

12. Chemical and biological weapon developments and arms control

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I. Introduction

The 1972 Biological and Toxin Weapons Convention (BTWC) and the 1993 Chemical Weapons Convention (CWC) regimes were seriously challenged in 2001.¹

In the first half of 2001 it became increasingly clear that the negotiation of a protocol to strengthen the BTWC would not be achieved in time for the Fifth Review Conference of the States Parties, which was held at the end of the year. While it was known that the United States was critical of the draft protocol, few states anticipated that it would reject both the document and the negotiation format. Because of the US rejection of the multilateral negotiation process both the Ad Hoc Group (AHG) of states parties negotiating the protocol and the Fifth Review Conference were unable to agree on final declarations.

One of the reasons for the rejection of the protocol by the United States was its claim that the protocol would be inadequate to deal with the growing threat of chemical and biological weapon (CBW) proliferation to so-called states of concern and terrorists. For several years the USA had expected that violent and destructive attacks might be carried out against it. The terrorist attacks of 11 September confirmed US concerns.² Less than one month after the attacks, letters filled with concentrated anthrax spores were mailed to members of the news media and politicians. As of January 2002, the sender of the letters remained unknown. The difficulties encountered in the criminal inquiry, the treatment of people exposed to anthrax spores and the disinfection of contaminated offices added to the sense of vulnerability.

As a consequence of the growing threat perception, the USA has been conducting several secret projects in an attempt to improve its defence against biological weapons (BW). However, the legality of these projects under the

¹ The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction is reproduced on the SIPRI Chemical and Biological Warfare Project Internet site at URL <<http://projects.sipri.se/cbw/docs/bw-btwc-text.html>>. The Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (corrected version), 8 Aug. 1994, is reproduced at URL <<http://projects.sipri.se/cbw/docs/cw-cwc-texts.html>>. The 31 Oct. 1999 amendment to Part VI of the Verification Annex of the CWC is reproduced at URL <<http://projects.sipri.se/cbw/docs/cw-cwc-verannex5bis.html>>.

² On 11 Sep. 2001 terrorists flew hijacked commercial airliners into the twin towers of the World Trade Center in New York City and into the Pentagon across the Potomac River from Washington, DC. A fourth plane crashed in Pennsylvania while flying to an unknown destination. Approximately 3000 people were killed.

BTWC is questionable, and international concern has been expressed because the USA is unwilling to open them to international scrutiny, which was an additional reason for the US rejection of the draft protocol.

The Organisation for the Prohibition of Chemical Weapons (OPCW) is the body which oversees the implementation of the CWC. In 2001 it faced a serious budgetary shortfall. As a result the number of inspections was reduced and some technical assistance and cooperative activities were postponed or cancelled. The budget problems will continue in 2002. Destruction operations continued in three of the four declared chemical weapon (CW) possessor states (India, South Korea and the USA), and there is increased hope that Russia will start large-scale destruction of its chemical weapon stockpile in 2002.

Section II of this chapter describes the negotiation of the draft protocol to the BTWC prior to the Fifth Review Conference, the suspension of the AHG as a negotiation forum and the actions that led to the suspension of the Fifth Review Conference until November 2002. The impact of biological defence research in the USA on the BTWC is analysed in section III. The implementation of the CWC and the operation of the OPCW are discussed in section IV. The terrorist attacks with mail-delivered anthrax spores are examined in section V. Section VI summarizes the concerns regarding offensive CBW state programmes and the terrorist acquisition of chemical and biological (CB) agents. Section VII presents the conclusions.

II. Biological weapon disarmament

The BTWC entered into force in 1975. In 2001 Algeria became the 144th party to it. As of 1 January 2002, 18 states are signatories to the convention, and 31 countries have not yet signed the BTWC.³

On 22 October 2001 the United States concluded an agreement for aid worth up to \$6 million with Uzbekistan as part of its Cooperative Threat Reduction (CTR) programme. The project will support the dismantlement of former Soviet BW facilities in Uzbekistan and the 'safe and secure' destruction of any 'residual pathogens' on Vozrozhdenie Island in the Aral Sea.⁴

³ 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, List of States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction as at October 2001, Fifth Review Conference document BWC/CONF.V/INF.1, 26 Oct. 2001. Complete lists of parties, signatory and non-signatory states are available at the SIPRI CBW Project Internet site at URL <<http://projects.sipri.se/cbw/docs/bw-btwc-mainpage.html>>. See also annex A in this volume. Taiwan also ratified the BTWC in 1973 but is no longer a member state of the United Nations.

⁴ US Department of State, Daily Press Briefing, 23 Oct. 2001, Washington, DC, URL <<http://www.state.gov/r/pa/prs/dpb/2001/index.cfm?docid=5509>>. The lead agency on the US side is the Defense Threat Reduction Agency (DTRA). The programme is scheduled to begin in Mar. or Apr. 2002. US official, Private communication with J. Hart, 26 Dec. 2001. Vozrozhdenie Island was the site of a BW field testing facility that was established in 1936. Some of its employees worked with the former Soviet Union's Anti-plague System, which was set up to combat naturally occurring plague outbreaks. It established stations which carried out basic research, developed vaccines and treatments, treated infected individuals and destroyed diseased animals.

Developments in the Ad Hoc Group

Between January 1995 and August 2001 the AHG met in regular session 24 times and elaborated a draft protocol text.⁵ Initially, at a Special Conference in 1994, the AHG had been mandated only to further develop the potential verification measures listed by the Ad Hoc Group of Governmental Experts to Identify and Examine Potential Verification Measures from a Scientific and Technical Standpoint (VEREX) and to explore the possibility of creating a legally binding instrument to strengthen the BTWC.⁶ Following the Fourth Review Conference, in 1996, the AHG received a mandate to negotiate a legally binding protocol and was requested to complete its work as soon as possible. The Fifth Review Conference (19 November–7 December 2001) became accepted as a possible target date.

In early 2001 some states or groups of states held strong positions on sensitive issues, and there were few indications that they were willing to compromise in order to conclude the negotiation. Iran and some other members of the Non-Aligned Movement (NAM) rejected the continued existence of multilateral export control arrangements (such as the Australia Group, AG) outside the BTWC regime, arguing that such arrangements caused restrictions on the transfer of biological materials and equipment to developing countries and are therefore discriminatory. Russia continued to have strong views on definitions and thresholds. China had serious concerns regarding the type and scope of information to be declared. Some members of the Western European and Other States Group (WEOG) resisted far-reaching measures to implement Article X of the BTWC (related to technology transfers) and many countries, including those from the West, had reservations regarding the criteria for declarations.⁷

Consequently, many delegations felt that the usefulness of the negotiation process—with the rolling text and the use of the Friends of the Chair (FoC) to discuss particular issues—had been exhausted.⁸ This prompted the chairman of the AHG, Ambassador Tibor Tóth of Hungary, to draft a ‘composite text’ to break the impasse. The document, which he distributed on 30 March, included the consensus items from the rolling text and suggested compromise language for outstanding issues on the basis of Tóth’s informal bilateral con-

⁵ In 2001 the AHG met 3 times: 22nd session (12–23 Feb.), 23rd session (23 Apr.–11 May) and 24th session (23 July–17 Aug.).

⁶ VEREX was created by the Third Review Conference of parties to the BTWC in 1991. The group met 4 times between Mar. 1992 and Sep. 1993 and listed 21 potential measures in its final report. Ad Hoc Group of Governmental Experts to Identify and Examine Potential Verification Measures from a Scientific and Technical Standpoint, BTWC Third Review Conference report, BWC/CONF.III/VEREX/9, Geneva, 24 Sep. 1993, pp. 132–33. For an overview of the proposed measures and the review conferences see Zanders, J. P., Hart, J. and Kuhlau, F., ‘Biotechnology and the future of the Biological and Toxin Weapons Convention’, SIPRI Fact Sheet, Nov. 2001, URL <<http://projects.sipri.se/cbw/research/biotechnologyfactsheet.pdf>>.

⁷ ‘Washington and the BWC protocol negotiation’, *CBW Conventions Bulletin*, no. 51 (Mar. 2001), p. 1.

⁸ Pearson, G. S., ‘Strengthening the Biological and Toxin Weapons Convention’, *CBW Conventions Bulletin* (note 7), p. 19. The rolling text is the draft text of the protocol.

sultations with individual delegations and the work of the FoC.⁹ The initial reactions at the 23rd session were encouraging. Nevertheless, China and some NAM countries expressed their preference for continuing the negotiation using the rolling text (which was viewed by many as a tactic to delay the negotiations).¹⁰ The US delegation welcomed the chairman's initiative but noted that the document did not address some fundamental US concerns regarding the substance of the draft protocol.¹¹

At the 24th (and final) session, on 23 July–17 August, Tóth's opening remarks indicated that it was time for the participating states to make the necessary compromises in order to secure common benefits in the long run. Most participants (including some NAM states which had previously expressed reservations to the chairman's initiative) now endorsed the composite text as a basis for final negotiation.¹²

On 25 July, however, the United States announced its rejection of the rolling text, the composite text and further efforts to negotiate such a document. The complete rejection of both the product and the multilateral disarmament process effectively ended efforts to complete the draft protocol prior to the Fifth Review Conference. The harshest criticism came from China, Cuba and Iran. Most states, however, reacted with restraint. This may have reflected the fact that the USA had not dismissed the AHG mandate and continued to support the objective of strengthening the BTWC within the multilateral framework, which allowed for a less pessimistic assessment of the US rejection as a temporary setback. In the WEOG, however, the divisions deepened.¹³ The European Union (EU) and Australia, in particular, disagreed with the US assessment that the cost of the protocol outweighed its benefits and that nothing could make the composite text acceptable.¹⁴

The delegates next turned to the sole remaining task of writing the report for consideration at the Fifth Review Conference, which, among other things,

⁹ Protocol to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, BTWC Ad Hoc Group document BWC/AD HOC GROUP/CRP.8, 30 Mar. 2001. The (corrected) composite text is also reproduced as Annex B to Procedural Report of the Ad Hoc Group 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, AHG document BWC/AD HOC GROUP/56-1, 18 May 2001.

¹⁰ The NAM members with this view included Cuba, Indonesia, Iran, Libya, Pakistan and Sri Lanka. Pearson, G. S., 'Strengthening the Biological and Toxin Weapons Convention', *CBW Conventions Bulletin*, no. 52 (June 2001), p. 17.

¹¹ The US position and its rejection of the draft protocol are discussed below.

¹² Rissanen, J., 'A turning point to nowhere? BWC in trouble as US turns its back on verification protocol', *Disarmament Diplomacy*, no. 59 (July/Aug. 2001), p. 12.

¹³ The WEOG as a group did not submit a joint AHG working paper as a consequence of internal differences of opinion. Federation of American Scientists, 'US public positions on the BTWC protocol', Washington, DC, Aug. 2001, URL <<http://www.fas.org/bwc/news/USPublicPositionsOnProtocol.htm>>.

¹⁴ Statement by the presidency on behalf of the European Union at the 24th meeting of the Special Group of States Parties to the Convention on the Prohibition of Biological and Toxin Weapons, in Response to the speech given by the US representative on 25 July, Geneva, 26 July 2001, URL <<http://www.eu2001.be>>; and 'Powell, Rumsfeld press conference in Canberra July 30', *Washington File*, International Information Programs, US Department of State, Washington, DC, 30 July 2001, URL <<http://usinfo.state.gov/>>.

would have laid out the future agenda of the AHG.¹⁵ They were unable to reach final agreement on the document because some countries (notably Cuba and Iran) wanted to explicitly blame the USA for the failure of the protocol negotiations, and subsequent compromise formulations were unacceptable to one group of countries or another. As a consequence of these developments, the AHG did not produce a procedural report of the 24th session. While some delegates acted as if the rolling and composite texts no longer existed, the AHG mandate was not suspended by these events and the participating states may yet readopt the documents as a starting point for future negotiation.¹⁶

The suspended protocol

The BTWC protocol, as envisaged by the AHG, would have been implemented by an Organization for the Prohibition of Biological Weapons (OPBW).¹⁷ Confidence in compliance would have been generated by means of declarations, visits and investigations.

The parties to the BTWC protocol would have been required to submit initial and, subsequently, annual declarations. In the initial declaration, they would have had to provide information on past offensive and defensive BW programmes.¹⁸ Annual declarations would have been based on certain 'triggers', including: national biological defence programme(s) and/or activities against bacteriological (biological) and toxin weapons conducted in the previous year; certain maximum biological-containment facilities, high biological-containment facilities and plant pathogen-containment facilities that work with pathogens or toxins listed in the protocol; and certain production facilities.¹⁹ Since biological agents can usually be grown quickly over a short period of time using small initial quantities, basing declarations on quantitative thresholds is of limited value. Partly for this reason the protocol was structured with a view towards ascertaining the capability of each state party.

The composite text envisaged three types of visits by OPBW teams to 'protocol-relevant' facilities: randomly selected transparency and voluntary assistance visits as well as declaration clarification procedures.²⁰ The main purpose of these on-site visits was to provide assurance of the completeness and correctness of the declarations submitted and thereby generate confidence in the compliance of the other parties. The OPBW would have conducted a

¹⁵ Some countries argued that the report should be addressed by a special conference of states parties to the BTWC to be held in the week before the Fifth Review Conference. Other countries argued strongly against the idea because such a special conference could call into question the continuation of the AHG's work. (In any case, only the states party to the BTWC, not an ad hoc group of parties, can call a special conference.)

¹⁶ Zanders, J. P., Discussions with delegates from several countries, Glion, Switzerland, 11–12 Oct. and Geneva, 19–25 Nov. 2001; Pearson, G. S., 'Strengthening the Biological and Toxin Weapons Convention', *CBW Conventions Bulletin*, no. 53 (Sep. 2001), pp. 18–23; and Rissanen (note 12), pp. 13–19.

¹⁷ BWC/AD HOC GROUP/CRP.8 (note 9).

¹⁸ BWC/AD HOC GROUP/CRP.8 (note 9), Article 4, part B, paras 3–5.

¹⁹ BWC/AD HOC GROUP/CRP.8 (note 9), Article 4, part C, paras 6–5.

²⁰ BWC/AD HOC GROUP/CRP.8 (note 9), Article 6, part B, paras 15–48; Article 6, part C, paras 49–54; and Article 6, part D, paras 55–104.

maximum of 120 randomly selected transparency visits each year with a maximum of 7 such visits per state party.

The draft protocol also provided for two types of investigations to address cases of suspected non-compliance with the BTWC: field investigations and facility investigations. Investigation-related provisions dealing with the timing, degree of access and procedures for the Executive Council to allow or disallow an investigation were complicated and never fully resolved.

Each party would have been required to provide the Technical Secretariat of the OPBW with information on its domestic implementation legislation and other regulations governing the transfer of agents, toxins, equipment and technologies relevant to Article III of the BTWC.²¹ The transfer guidelines included a requirement for end-user certificates, written commitments by receiving parties not to re-transfer the item, and the provision of relevant information regarding the receiving party's laws and regulations. The guidelines would also have been restricted to certain types of equipment, such as 'fermentors or bioreactors designed to prevent the release of aerosols with a total internal volume of 100 litres or more' or 'aerosol analytical equipment designed to determine the size of aerosol particles up to 20 microns in diameter that contain micro-organisms or toxins'.²² In addition to transfer guidelines, Article VII contained provisions for voluntary notification among parties of aggregate data on certain exports or authorization for export of select equipment for prophylactic, protective or other peaceful purposes in order to promote transparency and act as a confidence-building measure (CBM).²³ The parties would have been permitted to consult among themselves on transfer-related questions and to exclude other parties, the Executive Council and the Director-General of the OPBW.²⁴

With respect to scientific and technological exchange for peaceful purposes and technical cooperation, the parties would have been required to promote and support a list of activities, including: (a) the publication, exchange and dissemination of information on conferences, training programmes, research and development (R&D) relating to biotechnology, Good Laboratory Practice (GLP) and Good Manufacturing Practice (GMP); (b) the work of certain laboratories, such as those working on disease prevention and surveillance; and (c) assistance to parties to improve laboratory capabilities in certain areas.²⁵ In order to avoid hampering economic and technological development the parties to the protocol would have had to ensure that, individually or collectively, they did not take discriminatory measures that were incompatible with the obligations of the BTWC.²⁶ The draft protocol envisaged the establishment of a cooperation committee within the OPBW to oversee the implementation of Article X of the BTWC on technical and scientific cooperation

²¹ BWC/AD HOC GROUP/CRP.8 (note 9), Article 7, part A, paras 1–2.

²² BWC/AD HOC GROUP/CRP.8 (note 9), Article 7, part B, para. 5.

²³ BWC/AD HOC GROUP/CRP.8 (note 9), Article 7, paras 7–9.

²⁴ BWC/AD HOC GROUP/CRP.8 (note 9), Article 7, para. 16.

²⁵ BWC/AD HOC GROUP/CRP.8 (note 9), Article 14, para. 4.

²⁶ BWC/AD HOC GROUP/CRP.8 (note 9), Article 14, para. 6(a).

for peaceful purposes.²⁷ However, the exact role to be played by the coordinating committee was highly controversial.

US objections to the projected protocol

Since the 1991 Third Review Conference the USA has, in contrast to many other parties to the BTWC, consistently expressed its conviction that the BTWC is not verifiable.²⁸ In 1995, when the AHG began its activities, the USA stated its requirements for the protocol in terms of transparency and measures to enhance confidence and compliance with the BTWC. The Clinton Administration viewed the protocol as a tool to deter proliferators that would increase the cost and risk of violating the BTWC, rather than as an instrument of verification.²⁹ US contributions to the negotiation process were not always constructive, mostly as a consequence of the deadlock in the inter-agency consultations within the US administration, and on several occasions the USA introduced working documents that blunted proposed measures.³⁰ Following a comprehensive policy review of the BW threat involving all relevant government agencies in the spring of 2001, the George W. Bush Administration concluded that the protocol as formulated in the composite text would not achieve the AHG's mandate and strengthen confidence in compliance with the BTWC.³¹ It also opposed the negotiation process, which led to the development of a policy strategy to stop 'the momentum of [the] seven-year long process'.³²

At the 23rd session of the AHG, on 23 April–11 May, at which participants discussed the composite text for the first time, the US delegation indicated that many of its national positions on the substance of the draft protocol were not reflected in the text.³³ While there were many early indications that the Bush Administration did not prefer negotiated multilateral disarmament treaties,³⁴ some independent institutes in Washington also criticized the draft protocol for its weaknesses. On the basis of exercises involving various experts, one

²⁷ BWC/AD HOC GROUP/CRP.8 (note 9), Article 14, paras 7–32.

