhance quality controls and professional performance.[16]

Capacity building was prominently featured in the plenary statements, and Article X was highlighted, with accusations made of the denial of the transfer of materials such as reference samples and equipment (e.g. for calibrations) for peaceful purposes to and from states parties. India stated, for example, that it is 'a fact that denial of materials, equipment and technology related to peaceful uses of bio-technology continue[s] to exist and hamper legitimate uses of biological materials'.[17] The parties stressed that assistance providers do not understand the specific needs of recipient states but commended the current provision of educational support in Europe to students from developing countries. Reference was also made to the financial support of the Drugs for Neglected Diseases initiative.[18] On behalf of the EU, Sweden presented a work package for reporting assistance opportunities, while Cuba, on behalf of the Non-Aligned Movement, presented a proposal for a formal Article X implementation mechanism.[19]

On 9 December US Under Secretary of State Ellen O. Tauscher presented the USA's National Strategy for Countering Biological Threats.[20] She stated that the USA wished to 'reinvigorate' the convention as 'the premier forum for global outreach and coordination' against biological threats. Tauscher stated that the USA will support a 'rigorous, comprehensive program of cooperation, information exchange, and coordination that builds on and modifies as necessary' the BTWC's existing programme of work.[21] The revised US strategy focuses on: (*a*) the promotion of global health security to reduce the effect of disease outbreaks; (*b*) the establishment and strengthening of the international norm against the misuse of the life sciences; and (*c*) the implementation of a coordinated approach to 'influence,

[16] BTWC Meeting of States Parties, 'Synthesis of considerations, lessons, perspectives, recommendations, conclusions and proposals drawn from the presentations, statements, working papers and interventions on the topic under discussion at the meeting of experts', document BWC/MSP/2009/L.1, 16 Oct. 2009. On the IHRs see Raveché, B., 'International public health diplomacy: the case of global public health surveillance of avian influenza', *SIPRI Yearbook 2008*, pp. 456–69.

[17] Statement by Ambassador Hamid Ali Rao, Permanent Representative of India to the Conference on Disarmament, Meeting of States Parties to the BTWC, Geneva, 7 Dec. 2009.

[18] See the website of the Drugs for Neglected Diseases Initiative, <http://www.dndi.org>.

[19] BTWC Meeting of Experts, 'Striving towards a common format for reporting assistance opportunities and needs from states parties in areas with relevance for the BTWC: submitted by Sweden on behalf of the European Union', document BWC/MSP/2009/WP.6, 8 Dec. 2009; and BTWC Meeting of States Parties, 'The establishment of a mechanism for the full implementation of Article X of the convention: submitted by Cuba on behalf of the Group of the Non-aligned Movement and Other States', document BWC/MSP/2009/WP.2, 7 Dec. 2009.

[20] US National Security Council, *National Strategy for Countering Biological Threats* (White House: Washington, DC, Nov. 2009).

[21] US Department of State, 'Under Secretary for Arms Control and International Security Ellen Tauscher, Address to the annual meeting of the states parties to the Biological Weapons Convention', Geneva, 9 Dec. 2009, <http://www.state.gov/t/us/133335.htm>, pp. 3–4.

identify, inhibit, and interdict those who seek to misuse scientific progress to harm innocent people'.[22]

The Obama Administration has indicated that prevention is a major priority to which it is prepared to devote the corresponding necessary resources. It has also signalled the importance it places on the USA being proactively engaged in multilateral frameworks, as opposed to focusing on bilateral arrangements or 'coalitions of the willing'. The National Strategy for Countering Biological Threats encompasses a range of biorisks, including laboratory biosecurity and biosafety, and capacity building to assess the nature and origin of all disease outbreaks. The USA intends to assist resource-poor states to implement the revised IHRs. The regulations' revision indicates a shift in approach: biological weapon threats (i.e. deliberate disease outbreaks) are increasingly being considered by the WHO, which historically has avoided direct scrutiny of such threats.[23]

Some states parties reiterated their support for a legally binding protocol or verification mechanism for the BTWC. India, for example, stated its belief that 'only a multilaterally agreed mechanism for verification of compliance can provide the assurance of observance of compliance' and that a decision on strengthening the BTWC should be taken at the next review conference.[24] However, Tauscher noted that the USA would 'not seek to revive the negotiations on a verification protocol' to the BTWC because, after having reviewed previous efforts, it had determined that a 'legally binding protocol would not achieve meaningful verification or greater security'.[25]

IV. Chemical weapon arms control and disarmament

As of 31 December 2009, 188 states had ratified or acceded to the Chemical Weapons Convention, the principal international legal instrument against chemical warfare. Three states—Bahamas, the Dominican Republic and Iraq—became parties to the convention in 2009. A further two states—Israel and Myanmar—had signed but not ratified the convention, while five states had neither signed nor ratified the CWC.[26]

The Organisation for the Prohibition of Chemical Weapons (OPCW) continued its activities to maintain and improve implementation of the CWC, including strengthening chemical transfer control requirements. On 6–8 May a workshop for customs and border authorities in Eastern Europe

[22] US National Security Council (note 20), p. 4.

[23] Tucker, J. B., 'Seeking biosecurity without verification: the new US strategy on biothreats', *Arms Control Today*, vol. 40 (Jan./Feb. 2010), p. 6.

[24] Statement by Ambassador Hamid Ali Rao (note 17).

[25] US Department of State (note 21).