²⁸ For an overview of US compliance and verification concerns and preferred policy options see US General Accounting Office (GAO), *US and International Efforts to Ban Biological Weapons*, GAO/NSIAD-93-113 (GAO: Washington, DC, Dec. 1992).

²⁹ Harris, E. D., 'Bioweapons treaty still a good idea', *Christian Science Monitor*, 24 Aug. 2001, URL <<http://www.csmonitor.com/2001/0824/p11s3-coop.htm>>.

³⁰ Rosenberg, B., 'US policy and the BWC protocol', *CBW Conventions Bulletin*, no. 52 (June 2001), p. 1. According to a review prepared by the Federation of American Scientists (FAS), the USA submitted or co-submitted only 18 working papers to the AHG between 1995 and 2001, in contrast to South Africa (86), the United Kingdom (66) and Russia (29). Federation of American Scientists, 'US public positions on the BTWC protocol', Washington, DC, Aug. 2001, URL <<http://www.fas.org/bwc/news/USPublicPositionsOnProtocol.htm>>.

³¹ Statement by the United States to the Ad Hoc Group of Biological Weapons Convention States Parties, Geneva, 25 July 2001, p. 2.

³² Remarks by John Bolton, Under Secretary of State for Arms Control, at the Monterey Institute of International Studies, Washington, DC, 11 Jan. 2002, as distributed by Federal News Service, 11 Jan. 2002, URL <<http://www.fnsg.com>>.

³³ Pearson (note 10), p. 19.

³⁴ MacKenzie, D., 'Bugs of war', *New Scientist* (Internet edn), 9 May 2001, URL <<http://www.newscientist.com/news/news.jsp?id=ns9999714>>.

report noted that the envisaged industry monitoring routines, in particular, would create compliance ambiguities that would be detrimental to the reputation of the companies involved. It attributed this outcome to the fact that the draft protocol was designed to minimize the inconvenience and intrusiveness of inspections to host facilities and concluded that the companies might find an ambiguous compliance report more damaging than full-blown inspections.³⁵ Another report judged the text inadequate as a 'cost-effective, sharply focused, useful instrument in the fight against BW proliferation'.³⁶ The widespread negative attitude towards the protocol in Washington complicated efforts by other countries before the 24th session of the AHG to convince the USA to endorse the document.³⁷

On the basis of an assessment that biological weapons pose a unique threat and that therefore the arms control approaches to other weapon categories (in particular, the CWC model) do not offer a workable structure to deal with the BW threat, the USA maintains that the protocol would be unlikely to deter states seeking a BW capability. Its adoption would consequently put US national security at risk. The core US objections to the protocol can be summarized as follows:³⁸

1. The protocol (or any other verification regime) could not improve the ability to verify compliance with the BTWC or make the BTWC enforceable. The information that parties would receive under the protocol would not be of a type that would enable a country to judge compliance. As BW facilities can be small, temporary and without distinguishing features, it is unlikely that clandestine weapon projects would be detected.

2. The protocol would harm legitimate activities in the field of biotechnology by increasing expenses, risking the loss of confidential business or proprietary information, and limiting certain types of research. The measures in the protocol to reduce such risks would be insufficient (especially with respect to frivolous allegations of non-compliance that could force companies to release confidential information in order to refute the allegations).

3. The nature of the biotechnology industry would make it almost impossible to take inventories of activity in a party to the BTWC as the basis of a national declaration. In the USA there are possibly tens of thousands of relevant

³⁵ Smithson, A. E., *House of Cards: The Pivotal Importance of a Technically Sound BWC Monitoring Protocol*, Report no. 37 (Henry L. Stimson Center: Washington, DC, May 2001), p. 98.

³⁶ Moodie, M., *The BWC Protocol: A Critique*, Special Report no. 1 (Chemical and Biological Arms Control Institute: Washington, DC, June 2001), p. 37.

³⁷ Comment by a diplomat at a discussion meeting between representatives of EU member states and non-governmental organizations at the Fifth Review Conference, Geneva, 23 Nov. 2001.

³⁸ Statement by the United States to the Ad Hoc Group of Biological Weapons Convention States Parties (note 31); Press conference by US Ambassador Donald A. Mahley, Geneva, 25 July 2001 as transcribed in 'Mahley says absence of protocol will not undercut BWC', International Information Programs, US Department of State, Washington, DC, 25 July 2001, URL <<http://usinfo.state.gov/topical/pol/arms/stories/01072502.htm>>; 'Wolfowitz cites importance of biological weapons treaty', *Washington File*, International Information Programs, US Department of State, Washington, DC, 30 July 2001, URL <<http://usinfo.state.gov/>>; and Bailey, K. C., 'The biological and toxin threat to the United States', Paper published by the National Institute for Public Policy, Fairfax, Va., Oct. 2001, p. 10, URL <<http://www.nipp.org>>.

facilities whose number and location change on an irregular but frequent basis. The on-site inspection of a subset of such sites (arbitrarily selected for declaration by each party) would require an international organization far larger than the OPCW, and no AHG participant was willing to contemplate so extensive an organization. In addition, most such facilities are located in the countries that are the least likely to conduct activities which are prohibited under the BTWC.

4. If the declarations under the protocol with respect to the BW defence programmes were sufficiently comprehensive, they would risk compromising legitimate and sensitive national security information to an extent that would be unacceptable to the USA. If, in contrast, exclusions in such declarations were allowed, a potential proliferator might be able to conceal significant aspects of its BW programme in legitimately undeclared facilities. The USA viewed the dilemma as irreconcilable.

5. The USA was not prepared to have the other tools it uses to deal with BW proliferation (e.g., export controls and non- and counter-proliferation policies) degraded by the protocol. In particular, it objected to the proposed measures to implement Article X of the BTWC (technology transfers and international cooperation for peaceful purposes) and the concomitant demands by certain countries for so-called parallel export control arrangements such as the Australia Group to be abolished.³⁹

6. Some parts of the protocol might limit the scope of the prohibitions or fix the meaning of terms in the BTWC.

7. The US Senate would be unlikely to ratify the protocol.

Several other countries shared some of the US concerns. However, in contrast to the USA they were still prepared to negotiate further on the basis of the draft documents in order to achieve a satisfactory result.

The Fifth Review Conference of the Parties to the BTWC

The Fifth Review Conference met in Geneva on 19 November–7 December 2001. Formally, the draft protocol was not on the agenda: the review conferences evaluate the functioning of the BTWC and confirm or expand the obligations of states in the light of international developments and technological advances made in the fields of the biological sciences and biotechnology. However, the failure of the AHG to achieve an agreed document prior to this conference placed the burden of conceptualizing the future regime for the prohibition of BW and devising the mechanisms to strengthen it on the review conference. Furthermore, it was inevitable that the issues that had complicated the AHG negotiation would also affect the review of the convention (particularly regarding Article III on non-proliferation and Article X on international

³⁹ The AG is discussed in Anthony, I., 'Multilateral weapon and technology export controls', *SIPRI Yearbook 2001: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2001), p. 619. Australia Group documents are accessible on the Internet at URL <<http://www.australiagroup.net>>.

cooperation and technology transfers).⁴⁰ In addition, there was a general expectation that the USA would submit its alternative proposals at the forum and that most parties to the BTWC would confirm the continued validity of the AHG mandate.

The US alternative proposals

In his plenary address on the opening day of the review conference, Under Secretary of State for Arms Control and International Security Affairs John Bolton reiterated the US opposition to the composite text and formally presented alternative proposals for mechanisms to implement specific articles of the BTWC. With respect to Article IV (national implementation) the USA suggested that parties enact strict national criminal legislation against prohibited BW activities with strong extradition requirements; establish sound national oversight mechanisms for the security and genetic engineering of pathogenic organisms; promote responsible conduct in the study, use, modification and shipment of pathogenic organisms; and devise a solid framework for bioscientists in the form of a code of ethical conduct that would have universal recognition. Regarding Article V (consultation and cooperation) the USA proposed that an effective UN procedure be established to investigate suspicious outbreaks or allegations of BW use. States parties would be required to accept international inspectors following the determination by the UN Secretary-General that an inspection should take place. The United States also supported the setting up of a voluntary cooperative mechanism for clarifying and resolving compliance concerns by mutual consent. The procedures would include exchanges of information, voluntary visits and other measures to clarify and resolve doubts about compliance. With regard to Article VII (assistance to victims) and Article X (technical and scientific cooperation) the USA proposed the adoption of strict biosafety procedures, improved international disease surveillance and enhanced mechanisms for sending expert response teams to cope with outbreaks.⁴¹ Bolton requested that these proposals be endorsed in the Final Declaration of the review conference.

US non-compliance allegations

To the surprise of many countries, the USA also formally accused Iran, Iraq, Libya, North Korea, Sudan and Syria of maintaining offensive BW programmes and expressed its grave concern about possible BW use by the

⁴⁰ One of the alternatives mentioned by the USA in July was expansion of the Australia Group in terms of both participation and the scope of equipment and material covered in the export control lists. Press conference by US Ambassador Donald A. Mahley (note 38).

⁴¹ 'Strengthening the international regime against biological weapons', Statement by the President, Office of the Press Secretary, Washington, DC, 1 Nov. 2001, URL <<http://www.whitehouse.gov/news/releases/2001/11/20011101.html>>; and Statement of John R. Bolton, Under Secretary of State for Arms Control and International Security, US Department of State, to the Fifth Review Conference of the Biological Weapons Convention, United States Mission, Office of Public Affairs, Geneva, 19 Nov. 2001.

Afghanistan-based al-Qaeda terrorist organization.⁴² Iran, Iraq and Libya (all of which are parties to the BTWC) rejected the accusations.⁴³ Iran condemned the United States for duplicity with respect to arms control and disarmament and referred to US support for Israel (which is not a party to the BTWC, CWC or the 1968 Non-Proliferation Treaty, NPT), the secret US BW defence programmes and the reservations to the CWC formulated by the US Congress with respect to challenge inspections on US territory.⁴⁴ Iraq and Libya also referred to the US support for Israel; Iraq added that it had terminated its BW programme in 1991 and that the items which the international inspectors considered to be related to the programme had been destroyed.⁴⁵ The US statement was also noteworthy for the countries it did not name.⁴⁶

The review process

Following two days of general debate, the parties reviewed the operation of the convention article by article in the Committee of the Whole. Proposals for clarification and expansion of the articles were suggested in response to the terrorist attacks of 11 September and the subsequent delivery of anthrax spores by post. Among the topics discussed were: assistance following incidents involving the use of BW or in the case of a natural outbreak of disease, the establishment of an oversight mechanism on genetic manipulation and a code of conduct. Other suggestions were made for regime-building activities between the quinquennial review conferences. These included proposals to hold annual meetings and create a scientific advisory panel to advise on new biotechnology developments. Chairman of the Fifth Review Conference

⁴² Statement of John R. Bolton (note 41). In the weeks preceding the review conference Ambassador Donald Mahley and Assistant Secretary for Arms Control Avis Bohlen visited the capitals of the other members of the WEOG to seek support for the US proposals. Rissanen, J., 'Preparations for the review conference, US lobbies its proposals', *BWC Protocol Bulletin*, 1 Nov. 2001, distributed by the Acronym Institute, URL <<http://www.acronym.org.uk/bwc/index.htm>>. In the week immediately preceding the review conference the USA informed the WEOG of its intention to name the proliferators. The other WEOG members strongly opposed the move but were unable to dissuade the USA and only succeeded in having the relevant sections shortened. EU delegate, Geneva, Private communication with J. P. Zanders, 22 Nov. 2001.

⁴³ North Korea is also a party to the BTWC (but did not participate in the review conference) and Syria is a signatory state. Sudan has not signed the convention. Complete lists of parties, signatory and non-signatory states are available at the SIPRI CBW Project Internet site at URL <<http://projects.sipri.se/cbw/docs/bw-btwc-1>>. See also annex A in this volume.

⁴⁴ Reply of the Islamic Republic of Iran to the US statement, Document distributed at the Fifth Review Conference, Geneva, 19 Nov. 2001. The US BW defence programme is discussed below.

⁴⁵ Fifth Review Conference for SIPRI, Geneva, 19 Nov. 2001. Many unresolved issues remain with respect to Iraq's BW programme. See Wahlberg, M., Leitenberg, M. and Zanders, J. P., 'The future of chemical and biological weapon disarmament in Iraq: from UNSCOM to UNMOVIC', *SIPRI Yearbook 2000: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2000), pp. 560–75.

⁴⁶ See section VI of this chapter. The identification of suspected violators is not unprecedented at the BTWC review conferences. E.g., Iraq and Russia were named by several countries at both the Third and the Fourth review conferences. However, as one observer noted, in 1996 there were mechanisms to address compliance concerns (the trilateral process and the United Nations Special Commission on Iraq, UNSCOM), whereas it does not appear that the USA has used or intends to use the procedures in the BTWC and those agreed at previous review conferences to resolve the current concerns. Pearson, G. S., 'The Biological and Toxin Weapons Convention', *Chemical and Biological Weapons Conventions Bulletin*, no. 54 (Dec. 2001), p. 25.

Ambassador Tóth remarked that these ideas came from many participating states, not just the United States.⁴⁷ However, the USA preferred voluntary measures to be adopted by individual states, whereas other states (most notably the NAM) wanted such measures to be adopted as part of a legally binding instrument to be negotiated in the AHG.⁴⁸ The EU, in particular, was reported to be trying to bridge the gap between the USA and other parties.⁴⁹

In the final week, following the review by the Committee of the Whole, the delegates discussed compromise language for the final declaration. However, several issues (notably, export control arrangements, such as the Australia Group, and technology transfers) that had proved impossible to resolve in the AHG sessions were raised again. No country rejected the US proposals out of hand, but views on how to implement them varied greatly, even between the USA and the EU.⁵⁰ The United States insisted on having the UN Security Council (where it has veto power) rather than another international body determine the need for an investigation in the event of a suspected outbreak of disease. It also objected to including facilities in such investigations, although this may be critical, as was proved by the 1979 anthrax outbreak in Sverdlovsk (now Yekaterinburg) following its accidental release from an illegal Soviet military research facility. The issues of past compliance (and whether or not to include the countries named by the USA as violators of the BTWC) and the status of the AHG mandate also remained to be resolved.⁵¹

On 7 December, the final day of the review conference, the delegates reached agreement on most of the text in the final declaration that addressed articles I–XI and XIII–XV of the BTWC. However, two hours before the scheduled end of the review conference the USA unexpectedly tabled new language for Article XII which proposed terminating the AHG mandate in exchange for US acceptance of annual meetings to review the progress in implementing the new measures adopted at the Fifth Review Conference and to consider measures or mechanisms to effectively strengthen the BTWC. An expert group could meet to examine matters identified by the parties at the annual meetings, but it would not have a negotiation mandate.⁵² The US submission was received with shock and anger. EU representatives, who had not been informed in advance, were particularly disturbed by the US action. During a brief recess, in which the regional groups considered their responses,

⁴⁷ Highlights of press conference held on developments in the Fifth Review Conference of States Parties to the Biological Weapons Convention, United Nations, Geneva, 27 Nov. 2001, URL <<http://www.unog.ch/news/documents/newsen/pc011127.html>>.

⁴⁸ Rissanen, J., 'Differences and difficulties as delegates consider wide range of proposals', *BWC Protocol Bulletin*, 30 Nov. 2001, URL <<http://www.acronym.org.uk/bwc/index.htm>>.

⁴⁹ Highlights of press conference held on developments in the Fifth Review Conference of States Parties to the Biological Weapons Convention, United Nations, Geneva, 30 Nov. 2001, URL <<http://www.unog.ch/news/documents/newsen/pc011130.html>>.

⁵⁰ The USA does not appear to have elaborated its proposals in any document or statement prior to these discussions. This led to different interpretations by the other delegations. The proposals by the various parties for the language of the final declaration are contained in Fifth Review Conference, Committee of the Whole document BWC/CONF.V/COW/1, 13 Dec. 2001, annex.

⁵¹ Rissanen, J., 'Endgame in earnest: first draft of final declaration issued on penultimate day', *BWC Protocol Bulletin*, 6 Dec. 2001, URL <<http://www.acronym.org.uk/bwc/index.htm>>.

⁵² The full text of the US proposal is reproduced in Pearson (note 46), p. 20.

the EU representatives refused to participate in a WEOG meeting with the USA and instead met as an EU group. As a consequence of the actions by the USA and some other participating state parties a final declaration was not adopted, and the review conference was adjourned until 11–22 November 2002.⁵³

III. Biotechnology, biological defence research and the BTWC

Biotechnology and genetic engineering have the potential to improve the quality of life. However, such knowledge can also be used for hostile purposes, to increase the stability and virulence of existing warfare agents or to create new agents based on the components of an organism.⁵⁴ This inherent duality is reinforced by the growing possibility of the chance discovery in non-military biotechnological research of a new pathogen, or a new expression of a pathogen, with characteristics that could make it attractive for military use. Such discoveries confront scientists with the dilemma of whether or not to publish results or pursue a line of research. Publication makes the results available to governments with hostile intentions or terrorists, but it also allows the scientific community to devise countermeasures (e.g., pharmaceuticals or detectors) and policy makers to reinforce the norms against the misapplication of biology (e.g., the BTWC).⁵⁵

The number of institutes, government agencies and countries engaging in BW defence activities is increasing rapidly. The focus is on traditional and potential biological warfare agents, but research is also being conducted on the evolution of microbes and genetic modification in order to increase pathogenicity, stability or resistance to various types of medical treatment.⁵⁶ Such modifications were carried out in the offensive Soviet BW programme. Genome studies into traditional warfare agents offer opportunities for new prophylaxis and pretreatments and might contribute to the development of generic biological warfare agent detectors, but the results could also lead to the development of enhanced warfare agents.⁵⁷ Other research involves the behaviour of

⁵³ Rissanen, J., 'Anger after the ambush: review conference suspended after US asks for AHG's termination', *BWC Protocol Bulletin*, 9 Dec. 2001, URL <<http://www.acronym.org.uk/bwc/index.htm>>.

⁵⁴ These issues are discussed in greater detail in Zanders, Hart and Kuhlau (note 6).

⁵⁵ E.g., in 1994 a report was published on research with a strain of *E. coli* that had been rendered 32 000 times less sensitive to a certain antibiotic using an engineering technique of DNA shuffling. In the technique, copies of a particular bacterial gene are first broken up in fragments and then reassembled so that the fragments are ordered in subtly different sequences. After reintroduction of these genes into the bacteria, the specimens exhibiting the desired traits are selected for further development. Following a request by the American Society of Microbiology, which expressed its concern about potential misuse, the researcher destroyed the strain. Dennis, C., 'The bugs of war', *Nature*, vol. 411 (17 May 2001), p. 234.

⁵⁶ The term 'microbe' encompasses all microbial agents, such as viruses, bacteria, fungi, protozoa and microalgae. US National Science and Technology Council, *The Microbe Project* (Executive Office of the President, Office of Science and Technology Policy: Washington, DC, Jan. 2001), p. 2.

⁵⁷ By Oct. 2001 all the genes of the plague bacterium (*Yersinia pestis*) had been mapped. In Nov. 2001 scientists reported that they had decoded the genome of the anthrax bacterium (*Bacillus anthracis*). Reuters Medical News, 'Yersinia pestis genome sequenced', 3 Oct. 2001, URL <<http://id.medscape.com/reuters/prof/2001/10/10.04/20011003scie004.html>>; and Broad, W. J., 'Genome offers "fingerprint" for

agents in the environment in order to test experimental detectors, but these activities could also contribute to the development of enhanced dissemination devices. As was demonstrated by revelations in 2001, such work may reach the limits of what is interpreted as being permissible under the BTWC. In the future the calls for secrecy in order to prevent proliferation will increasingly conflict with the need for scientific freedom and increased transparency with regard to BW defence programmes to maintain confidence in compliance with the BTWC.

The US BW defence research programme

The USA has the world's largest BW defence programme. In the light of the growing threat perception regarding BW proliferation and terrorism involving biological agents, the USA drastically expanded its efforts to prevent and counter the effects of BW use in the second half of the 1990s.⁵⁸ It was argued that the USA should adopt a more proactive policy and that research should be conducted on biological and toxin agents in order to understand what is possible even if this entailed criticism that the USA was violating the BTWC.⁵⁹ There was also criticism that the existing programmes focused on agents, not on the technology and functioning of delivery systems.⁶⁰

In September 2001 *New York Times* journalists Judith Miller, Stephen Engelberg and William J. Broad revealed three secret BW threat assessment activities: Project Clear Vision, Project Bacchus and Project Jefferson. All arguably test the limits of the BTWC as they are closely related to activities that might be undertaken as part of an offensive BW development programme. Other projects exist, but little is known about them.⁶¹

In 1997 the Central Intelligence Agency (CIA) started Project Clear Vision to analyse delivery systems for biological warfare agents in countries of proliferation concern. A copy of a Soviet-designed biological bomblet that disperses the agent in aerosol form was built and its performance was assessed under various atmospheric conditions in two sets of tests at the Battelle Memorial

anthrax', *New York Times* (Internet edn), 28 Nov. 2001, URL <<http://www.nytimes.com/2001/11/28/health/28GENE.html>>.

⁵⁸ Zanders, J. P., French, E. M. and Pauwels, N., 'Chemical and biological weapon developments and arms control', *SIPRI Yearbook 1999: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 1999), pp. 594–95. In 2001 US government spending on preparedness activities against terrorist attacks with chemical, biological, radiological or nuclear materials was \$1.7 billion per year, an increase of 310% since fiscal year (FY) 1998. For FY 2000 funding specifically related to terrorism with biological agents was estimated to be in the range of \$35–40 million. As a result of the \$40 billion emergency supplemental appropriation after the 11 Sep. terrorist attacks these figures are expected to rise further in FY 2002. Committee on Science, US House of Representatives, *The Science of Bioterrorism: Is the Federal Government Prepared?*, Hearing held on 5 Dec. 2001, URL <http://www.house.gov/science/full/dec05/full_charter_120501.htm>.

⁵⁹ Bailey (note 38).

⁶⁰ Miller, J., Engelberg, S. and Broad, W., *Germs: Biological Weapons and America's Secret War* (Simon & Schuster: New York, 2001), pp. 287–89.

⁶¹ Project Bite Size, Back Star and Druid-Tempest are mentioned in the context of secret US Department of Defense programmes to develop defences against BW and other unconventional weapons. Miller, Engelberg and Broad (note 60), pp. 296–97.

Institute, a military contractor in Columbus, Ohio. The tests were completed in mid-2000 and were deemed successful.

In addition to investigating the delivery systems of the former Soviet Union and other BW proliferators, it was argued that the Clear Vision Project ought to investigate the military implications of gene splicing, a genetic engineering technique that could be used to increase the lethality of microbes. The work would have involved the creation of new strains of pathogens, but it was reportedly halted before genes were inserted into a pathogen.⁶²

Project Clear Vision ended in early 2001. Following briefings of White House officials (President Bill Clinton was reportedly never informed) and congressional intelligence committees, the programme became increasingly controversial and the CIA did not seek new appropriations to fund it. In addition, the project did not satisfy one of the CIA's conditions for a particular research item: namely, the availability of credible intelligence that an adversary country was developing or deploying a particular BW.⁶³

In Project Bacchus experts from the Defense Threat Reduction Agency (DTRA), a Department of Defense (DOD) agency, assembled a production plant that would be capable of producing biological warfare agents at a former nuclear test site in the Nevada desert using only commercially available materials that were procured in the USA and Europe.⁶⁴ Anthrax simulants were used in the production runs. It was hoped that distinctive patterns (signatures) of purchase of equipment would emerge, but none was detected. Project Bacchus received \$1.6 million in funding. According to the participants, the project demonstrated the ease with which a state or a terrorist organization could acquire significant amounts of a biological warfare agent. The DTRA followed Project Bacchus with Operation Divine Junker, which simulated an attack by military commandos on a plant in order to neutralize it. The simulation was intended to assess whether the fermentor and milling machine could be disabled without disseminating any of the agent. It was also deemed a success.⁶⁵

The Bush Administration reportedly plans to expand the BW defence projects because of the growing BW threat.⁶⁶ The DOD Defense Intelligence Agency (DIA) has taken over the CIA project to genetically engineer a more potent strain of the anthrax bacterium, similar to one first created by Soviet

⁶² Miller, Engelberg and Broad (note 60), p. 296.

⁶³ Miller, Engelberg and Broad (note 60), p. 296.

⁶⁴ Miller, J., Engelberg, S. and Broad, W. J., 'US germ warfare research pushes treaty limits', *New York Times* (Internet edn), 4 Sep. 2001, URL <<http://www.nytimes.com>>. 'Bacchus' is reportedly an acronym for Biotechnology Activity Characterization by Unconventional Signatures.

⁶⁵ Miller, Engelberg and Broad (note 60), pp. 297–98.

⁶⁶ Miller, Engelberg and Broad (note 64). According to the Director of the National Institute of Allergy and Infectious Diseases at the National Institutes of Health, the USA is primarily concerned with the 6 so-called 'Category A' biological agents: anthrax, botulinum toxin, haemorrhagic fevers (e.g., Ebola), plague, smallpox and tularaemia. The criteria for focusing on these agents are ease of dispersal, impact versus mortality rate and the availability of an adequate therapy. Anthony Fauci, Director of the National Institute of Allergy and Infectious Diseases at the National Institutes of Health, as quoted in Nartker, M., 'US response: bioterrorism differs from biowarfare, official says', *Global Security Newswire*, 17 Jan. 2002, URL <http://www.nti.org/d_newswire/issues/newswires/2002_1_17.html#3>.

scientists.⁶⁷ Its purpose is to assess the effectiveness of the anthrax vaccine currently being administered to US military personnel against the modified strain. The DIA included the anthrax programme in its Project Jefferson, a government effort to assess the BW threat. In October 2001 the DOD approved the project, and the Battelle Memorial Institute will probably be chosen to engineer the anthrax strain and develop the new vaccine.⁶⁸

In December 2001 another classified aspect of the US biological defence programme came to light during the search for the domestic source of the anthrax spores used in the letters. In the early 1990s US Army scientists at the Life Sciences Division of Dugway Proving Ground in Utah had made small quantities of dried anthrax. It was milled into respirable particles and aerosolized in order to test decontamination techniques and biological agent detection systems. The anthrax spores were milled to a concentration of the range of 1 trillion spores per gram, which reportedly exceeds that of the anthrax produced in the US and Soviet BW programmes. Production batches reportedly rarely accumulate more than 10 grams at any given time.⁶⁹ The project was launched in the early 1990s after Iraq's BW threat in the 1991 Persian Gulf War. The dried anthrax batches may have been the first produced since President Richard M. Nixon renounced BW in 1969.

The BTWC and BW defence

The BTWC is governed by the general purpose criterion in Article I: all activities that may contribute to the acquisition or retention of any type of biological warfare agent, however created or manufactured, are prohibited. Exception is made for those activities that benefit prophylactic, protective or other peaceful purposes.⁷⁰ Even experimentation involving the open-air release of pathogens or toxins can be justified if it supports one or more of these non-prohibited purposes.⁷¹ The BTWC does not specify any quantitative or qualitative limitations for the biological agents that are used in the non-prohibited activities. Consequently, there is a potential ambiguity, and judgement of compliance with the BTWC with respect to biological defence

⁶⁷ 'DoD news briefing Victoria Clarke, ASD PA', DefenseLINK, 4 Sep. 2001, URL <http://www.defenselink.mil/news/Sep2001/t09052001_t0904asd.html>.

⁶⁸ Miller, J., 'US agrees to clean up anthrax site in Uzbekistan', *New York Times* (Internet edn), 23 Oct. 2001, URL <<http://www.nytimes.com>>; Borger, J., 'Pentagon approves super strain', *The Guardian*, 24 Oct. 2001, URL <<http://www.guardian.co.uk/Archive/Article/0,4273,4283710,00.html>>; and 'News briefs', *Arms Control Today*, Nov. 2001, URL <http://www.armscontrol.org/act/2001_11/briefsnov01.asp>.

⁶⁹ Shane, S., 'Bioterror: organisms made at a military laboratory in Utah are genetically identical to those mailed to members of Congress', *Baltimore Sun* (Internet edn), 12 Dec. 2001, URL <<http://www.baltimoresun.com>>; Shane, S., 'Army confirms making anthrax in recent years', *Baltimore Sun* (Internet edn), 13 Dec. 2001, URL <<http://www.baltimoresun.com>>; and Harvey, M. and Zither, A., 'Army defends its anthrax-making program', *Los Angeles Times* (Internet edn), 13 Dec. 2001, URL <http://www.cmonitor.com/stories/front1101/1213army_2001.shtm>.

⁷⁰ Article I(1) of the BTWC.

⁷¹ Final Document of the Fourth Review Conference of the Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, document BWC/IV/9, Part II, Final Declaration, Article I, para. 7, p. 16.

activities depends largely on the judgement of intent (in which perceptions of the enemy inevitably play a significant role).

With the exception of rudimentary consultation mechanisms the BTWC contains no provisions to deal with compliance concerns. The parties have therefore adopted a set of CBMs through the process of the review conferences. States are requested, among other things, to submit information on relevant national defence R&D programmes and on research centres and laboratories that specialize in permitted biological activities of direct relevance to the BTWC. The CBMs are only politically binding, and the extent and quality of the annual responses have generally been poor.⁷²

Despite the misgivings of some individuals, US officials have consistently argued that the BW threat evaluation projects fall within the scope of BW defence activities permitted under the BTWC. In May 2000 a microbiologist at the US Army Medical Research Institute of Infectious Diseases (USAMRIID) was infected with glanders. Research on its causative agent, *Burkholderia mallei*, was justified on the grounds that there is suspicion that attempts are being made to develop an aerosolized and antibiotic-resistant form of the pathogen. No case of human glanders had been recorded in the USA since 1945.⁷³ Similarly, Project Clear Vision was defended by CIA officials who insisted that the research activities were within the scope of activities for protective purposes that are permitted by the BTWC.⁷⁴ The bomblet developed by the project lacked a fuse and other parts required to make it operational, and US officials argued that there was no intent to develop it into a complete weapon. The project was further justified by the claim that such items were being sold on the international market.⁷⁵ CIA lawyers were reportedly also convinced that the BTWC permitted the creation of new microbe strains in order to assess their military implications.⁷⁶ In the case of Project Bacchus, CIA legal reviews concluded that the construction of a plant was permitted under the BTWC because of its defensive nature and the fact that no actual biological warfare agent was intended to be produced. The Bush Administration considers projects such as the one designed to create a genetically modified strain of anthrax in Project Jefferson as fully consistent with the BTWC. Administration representatives have argued that the convention allows such research on both pathogens and delivery systems for protective or defence pur-

⁷² Sims, N. A., 'The regime of compliance: the addition of confidence-building measures', *The Evolution of Biological Disarmament*, SIPRI Chemical & Biological Warfare Studies no. 19 (Oxford University Press: Oxford, 2001), pp. 61–81.

⁷³ Srinivasan, A. *et al.*, 'Glanders in a military research microbiologist', *New England Journal of Medicine*, vol. 345, no. 4 (26 July 2001), p. 256; Khan, A. S. and Ashford, D. A., 'Ready or not—preparedness for bioterrorism', *New England Journal of Medicine*, vol. 345, no. 4 (26 July 2001), pp. 287–89; and DeShazer, D. *et al.*, 'Laboratory-acquired human glanders', *Case Studies*, Center for the Study of Bioterrorism & Emerging Infections, Saint Louis University School of Public Health, May 2000, URL <http://bioterrorism.slu.edu/case_studies/laboratory>. Glanders was used by German agents to infect livestock and draught animals in the USA during World War I.

⁷⁴ This does not imply that the legal reviews produced consensus advice. Miller, J., 'When is a bomb not a bomb? Germ experts confront the US', *New York Times* (Internet edn), 5 Sep. 2001, URL <<http://www.nytimes.com>>.

⁷⁵ Miller, Engelberg and Broad (note 64).

⁷⁶ Miller, Engelberg and Broad (note 60), p. 296.

poses.⁷⁷ Similar arguments were used to justify the generation of dried anthrax aerosols at the Dugway Proving Ground.

In contrast to many other parties to the BTWC, the USA has consistently made detailed declarations of its BW defence activities (including activities conducted by the Battelle Memorial Institute facility in West Jefferson, Ohio).⁷⁸ However, the various programmes that were revealed in the second half of 2001 had never been declared, nor was the site for tests in the Nevada desert.⁷⁹ The surprise and concern that have been expressed about these programmes are motivated less by the fact that the USA conducts a wide variety of BW defence projects in order to deal with its perceived security threats than by the intent that motivates and justifies the secrecy and non-disclosure. As two BW disarmament experts wrote, CBMs are ‘an assortment of activities that states engage in with the primary aim to become more sure that each understands the actions and/or intentions of the others’.⁸⁰ These doubts about intent have led to serious questions about the permissibility of these activities under the BTWC among members of the arms control community and governments.⁸¹

The BTWC is unclear about when a particular activity should be considered defensive or offensive, and ‘purpose’ is determined by the judgement of intent. Nevertheless, on the basis of analyses of past programmes and proliferation allegations, certain activities have become widely accepted as potential indicators of an offensive programme: certain kinds of vaccine research (especially if the disease is not indigenous), large-scale vaccinations of troops against certain agents, the creation of non-naturally occurring disease strains (especially those with heightened pathogenicity), the development of agent delivery systems, agent production installations, open-air release of pathogens, the presence of an explosive chamber inside a research establishment, and so on.

US officials have justified the projects on the grounds that the activities, installations and equipment are part of a defensive programme and have argued that secrecy is necessary in order not to provide potential adversaries

⁷⁷ ‘DoD news briefing Victoria Clarke, ASD PA’ (note 67)

⁷⁸ There is no official systematic presentation of the data submitted under the CBMs. According to 1 analysis by independent researchers based on 1998 data, the USA declared 18 facilities and 1063 (full- and part-time) personnel participating in its BW defence programmes. Annual financing amounted to c. \$88.3 million. Chevrier, M. I. and Hunger, I., ‘Confidence-building measures for the BTWC: performance and potential’, *Nonproliferation Review*, vol. 7, no. 3 (fall/winter 2000), p. 33.

⁷⁹ ‘Verification watch’, *Trust & Verify*, Sep./Oct. 2001, URL <<http://www.vertic.org/tnv/septoct01/watch.html>>; and Private communication with J. P. Zanders, 6 Sep. 2001. Because the decision to go forward with the anthrax research under Project Jefferson was not taken until Oct. 2001, the programme would not yet have been part of the CBM submissions.

⁸⁰ Chevrier and Hunger (note 78), p. 25.