[26] The states that had not signed or ratified the CWC were Angola, Egypt, North Korea, Somalia and Syria. For a full list of parties and signatories see annex A in this volume.

on technical aspects of international transfer regimes affecting chemicals was organized by the OPCW and the Government of Belarus. The workshop considered the identification of chemicals relevant to the CWC, the Globally Harmonized System of Classification and Labelling of Chemicals, World Customs Organization recommendations, sources of information for customs officials and customs laboratories (e.g. the OPCW Handbook on Chemicals and the OPCW Central Analytical Database) and practical issues (e.g. customs software, risk assessment, and free trade ports and zones).[27]

In 2009 the OPCW released a revised Handbook on Chemicals to help the parties identify chemicals listed in the CWC's Annex on Chemicals. The handbook provides Chemical Abstracts Service (CAS) Registry numbers, International Union of Pure and Applied Chemistry and CAS chemical names, synonyms and World Customs Organization codes for more than 1300 scheduled chemicals and riot control agents that have been declared to the OPCW. However, the list is not comprehensive.[28]

The Conference of the States Parties and national implementation

The 14th Session of the Conference of the States Parties (CSP) to the CWC, held on 30 November–4 December 2009, approved the OPCW's 2010 Programme and Budget of €74 505 400 ($99.5 million), the fifth consecutive zero nominal growth budget.[29] Ambassador Ahmet Üzümcü of Turkey was elected by the CSP as the next director-general of the OPCW for the term 25 July 2010 to 24 July 2014.[30] The CSP also decided that mixtures of chemicals containing 1 per cent or less of a Schedule 2A or 2A* chemical need not be declared, a decision that affects the chemical industry.[31]

The OPCW continues to encourage the full and comprehensive implementation of the CWC's Article VII on national implementation measures. As of August 2009, 181 parties (96 per cent) had established or designated a national authority; 128 parties (68 per cent) had reported to the Technical

[27] OPCW, 'Call for nominations for a regional sensitisation workshop for customs and border authorities in Eastern Europe on the technical aspects of the transfers regime, Grodno, Belarus, 6–8 May 2009', Note by the Technical Secretariat, document S/743/2009, 10 Mar. 2009.

[28] OPCW, 'Handbook on Chemicals 2009 and language versions of the Declarations Handbook 2008', Note by the Technical Secretariat, document S/756/2009, 2 Apr. 2009; and OPCW, *Handbook on Chemicals (2009 Version)* (OPCW: The Hague, 2009), <http://www.opcw.org/our-work/national-implementation/declarations-adviser/handbook-on-chemicals/>.

[29] A total of €37 301 400 ($49.8 million) is allocated for verification. OPCW, 'Decision, programme and budget of the OPCW for 2010', document C-14/DEC.8, 2 Dec. 2009.

[30] OPCW, 'Decision, appointment of the director-general', document C-14/DEC.6, 2 Dec. 2009. An OPCW director-general may serve up to two 4-year terms. See Meier, O., 'Race is on for new head of OPCW', *Arms Control Today*, vol. 39, no. 7 (Sep. 2009), pp. 31–32.

[31] OPCW, 'Decision, guidelines regarding low-concentration limits for declarations of Schedule 2A and 2A* chemicals', document C-14/DEC.4, 2 Dec. 2009. See also Hart, J., 'The treatment of perfluorisobutylene under the Chemical Weapons Convention', *ASA Newsletter*, no. 88 (28 Feb. 2002), pp. 1, 20–23.

Secretariat the adoption of legislative and administrative measures to implement the CWC; and 86 parties (46 per cent) had adopted and reported on national legislation covering all key areas required by the CWC.[32]

Destruction of chemical weapons

The parties to the CWC that have declared chemical weapon stockpiles to the OPCW are Albania, India, Iraq, South Korea, Libya, Russia and the USA. As of 30 November 2009, of 71 194 agent tonnes of declared chemical weapons, 39 585 agent tonnes had been verifiably destroyed; of 8.67 million declared items and containers, 3.93 million had been destroyed.[33] As of the same date, 13 states had declared 70 former chemical weapon production facilities (CWPFs) of which 43 have been destroyed and 19 converted to peaceful purposes.[34] The CWC allows for the lifting of verification of CWPFs 10 years after they have been converted to peaceful purposes.[35] However, the Executive Council has yet to decide on the lifting of ongoing verification of such converted CWPFs.[36] At the end of 2010, when a two-year period of reduced chemical weapon destruction activity is envisaged, the OPCW's verification regime will face the challenge of how to utilize the organization's verification capacity (i.e. a percentage of its inspectors) given the fact that inspectors cannot be dismissed and re-employed on short notice.[37] In addition, a percentage of inspector salaries are paid by the states that receive inspections.

India completed the destruction of its Category 1 chemical weapons on 16 March, ahead of its extended deadline of 28 April 2009.[38] It became the third party to complete the destruction of its chemical weapon stockpile, after Albania and South Korea.

[32] OPCW, 'Note by the Director-General, report to the Conference of the States Parties at its fourteenth session on the status of implementation of Article VII of the Chemical Weapons Convention as at 19 August 2009', document C-14/DG.9, 21 Oct. 2009, p. 7.

[33] OPCW, 'Demilitarisation: chemical weapons declared and destroyed', 30 Nov. 2009, <http://www.opcw.org/our-work/demilitarisation>.

[34] The states are Bosnia and Herzegovina, China, France, India, Iran, Iraq, Japan, South Korea, Libya, Russia, Serbia, the United Kingdom and the USA. OPCW, 'Opening statement by the Director-General to the Conference of the States Parties at its fourteenth session', document C-14/DG.13, 30 Nov. 2009, para. 25.

[35] Chemical Weapons Convention (note 1), Verification Annex, Part V, para. 85.

[36] As of 30 Nov. 2009, 4 converted CWPFs in 2 states parties have passed the 10-year post-conversion verification threshold, and in 2010, 3 more CWPFs in 3 states parties are expected to pass it. OPCW (note 34), para. 27.

[37] Options for how to redirect inspectors' activities towards other OPCW work and for how to supplement the standing inspectorate with an 'inspector-on-call' system are being considered.

[38] India, 'Statement by India, 14th session of the Conference of the States Parties, Organization for the Prohibition of Chemical Weapons', The Hague, 30 Nov.–4 Dec. 2009, para. 10. The CWC places chemical weapons in 3 categories. 'Order of destruction' provisions are provided in CWC (note 1), Verification Annex, Part IV(A), paras 15–19.