⁸¹ Miller, Engelberg and Broad (note 64); ‘USA abetting proliferation of arms of mass destruction’, *El Pais* (Madrid), 6 Sep. 2001, in Foreign Broadcast Information Service, *Daily Report–West Europe (FBIS–WEU)*, FBIS–WEU–2001–0906, 7 Sep. 2001; ‘DPRK radio urges US to drop research on biological weapons’, Central Broadcasting Station (Pyongyang), 14 Sep. 2001, Foreign Broadcast Information Service, *Daily Report–East Asia (FBIS–EAS)*, FBIS–EAS–2001–0914, 17 Sep. 2001; and Kempf, H., ‘Les Américains ont réactivé leur recherche sur les armes biologiques’ [The Americans have reactivated their research into biological weapons], *Le Monde* (Internet edn), 11 Dec. 2001, URL <<http://www.lemonde.fr>>.

with information about weaknesses in US BW defence. In so doing, the USA has argued that a wide range of activities which could contribute directly to an offensive programme falls outside the core prohibitions of the BTWC. The US biological defence activities also risk undermining the non-proliferation norms which the USA seeks to establish by enabling countries of proliferation concern to plausibly deny that certain suspicious activities they may be undertaking are connected to an offensive BW programme. Several such countries denied their interest in BW in the wake of the disclosures about the US projects.⁸²

IV. Chemical weapon disarmament

The Chemical Weapons Convention entered into force on 29 April 1997. As of 1 January 2002, 145 states had ratified or acceded to the convention and a further 29 states had signed it.⁸³ Eighteen members of the United Nations have neither signed nor ratified the CWC.⁸⁴

Implementing the CWC

As of 31 December 2001 the OPCW had conducted 1117 inspections from the date of entry into force of the CWC and overseen the destruction of 6374 tonnes (of a declared total of 69 869 tonnes) of chemical agent and 2 098 013 munitions (of a declared total of 8 624 493 munitions).⁸⁵

In 2001 the OPCW faced a deficit of approximately 10 per cent of the 2001 budget. The Sixth Conference of the States Parties (CSP) to the CWC, which met on 14–19 May 2001, was therefore mainly preoccupied with seeking to clarify the nature of the budgetary deficit, finding ways to address its consequences and preventing future shortfalls. As a consequence of the budgetary deficit, the OPCW was only able to conduct 197 of 293 planned inspections for 2001.⁸⁶ In addition, some provisions of the OPCW's financial regulations were suspended, and technical assistance and cooperation activities were post-

⁸² Reply of the Islamic Republic of Iran to the US statement (note 44); and 'Minister: Russia not developing biological weapons', Interfax (Moscow), 6 Sep. 2001, in Foreign Broadcast Information Service, *Daily Report—Central Eurasia (FBIS-SOV)*, FBIS-SOV-2001-0906, 7 Sep. 2001.

⁸³ Dominica, Nauru, Uganda and Zambia became parties in 2001.

⁸⁴ They are Andorra, Angola, Antigua and Barbuda, Barbados, Belize, Egypt, Iraq, Korea (North), Lebanon, Libya, Palau, Sao Tome and Principe, Solomon Islands, Somalia, Syria, Tonga, Tuvalu and Vanuatu.

⁸⁵ In 2001 there were 2 inspections of abandoned CW sites (40%), 62 of CW destruction facilities (98%), 26 of CW production facilities (57%), 28 of CW storage facilities (70%), 37 of old CW sites (43%), 19 of Schedule 1 facilities (100%, plus 1 additional inspection), 28 of Schedule 2 plant sites (70%), 12 of Schedule 3 plant sites (29%) and 17 of DOC/PSF plant sites (53%). Percentages indicate the number of planned inspections actually completed. OPCW official, Private communication with J. Hart, Jan. 2002.

⁸⁶ By 31 Dec. 2001, 98% of CWDFs, 57% of CWPfFs, 70% of CWSFs, 43% of OCW sites, 40% of ACW sites, 100% of Schedule 1 facilities, 70% of Schedule 2 plant sites, 29% of Schedule 3 plant sites and 53% of DOC/PSF plant sites scheduled to be inspected during 2001 had actually received inspections. OPCW official, Private communication with J. Hart, Jan. 2002.

poned, curtailed or cancelled.⁸⁷ Director-General José Bustani warned that the OPCW was not in a position to adequately assist victims of CW use.⁸⁸ He also warned that, without additional funding, the Technical Secretariat (TS) of the OPCW would be forced to further reduce the number of inspections and that it would only be able to carry out some 60 per cent of its planned verification and international cooperation activities in 2002.⁸⁹

The problem was largely caused by considerable delays between the inspections of CW (Article IV of the CWC) and CW production facilities (Article V) and the reimbursement by parties for direct costs related to these inspections.⁹⁰ Other factors were the late annual contributions to the OPCW by some parties, internal budgetary procedures, and the delays in CW destruction facilities becoming operational, so that there were fewer 'reimbursable inspections' than projected in the budget calculations.⁹¹

In order to remedy the situation, the Sixth CSP decided to apply the OPCW's 1999 cash surplus, totalling €2 709 614 (c. \$2.4 million), towards the deficit incurred in 2000.⁹² It also authorized the application of accrued interest in special accounts to offset the 2001 cash deficit.⁹³ In addition, a voluntary fund was established. The parties have provided some cost-free services, such as preparation of samples for the annual analytical laboratory proficiency tests. In December 2001 the TS nevertheless projected a €6 million deficit (c. \$5.3 million) if no steps are taken to address the underlying reasons for the financial shortfall.⁹⁴ The budgetary discussions are complicated by a number of broader, somewhat more philosophical questions with political elements such as whether the size of the TS needs to be expanded to meet its objectives

⁸⁷ Opening statement by the Director-General to the Executive Council at its Twenty-Seventh Session, OPCW document EC-XXVII/DG.10, 4 Dec. 2001, para. 66; and 'The OPCW: twenty-seventh session of the Executive Council, OPCW establishes anti-terrorism working group', OPCW Press Release no. 31/2001, 13 Dec. 2001.

⁸⁸ Simons, M., 'Money short for battle on chemicals used in war', *New York Times* (Internet edn), 5 Oct. 2001, URL <<http://www.nytimes.com>>.

⁸⁹ 'The OPCW: twenty-seventh session of the Executive Council, OPCW establishes anti-terrorism working group' (note 87); Opening statement by the Director-General to the Executive Council at its Twenty-Seventh Session (note 87), para. 81; and 'Executive Council concludes its twenty-seventh session', *Secretariat Brief*, no. 30 (18 Dec. 2001), p. 2.

⁹⁰ At least €1.3 million (\$1.25 million) of the estimated cost of reimbursement under Articles IV and V were not actually incurred in 2001 because the inspection costs were not generated. The costs were, however, incorporated into the 2001 budget when it was prepared in 2000. 'Organisation for the Prohibition of Chemical Weapons', *Secretariat Brief*, no. 28 (20 July 2001). Over the next 2–3 years the problem may worsen as the number of inspectable facilities, mainly CW destruction facilities, will increase.

⁹¹ Bustani, J., Opening statement by the Director-General to the Conference of the States Parties at its sixth session, The Hague, Netherlands, 14 May 2001, para. 44; and Statement by the Director-General at its twenty-sixth session, OPCW document EC-XXVI/DG.11, 25 Sep. 2001, para. 76.

⁹² Decision: withholding the distribution of the cash surplus for 1999, OPCW document C-VI/DEC.18, 19 May 2001. The OPCW financial regulations do not allow the organization to spend more money than is allocated in its annual programme and budget. Any surpluses are either to be refunded to parties or applied to parties' contributions for the following year. This decision was made on an exceptional, one-off basis.

⁹³ Decision: authorisation to use accrued interest in special accounts to offset the 2001 cash deficit, OPCW document C-VI/DEC.19, 19 May 2001.

⁹⁴ 'Executive Council concludes its twenty-seventh session', *Secretariat Brief*, no. 30, 18 Dec. 2001, p. 2.

or whether it is large enough already and the need to reallocate or better manage existing funds.

The Sixth CSP also approved an authentication and certification procedure for the central OPCW analytical database and on-site databases,⁹⁵ a relationship agreement between the UN and the OPCW,⁹⁶ privileges and immunities agreements with five parties,⁹⁷ a request by Russia to use a former chemical weapon production facility (CWPF) for non-prohibited purposes,⁹⁸ an obligation for parties to require end-user certificates from non-CWC parties receiving transfers of Schedule 3 chemicals,⁹⁹ a decision to allow the Executive Council (EC) to consider and conclude negotiated texts of cooperation agreements between the OPCW and other international organizations as may be required for the effective implementation of the CWC,¹⁰⁰ and a scale of assessment for 2002 in which the US contribution was reduced from 25 to 22 per cent.¹⁰¹

⁹⁵ Decision: authentication and certification procedure for the central OPCW analytical database and on-site databases, OPCW document C-VI/DEC.4, 17 May 2001.

⁹⁶ Decision: relationship agreement between the United Nations and the OPCW, OPCW document C-VI/DEC.5, 17 May 2001.

⁹⁷ Decision: agreement between the Republic of Austria and the Organisation for the Prohibition of Chemical Weapons on the privileges and immunities of the OPCW, OPCW document C-VI/DEC.12, 17 May 2001; Decision: agreement between the Government of the Republic of Belarus and the Organisation for the Prohibition of Chemical Weapons on the privileges and immunities of the OPCW, OPCW document C-VI/DEC.13, 17 May 2001; Decision: agreement between the Organisation for the Prohibition of Chemical Weapons and the Government of the Republic of Panama on the privileges and immunities of the OPCW, OPCW document C-VI/DEC.7, 17 May 2001; Decision: agreement between the Republic of the Philippines and the Organisation for the Prohibition of Chemical Weapons on the privileges and immunities of the OPCW, OPCW document C-VI/DEC.14, 17 May 2001; and Decision: agreement between the Organisation for the Prohibition of Chemical Weapons and the Portuguese Republic on the privileges and immunities of the OPCW, OPCW document C-VI/DEC.6, 17 May 2001.

⁹⁸ Decision: request by the Russian Federation to use the chemical weapons production facility, (filling of hydrocyanic acid into munitions) at OJSC 'Orgsteklo', Dzerzhinsk, for purposes not prohibited under the Convention, OPCW document C-VI/DEC.8, 17 May 2001.

⁹⁹ Decision: provisions on transfers of Schedule 3 chemicals to states not party to the Convention, OPCW document C-VI/DEC.10, 17 May 2001. The CWC categorizes chemical compounds of particular concern in schedules depending on their importance for the production of chemical warfare agents and for legitimate civilian manufacturing processes. Each list has different reporting requirements. Schedule 1 contains toxic chemicals that can be used as CW and that have few uses for permitted purposes. They are subject to the most stringent controls. Schedule 2 includes toxic chemicals and precursors to CW but which generally have greater commercial application. Schedule 3 chemicals can be used to produce CW but are also used in large quantities for non-prohibited purposes. The CWC also places reporting requirements on firms which produce certain discrete organic chemicals (DOC) that are not on any of the schedules and may contain phosphorus, sulphur or fluorine (DOC/PSFs). The CWC requires parties to adopt the necessary measures to ensure that Schedule 3 chemicals transferred to non-parties are not used for purposes prohibited by the CWC (para. 26, Part VIII of the Verification Annex). Products containing 30% or less of a Schedule 3 chemical or products identified as 'consumer goods packaged for retail sale for personal use, or packaged for individual use' are exempted from the end-user requirement. Decision: provisions on transfers of Schedule 3 chemicals to states not party to the Convention, OPCW document C-VI/DEC.10, 17 May 2001, para. 2.

¹⁰⁰ Decision: cooperation with international organisations, OPCW document C-VI/DEC.15, 17 May 2001.

¹⁰¹ Decision: scale of assessments for 2002, OPCW document C-VI/DEC.20, 19 May 2001. The USA has also reduced its scale of assessment to the UN by the same percentage. The OPCW took this decision because the CWC requires that the OPCW's activities be paid for by members in accordance with the UN scale of assessment adjusted to take into account certain factors such as differences in membership between the two organizations. CWC, Article VIII, para. 7.

In response to the terrorist attacks of 11 September 2001, the EC of the OPCW established an anti-terrorism working group during its 27th session, held on 4–7 December.¹⁰² The group will cooperate with the UN Security Council's Counter-Terrorism Committee, which was established on 28 September in accordance with UN Security Council Resolution 1373.¹⁰³

A meeting of the OPCW working group that was mandated to prepare for the First Review Conference of the States Parties to the CWC was held on 29 November.¹⁰⁴ Other bodies, including the Scientific Advisory Board (SAB), are also preparing contributions for the conference.¹⁰⁵

Destruction of chemical weapons and related facilities

The states that are declared possessors of CW are India, South Korea, the USA and Russia.¹⁰⁶ At the end of 2001, *India* had destroyed approximately 29 per cent of its Category 1 CW and over 39 per cent of its Category 2 CW.¹⁰⁷ It uses a neutralization-based destruction technology at a converted CW production facility. *South Korea* resumed its destruction operations after upgrading its CW destruction facility. It is expected to meet its Phase 2 (and possibly Phase 3) intermediate destruction deadlines for Category 1 CW.¹⁰⁸ The exact size and composition of the Indian and South Korean stockpiles are not publicly known.¹⁰⁹

US CW destruction

At the end of 2001 approximately 25 per cent of the USA's 31 279.74-tonne CW stockpile as declared to the OPCW had been destroyed.¹¹⁰ The US Army reportedly expects the cost of destroying the stockpile to reach \$24 billion, a

¹⁰² 'The OPCW: twenty-seventh session of the Executive Council, OPCW establishes anti-terrorism working group' (note 87).

¹⁰³ UN Security Council Resolution 1373, 28 Sep. 2001.

¹⁰⁴ Opening statement by the Director-General to the Executive Council at its Twenty-Seventh Session (note 87), paras 73–74.

¹⁰⁵ Mills, P., 'Progress in the Hague', *CBW Conventions Bulletin*, no. 51 (Mar. 2001), p. 17.

¹⁰⁶ Zanders, J. P., Hersh, M., Simon, J. and Wahlberg, M., 'Chemical and biological weapon developments and arms control', *SIPRI Yearbook 2001* (note 39), pp. 517–26.

¹⁰⁷ Opening statement by the Director-General to the Executive Council at its Twenty-Seventh Session (note 87), para. 14. Category 1 CW consists of Schedule 1 chemicals and their parts and components. Category 2 CW consists of all other (non-Schedule 1 chemicals) and their parts and components. CWC, Part IV(A), para. 16.

¹⁰⁸ Opening statement by the Director-General to the Executive Council at its Twenty-Seventh Session (note 87), para. 13; and CWC, Part IV(A), Verification Annex, para. 17 (a). The destruction of Category 1 CW is divided into 4 'phases' spread over 10 years starting from the CWC's entry into force on 29 Apr. 1997. CWC, Part IV(A), Verification Annex, para. 17(a).

¹⁰⁹ However, the size of India's and South Korea's combined CW stockpiles can be established by subtracting the US and Russian CW stockpiles from previous editions of the *OPCW Annual Report*, which contains aggregate stockpile amounts and compositions.

¹¹⁰ US delegation to the CWC Preparatory Commission, Private communication with the authors, 6 Feb. 1996. Types and quantities of the CW stockpile are given in Zanders, J. P., Eckstein, S. and Hart, J., 'Chemical and biological weapon developments', *SIPRI Yearbook 1997: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 1997), p. 450.

rise of more than \$9 billion over previous budget projections.¹¹¹ The reasons for the cost increase include delays in obtaining environmental permits, the rising cost of contractors and costs associated with containing and stabilizing leaking munitions.¹¹² In the wake of the 11 September terrorist attacks, the US Congress approved \$40 million in supplementary funding to enhance the security of US CW stockpiles in addition to the approximately \$120 million per year which the US Army was already spending on safeguarding CW stockpiles.¹¹³ It was also announced that, partly as a result of the 11 September attack, the US Army would accelerate the schedule of its destruction operations at its Aberdeen facility and complete destruction operations there by the end of 2002, some three years ahead of schedule.¹¹⁴

The US Army Program Manager for Chemical Demilitarization (PMCD) is responsible for the destruction of CW. The PMCD consists of the Chemical Stockpile Disposal Program, the Alternative Technologies and Approaches Program (ATAP) and the Non-Stockpile Chemical Materiel Program (NSCMP).¹¹⁵ A separate programme for Assembled Chemical Weapons Assessment (ACWA) was established in 1997 by Public Law 104-208. In 2001 it continued to review alternative, non-incineration-based technologies.¹¹⁶ The NSCMP is responsible for disposing of former CW production facilities as well as recovered CW and CW *matériel*.¹¹⁷ Non-stockpiled CW are reportedly located at over 100 locations, and the CW stockpile is stored at eight locations.¹¹⁸ Incineration is the 'baseline' CW destruction technology, while alternative, neutralization-based destruction technologies will be used to

¹¹¹ Miller, A. C. and Levin, M., 'Disposal of chemical arms in US lags as costs mount', *Los Angeles Times*, 29 Sep. 2001, p. 1, URL <<http://www.latimes.com>>.

¹¹² 'Rocket containing chemical weapon found leaking', *MSNBC*, 3 May 2001, URL <<http://www.msnbc.com/local/wvtm/m41407.asp?cp1=1>>.

¹¹³ Firestone, D., 'Army tightens security at nation's 8 chemical arms depots', *New York Times* (Internet edn), 2 Oct. 2001, URL <<http://www.nytimes.com>>; Westphal, J., US congressional testimony before the Senate Committee on Appropriations Subcommittee on Defense, 25 Apr. 2001, URL <<http://www.senate.gov/~appropriations/defense/testimony/westfall42501.htm>>; and *Baltimore Sun*, 11 Dec. 2001, quoted in *Chemical & Biological Arms Control Dispatch*, Dispatch no. 163, 1–15 Dec. 2001 (Chemical and Biological Arms Control Institute: Washington, DC, Dec. 2001).

¹¹⁴ Brown, L. H., 'Army speeds APG plan: Aberdeen stockpile will be destroyed by end of the year', *Baltimore Sun*, 10 Jan. 2002, URL <<http://www.sunspot.net/news/local/bal-md.mustard10jan10.story>>.

¹¹⁵ Westphal (note 113).

¹¹⁶ The DOD must certify to Congress that the alternative technologies are as 'safe and cost-effective' as incineration, that implementing them will not take longer than implementing incineration and that the technologies satisfy relevant state and federal environmental and safety laws. Parker, M., US congressional testimony before the Senate Committee on Appropriations' Subcommittee on Defense, 25 Apr. 2001, URL <<http://www.senate.gov/~appropriations/defense/testimony/ACWA.htm>>. Additional information is presented in Zanders, French and Pauwels (note 58), pp. 515–16.