In 2009 Iraq joined the CWC and declared that it possesses five former CWPFs and chemical weapons at the former Muthanna State Establishment.[39] The OPCW's preparations to send inspectors to carry out an initial inspection included meetings of OPCW officials in Jordan and inspection exercises.[40] In September 2009 Technical Secretariat officials travelled to the UK and the USA to review government documentation on Iraq's chemical munitions that were recovered and destroyed by British and US forces in 2003–2008.[41] On 1 July the US National Security Archive released transcripts of interrogations of former Iraqi President Saddam Hussein by the US Federal Bureau of Investigation (FBI) held in 2004, including those on nuclear, biological and chemical (NBC) weapons and threat perceptions.[42] The UN Office of Disarmament Affairs (ODA) also provided information obtained by the United Nations Special Commission on Iraq (UNSCOM) and the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC).[43]

Because of the continued uncertain security situation in Iraq, it remained unclear when the OPCW would send inspectors. In addition, according to Charles A. Duelfer, who served as the Deputy Chairman of UNSCOM in 1993–2000 and headed the Iraq Survey Group from January 2004 until the group's disbanding later that year, the Muthanna facility contains 'dozens of buildings and bunkers . . . [and] UNSCOM, using the facilities at hand . . . destroyed 28,000 munitions, 480,000 liters of agent, 1.8 million liters of liquid chemical precursors, and a million kilograms of solid precursor chemicals'.[44] UNSCOM judged some containers and munitions to be too volatile to attempt to destroy; these were placed in a large bunker before it was 'finally, and permanently, sealed'. Duelfer describes the interior 'with its leaking sarin rounds, barrels with toxic agents, and assorted contaminated equipment' as 'a dark, lethal junkyard'. As of December 2009, Iraq and the OPCW Technical Secretariat had yet to finalize a detailed destruction plan which must then be forwarded to the Executive Council for its consideration and approval.

[39] OPCW (note 34), para. 26.

[40] OPCW official, Communication with the author, May 2009.

[41] OPCW (note 34), para. 28.

[42] 'Saddam Hussein talks to the FBI: twenty interviews and five conversations with "High Value Detainee #1" in 2004', National Security Archive Electronic Briefing Book no. 279, 1 July 2009, <http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB279/index.htm>.

[43] The UNSCOM and UNMOVIC files are now in the custody of the UN's Archive and Records Management Section in the Department of Management, where they will remain sealed separately from other UN archival material for 30–60 years from 1 Mar. 2008. United Nations, 'Records and archives of the United Nations Monitoring, Verification and Inspection Commission', Secretary-General's bulletin, ST/SGB/2009/12, 1 Aug. 2009.

[44] Duelfer, C., *Hide and Seek: The Search for the Truth in Iraq* (PublicAffairs: New York, 2009), pp. 96–97.

The CSP granted a request by Libya to extend its intermediate and final chemical weapon destruction deadlines. Libya must now destroy its Category 1 chemical weapon stockpiles by 15 May 2011.[45]

With the completion of destruction of the chemical weapons at Kambarka on 27 March 2009, Russia's chemical weapon stockpile is now stored at five locations.[46] As of 25 November 2009 Russia had verifiably destroyed 18 000 tonnes or 45 per cent of its declared Category 1 chemical weapons (meeting its phase 3 extended deadline of 31 December 2009).[47] In May Russia began operating its fifth chemical weapon destruction facility (CWDF), at Shchuchye, and by December 5462 tonnes of organophosphorus nerve agents had been destroyed.[48] Destruction operations are also under way at the Leonidovka and Maradikovsky facilities. The last destruction facilities, at Kizner and Pochep, are expected to begin operation in 2010.[49]

The US chemical weapon stockpile is currently stored at six locations.[50] As of 31 October 2009 the USA had destroyed 18 516 agent tonnes of its Category 1 chemical weapons (67 per cent of its declared stockpile).[51] The USA estimates that by April 2012, the final CWC-mandated deadline, it will have destroyed 90 per cent of its stockpile; its current estimate for completing

[45] Its new intermediate destruction deadlines are: (*a*) phase 1 (1%) must be completed by 1 Nov. 2010; (*b*) phase 2 (20%) must be completed by 15 Dec. 2010; and (*c*) phase 3 (45%) must be completed by 31 Jan. 2011. OPCW, 'Decision, extension of the intermediate and final deadlines for the destruction by the Libyan Arab Jamahiriya of its Category 1 chemical weapons', document C-14/DEC.3, 2 Dec. 2009. On Libya's chemical weapon programme see Tucker, J., 'The rollback of Libya's chemical weapons program', *Nonproliferation Review*, vol. 16, no. 3 (Nov. 2009), pp. 363–84; and Hart, J. and Kile, S. N., 'Libya's renunciation of nuclear, biological and chemical weapons and ballistic missiles', *SIPRI Yearbook 2005*, pp. 629–48.

[46] Originally, Russia's chemical weapon stockpile was stored at Gorny, Saratov oblast; Kambarka, Udmurtia Republic; Kizner, Udmurtia Republic; Leonidovka, Penza oblast; Maradikovsky, Kirov oblast; Pochep, Bryansk oblast; and Shchuchye, Kurgan oblast. Destruction operations at Gorny and Kambarka have been completed. See [Destruction of chemical weapons in the Russian Federation] on the website of *Rossisskaya Gazeta*, <http://www.rg.ru/ximiya.html> (in Russian); and the website of *Khimicheskoe Razoruzhenia: Otkrity Elektronny Zhurnal*, <http://www.chemicaldisarmament.ru/> (in Russian). A chemist with the Soviet chemical defence establishment has published a history of the Soviet chemical weapon programme. Fedorov, L. A., [Chemical armament: war against one's own people: the tragic Russian experience], 3 vols (self-published: Moscow, Feb. 2009).

[47] OPCW (note 34), para. 14.

[48] Russian Government, *The Destruction of Chemical Weapons in the Russian Federation: To the Third Stage of the Implementation of the Chemical Weapons Convention* (ARMS-TASS Information Agency: Moscow, 2009), p. 4.

[49] Russian Federation, 'Statement by Mr. Victor Kholstov, Head of the Russian Delegation at the fourteenth session of the Conference of the States Parties to the Chemical Weapons Convention', The Hague, 30 Nov.–4 Dec. 2009, p. 2.

[50] The locations are Anniston, AL; Blue Grass, KY; Pine Bluff, AR; Pueblo, CO; Tooele, UT, and Umatilla, OR. Destruction operations have been completed at Aberdeen, MD; Johnston Atoll, west of Hawaii; and Newport, IN.

[51] OPCW (note 34), para. 15.

destruction operations at its last two storage facilities—at Pueblo, Colorado, and Blue Grass, Kentucky—are 2017 and 2021, respectively.[52]

Old, abandoned and sea-dumped chemical weapons

As of 30 November 2009 three countries—China, Italy and Panama—had declared that abandoned chemical weapons (ACWs) were present on their territories, and 13 countries had declared that they have possessed old chemical weapons (OCWs) since the convention's entry into force in 1997.[53]

China and Japan continued to prepare to destroy the chemical weapons that were abandoned in China by Japan during World War II. A mobile destruction facility (which has been constructed but not assembled) is expected to begin operation in Nanjing in 2010, and the two states and the OPCW Technical Secretariat have reached general agreement on the verification measures to be taken when the mobile unit is employed.[54] In 2009 survey work using ground-penetrating radar and further infrastructure work were carried out for a fixed CWDF to be constructed at Haerbaling, Jilin Province, the location of the largest number of ACWs.[55] In the 12 months preceding the CSP, Japan recovered and stored 2000 ACWs for later destruction.[56]

The US armed forces dumped chemical warfare materiel off Oahu, Hawaii, in 1933–46. In March 2009 the Hawai'i Undersea Military Munitions Assessment Project (HUMMA) collected water and sediment samples in suspected munition dump site areas.[57] In north-west Washington, DC, the US Army continued to search the Spring Valley neighbourhood for chemical weapons and related equipment and material (an operation it

[52] Weber, A. C., 'United States Chemical Demilitarization Program', Presented by the US Delegation to the 14th session of the Conference of the States Parties to the CWC, The Hague, 1 Dec. 2009, pp. 5, 11.

[53] OPCW (note 33). The countries that have declared OCWs to the OPCW are Austria, Australia, Belgium, Canada, France, Germany, Italy, Japan, Marshall Islands, Russia, Slovenia, the UK and the USA. ACWs are defined as chemical weapons that were abandoned by a state after 1 Jan. 1925 on the territory of another state without the permission of the latter. CWC (note 1), Article II, para. 6. OCWs are defined as chemical weapons that were produced before 1925 or chemical weapons produced between 1925 and 1946 that have deteriorated to such an extent that they are no longer usable in the manner in which they were designed. CWC (note 1), Article II, para. 5. See also 'The legacy of underwater munitions worldwide: policy and science of assessment, impacts and potential responses', *Marine Technology Society Journal*, Special issue, vol. 43, no. 4 (fall 2009).

[54] Delegation of China, 'Statement by Ambassador Zhang Jun, Head of the Chinese Delegation at the fourteenth session of the Conference of States Parties to the Chemical Weapons Convention', The Hague, 1 Dec. 2009, p. 2.

[55] Delegation of Japan, 'Statement by H. E. Mr. Minoru Shibuya, Ambassador of Japan and Permanent Representative of Japan to the OPCW at the fourteenth session of the Conference of the States Parties to the OPCW', The Hague, 30 Nov. 2009, p. 5.

[56] Delegation of Japan (note 55).

[57] Hawai'i Undersea Military Munitions Assessment Project, 'Current activities & progress', <http://hummaproject.com/activities.php>; and Garcia, S. S. et al., 'Discarded military munitions case study: ordnance reef (HI–06), Hawaii', *Marine Technology Society Journal*, Special issue, vol. 43, no. 4 (fall 2009), pp. 85–99.

began in 1994). In August it uncovered a World War I-era vial containing trace amounts of sulphur mustard.[58]

Nord Stream, a German–Russian business consortium which will construct and operate a 1200-kilometre gas pipeline linking Viborg, Russia, and Greifswald, Germany, issued an environmental assessment that identified three chemical munitions along the planned route of the pipeline off the coast of Denmark. Munitions that lie along the final route will be remediated.[59]

V. Allegations of violations and prior programmes and activities

In Afghanistan at least three attacks using poisonous fumes were made on girls' schools by alleged Taliban or al-Qaeda affiliates.[60] In 2009 at least 40 members of al-Qaeda in the Islamic Magrheb (AQIM) in Algeria were reported to have died of plague at a training camp in Tizi Ouzou; according to an unnamed US intelligence official, the incident resulted from 'an experiment with unconventional weapons [that] went awry'.[61]

In December 2009 in Chile, judge Alejandro Madrid ordered the arrest of six people, including four doctors, for their roles in the alleged assassination in 1982 of Eduardo Frei Montalva, a political opponent of President Augusto Pinochet. Madrid determined that the accused were involved in the administration of doses of thallium and sulphur mustard to Frei while he was a patient at the Santa Maria Clinic in Santiago: Frei underwent stomach surgery, after which he died.[62]

Periodically, discussions arise over whether white phosphorus is a chemical weapon. In 2009 a UN fact-finding mission, chaired by Richard Goldstone of South Africa, issued its report on the 2008–2009 Israeli military operations in the Gaza Strip. The report's authors accepted that white

[58] Ruane, M. E., 'Vial used for chemical agent mustard is uncovered', *Washington Post*, 13 Aug. 2009. The area, previously part of the grounds of American University, was used by the US Chemical Warfare Service during World War I for field testing of chemical weapons. Gordon, M. K., Sude, B. R. and Overbeck, R. A., 'Chemical testing in the Great War: the American University Experiment Station', *Washington History*, vol. 6, no. 1 (spring/summer 1994), pp. 29–45.

[59] Of the 35 munitions identified, 31 are located off the coast of Finland; 3 of the total are chemical munitions. Nord Stream, *Munitions: Conventional and Chemical*, Nord Stream Espoo Report: Key Issue Paper (Nord Stream: Zug, Feb. 2009), pp. 29–30.