¹¹⁷ A number of mobile, neutralization-based treatment systems continue to be developed to handle and destroy non-stockpiled CW. In addition, a fixed destruction facility for the disposal of non-stockpiled CW will operate at Pine Bluff Arsenal. 'Washington Group International to destroy chemical weapons', *Defence Systems Daily*, 13 Dec. 2001.

¹¹⁸ The CW stockpiles are located at Aberdeen Proving Ground, Md.; Anniston Army Depot, Alabama; Blue Grass Army Depot, Ky.; Deseret Chemical Depot, Utah; Newport Chemical Depot, Ind.; Pine Bluff Arsenal, Ark.; Pueblo Depot, Colo.; and Umatilla Chemical Depot, Oreg.. 'Chemical demilitarization', US Army Corps of Engineers (Huntsville Center), Fact sheet, Sep. 2001, URL <<http://www.hnd.usace.army.mil>>. Non-stockpiled CW consist of (a) binary CW; (b) miscellaneous chemical warfare items, including unfilled munitions, support equipment and devices to be employed in conjunction with the use of CW; (c) recovered chemical weapons; (d) former production facilities; and (e) buried chemical warfare *matériel*.

destroy CW in at least two locations: Aberdeen and Newport.¹¹⁹ Destruction operations are currently taking place only at Tooele, Utah.¹²⁰ In 2001 closure operations, which are expected to be completed in September 2003,¹²¹ were begun at the Johnston Atoll Chemical Agent Disposal System (JACADS), located south-west of Hawaii.¹²² Construction of chemical weapon destruction facilities (CWDFs) at the Pueblo Chemical Depot and Blue Grass Chemical Activity remained suspended pending the results of congressionally mandated alternative destruction technology studies.¹²³ Construction of the Anniston and Umatilla CWDFs was completed in June 2001 and August 2001, respectively.¹²⁴ Both are scheduled to begin operating in 2002.¹²⁵ Construction of the Pine Bluff, Aberdeen, and Newport CWDFs continued in 2001.¹²⁶ At a December 2001 OPCW Executive Council meeting the USA indicated that it may have to request an extension of the 2007 deadline for destroying its stockpiled CW.¹²⁷

Russian CW destruction

The declared Russian CW stockpile consists of about 40 000 agent tonnes and is stored at seven locations.¹²⁸ Russia conducted limited destruction operations

¹¹⁹ 'Chemical demilitarization' (note 118). About 1269 tonnes of VX are stored in bulk at Newport, while c. 1623 tonnes of sulphur mustard are stored in bulk at Aberdeen. A pilot CW destruction technology consisting of neutralization followed by supercritical water oxidation is to be tested on the VX. A second pilot CW destruction technology to be tested at Aberdeen consists of neutralization using hot water followed by biodegradation of the neutralization products. If successful, the pilot destruction technologies will be scaled up. Westphal (note 113).

¹²⁰ The CW is stockpiled at Deseret Chemical Depot.

¹²¹ Westphal (note 113).

¹²² CW destruction operations at JACADs were completed on 29 Nov. 2000. Secondary waste products and chemical agent identification sets (CAIS) will be disposed of as part of the closure activities. 'Chemical weapons destruction complete on Johnston Atoll', Press release distributed by the Office of the Assistant Secretary of Defense (Public Affairs), Washington, DC, 30 Nov. 2000, URL <http://www.defenselink.mil/news/Nov2000/b11302000_bt715-00.html>; 'Mission accomplished: JACADS safely destroys over 400,000 chemical weapons on Johnston Island', US Environmental Protection Agency information sheet, URL <<http://www.epa.gov/region09/features/jacads>>; and 'Chemical demilitarization' (note 118).

¹²³ 'Chemical demilitarization' (note 118); Committee on Review and Evaluation of Alternative Technologies for Demilitarization of Assembled Chemical Weapons: Phase II, and US Board on Army Science and Technology Division on Engineering and Physical Sciences (US National Research Council), *Analysis of Engineering Design Studies for Demilitarization of Assembled Chemical Weapons at Pueblo Chemical Depot* (National Academy Press: Washington, DC, 2001); and Miller and Levin (note 111). The destruction technologies to be used at both sites should be selected in 2002. Miller, A. and Levin, M., 'US to step up arms disposal', *Los Angeles Times*, 3 Oct. 2001, URL <<http://www.latimes.com>>.

¹²⁴ 'Chemical demilitarization' (note 118); Gillespie, K., 'Completion ceremony held for Anniston chemical agent disposal facility', *Bulletin* (US Army Corps of Engineers, Huntsville Center), vol. 22, no. 5 (June 2001), pp. 1, 4; and Gillespie, K., 'Umatilla chemical agent disposal facility completed', *Bulletin* (US Army Corps of Engineers, Huntsville Center), vol. 22, no. 7 (Aug. 2001), p. 3.

¹²⁵ Westphal (note 113).

¹²⁶ 'Chemical demilitarization' (note 118).

¹²⁷ Executive Council concludes its twenty-seventh session, *Secretariat Brief*, OPCW document, no. 30 (18 Dec. 2001), p. 3.

¹²⁸ Kambarka, Udmurtia Republic; Gorny, Saratov oblast; Kizner, Udmurtia Republic; Maradikovskiy, Kirov oblast; Pohep, Bryansk oblast; Leonidovka, Penza oblast; and Shchuchye, Kurgan oblast. For background on Russian CW destruction see Hart, J. and Miller, C. D. (eds), *Chemical Weapon Destruction in Russia: Political, Legal and Technical Aspects*, SIPRI Chemical & Biological Warfare Studies, no. 17 (Oxford University Press: Oxford, 1998).

in 2001. In April it began destroying Category 2 CW at Shchuchye and Category 3 CW at Leonidovka and Maradikovskiy.¹²⁹ Russia completed the destruction of its Category 3 CW, consisting of over 4300 unfilled munitions and devices, by mid-November 2001.¹³⁰ On 27 September Russia completed the transfer of some 10 tonnes of phosgene (Category 2 CW) from approximately 4000 projectiles stored at Shchuchye into bulk containers.¹³¹ All Category 2 CW are to be destroyed by 29 April 2002.¹³²

However, systematic destruction of Category 1 CW was delayed again, principally as a consequence of Russia's generally weakened economy since the CWC's entry into force and a lack of high-level political commitment to resolve political, legal and technical difficulties associated with the destruction programme. In 2001 several developments indicated that Russia will begin large-scale destruction operations in 2002. Funding for CW destruction was increased from 500 million roubles (c. \$16 million) in FY 2000 to 3 billion roubles (c. \$96.6 million) in FY 2001.¹³³ Russian government officials estimated that the destruction of the CW stockpile will cost about \$3 billion (other sources estimate the total cost to be in the range of \$6–7 billion) and hope to meet 20–30 per cent of the cost with foreign assistance.¹³⁴

Russia's revised destruction plan, which supersedes the 1996 comprehensive destruction plan, specifies that 1 per cent of the stockpile is to be destroyed by 2003, 20 per cent by 2007, 45 per cent by 2008 and 100 per cent by 2012.¹³⁵ Russia therefore requested the EC to approve a five-year extension of the final destruction deadline.¹³⁶ The plan also calls for the construction of three full-scale CWDFs, to be located at Gorny, Kambarka and Shchuchye.¹³⁷ Small-scale detoxification facilities are to be constructed at Leonidovka, Maradikovskiy and Pochep.¹³⁸ Work on the construction of CWDFs at Gorny and

¹²⁹ Mills, P., 'Progress in The Hague, developments in the Organization for the Prohibition of Chemical Weapons', Quarterly review no. 34, *CBW Conventions Bulletin*, no. 52 (June 2001), p. 4.

¹³⁰ Reuters, 'Russia destroys chemical arms', 22 Nov. 2001, URL <<http://www.iht.com/articles/39631.htm>>; and Opening statement by the Director-General to the Executive Council at its Twenty-Seventh Session (note 87), para. 9.

¹³¹ Opening statement by the Director-General to the Executive Council at its Twenty-Seventh Session (note 87), para. 10. Russia intends to destroy the phosgene at the Prikladnaya Khimiya Research Centre, located in Perm. Opening statement by the Director-General to the Executive Council at its Twenty-Seventh Session (note 87), para. 11.

¹³² 'Twenty-sixth session of the Executive Council, 25–28 September 2001', *OPCW Synthesis* (winter/Dec. 2001), p. 31.

¹³³ Pikayev, A., 'Russian implementation of the CWC', ed. J. B. Tucker, *The Chemical Weapons Convention, Implementation Challenges and Solutions* (Monterey Institute of International Studies: Monterey, Calif., Apr. 2001), p. 35.

¹³⁴ 'Russia to destroy all chemical weapons stockpiles by 29 April 2012', Interfax (Moscow), 11 Dec. 2001, in FBIS-SOV-2001-1211, 12 Dec. 2001; 'Twenty-sixth session of the Executive Council, 25–28 September 2001' (note 132), p. 31; ITAR-TASS (Moscow), 30 Nov. 2001, in 'Russia revises chemical weapon destruction program', FBIS-SOV-2001-1130, 3 Dec. 2001; and Military News Agency, 'Russia resumes construction of chemical weapons scrapping facilities', 6 Apr. 2001, URL <http://www.militarynews.ru/fcl_1/eaneews.asp?is=62925>.

¹³⁵ On making amendments and additions to the Resolution by the Government of the Russian Federation of March 21, 1996 (no. 305) on approving the Federal Special Program Chemical Weapons Stockpiles Destruction in the Russian Federation, Resolution no. 510, 5 July 2001.

¹³⁶ 'Twenty-sixth session of the Executive Council, 25–28 September 2001' (note 132), p. 31.

¹³⁷ Federal Special Program (note 135).

¹³⁸ Federal Special Program (note 135).

Shchuchye was intensified in 2001.¹³⁹ CW destruction is expected to begin at Gorny in 2002 and continue until 2005,¹⁴⁰ and at Kambarka and Shchuchye by 2005 and continue until 2011.¹⁴¹ The building which will house the Gorny pilot CW destruction facility has been constructed, and equipment and infrastructure are currently being installed.¹⁴² The plant will destroy 220 tonnes of lewisite using alkaline hydrolysis followed by electrolysis.¹⁴³ Legal uncertainties, including the effect of local and regional laws banning the transport of CW, have apparently not been fully resolved.¹⁴⁴

The principal bodies involved in Russian CW destruction are the Munitions Agency, the Interdepartmental Scientific Council on Chemical and Biological Weapons Convention Problems, and the State Commission on Chemical Disarmament. The stockpile is under the jurisdiction and control of the Munitions Agency, headed by Zinovy Pak. The agency acts as Russia's National Authority to the OPCW and is responsible for the implementation of Russia's CW destruction programme, including the allocation of funds and the conversion or destruction of former CWPFs.¹⁴⁵ On 8 February 2001 the Russian Prime Minister's Cabinet issued Directive no. 87 outlining the mandate of the Directorate for the Safe and Secure Storage and Destruction of Chemical Weapons, located within the Munitions Agency.¹⁴⁶ The directorate is responsible for the safe storage, transport and destruction of CW, ensuring that CW is not diverted, letting contracts and R&D for CW destruction technologies.¹⁴⁷ The Interdepartmental Scientific Council, which is responsible to the Munitions Agency and headed by Academician Anatoliy Kuntsevich, is mandated to provide relevant CW-related scientific expertise, especially with regard to the selection of CW destruction technologies.¹⁴⁸ On 4 May 2001 a 22-member State Commission on Chemical Disarmament, whose chairman is Sergey Kiriyenko and deputy chairman is Zinovy Pak, was established to improve cooperation between the various bodies involved in CW destruction.¹⁴⁹

¹³⁹ 'Russia resumes construction of chemical weapons scrapping facilities' (note 134).

¹⁴⁰ Federal Special Program (note 135); and 'European Union non-proliferation and disarmament actions in the Russian Federation', Statement provided by the Embassy of the Federal Republic of Germany, Stockholm, 3 Dec. 2001.

¹⁴¹ Federal Special Program (note 135); and 'Twenty-sixth session of the Executive Council, 25–28 September 2001' (note 132), p. 31.

¹⁴² 'European Union non-proliferation and disarmament actions in the Russian Federation' (note 140).

¹⁴³ 'European Union non-proliferation and disarmament actions in the Russian Federation' (note 140). The arsenic will be removed by electrolysis and later purified for industrial use.

¹⁴⁴ The governor of Bryansk oblast, e.g., is apparently opposed to the construction of any destruction facility anywhere in the oblast. Pikayev (note 133).

¹⁴⁵ Russia's payment for direct costs of inspection owed to the OPCW is made by the Munitions Agency. 'News chronology', *CBW Conventions Bulletin*, no. 53 (Sep. 2001), p. 28.

¹⁴⁶ Averde, D. and Khripunov, I., 'Chemical weapons disposal: Russia tries again', *Bulletin of the Atomic Scientists*, vol. 57, no. 5 (Sep./Oct. 2001), p. 60; and Pikayev (note 133).

¹⁴⁷ Pikayev (note 133).

¹⁴⁸ 'News chronology' (note 145), p. 45.

¹⁴⁹ 'On the formation of a State Commission on Chemical Disarmament', *Ministry of Foreign Affairs of the Russian Federation Daily News Bulletin*, 7 May 2001; and 'News chronology' (note 145), p. 26.

CW destruction assistance

CW destruction assistance is provided to Russia by Canada, the EU, Finland, France, Germany, Italy, the Netherlands, Norway, Sweden, Switzerland, the USA and the UK (table 12.1).¹⁵⁰ Approximately \$374.4 million worth of assistance has been offered, while \$237.4 million has been allocated to specific projects.¹⁵¹

Conversion of Russian CWPFs

One of the key concerns of the Russian Government regarding CWC implementation has been the fact that the convention requires each party to request Executive Council approval for conversion.¹⁵² For Russia this issue is more important than for other parties to the CWC because its CWPFs were generally part of larger industrial complexes, while CWPFs in other countries were usually dedicated facilities. Russia has declared a total of 24 CWPFs of which at least 6 have been destroyed and 6 converted.¹⁵³ In 2001, Russia had seven conversion requests awaiting action by the OPCW Executive Council.¹⁵⁴

Old and abandoned chemical weapons

According to the OPCW, the states which have officially declared that they possess old chemical weapons (OCW) are Belgium, France, Germany, Italy, Japan and the UK.¹⁵⁵

On 13 April 2001 *French* authorities evacuated over 12 000 residents of the town of Vimy for more than a week while 173 tonnes of World War I-vintage explosive materials, including munitions containing sulphur mustard and phosgene, were transported to the Suippes military camp, located in the Marne

¹⁵⁰ Russian Embassy statement, Stockholm, 6 Mar. 2002; 'Russia to destroy all chemical weapons stockpiles by 29 April 2012', Interfax (note 134); 'Norway assists Russia in destroying chemical weapons', Interfax (Moscow), 30 Nov. 2001, in FBIS-SOV-2001-1130, 3 Dec. 2001; 'As if by magic: London and Rome earmark almost \$20 million for destruction of Russian chemical weapons', *Rossiyskaya Gazeta* (Moscow), 22 Sep. 2001, in 'Putin's envoy secures funds for chemical weapon destruction on trip to Europe', FBIS-WEU-2001-0925, 22 Sep. 2001; and Interfax (Moscow), 7 Jan. 2002, 'Russia: new chemical weapons processing plant to be built this year', FBIS-SOV-2002-0107, 8 Jan. 2002.

¹⁵¹ Russian Embassy statement, Stockholm, 6 Mar. 2002.

¹⁵² CWC, Verification Annex, Verification Annex, paras 64–72, CWC; Gilbert, J. A. *et al.*, 'Destruction or conversion of Russian chemical weapon production facilities', eds Hart and Miller (note 128), pp. 55–74; and Kalinina, N., 'The problems of Russian chemical weapon destruction', eds Hart and Miller (note 128), pp. 8–9.

¹⁵³ 'List of chemical weapons production facilities subject to conversion or destruction', appendix no. 3, Federal Special Program (note 135); and 'Verification of destruction of chemical weapons and chemical weapons production facilities', *OPCW Annual Report 2000*, p. 17.

¹⁵⁴ Russian Embassy statement, Stockholm, 6 Mar. 2002.

¹⁵⁵ 'Old chemical weapons' are defined by the CWC as either (a) CW produced before 1925, or (b) CW produced between 1925 and 1 Jan. 1946 which have deteriorated to such an extent that they can no longer be used as CW. CWC, Article II, para. 5.

Table 12.1. Type, location and amount of Russian CW destruction assistance

Figures are in US \$m.

Country/entity	Type ^a	Location(s)	Allocated or offered
Canada
European Union ^b	..	Gorny, Shchuchye	c. 1.76
Finland ^c	Detection equipment	Kambarka	c. 0.89
France
Germany ^d	Pilot destruction plant	Gorny	c. 30.8
Italy ^e	Gas pipeline construction	Shchuchye	c. 7
Netherlands ^f	Electricity transformer	Gorny	c. 10
Norway ^g	Electricity transformer	Shchuchye	c. 1
Sweden ^h	Analytical equipment	Kambarka	..
Switzerland ⁱ	18–30
United Kingdom ^j	Water and power supply	Shchuchye	c. 18
United States ^k	Pilot destruction facility	Shchuchye	c. 866

^a The listed types of assistance are not comprehensive.

^b Some aid is coordinated and/or channelled through member states. A total of €700 000 (c. \$617 000) is intended for Munitions Agency administrative tasks. The EU is also involved in assisting with the destruction of a former mustard production facility at Dzerzhinsk.

^c The Finnish assistance programme was apparently begun in 1997. Detection equipment was scheduled to be delivered by the end of 2001.

^d Germany has provided assistance since 1993 and currently provides CW destruction assistance within the framework of a 17 Dec. 1999 agreement between the EU and Russia on cooperation in the area of non-proliferation of nuclear, chemical and biological weapons. Germany's assistance consists of the construction of a facility for draining CW agent stored in bulk, equipment for a mobile and a stationary analytical laboratory, destruction equipment for initial hydrolysis of lewisite followed by arsenic extraction by electrolysis, an incinerator for liquid and solid CW residues, equipment for purification of off gases and liquid waste, and engineering and technical support for these activities. A mobile and a fixed laboratory are operational; various CW destruction equipment is on-site; and CW destruction equipment provided by Germany is being installed.