[60] Winfield, G, 'Is this it?', *CBRNe World*, summer 2009, pp. 6–7.

[61] Pita, R., Gunaratna, R. and Henika, P., 'Al Qaeda in the Islamic Maghreb (AQIM) and the alleged production of the etiological agent of plague', *ASA Newsletter*, no. 131 (30 Apr. 2009), pp. 1, 21–22.

[62] 'Six arrested over "assassination" of former Chilean president', *Daily Telegraph*, 7 Dec. 2009; and Sanhueza, J. M., 'Detalles del auto de procesamiento médicos que lo operaron, Con bajas dosis de Talio y gas mostaza durante varios meses asesinaron a Frei' [Details of indictment against medical staff who operated by introducing doses of thalium and mustard gas over several months to assassinate Frei], *El Mostrador* (Santiago), 7 Dec. 2009.

phosphorus is not currently proscribed under international law but noted that Israeli armed forces 'were systematically reckless in determining its use in built-up areas'.[63] If white phosphorus is used to cause harm or death through its toxic properties, it would be covered by the CWC. However, if used as tracer rounds, the convention does not ban its use.[64]

The International Crisis Group's review of the literature on the chemical and biological weapon programmes of the Democratic People's Republic of Korea (DPRK, or North Korea), including Korean language sources, concluded that it 'possesses a large stockpile of chemical weapons and is suspected of maintaining a biological weapons program'.[65] In March North Korea was accused of obtaining 2000 confidential files, including the identity of 700 companies or state-run entities that manufacture toxic industrial chemicals and information on 1350 such chemicals, by hacking into the military Internet system of the Republic of Korea (South Korea). Questions were raised about the wisdom of South Korea's providing North Korea with computers and Internet technology training in the light of its alleged chemical and biological weapon programmes.[66]

Periodic allegations of the use of chemical weapons were made during the civil war in Sri Lanka between government forces and the Liberation Tigers of Tamil Eelam (LTTE or Tamil Tigers).[67] In March, after the Sri Lankan military recovered 17 respirators and 16 chemical protective suits, a Sri Lankan official stated that the LTTE had been employing 'chemical gases' against the government forces for two years.[68]

In the USA the National Academy of Sciences began a 15-month review of the scientific work underlying the investigation of the 2001 anthrax letter attacks in the USA to which the FBI will contribute $879 550.[69]

[63] United Nations, Human Rights Council, 'Human rights in Palestine and other occupied Arab territories', Report of the United Nations Fact-finding Mission on the Gaza Conflict (Goldstone Report), A/HRC/12/48, 25 Sep. 2009, p. 16.

[64] The term 'chemical weapon' is defined in CWC (note 1), Article II, para. 1.

[65] International Crisis Group (ICG), *North Korea's Chemical and Biological Weapons Programs*, Asia Report no. 167 (ICG: Brussels, 18 June 2009).

[66] 'N. Korean hackers infiltrated S. Korean military networks', *Chosun Ilbo*, 19 Oct. 2009.

[67] E.g. Hoffman, B., 'The first non-state use of a chemical weapon in warfare: the Tamil Tigers' assault on East Kiran', *Small Wars & Insurgencies*, vol. 20, nos 3–4 (Sep.–Dec. 2009), pp. 463–77. See also appendix 2A in this volume.

[68] 'Sri Lanka troops kill 12 more rebels: military', Agence France-Presse, 12 Mar. 2009; and Sri Lankan Ministry of Defence, 'LTTE plot for mass scale chemical attack barred [updated]', 13 Mar. 2009, <http://www.defence.lk/new.asp?fname=20090312_05>.

[69] Shane, S., 'F.B.I. to pay for anthrax inquiry review', *New York Times*, 7 May 2009. See also Hart, J. and Clevestig, P., 'Reducing security threats from chemical and biological materials', *SIPRI Yearbook 2009*, pp. 428–32.

VI. Prevention, response and remediation

On 25 May–5 June 2009 the European Chemical, Biological, Radioactive, Nuclear and Explosive Centre at the University of Umeå, Sweden, hosted a training course on the investigation of chemical, biological and toxin weapon use for experts who are available to the UN Secretary-General.[70] The UN Office of Disarmament Affairs currently maintains a roster of over 200 experts and 40 laboratories that have been nominated by 41 UN member states.[71] The ODA also continued to develop a biological incident database (the OPCW has primary responsibility for investigating alleged chemical weapon use).[72]

UN Security Council Resolution 1540 of 2004 requires states to adopt and enforce national laws criminalizing acts by any citizen or legal person engaged in developing, acquiring, manufacturing, possessing, transporting, transferring or using NBC weapons and their means of delivery.[73] In October 2009 the 1540 Committee, which was established pursuant to Resolution 1540, met for a comprehensive review of the resolution's implementation. UN member states and international and regional organizations shared experiences and expressed their views, and an open day was held at which non-governmental organizations (NGOs) that actively help a number of UN member states to implement the resolution could present their projects and ideas. However, representatives of informal bodies, such as the relevant export control regimes, were not invited to participate.[74] The meeting participants reviewed background reports on the status of implementation that had been prepared by the experts who support the work of the 1540 Committee.[75]

Many states indicated their desire to pursue practical, concrete measures to enhance Resolution 1540's implementation. However, other states highlighted problems, such as the lack of clear guidance and definitions to help

[70] United Nations, 'Experts to attend training course on investigation of chemical, biological, toxin weapons use, in Umeå, Sweden, 25 May–5 June', Press Release DC/3175, 22 May 2009, <http://www.un.org/News/Press/docs/2009/dc3175.doc.htm>.

[71] United Nations (note 70).

[72] On the database's format see UN Office for Disarmament Affairs and NGO Committee on Disarmament, Peace and Security, *Developing a Biological Incident Database*, UNODA Occasional Paper no. 15 (United Nations: New York, Mar. 2009), pp. 95–101.

[73] UN Security Council Resolution 1540, 28 Apr. 2004.