^e On 17 Feb. 2001 an agreement between Italy and Russia on CW destruction assistance for the period 2000–2002 entered into effect.

^f The Netherlands' assistance is scheduled to operate from autumn 2001 to spring 2002. A total of €4.55 million (c. \$4 million) has been allocated for the first phase of the assistance—the financing of an electric transformer at Gorny. The Netherlands is currently prepared to offer assistance totalling €11.34 million (c. \$10 million).

^g Norway agreed to provide c. \$1 million to pay for an electrical transformer for the CWDF at Shchuchye. Norway's assistance will be coordinated with assistance from the UK.

^h Sweden conducted a risk assessment of the CW stockpile at Kambarka. Sweden's assistance is currently focused on the delivery of analytical medical equipment to a local Kambarka hospital. The equipment is to be used to measure the levels of arsenic in the population before

and during CW destruction operations, detect any health effects of destruction operations on workers and promote an effective hospital response in case of CW-related accidents.

ⁱ The Swiss Parliament is reportedly considering an expenditure of CHF 30–50 million (\$18–30 million) in 2007–2009.

^j On 20 Dec. 2001 the UK signed a 3-year agreement worth £12 million (*c.* \$18 million) to assist with the establishment and maintenance of water and power supplies for Shchuchye's CWDF.

^k In 2001 the USA completed a high-level review of non-proliferation and threat reduction assistance programmes to Russia, including CW destruction assistance provided within the framework of the CTR programme. Work on renovating and equipping a US-funded Central Analytical Laboratory was completed in Jan. 2001. The laboratory, located at the State Scientific Research Institute for Organic Chemistry and Technology (GosNIIOKhT), is important as it will be used to provide quality assurance for Russia's CW destruction programme. On 10 July 2001 Russia approved a second protocol to the US–Russian Agreement on the Safe and Secure Transportation, Storage and Destruction of Weapons and the Prevention of Weapons Proliferation. A total of \$35 million in assistance has been allocated for FY 2002. The US plans to contribute assistance eventually totalling *c.* \$866 million towards construction of the CWDF at Shchuchye, the main focus of US assistance. Preparatory site work was begun at Shchuchye in January 2001, and it is estimated that construction of the CWDF should be completed in 2006.

Sources: Russian Embassy statement, Stockholm, 6 Mar. 2002; *CBW Conventions Bulletin*, no. 53 (Sep. 2001), pp. 40–41, 44; Könberg, M., 'Rysslands destruktion av kemiska stridsmedel' [Russia's destruction of chemical warfare agents], FOI [Swedish Defence Research Agency], *BC-bulletin*, no. 6 (May 2001), pp. 1–10; 'Finland support for Russian CW storage facility', *Disarmament Diplomacy*, no. 52 (Nov. 2001), p. 63; Russian Ministry of Foreign Affairs, 'Note sent to German side on consent to distribution of gratuitous allocations made by the European Union for the destruction of chemical weapons in the Russian Federation', Press Release no. 0264, 6 Mar. 2001; 'European Union non-proliferation and disarmament actions in the Russian Federation', German Embassy statement, Stockholm, 3 Dec. 2001; OPCW Press Release 001/00, 20 Apr. 2000; 'Areas and volumes of international assistance extended to the Russian Federation for implementing the Program', appendix no. 6, The Federal Special Program Chemical weapons stockpiles destruction in the Russian Federation, revised plan approved by Resolution no. 510, 5 July 2001; ITAR-TASS (Moscow), 'Italy helping to scrap Russia's chemical weapons', 9 June 2001, in Foreign Broadcast Information Service, *Daily Report—Central Eurasia (FBIS-SOV)*, FBIS-SOV-2001-0609, 11 June 2001; and RIA (Moscow), 17 Sep. 2001, in 'Russia, Italy to cooperate in chemical weapons destruction', FBIS-SOV-2001-0918, 19 Sep. 2001; 'European Union non-proliferation and disarmament actions in the Russian Federation', Statement from the Embassy of the Netherlands, Stockholm, 28 Nov. 2001; Interfax (Moscow), 30 Nov. 2001, in 'Norway assists Russia in destroying chemical weapons', FBIS-SOV-2001-1130, 3 Dec. 2001; 'UK, Norway join forces with Russia to destroy chemical weapons', *Defence Systems Daily*, 7 Dec. 2001, URL <<http://defence-data.com>>; Private communication with J. Hart, 19 June 2001; ITAR-TASS (Moscow), 20 Dec. 2001, in 'UK to help fund construction of Russian chemical weapons elimination facility', FBIS-SOV-2001-1220, 21 Dec. 2001; 'UK, Russia sign treaty on CW weapon destruction', *Defence Systems Daily*, 21 Dec. 2001, URL <<http://defence-data.com>>; Koch, A., 'US review to aid Russia's WMD legacy programmes', *Jane's Defence Weekly*, vol. 37, no. 2 (9 Jan. 2002), p. 8; Gillespie, K., 'Huntsville Center team completes Russian chemical laboratory', *Bulletin* (US Army Corps of Engineers, Huntsville Center), vol. 22, no. 1 (Feb. 2001), pp. 1, 8; Zanders, J. P., Eckstein, S. and Hart, J., 'Chemical and biological weapon developments and arms control', *SIPRI Yearbook 1997: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 1997), p. 448; and US Army Corps of Engineers (Huntsville Center), 'Chemical demilitarization', Fact Sheet, Sep. 2001, URL <<http://www.hnd.usace.army.mil>>.

region.¹⁵⁶ The munitions were refrigerated during transport and finally deposited in underground nuclear missile silos to await destruction.¹⁵⁷ A CWDF is planned to be ready for operation at Suippes in 2005.¹⁵⁸ Approximately 250 tonnes of World War I munitions are reportedly uncovered in France annually, 10–15 per cent of which are CW.¹⁵⁹

*The United States' Army Corps of Engineers and the Environmental Protection Agency (EPA) continued systematically surveying and testing approximately 1600 properties to locate CW-contaminated soil and any remaining World War I-era CW munitions in Spring Valley in the north-west section of Washington, DC.*¹⁶⁰ During World War I the US Army had rented the area from American University in order to develop and test CW.¹⁶¹ Containers filled with sulphur mustard and lewisite as well as mortar shells were uncovered in 2001.¹⁶² The current activities are expected to continue for at least two years.¹⁶³

The countries which have officially declared to the OPCW the presence of abandoned chemical weapons (ACW) on their territory are China, Italy and Panama.¹⁶⁴

On 27 June 2001 the *Japanese* Government reportedly approved a plan to remove ACW in Jilin province, China, for which it will provide the necessary

¹⁵⁶ 'Un risque d'explosion de munitions provoque une évacuation massive près d'Arras' [A risk of explosion of munitions provokes a massive evacuation near Arras], *Le Monde*, 15–16 Apr. 2001; and 'Les "évacués" de Vimy pourraient rentrer chez eux en fin de semaine' [The Vichy 'evacuees' will be able to return home at the end of the week], *Le Monde*, 19 Apr. 2001, Ministry of the Interior communiqué, n.d. [2001].

¹⁵⁷ BBC News Online, 'WWI shells reach army base', 16 Apr. 2001, URL <http://news.bbc.co.uk/low/english/world/europe/newsid_1279000/1279852.stm>.

¹⁵⁸ 'News chronology' (note 145), p. 28; and 'Itinéraire, commandement, coordination et composition du convoi itinéraire' [Itinerary, command, coordination and composition of the convoy itinerary], Mise en sécurité du centre de munitions de Vimy, 15 Apr. 2001, URL <<http://www.pas-de-calais.pref.gouv.fr/details.asp?table=news&ID=79>>. The CWDF was scheduled to be ready for operation in 2002. 'News chronology', *CBW Conventions Bulletin*, no. 40 (June 1998), p. 21.

¹⁵⁹ 'News chronology' (note 158), p. 21.

¹⁶⁰ Tucker, J., 'Chemical weapons: buried in the backyard', *Bulletin of the Atomic Scientists*, vol. 57, no. 5 (Sep./Oct. 2001), pp. 51–56; Vogel, S., 'Evidence of DC toxins unheeded: in 1986, US failed to act on warnings of buried munitions', *Washington Post*, 9 July 2001, p. A01; Holly, D., 'Old army chemicals plague DC', *Philadelphia Inquirer* (Internet edn), 15 Apr. 2001, URL <<http://inq.philly.com>>; and Argetsinger, A. and Vogel, S., 'Excavation by military forces some AU [American University] closings', *Washington Post*, 8 Jan. 2001, p. B01. OCW were previously discovered in the area in Jan. 1993. In Feb. 1998 more munitions were discovered in the backyard of the South Korean Ambassador to the USA in what was apparently a former disposal pit. Elevated levels of arsenic in soil samples have also been reported.

¹⁶¹ The role of American University in the USA's World War I CW programme is discussed in Jones, D. P., 'The role of chemists in research on war gases in the United States during World War I', PhD thesis, University of Wisconsin, 23 May 1969, pp. 115–65; and Brophy, L. P., Miles, W. D. and Cochrane, R. C., *The Chemical Warfare Service: from Laboratory to Field* (Office of the Chief of Military History, US Army: Washington, DC, 1959), pp. 5–8, 24–25. In July 2001 American University filed a damage claim in the amount of \$87 million against the US Army. Vogel, S., 'AU seeks \$87 million in burial of weapons: claim alleges Army mishandled cleanup', *Washington Post* (Internet edn), 14 July 2001, p. B01, URL <<http://www.washingtonpost.com>>.

¹⁶² Vogel, S., 'WW I chemicals removed from Spring Valley yard, army unearths mustard gas variant', *Washington Post* (Internet edn), 6 July 2001, p. B01, URL <<http://www.washingtonpost.com>>.

¹⁶³ Tucker (note 160), p. 55.

¹⁶⁴ The CWC defines 'abandoned chemical weapons' as CW abandoned by a state after 1 Jan. 1925 on the territory of another state without the consent of the latter. CWC, Article II, para. 6.

funding.¹⁶⁵ Further information regarding Japanese BW and CW activities was made public.¹⁶⁶ There were also reports that German and Russian companies may cooperate with China and Japan in destruction of the ACW.¹⁶⁷

At the invitation of the *Panamanian* Government, the OPCW carried out a fact-finding mission on 12–19 July to three locations in Panama, including San José Island, where the USA had operated a field-test facility during and after World War II.¹⁶⁸ The team was shown conventional munitions, fragments and the remnants of what appeared to be CW cylinders, rockets and air bombs.¹⁶⁹ A total of four intact CW air bombs were reportedly found on the island.¹⁷⁰ However, the origin and nature of many of the items shown to the team could not be positively identified. On 4 September, Panama's Foreign Minister gave the findings to the US Department of State and requested that the USA formally declare whether it is aware of the existence of CW abandoned on Panamanian territory and provide technical and financial assistance for the disposal of any such weapons.¹⁷¹ An inter-agency US government group is reportedly studying the OPCW report.¹⁷² Conflicting information on the types and quantities of CW shipped to Panama, their dates of production, the total number of sites where CW may be located and questions regarding the possible effects of contamination have been reported.¹⁷³

¹⁶⁵ 'News chronology' (note 145), p. 42.

¹⁶⁶ Chu, H., 'China haunted by WW II chemical weapons', *Los Angeles Times* (Internet edn), 27 Dec. 2001, URL <<http://www.latimes.com>>.

¹⁶⁷ 'German company plans using Russia's experience in weapons destruction', ITAR-TASS (Moscow), 24 May 2001, in 'German company plans using Russia's experience in weapons destruction', FBIS-SOV-2001-0524, 29 May 2001.

¹⁶⁸ Statement from the Panamanian Embassy, Stockholm, 7 Mar. 2002. The facility, which is located c. 97 km from Panama City, was established to test the characteristics of sulphur mustard in a tropical environment. This was believed to be necessary in part because of Japanese use of CW agents on mainland China and the climate and terrain where combat between Japanese and Allied forces was occurring. Brophy, L. P. and Fisher, G. J. B., *The Chemical Warfare Service: Organizing for War* (Office of the Chief of Military History, US Army: Washington, DC, 1959), pp. 106, 135–38; and Brophy, Miles and Cochrane (note 161), pp. 41, 411. The facility was used by personnel from the Canadian Army and Air Force, US Army and Navy and the British Army. Brophy and Fisher (note 168), p. 137.

¹⁶⁹ Lindsay-Poland, J., 'Panama calls for US chemical cleanup', Nov. 2001, URL <http://www.forusa.org/panama/1101_panamacleanup.html>.

¹⁷⁰ Four intact CW were identified: 3 1000-lb (c. 455 kg) AN-M79 bombs and 1 500-lb (c. 228 kg) AN-M78 bomb. All were originally filled with non-persistent agent. Statement from the Panamanian Embassy (note 168). According to an official US Army military historical source, 1000-lb AN-M79 bombs filled with phosgene and cyanogen chloride were tested at San José Island. Brophy, Miles and Cochrane (note 161), p. 41. In general, either the chemical fill of a munition left in the field has leaked out and hydrolysed or it is in nearly the same condition as it was the day the munition was filled. Prior to transferring US military bases to the Panamanian Government, the USA carried out a programme to locate munitions (mostly conventional) and render them harmless. However, it is difficult to ascertain whether every munition fired has been located, especially in view of the fact that much of the land consists of jungle. In addition, under the CWC a chemical weapon may consist of a munition body only. CWC, Article II, para. 1.

¹⁷¹ Statement from the Panamanian Embassy (note 168); and Lindsay-Poland (note 169).

¹⁷² US Embassy statement, 20 Nov. 2001, Stockholm.

¹⁷³ Hernandez, S., 'Panama-US: chemical weapons in Canal Zone sour relations', 9 Aug. 2001, URL <<http://www.oneworld.org>>; Pugliese, D., 'DND fears toxic legacy in Panama', *Ottawa Citizen Online*, 5 Aug. 2001, URL <<http://www.ottawacitizen.com/national/010805/5043507.htm>>; Pugliese, D., 'Deadly American legacy lingers in Panama', *Ottawa Citizen*, 23 Apr. 2001; Pugliese, D., 'Canada's toxic wartime secret', *Ottawa Citizen*, 22 Apr. 2001; and Pugliese, D., 'Canada may be part of Panama bomb menace', *Ottawa Citizen*, 24 Apr. 2001. Hernandez reports that the USA may have tested CW at 15 other sites in addition to San José Island.

A total of 1420 munitions, including CW, dating from the Italian–Ethiopian war in the 1930s were reportedly discovered at a construction site in the town of Amba Alage, located in the Tigray province of northern *Ethiopia*.¹⁷⁴ The Ministry of Trade and Industry, Ethiopia’s CWC national authority, reportedly estimated that Italy transported some 80 000 tonnes of chemical agent during the war.¹⁷⁵ The Italian Government indicated that it was prepared to assist with the destruction of any weapons, including CW, that it may have left on Ethiopian territory.¹⁷⁶ However, at the end of 2001 Ethiopia had not declared to the OPCW that it possessed ACW and a joint Italian–Ethiopian investigative team found no chemical munitions among the recovered items examined.¹⁷⁷

V. Terrorism with mail-delivered anthrax spores

Anthrax bacteria as a biological warfare agent

For many decades the spores of the anthrax bacterium have been considered a prime agent of biological warfare. Several countries—including Iraq, Japan, the former Soviet Union, the United Kingdom and the USA—have prepared them as a weapon. Their hardiness, wide availability and potential lethality also make them a potential candidate for biological terrorism.¹⁷⁸ However, the underlying mechanisms for anthrax virulence are still incompletely understood. Scientists have only begun to understand the biochemical causes of the virulence of the anthrax bacterium. In November 2001 scientists reported that they have decoded the anthrax bacterium genome.¹⁷⁹

Bacillus anthracis, the causative agent of anthrax, occurs naturally worldwide. It can persist in the environment for decades in sporulated form. Anthrax primarily affects grazing animals and is encountered chiefly among livestock

¹⁷⁴ United Nations Office for the Coordination of Humanitarian Affairs (OCHA), Integrated Regional Information Network for the Horn of Africa, IRIN, ‘Ethiopia: buried armaments discovered in Tigray’, 3 May 2001, URL <http://www.irinnews.org/report.asp?ReportID=6206&SelectRegion=Horn_of_Africa&SelectCountry=ETHIOPIA>; ‘Workers stumble on Italian chemical weapons cache in Ethiopia’, *African Environmental Newsletter*, 6 May 2001; and ‘Buried armaments discovered in Tigray’, UN Integrated Regional Information Network/All Africa Global Media via COMTEX, 4 May 2001, URL <<http://library.northernlight.com/FD20010503310000062.html?cb=0&dx=1006&sc=0#doc>>. See also *The Problem of Chemical and Biological Warfare: The Rise of CB Weapons*, vol. 1 (Almqvist & Wiksell: Stockholm, 1971), pp. 142–46, 257–58.

¹⁷⁵ BBC News Online, ‘Ethiopia accuses Italy over weapons’, 3 May 2001, URL <http://news.bbc.co.uk/low/english/world/africa/newsid_1310000/1310932.stm>; and IRIN, ‘Ethiopia: buried armaments discovered in Tigray’, 3 May (note 174). It is unclear whether the figure includes munition weight. The main CW agent used by Italy was sulphur mustard, which was generally dispersed using spray tanks attached to aircraft. It is unclear how much agent remained prior to Italy’s withdrawal from Ethiopia in 1941. *New Encyclopædia Britannica*, vol. 4, Micropædia, 15th edn (Encyclopædia Britannica Inc.: London, 1985), p. 580.

¹⁷⁶ Italian Ministry of Foreign Affairs statement, 3 May 2001, unofficial translation of statement provided by the Italian Embassy, Stockholm.

¹⁷⁷ Private communication with J. Hart, 29 Jan. 2002.

¹⁷⁸ Atlas, R. M., ‘The medical threat of biological weapons’, ed. R. M. Atlas, ‘Special issue: biological weapons’, *Critical Reviews in Microbiology*, vol. 24, no. 3 (1998), p. 160.

¹⁷⁹ Broad, W. J., ‘Genome offers “fingerprint” for anthrax’, *New York Times* (Internet edn), 28 Nov. 2001, URL <<http://www.nytimes.com>>.

like cattle, sheep, goats and horses. It is most common in agricultural regions with inadequate control programmes for anthrax in livestock. *Bacillus anthracis* has a low incidence of infection in humans and the disease is mostly associated with agricultural, horticultural or industrial exposure. There are almost no known cases of human-to-human transmission.¹⁸⁰

Anthrax bacteria in the vegetative (multiplying) state are rod-shaped and measure 1–1.2 to 3–5 microns; in sporulated form their size is approximately 1 micron. Anthrax spores cluster together to form particles. However, particle sizes are usually too large for the spores to reach the terminal alveoli of the lungs. In order for particles containing anthrax spores to be able to reach the terminal alveoli, where infection leading to the inhalational form of the disease can be initiated, they should ideally be no bigger than 5 microns.¹⁸¹ Military programmes therefore try to deliver anthrax spores as an aerosol of small particles.

On the basis of experiments involving non-human primates, the LD₅₀ dose (the amount required to kill 50 per cent of the people exposed) for (untreated) inhalational anthrax has been determined to vary enormously—from 2500 to 760 000 spores. The individual susceptibility among humans may vary greatly, as was suggested by the analysis of the anthrax outbreak in Sverdlovsk in the former Soviet Union in 1979.¹⁸² For instance, none of the 66 documented fatal cases involved a person younger than 24 years of age. The human ID₅₀ (the amount required to infect 50 per cent of the people exposed) of anthrax is usually set at 8 000–50 000 spores; however, infection may occur at far lower doses. It cannot be excluded that a single spore can cause the disease.¹⁸³

Depending on the point of entry into the body, the disease can manifest itself as inhalational anthrax if the spores settle in the lungs; gastrointestinal (with two distinct syndromes—abdominal and the (rare) oropharyngeal) anthrax after ingestion; or cutaneous anthrax if they penetrate the skin. In the body the spores germinate into vegetative cells. Initially, cell damage is local. However, if the bacteria succeed in entering the bloodstream the disease may become

¹⁸⁰ Franz, D. R. *et al.*, 'Clinical recognition and management of patients exposed to biological warfare agents', *Clinics in Laboratory Medicine*, vol. 21, no. 3 (Sep. 2001), p. 437; Friedlander, A. M., 'Anthrax', eds F. R. Sidell, E. T. Takajufi and D. R. Franz, *Medical Aspects of Chemical and Biological Warfare* (Office of the Surgeon General, Department of the Army: Washington, DC, 1997), p. 469; 'Use of anthrax vaccine in the United States; recommendations of the Advisory Committee on Immunization Practices (ACIP)', *Morbidity and Mortality Weekly Report*, vol. 49, no. RR-15 (15 Dec. 2000), p. 1; and Cymet, T. C. *et al.*, 'Symptoms associated with anthrax exposure: suspected "aborted" anthrax', *Journal of the American Osteopathic Association*, vol. 102, no. 1 (Jan. 2002), pp. 41, 42.

¹⁸¹ A micron is 1 millionth of a metre. Large particles, like pollen, are on average 20 micron in size and are stopped by the hairs in the nose. Particles of the range of 5–15 micron (e.g., fly ash and some pollution) can enter the respiratory tract but are caught by the mucous and ciliary (hairlike) cells of the bronchial walls. Particles smaller than 1 micron are also usually trapped in the upper respiratory tract because the air molecules push them against the bronchial walls. World Health Organization, *Hazard Prevention and Control in the Work Environment: Airborne Dust*, document WHO/SDE/OEH/99.14 (1999), pp. 4–7, URL <http://www.who.int/peh/Occupational_health/dust/dusttoc.htm>.

¹⁸² For a detailed analysis of the Sverdlovsk incident see Guillemin, J., *Anthrax: The Investigation of an Outbreak* (University of California Press: Berkeley, Calif., 1999).

¹⁸³ Matthew Meselson, Harvard biologist, quoted in Broad, W. J. *et al.* 'Excruciating lessons in the ways of a disease', *New York Times* (Internet edn), 31 Oct. 2001, URL <<http://www.nytimes.com>>.

systemic and rapidly lethal. The mortality rate of untreated inhalational anthrax approaches 100 per cent. Death occurs within a few days of the onset of symptoms.¹⁸⁴ The mortality rate of gastrointestinal anthrax varies depending on the outbreak, but it may also approach 100 per cent. Cutaneous anthrax, which in most cases remains localized, is usually curable.¹⁸⁵

Two factors characterize the virulence of the anthrax bacterium. First, the vegetative cells are encased in a polypeptide capsule that prevents the so-called scavenger cells (phagocytes, such as macrophages and neutrophils) from ingesting the invading bacteria.¹⁸⁶ Second, the vegetative anthrax bacterium releases a potent toxin that attacks the macrophages, thereby wiping out the first line of defence of the immune system. The anthrax toxin consists of three proteins: protective antigen, oedema factor and lethal factor. The protective antigen binds to the surface of the cell, where an enzyme trims off molecules, seven of which then combine to form a ring-shaped structure, or heptamer. The heptamer captures the two factors, which are then transported through the membrane of the attacked cell. Through biochemical action inside the cytosol the oedema factor and lethal factor catalyse different molecular reactions that lead to the destruction of the phagocyte and the release of cytokines.¹⁸⁷

There are no reliable estimates of the number of human anthrax cases worldwide, but it is believed that over 95 per cent of the cases are cutaneous.¹⁸⁸ According to statistics published before the anthrax attacks in the autumn of 2001, the annual incidence of human anthrax cases in the USA dropped from approximately 130–200 in the early 20th century to none in the period 1992–99; a single case of cutaneous anthrax involving a 67-year-old farmer in

¹⁸⁴ Early symptoms of anthrax infection, which can last for several days, are nondescript (often described as flu-like). Dixon, T. C. *et al.*, 'Anthrax', *New England Journal of Medicine*, vol. 341, no. 11 (9 Sep. 1999), p. 815; and Bush, L. M. *et al.*, 'Index case of fatal inhalational anthrax due to bioterrorism in the United States', *New England Journal of Medicine*, vol. 345, no. 22 (29 Nov. 2001), p. 1608. The anthrax attacks in the United States in the autumn of 2001 led to a mortality rate for inhalational anthrax of around 44% (see below). This is primarily due to the high state of alert after the confirmation of the first anthrax cases, the accelerated diagnostic procedures and the application of multiple antibiotics as soon as an anthrax infection was suspected. It cannot be excluded, however, that in the event of an attack on a larger scale than the ones in the USA in which the emergency services could be overwhelmed that the mortality rate for inhalational anthrax would be much higher.

¹⁸⁵ Inglesby, T. V. *et al.*, 'Anthrax as a biological weapon', *Journal of the American Medical Association*, vol. 281, no. 18 (12 May 1999), p. 1737; Dixon *et al.* (note 184), p. 815; and Pannier, A. D. *et al.*, 'Crystal structure of the anthrax lethal factor', *Nature*, vol. 414 (8 Nov. 2001), URL <www.nature.com>.

¹⁸⁶ Upon entering the body the spores are actually enveloped by the macrophages, where they germinate and become vegetative. After being released by the macrophages, which have meanwhile taken the invading bacteria to the regional lymph nodes, the anthrax bacteria multiply in the lymphatic system and subsequently enter the bloodstream. Once released from the macrophages, there is no indication of immune response to the vegetative cells. Dixon, T. C. *et al.* (note 184), p. 815.

¹⁸⁷ Young, J. A. T. and Collier, R. J., 'Attacking anthrax', *Scientific American*, vol. 286, no. 3 (Mar. 2002), pp. 38–40.

¹⁸⁸ 'Use of anthrax vaccine in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP)' (note 180), p. 1. In industrialized states inhalational anthrax may make up the remaining 5%; developing countries, where animals are not always vaccinated, may suffer from a higher incidence of gastrointestinal anthrax as a consequence of the higher risk of consumption of contaminated meat. Pile, J. C. *et al.*, 'Anthrax as a potential biological warfare agent', *Archives of Internal Medicine*, vol. 158 (9 Mar. 1998), p. 430.

North Dakota was diagnosed in August 2000. Only 18 of all US cases in the 20th century involved inhalational anthrax (most of the cases were among wool or goat hair workers); the most recent report dates back to 1976. The remainder were cutaneous anthrax, and there were no reports of gastrointestinal anthrax.¹⁸⁹

The manufacture of a lethal anthrax aerosol is believed by some to be beyond the capability of individuals or groups without access to advanced biotechnology.¹⁹⁰ This is in part related to difficulties in producing sufficient quantities of particles of the right size.

Letters as a means of delivering anthrax bacteria

On 5 October 2001 a 63-year-old man died from inhalational anthrax in Florida. The same day, a nasal swab taken from a co-worker, who had been admitted to a local hospital for pneumonia, tested positive for anthrax spores.¹⁹¹ Given the extremely low incidence of anthrax the cases were an early indicator of an unnatural outbreak.¹⁹² The Federal Bureau of Investigation (FBI) and public health officials began the search for the source of the spores.¹⁹³

As of 7 December 2001, a total of 22 cases of confirmed or suspected anthrax exposure had been reported to the Centers for Disease Control and Prevention (CDC). Half of the victims contracted inhalational anthrax and five of them died. There were 7 confirmed and 4 suspected cases of cutaneous anthrax. The casualties occurred in Florida (2 inhalational and 0 cutaneous), New York (1 and 7), Washington, DC (5 and 0), New Jersey (2 and 4) and Connecticut (1 and 0).¹⁹⁴ The age of the people who developed inhalational anthrax ranged from 43 to 94 years; the incubation period from the time of exposure to the onset of the symptoms, when known, was 5–11 days. The incubation period for cutaneous anthrax was estimated to be 1–10 days.¹⁹⁵ No

¹⁸⁹ 'Use of anthrax vaccine in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP)' (note 180), pp. 1–2; Shirley, L. *et al.*, 'Human anthrax associated with an epizootic among livestock North Dakota, 2000', *Morbidity and Mortality Weekly Report*, vol. 50, no. 32 (17 Aug. 2001), pp. 677–78; and Editorial note to the article, p. 678.

¹⁹⁰ Inglesby *et al.* (note 185), p. 1736.

¹⁹¹ 'Update: investigation of anthrax associated with intentional exposure and interim public health guidelines, October 2001', *Morbidity and Mortality Weekly Report*, vol. 50, no. 41 (19 Oct. 2001), p. 890.

¹⁹² Inglesby *et al.* (note 185), p. 1737.

¹⁹³ 'Update: investigation of anthrax associated with intentional exposure and interim public health guidelines, October 2001' (note 191).

¹⁹⁴ 'Update: investigation of bioterrorism-related anthrax—Connecticut, 2001', *Morbidity and Mortality Weekly Report*, vol. 50, no. 48 (7 Dec. 2001), p. 1077. Earlier, an additional case of suspected cutaneous anthrax was listed, but the person was removed from the statistic as he no longer met the CDC surveillance case definition for anthrax following the negative results of biopsies of the skin lesion. No new cases were reported between Dec. 2001 and Feb. 2002.

¹⁹⁵ 'Update: investigation of bioterrorism-related anthrax and interim guidelines for clinical evaluation of persons with possible anthrax', *Morbidity and Mortality Weekly Report*, vol. 50, no. 43 (2 Nov. 2001), p. 944; and Goldman, J. J. and Garvey, M. J., '5th person dies of anthrax: case baffles investigators', *Los Angeles Times*, 22 Nov. 2001 (Internet edn), URL <<http://www.latimes.com>>.

one claimed responsibility for these covert attacks or articulated particular demands.¹⁹⁶

One or more mailed letters or packages were suspected as the source of exposure in Florida, and several environmental samples taken from regional and local postal centres tested positive for anthrax bacteria. Postal workers in Florida tested negative.¹⁹⁷ With regard to the cases outside Florida, the investigators were able to identify four letters which had been contaminated with anthrax spores. They had all been mailed from Trenton, New Jersey. Two letters, sent on 18 September, were addressed to the National Broadcasting Company (NBC) and *The New York Post*. The two other letters, postmarked 9 October, were sent to Democratic Senate Majority Leader Tom Daschle and Senator Patrick Leahy (the letter to Leahy was found among quarantined mail on 16 November). The victims included no addressee but several people responsible for opening the mail for the addressees were infected.¹⁹⁸ Other letters that contained powdery substances proved to be hoaxes.¹⁹⁹

It has been established that significant amounts of the anthrax spores leaked from the four envelopes as a consequence of mechanical agitation by the high-speed sorting machines. The letters contained approximately 1 gram of spores, each in a concentration of approximately 1 trillion spores per gram. The pores in the paper of the envelopes are about 10 microns, whereas the anthrax spores were about 1 micron. The very fine particles were alleged to have been treated with a chemical that enables the particles to float in the air by eliminating the static charge that would make them clump.²⁰⁰ This claim cannot be confirmed on the basis of public sources. All the letters contained anthrax spores of the same Ames strain, but it is unclear whether they were prepared in the same way.²⁰¹ The leaking spores not only infected the postal workers closest to the sorting machines, but also contaminated large sections of the postal facilities, and (re)aerosolization may have infected personnel further away.²⁰² They also

¹⁹⁶ Caruso, J. T., Testimony before the Subcommittee on Technology, Terrorism and Government Information of the Committee on Judiciary, US Senate, Washington, DC, 6 Nov. 2001, URL <<http://judiciary.senate.gov/110601f-caruso.htm>>.

¹⁹⁷ 'Update: investigation of bioterrorism-related anthrax and interim guidelines for exposure management and antimicrobial therapy, October 2001', *Morbidity and Mortality Weekly Report*, vol. 50, no. 42 (26 Oct. 2001), p. 909.

¹⁹⁸ 'Update: investigation of bioterrorism-related anthrax and interim guidelines for exposure management and antimicrobial therapy, October 2001' (note 197), p. 910; and Meyer, J., 'Tainted letter opened with care', *Los Angeles Times*, 6 Dec. 2001 (Internet edn), URL <<http://www.latimes.com>>.

¹⁹⁹ Garvey, M., 'Fugitive on FBI wanted list suspected in hoax letters', *Los Angeles Times*, 30 Nov. 2001 (Internet edn), URL <<http://www.latimes.com>>; and Eggen, D., 'Marshals arrest suspect in hoax anthrax mailings', *Washington Post*, 6 Dec. 2001, p. A26.

²⁰⁰ In early 2002 the issue of silica (or another chemical preventing clustering) has been clouded with disinformation as part of the efforts by some US policy shapers to deny any direct or indirect involvement by US laboratories or to implicate a foreign government in the attacks.

²⁰¹ According to one assessment, the clumping noticed in Florida and in the letters sent to the New York media may have resulted from exposure to humidity during the mail processing or delivery. Hatch Rosenberg, B., 'Analysis of the source of the anthrax attacks', Federation of American Scientists, Washington, DC, 17 Jan. 2002, URL <<http://www.fas.org/bwc/news/anthraxreport.htm>>. The Ames strain is one of 89 known genetic varieties of the anthrax bacterium. Warrick, J., 'One anthrax answer: Ames strain not from Iowa', *Washington Post*, 29 Jan. 2002, p. A02.

²⁰² 'Evaluation of *Bacillus anthracis* contamination inside the Brentwood Mail Processing and Distribution Center—District of Columbia, October 2001', *Morbidity and Mortality Weekly Report*, vol. 50, no. 50 (21 Dec. 2001), pp. 1129–33.

contaminated other letters passing through the sorting machines, which may explain the infection of the individuals who became ill but who did not work in the vicinity of one of the addressees or in or near a postal facility.²⁰³ The cross-contamination in the US postal system also explains the presence of anthrax spores in other countries, such as Lithuania and Peru.²⁰⁴ Whether the intention of the sender was cross-contamination and infection of people is uncertain because he or she ensured that the envelopes were tightly sealed and included warnings of the presence of the anthrax bacteria and the need to take antibiotics.²⁰⁵

The ease with which the anthrax spores became aerosolized meant that, in addition to the mail facilities, large sections of the US Senate buildings and newspaper offices were contaminated, requiring extensive and costly clean-up operations. (The Brentwood Mail Processing and Distribution Center in the District of Columbia was still closed in the second quarter of 2002.) These were also hampered by the lack of consensus about what constitutes a safe environment following decontamination.²⁰⁶

Proliferation implications of the anthrax attacks

In the wake of the 11 September attacks there was intense speculation as to whether members of the al-Qaeda network had also been preparing for a chemical or biological attack. These fears were heightened by the discovery of a crop duster manual among the belongings of a man being held in FBI custody in connection with the 11 September attacks and by the subsequent letters filled with anthrax spores.

Initially, the Bush Administration assumed that the anthrax letters had been sent by al-Qaeda members in connection with the 11 September attacks.²⁰⁷ The

²⁰³ The case of a 94-year-old Connecticut woman remains a mystery as environmental samples taken from her home, local businesses and other areas, as well as the nasal swabs of 460 employees working in postal centres that process the mail for the victim's town all proved negative for anthrax spores. According to calculations based on detailed analysis of weather conditions, wind patterns and air turbulence, Martin Furmanski concluded that it was possible that anthrax spores from Trenton, N.J., had travelled all the way to Connecticut. She died on 21 Nov. 2001. 'Update: investigation of bioterrorism-related inhalational anthrax—Connecticut, 2001', *Morbidity and Mortality Weekly Report*, vol. 50, no. 47 (30 Nov. 2001), pp. 1050–51; and MacKenzie, D., 'Wind may explain mystery anthrax cases', *New Scientist* (Internet edn), 14 Dec. 2001, URL <<http://www.newscientist.com>>. In Jan. 2002 the source of her infection was still unknown.

²⁰⁴ 'Update: investigation of bioterrorism-related anthrax and interim guidelines for exposure management and antimicrobial therapy, October 2001' (note 197), pp. 914–15; and Knight, W., 'Resilient anthrax spreads far and wide', *New Scientist* (Internet edn), 2 Nov. 2001, URL <<http://www.newscientist.com/news/news.jsp?id=ns99991516>>.