[74] The decision not to invite such participation was criticized by some states. Statement by Gary Quinlan, Ambassador and Permanent Representative of Australia to the United Nations Security Council Committee regarding the comprehensive review of the status of implementation of Resolution 1540, 1 Oct. 2009, <http://www.australiaun.org/unny/20091001_SC.html>. On the export control regimes see also chapter 12 in this volume.

[75] All but 1 of the reports is publicly available. The public reports include a regional analysis of implementation with examples of national and regional practices and experience sharing, and an assessment of the reporting template used to gather information on implementation in the light of information gathered up to 2008.

states understand how to meet the standard of appropriate and effective national laws that is established in the resolution.[76] The main organizer of the NGO open day concluded that more action at the national level to enhance implementation and a process to develop criteria and standards for compliance were both needed.[77]

The European Union's Instrument for Stability and the CBRN Action Plan

The EU undertakes internal and external policy actions. The EU Instrument for Stability and EU joint actions are examples of the latter, while the EU CBRN Action Plan is an example of internal policy action. An EU joint action in support of the BTWC will operate from May 2009 to April 2011. It consists of four projects: (*a*) promoting the universalization of the BTWC; (*b*) providing assistance to states parties for national implementation of the BTWC; (*c*) promoting the submission of CBM declarations on a regular basis by parties to the BTWC; and (*d*) providing support for the BTWC inter-sessional process.[78] The EU also launched a joint action in support of the World Health Organization that consists of two projects: promotion of biorisk reduction management through regional and national outreach; and strengthening the security and laboratory management practices against biological risks (a demonstration model for countries).[79] In December the European Commission concluded an agreement with the OPCW to carry out an EU joint action worth €2 110 000 ($2.8 million) to support OPCW activities over 18 months.[80]

On 8 April the European Commission agreed to allocate €225 million ($300 million) for the EU Instrument for Stability for the period 2009–11.

[76] The discussion is summarized in United Nations, Security Council, 'Review opens of implementation of Security Council Resolution 1540, compelling states to criminalize spread of mass destruction weapons to non-state actors', Press Release SC/9754, 30 Sep. 2009, <http://www.un.org/News/Press/docs/2009/sc9754.doc.htm>.

[77] Kraig, M. H., *United Nations Security Council Resolution 1540 at the Crossroads: The Challenges of Implementation* (Stanley Foundation: Muscatine, IA, 1 Oct. 2009).

[78] Council Joint Action 2008/858/CFSP of 10 Nov. 2008 in support of the Biological and Toxin Weapons Convention (BTWC), in the framework of the implementation of the EU Strategy against the Proliferation of Weapons of Mass Destruction, *Official Journal of the European Union*, L302, 13 Nov. 2008.

[79] Council Joint Action 2008/307/CFSP of 14 Apr. 2008 in support of the World Health Organization activities in the area of laboratory bio-safety and bio-security in the framework of the European Union Strategy against the proliferation of Weapons of Mass Destruction, *Official Journal of the European Union*, L106, 16 Apr. 2008.

[80] OPCW, 'OPCW Director-General welcomes continued EU support for OPCW activities', Press Release OPCW NEWS 60/2009, 15 Dec. 2009, <http://www.opcw.org/news/news/article/opcw-director-general-welcomes-continued-eu-support-for-opcw-activities/>; and Council Decision 2009/569/CFSP of 27 July 2009 on support for OPCW activities in the framework of the implementation of the EU Strategy against Proliferation of Weapons of Mass Destruction, *Official Journal of the European Union*, L197, 29 July 2009.

The money will support efforts to address the key threats that were identified in the 2003 European Security Strategy.[81] To implement the WMD component, EU assistance will continue to focus on redirecting scientists, export controls and 'illicit trafficking'. It will also support the development of safety and security culture when dealing with CBRN materials.[82]

In December 2009 the Council of the European Union adopted a CBRN Action Plan.[83] The plan's purpose is to contribute to the wider EU counterterrorism effort, but it is designed using an 'all-hazard' approach that is intended to help prevent and mitigate incidents of accidental, natural or intentional origin. The action plan is one important element helping to implement the wider EU strategy to combat terrorism that was published in 2005.[84] The counterterrorism strategy defined four 'pillars' of action: terrorism prevention, the protection of critical infrastructure, the pursuit of terrorists and, should those measures fail, mounting an effective response to any act of mass impact terrorism that is carried out.

The action plan does not introduce new EU legislation. In December 2007 the Council decided that effective policies to address CBRN risks would be developed 'in close consultation with national authorities and, as appropriate, the industrial sectors concerned, academic institutions and other relevant stakeholders, notably with a view to ensuring the viability and proportionality of measures which may be required'.[85]

The counterterrorism effort built on work already carried out to elaborate a green paper in 2006 that pointed out basic elements that would be needed to strengthen biopreparedness.[86] Comments and discussion inside the EU institutions, and in particular within the Commission Directorate-General (DG) for Justice, Freedom and Security, expanded the portfolio of issues to include chemical security and radiological sources.[87] The task force worked on the principle of avoiding duplication of effort and there-

[81] 'A secure Europe in a better world: European Security Strategy', Brussels, 12 Dec. 2003.

[82] Council of the European Union, 'Instrument for stability: the EU's response to some of today's global threats', Press Release MEMO/09/164, 17 Apr. 2009, <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/09/164>.

[83] Council of the European Union, Council Conclusions on strengthening chemical, biological, radiological and nuclear (CBRN) security in the European Union: an EU CBRN action plan, document 15505/1/09, REV 1, Brussels, 12 Nov. 2009.

[84] Council of the European Union, The European Union Counter-Terrorism Strategy, document 14469/4/05 REV 4, Brussels 30 Nov. 2005.

[85] Council of the European Union, Council conclusions of 6 Dec. 2007 on addressing chemical, biological, radiological and nuclear risks and on bio-preparedness, 16589/07, 17 Dec. 2007.

[86] European Commission, 'Green paper on bio-preparedness', Brussels, COM(2007) 399, 11 July 2007.

[87] In contrast, nuclear security measures have been elaborated inside the EU over many years and are already enshrined in EU law.

fore gave relatively little attention to the security of radiological sources and chemical safety (issues being actively examined elsewhere in the EU).[88]

During 2008 and the first half of 2009 the Commission used an interdisciplinary task force made up of both government and non-governmental experts to elaborate a communication on strengthening CBRN security that was presented to the EU member states in June 2009.[89] Consistent with the method of wide cooperation, the task force compiled and discussed existing good practices. The main effort was focused on biological risks as well as on chemical security. The approach to security and health built on work already carried out during the preparation of the green paper on biopreparedness, and the June communication included an annex laying out a number of best practices that had already been identified.[90]

The December 2009 action plan eventually defined approximately 130 measures to prevent, detect and respond to CBRN threats and risks inside the EU.[91] The measures, which cover the entire spectrum of chemical, biological and radiological threats, will be implemented in phases. Projects that are allocated the highest priority will be initiated from mid-2009 to the end of 2010, although this period is also seen as a preparatory phase. The period 2011–12 is an enhanced implementation phase, and in 2013 the Commission plans to review progress and consider new projects. The Commission has concluded that the safety and security aspects of nuclear and radiological threats are already adequately covered by existing EU regulations but more work is needed on the chemical and biological side.[92]

In the first phase the first priority has been developing new lists of high-risk materials that require protection and special scrutiny. While controversial, given that lists developed in other initiatives that could serve as a point of reference exist, the Commission defended this approach by arguing that the existing lists are too narrowly defined for the purpose of counterterrorism. The narrow lists might, it is argued, even undermine efforts to promote security by creating an erroneous perception that only

[88] The Joint Research Centre of the Commission has made a study on radiological preparedness in the EU and chemical safety issues have been examined extensively, leading to the creation of a European Chemicals Agency (ECHA). See the website of ECHA at <http://echa.europa.eu/>.

[89] European Commission, 'Proposal for a new policy package on chemical, biological, radiological and nuclear (CBRN) security', Press Release MEMO/09/291, Brussels, 24 June 2009, <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/09/291>.

[90] European Commission, 'Bridging security and health: towards the identification of good practices in the response to CBRN incidents and the security of CBR substances', 11480/09 ADD 3, Commission Staff Working Document, Brussels, 29 June 2009.

[91] Örnéus, P., 'EU statement at the comprehensive review of the status of implementation of Resolution 1540', New York, 30 Sep. 2009, <http://www.swedenabroad.com/Page____97653.aspx>.

[92] European Commission, 'The Commission proposes a new policy to enhance chemical, biological, radiological and nuclear security in the EU', Press Release IP/09/992, Brussels, 24 June 2009, <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/992>.

these items need to be protected and monitored. The EU-specific list is also needed to help the Commission assess the economic impact of the measures contained in the action plan and to help develop budgets and allocate financing to implement the measures defined.

A second priority is to enhance security at facilities through the development of practical guidelines and good practice documents. Here the Commission intends to collate, assess and disseminate existing national and non-governmental products in order to create minimum standards across the EU. The third priority in the action plan is to assess the risks stemming from the transport of materials, where little action has so far been taken at the European level. The fourth priority is to develop detection equipment based on EU-wide trials, testing and certification. Standards adopted at the EU level are expected to have a powerful impact not only on the European market for such products, but also worldwide. The final priority in the first implementation phase is a dedicated effort to connect medical and research communities with the national authorities that are responsible for emergency planning and response (including first responders and law enforcement) in a more coherent and systematic manner.

To support these objectives the Commission intends to initiate a series of EU-wide projects to improve training, develop improved tools and strengthen personnel security. One of these projects will analyse the feasibility of mutual recognition of security clearances and qualifications across the EU as well as the development of common criteria for vetting procedures and background checks. This would include a common approach to visiting students and guest researchers and examination of whether or not a secure registry of personnel with access to the most sensitive items and technologies within the EU could be of value in counterterrorism. Finally, the projects under the action plan will be supported using financial instruments that are available to the DG for Justice, Freedom and Security as well as linking to the security research funds available under the Framework Programme for research that are administered within the Commission by the DG for Enterprise.

Scientific research

In 2009 attention continued to be focused on procedures for the oversight of gene synthesis and of the acquisition, handling and storage of biopharmaceuticals.[93] Such procedures are needed in order to help ensure that

[93] E.g. Jeremias, G., 'Regulating the worldwide transfer and use of biological dual-use goods: monitoring the trade of biological dual-use biological items', *Micromaterials and Nanomaterials*, Oct. 2009, pp. 32–36.

materials are not misused for CBW purposes. In November 2009 five gene synthesis companies established an International Gene Synthesis Consortium and a 'harmonized screening protocol for gene sequence & customer screening to promote biosecurity'.[94] The agreement covers five core components: (*a*) complete DNA sequence screening of every order for synthetic genes against a pathogen database, developed by the consortium, including screening of amino acid translated sequences;[95] (*b*) screening of customers to establish identity and clearance in accordance with national guidelines; (*c*) record keeping of all orders and customers for up to eight years; (*d*) order refusal at the liberty of the companies and the reporting to authorities of problematic orders; and (*e*) compliance with all applicable laws and regulations governing the synthesis, possession, transport, export and import of synthesized genes and other related products.[96] The same month the US Department of Health and Human Services issued for public comment a draft voluntary screening framework guidance for commercial providers of synthetic double-stranded DNA of 200 base pairs or more. The framework entails confirming the identity of customers, being aware of 'red flags' (e.g. unusual method of payment or shipping or labelling requests) and screening key nucleic acid segments based on select agents and toxins on the US Export Administration Regulation's Commerce Control List.[97] The Australia Group continued a 'particular focus on international developments' in synthetic biology and 'considered' an internal report on the implementation of possible oversight measures to ensure that synthetic biology is not misused.[98]

Chemical management and oversight

The American Chemical Society has asked the US Congress to make a regulatory distinction between university laboratories and industrial production sites in view of the relative threats posed by larger quantities of toxic chemicals, and the Congress continues to consider how standards and procedures for security vulnerability assessments of chemical facilities

[94] 'Gene-synthesis firms set up biosecurity protocol', *Genetic Engineering & Biotechnology News*, 18 Nov. 2009.

[95] 'Translated' refers to the conversion of the nucleic acid (DNA/RNA) sequence information into its corresponding amino acid (protein) sequence. Screening against US select agent lists will be included for all US domestic orders.

[96] International Gene Synthesis Consortium, 'Harmonized Screening Protocol: gene sequence and customer screening to promote biosecurity', <http://www.genesynthesisconsortium.org/Harmonized_Screening_Protocol.html>.

[97] US Department of Health and Human Services, Health and Human Services Department, 'Screening framework guidance for synthetic double-stranded DNA providers', *Federal Register*, vol. 74, no. 227 (27 Nov. 2009), pp. 62319–27.

[98] Australia Group, 'Media release: 2009 Australia Group Plenary', <http://www.australiagroup.net/en/agm_sept2009.html>. See also chapter 12, section III, in this volume.

should be applied.[99] Debate continues on whether and how information is sensitive and how such determinations should affect its public dissemination.[100] In 2009 it was revealed that US chemical security policy had been misused to prevent the release of information about an explosion at a chemical plant in August 2008.[101] Safety inspectors cancelled a briefing about the explosion because plant officials maintained that some information about the plant was protected from public disclosure under the 2002 Maritime Transportation Security Act.[102]

Disease surveillance and response and public health

In 2009 a new strain of influenza A emerged following a likely event of genetic reassortment.[103] This virus, which the WHO officially designated as a new strain in June, has an unusual genetic combination of material from swine, bird and human influenza viruses and is of a similar subtype (H1N1) to that of the 1918 Spanish influenza. Within the framework of the International Health Regulations, the WHO member states discussed whether the H1N1 outbreak should be designated a 'pandemic' because the definition of the term as understood by some states had not been met. The underlying issue was whether the term should be used in relation to the lethality or the geographic extent of the outbreak. In response, the WHO revised its definition of 'pandemic' in June and announced a 'phase six' outbreak.[104] The previous definition of pandemic was based on geographic spread, while the new WHO definition takes into greater account its severity.

[99] Hess, G., 'Chemical security bill wins approval', *Chemical & Engineering News*, vol. 87, no. 46 (16 Nov. 2009), p. 6.

[100] See Federation of American Scientists (FAS), 'Secrecy news blog', <http://www.fas.org/blog/secrecy/>; and US Department of the Army, *Classification of Former Chemical Warfare, Chemical and Biological Defense, and Nuclear, Biological, and Chemical Contamination Survivability Information* (Department of the Army: Washington, DC, 22 June 2005).

[101] Hamill, S. D., 'Safety panel cites errors in blast at chemical plant', *New York Times*, 23 Apr. 2009; and US House of Representatives, Committee on Energy and Commerce, 'Memorandum: supplemental information regarding the 2008 Bayer chemical plant explosion', 21 Apr. 2009, <http://energycommerce.house.gov/>.

[102] Ward, K., 'Board cancels hearing under Bayer pressure', *Charleston Gazette*, 25 Feb. 2009; and Maritime Transportation Security Act of 2002, US Public Law 107–295, signed into law on 25 Nov. 2002, <http://thomas.loc.gov/cgi-bin/query/z?c107:s1214:>.

[103] Novel Swine-Origin Influenza A (H1N1) Virus Investigation Team, 'Emergence of a novel swine-origin influenza A (H1N1) virus in humans', *New England Journal of Medicine*, vol. 360, no. 25 (18 June 2009), pp. 2605–15; and Malik Peiris, J. S., Poon, L. L. and Guan, Y., 'Emergence of a novel swine-origin influenza A virus (S-OIV) H1N1 virus in humans', *Journal of Clinical Virology*, vol. 45, no. 3 (July 2009), pp. 169–73.

[104] World Health Organization, Global Alert and Response, 'DG statement following the meeting of the Emergency Committee', 11 June 2009, <http://www.who.int/csr/disease/swineflu/4th_meeting_ihr/en/index.html>.

Health agencies in Scotland, UK, were alerted following the 16 December 2009 death of a heroin user in Glasgow, who tested positive for *Bacillus anthracis*.[105] A previous case of lethal anthrax infection in the UK had occurred in 2008 when a craftsman presumably contracted *B. anthracis* from animal hides that had been imported from Gambia.[106] Two years earlier, a similar fatal case of inhalation anthrax had occurred in Scotland, also involving imported animal hides for drums.[107] By 31 December six cases of anthrax had been confirmed in Glasgow, and three of these people died. Public health and police authorities suspected that the source was contaminated heroin. Bonemeal that had been imported from Afghanistan and used as a cutting agent in the heroin was suspected. The incident highlighted the ability of the international narcotic trade to affect global health security, led to speculation about the nature of future biological threats and emphasized the need for faster microbial forensics capabilities.[108]

VII. Conclusions

An emphasis on control and oversight of chemical and biological materials implies reduced focus on traditional state military programmes. In addition, the international trade in biological and chemical materials and technologies entails uncertainties and challenges. The negative effects of the signals that have been given to non-state actors by various threat assessment statements about the desirability of using chemical and biological weapons, and the anxiety that such use would provoke, could be mitigated by better understanding of the variability of the effects of CBRN weapons. Operational challenges associated with determining the volume and type of trade in dual-purpose material technology and intangible technology transfers can also inform threat assessments. This, in turn, would help to promote a balanced understanding of the role of future CBW threats in international peace and security.

[105] 'Anthrax found in Glascow heroin users', BBC News, 18 Dec. 2009, <http://news.bbc.co.uk/2/hi/8419113.stm>.

[106] Anaraki, S. et al., 'Investigations and control measures following a case of inhalation anthrax in East London in a drum maker and drummer', *Eurosurveillance*, vol. 13, issue 51 (18 Dec. 2008).

[107] Riley, A., *Report on the Management of an Anthrax Incident in the Scottish Borders* (NHS Borders: Melrose, Dec. 2007).

[108] McNeil, D. G., 'Anthrax: in Scotland, six heroin users die of anthrax poisoning', *New York Times*, 11 Jan. 2010.