²⁰⁵ 'Update: investigation of bioterrorism-related anthrax and interim guidelines for exposure management and antimicrobial therapy, October 2001' (note 197), p. 912; and Hatch Rosenberg (note 201).

²⁰⁶ 'The science of bioterrorism: is the federal government prepared?', Charter to the hearing organized by Committee on Science, US House of Representatives, Washington, DC, 5 Dec. 2001, URL <http://www.house.gov/science/full/dec05/full_charter_120501.htm>.

²⁰⁷ Johnston, D., 'In shift, officials look into possibility anthrax cases have bin Laden ties', *New York Times* (Internet edn), 16 Oct. 2001, URL <<http://www.nytimes.com>>; and Weiss, R. and Eggen, D., 'Additive made spores deadlier', *Washington Post*, 25 Oct. 2001, p. A01.

al-Qaeda network had been mentioned as possibly possessing CBW, but no such weapons were found following the capture of al-Qaeda sites in Afghanistan. Some literature on chemical and biological warfare was retrieved, but it was similar to that which can be downloaded from the Internet. In addition, for several years jihad war manuals have reportedly contained sections devoted to chemical and biological warfare and instructions on how to prepare toxins, toxic agents and drugs.²⁰⁸

The fear of an attack using a crop duster filled with a chemical or biological agent led the US Federal Aviation Administration (FAA) to impose a nationwide flying ban on such aircraft. Furthermore, Mohammed Atta, a central figure in the 11 September attacks, reportedly rented an aeroplane four times from an airfield less than 2 km from the residence of the first anthrax victim in Florida and questioned workers at a second airfield about crop dusters.²⁰⁹

However, crop dusters may not be suitable for the dissemination of CB agents. They have spray tanks in the typical range of 1514–1892 litres, although some aircraft can carry up to 3028 litres.²¹⁰ Considering that Aum Shinrikyo manufactured 6–7 litres of sarin for its attacks in the Tokyo underground and its production capability was in the range of tens of litres (although the sect's plans called for 70 tonnes of agent),²¹¹ from the perspective of a potential terrorist the volume of spray tanks is huge. As agent production inside the country against which the terrorist attacks are planned appears unfeasible, the alternative is importation from abroad. This scenario, however, places high demands on the maintenance of the stability and viability of the agent during transport and storage. Considering the difficulties Iraq experienced in these respects, this may prove to be a significant challenge. Furthermore, the nozzles of the spray installation would typically produce droplets too large for optimal results or for inhalation of the agent.²¹² Major modifications would have to be made to the nozzles in order to produce finer mists.²¹³ Crop dusters are designed for spraying at very low levels in order to achieve the right concentration, and much of the agent would evaporate or be

²⁰⁸ Harris, E. D., Testimony before the Committee on International Relations, US House of Representatives, Washington, DC, 5 Dec. 2001, URL <http://www.house.gov/international_relations/harr1205.htm>.

²⁰⁹ 'FBI imposes new restrictions on crop-dusters', Cable News Network, URL <<http://www.cnn.com/2001/US/0923/inv.crop.dusters/index.html>>; and Associated Press, 'Florida anthrax victim dies', ABC News, 5 Oct. 2001, URL <<http://abcnews.go.com/sections/us/DailyNews/anthraxvictim011005.html>>.

²¹⁰ For technical specifications of the Air Tractor models of crop dusters see URL <<http://www.airtractor.com/models/ATmodels.html>>.

²¹¹ Tu, A. T., 'Anatomy of Aum Shinrikyo's organization and terrorist attacks with chemical and biological weapons', *Archives of Toxicology, Kinetics and Xenobiotic Metabolism*, vol. 7, no. 3 (autumn 1999), pp. 51, 55.

²¹² Agricultural crop dusters typically dispense materials with a particle size of 100 microns or more, whereas the particle size of a biological agent must be in the 1–10 micron range in order to penetrate the human lung. Smithson, A. E., Prepared statement before the Subcommittee on Oversight and Investigations of the Committee on Energy and Commerce, US House of Representatives, Washington, DC, 10 Oct. 2001, available at URL <<http://www.stimson.org/cbw/?sn=CB20011221144>>.

²¹³ UNSCOM found that Iraq experienced great difficulties in modifying the nozzles for spray tanks and was forced to buy the required components abroad. Richard Spertzel, former head of the UNSCOM BW inspections, cited in Broad, W. J., 'Experts call for better assessment of threats', *New York Times* (Internet edn), 2 Oct. 2001, URL <<http://www.nytimes.com/>>.

destroyed if the aircraft were to fly at higher altitudes.²¹⁴ These elements, taken together, do not make a crop duster ideal for disseminating CB agents for terrorist purposes.²¹⁵ By the end of 2001 the issue of the crop dusters had virtually disappeared from the discussion on CB attacks in the USA.

The purity and high concentration of the mail-delivered anthrax spores and the fact that they aerosolized easily became a cause of major concern, because the characteristics appeared to point to an origin in a military BW programme. This gave rise to speculation about state involvement in the attacks. Hardliners in the USA who are seeking a pretext to remove Iraqi President Saddam Hussein tried to link Iraq to the attacks.²¹⁶ The initial reports suggested that bentonite had been used as a chemical additive. According to former United Nations Special Commission on Iraq (UNSCOM) inspectors, the Iraqi BW programme used bentonite as part of a unique system to create anthrax spore powders that are light and easily airborne.²¹⁷ The claim that the spores had been chemically treated has not been publicly confirmed. The purity and concentration of the anthrax spores in the letter to Senator Daschle were later described as better than that produced in the Soviet, US or Iraqi BW programmes.²¹⁸

By the end of October 2001 there were a growing number of indications that the source of the anthrax spores might be within the USA. The US administration objected to a French-sponsored UN Security Council resolution condemning the letter attacks on the grounds that the UN Security Council only deals with matters of international security.²¹⁹ In early November the FBI released a profile of the sender of the letter: a lone, Western individual who has scientific expertise and access to anthrax samples and a well-equipped laboratory and is used to working with highly hazardous substances.²²⁰ In December, Professor Barbara Hatch Rosenberg of the Federation of American Scientists charged that the perpetrator is a US citizen working in the US biological defence programme.²²¹

²¹⁴ Ron Manley, head of the Verification Division of the OPCW, cited in MacKenzie, D., 'Invisible enemies', *New Scientist*, vol. 172, no. 2311 (6 Oct. 2001), p. 6.

²¹⁵ However, crop dusters filled with a chemical toxicant could be used to great effect in a terrorist attack against agricultural produce.

²¹⁶ Rose, D. and Vulliamy, E., 'Iraq "behind US anthrax outbreaks"', *The Observer* (Internet edn), 14 Oct. 2001, URL <<http://www.observer.co.uk/international/story/0,6903,573893,00.html>>. There were also numerous allegations that Iraq had assisted al-Qaeda with the 11 Sep. attacks.

²¹⁷ Spertzel, R. O., Russia, Iraq, and other potential sources of anthrax, Testimony before the Committee on International Relations, US House of Representatives, Washington, DC, 5 Dec. 2001, URL <http://www.house.gov/international_relations/sper1205.htm>. Spertzel added that UNSCOM found evidence that Iraq was seeking a supply of pharmaceutical silica in 1988 and 1989, but it did not find definitive proof that the acquisition had actually occurred. Bentonite is also commercially produced in the USA and an Internet search produces several company names.

²¹⁸ Spertzel (note 217); and Hatch Rosenberg (note 201).

²¹⁹ US Department of State, Daily Press Briefing, 1 Nov. 2001, URL <<http://www.state.gov/r/pa/prs/dpb/2001/5880.htm>>.

²²⁰ Federal Bureau of Investigation, 'Linguistic/behavioral analysis of anthrax letters', 9 Nov. 2001, URL <<http://www.fbi.gov/majcases/anthrax/amerithrax.htm>>.

²²¹ Hatch Rosenberg (note 201). Hatch Rosenberg made her claim public during her address as an NGO representative to the Fifth Review Conference of the States Parties to the BTWC in Nov. 2001 and circulated the first version of her paper on the SIPRI Internet CBW Discussion Forum. Its contents were

VI. CBW proliferation

The debate about the threat posed by the proliferation of CBW intensified in the latter part of 2001 following the terrorist attacks of 11 September, the mailing of anthrax-contaminated letters in the USA and reports of such letters (most of which were hoaxes) elsewhere in the world.

US proliferation allegations

Even before the September attacks the growing concern in the USA that an adversary, whether a state or a non-state actor, might use chemical or biological agents against it had contributed to massive resource allocation to defence and protection programmes at the national, state and local levels. The threat perception undoubtedly contributed to the US preparedness to name states that it perceives to be in contravention of the prohibitions of the BTWC and the CWC in unclassified reports and at diplomatic meetings, such as the Fifth Review Conference of the BTWC.²²² In his first State of the Union Address, on 29 January 2002, President George W. Bush described Iran, Iraq and North Korea as constituting an 'axis of evil'.²²³

In 2001 the US Secretary of Defense, the DOD Chemical and Biological Defense Program and the CIA each released reports on CBW proliferation and the implementation of measures to counter the threat. Together they named 10 countries as seeking CBW or as having the necessary infrastructure to start such programmes: China, India, Iran, Iraq, Libya, North Korea, Pakistan, Russia, Sudan and Syria. Some country assessments focus on the different stages of progress of the CBW programmes, and others appear to address regional instabilities and the possibility that governments might renege on their commitments to the BTWC and CWC should the regional security environment deteriorate.²²⁴

subsequently made public by Broad, W. J. and Miller, J., 'Anthrax inquiry looks at US labs', *New York Times* (Internet edn), 2 Dec. 2001, URL <<http://www.nyt.com>>.

²²² In 2000 the USA formally accused Iran of violating its CWC commitments, although the USA did not demand that a challenge inspection be conducted as it could have done under the provisions of the convention. Zanders, Hersh, Simon and Wahlberg (note 106), pp. 533–34.

²²³ 'The President's State of the Union Address', The White House, Washington, DC, 29 Jan. 2002, URL <<http://www.whitehouse.gov/news/releases/2002/01/print/20020129-11.html>>.

²²⁴ Office of the Secretary of Defense, *Proliferation: Threat and Response* (Department of Defense: Washington, DC, Jan. 2001); Department of Defense Chemical and Biological Defense Program, *Annual Report to Congress and Performance Plan* (Department of Defense: Washington, DC, July 2001), pp. 5–9; and Central Intelligence Agency, 'Unclassified report to Congress on the acquisition of technology relating to weapons of mass destruction and advanced conventional munitions, 1 January through 30 June 2001', Jan. 2002, URL <http://www.cia.gov/publications/bian/bian_jan_2002.htm>.

Iraq's CBW programmes and their elimination

There is serious concern about the status of Iraq's CBW programmes. In 2001 the US DOD reported that Iraq may be reconstituting its CBW capability.²²⁵ A January 2001 press report quoted allegations by senior US government officials that Iraq had rebuilt several factories for the production of CBW in an industrial complex in al-Fallujah, west of Baghdad.²²⁶

When the inspections by UNSCOM ended in December 1998 there were many unresolved questions regarding Iraq's CBW programmes.²²⁷ The UN Monitoring, Verification and Inspection Commission (UNMOVIC) succeeded UNSCOM in 1999, but as of January 2002 it had not yet conducted any inspections inside Iraq. UNMOVIC nonetheless continues to prepare for such inspections should Iraq allow the return of international inspectors.²²⁸ The UN Security Council also placed Iraq under an international sanctions regime in order to compel it to comply with the conditions of Resolution 687, which includes the destruction of its CBW and the termination of the CBW-related programmes under international supervision.²²⁹ In November 2001 the Security Council extended the sanctions regime, which had previously been modified in an attempt to gain Iraqi cooperation.²³⁰ Earlier, UNMOVIC revised and refined the list of items and materials whose transfer to Iraq is controlled.²³¹

The past South African CBW programme

Project Coast, under which the various components of South Africa's CBW programme were coordinated, was officially launched in 1981 and funded from 1982 until 1993. The trial of Brigadier Wouter Basson, the key figure in Project Coast, began in November 1999.²³² The criminal indictments are not directly connected to Basson's CBW activities, but information about Project Coast has emerged throughout the court hearings.²³³

Agent production in Project Coast appears to have focused on chemicals intended for crowd and riot control such as CR (Dibenz(b,f)-1:4-oxazepine)

²²⁵ Office of the Secretary of Defense (note 224), pp. 40, 41; and Department of Defense Chemical and Biological Defense Program (note 224), p. 7.

²²⁶ Lee Myers, S. and Schmitt, E., 'Iraq rebuilt weapons factories, officials say', *New York Times* (Internet edn), 22 Jan. 2001, URL <<http://www.nytimes.com>>. The details are not included in the DOD reports released in 2001, but the CIA biannual report contains a general statement regarding Iraq's reconstruction of its CBW programme. Central Intelligence Agency (note 224).

²²⁷ Wahlberg, Leitenberg and Zanders (note 45), pp. 560–75.

²²⁸ Note by the Secretary-General, UN Security Council document S/2001/1126, 29 Nov. 2001.

²²⁹ UN Security Council Resolution 687, 3 Apr. 1991.

²³⁰ Wahlberg, Leitenberg and Zanders (note 45), p. 565.

²³¹ Letter dated 1 June 2001 from the Executive Chairman of the United Nations Monitoring, Verification and Inspection Commission addressed to the President of the Security Council, UN document S/2001/560 [reissued for technical reasons], 15 Oct. 2001. The reissue corrected some clerical errors.

²³² Weekly reports of the Basson Trial are available from the Centre for Conflict Resolution, University of Capetown at URL <http://crweb.ccr.uct.ac.za/cbw/cbw_index.html>. Basson trial, week 45 report, 2–3 May 2001, prepared and distributed by Chandré Gould and Marlene Burger, Centre for Conflict Resolution, University of Capetown.

²³³ Zanders, Hersh, Simon and Wahlberg (note 106), pp. 536–37. Some charges relate to Basson's illegal possession of documents pertaining to the CBW activities.

and BZ (3-Quinuclidinyl benzilate). At the trial Basson confirmed that from the end of 1991 until the beginning of 1993 weaponization of incapacitants was accelerated and that the programme was set to be completed in 1994. According to his testimony, BZ was acquired through Abdul Razak, a Libyan, who had acquired the agent from Hong Kong. Five tonnes of BZ were delivered and, except for 980 kg, all of it was weaponized by the South African Defence Force (SADF), the forerunner of the South African National Defence Forces (SANDF), between June and December 1992.²³⁴

Basson testified that the CR was produced at the Delta G Scientific facility in Midrand (located between Johannesburg and Pretoria) and claimed that it had been used once by the SADF during the final attack at Tumpo in Angola.²³⁵ He also testified that a few hundred (or perhaps as many as 1000) 81-mm mortar shells had been imported from Israel and then filled with CR at Swartklip Products in 1987–88.²³⁶ Roelf Louw, an employee of the arms manufacturer Armscor, provided similar information.²³⁷

The possession and use of incapacitants for purposes other than riot control are prohibited under the CWC, which opened for signature in January 1993. According to Basson, Minister of Defence Eugene Louw therefore ordered all incapacitants apart from tear gas to be destroyed. The Co-ordinating Management Committee (CMC) then decided to remove the CR canisters from the shells and to store them separately. A subsequent decision was made to dump the chemicals into the sea.²³⁸

The Basson trial has provided insight into foreign involvement in South Africa's CBW programme despite the UN sanctions regime. Basson's claims that 500 kg of methaqualone had been purchased with the assistance of Swiss intelligence chief Peter Regli prompted the Swiss Ministry of Defence to investigate the allegation in August 2001. Another 500 kg was allegedly obtained from Croatia through Swiss intelligence agent Jurg Jacomet and the Swiss intelligence services.²³⁹ Basson confirmed that he signed a deal in 1992 with Franjo Kajfe, then Croatian Minister of Energy, concerning the manufacture of methaqualone, which was later used to produce mandrax. There are discrepancies in the testimony about the Croatian deal: the state prosecution claims that despite the money transfer the goods were never delivered. Basson maintains that they were delivered.²⁴⁰

The true extent of the CBW-relevant exchanges between Basson and Libya is unclear. Basson claimed that the only direct Project Coast transaction with

²³⁴ Basson trial, week 49 report, 27 July 2001; and Gould, C., Centre for Conflict Resolution, University of Capetown, Private communication with F. Kuhlau, 22 Jan. 2002.

²³⁵ Basson trial, week 48 report, 23 July 2001. Although Basson did not give a date in court, it is believed that the use of CW occurred during the 2nd attack on 23 Mar. 1988. Gould, C., Centre for Conflict Resolution, University of Capetown, Private communication with F. Kuhlau, 13 Feb. 2002.

²³⁶ Basson trial, week 55 report, 10 Sep. 2001.

²³⁷ 'The continuing trial of Wouter Basson', *CBW Conventions Bulletin*, no. 52 (June 2001), p. 32.

²³⁸ Basson trial, week 49 report, 27 July 2001. The chemicals that were allegedly dumped in the sea included cocaine, ecstasy, methaqualone and BZ.

²³⁹ 'The continuing trial of Wouter Basson', *CBW Conventions Bulletin*, no. 53 (Sep. 2001), p. 25.

²⁴⁰ Babic, J., 'HDZ sold chemical weapons to the Republic of South Africa', *Nacional*, no. 310, 25 Oct. 2001, URL <<http://www.nacional.hr/htm/310052.en.htm>>.

Libya was the purchase of BZ and certain 'cultures' supplied by the University of Tripoli.²⁴¹ Dr David Chu, managing director of Medchem Forschungs (a company specifically set up by Basson to promote the Roodeplaat Research Laboratory, RRL, in Europe) testified that Libya was a potential buyer for RRL.²⁴² Basson also claimed that he had made a series of deals on behalf of East German, Libyan and Russian financial actors with the consent of General Kat Liebenberg, then chief of the SADF.²⁴³ Basson informed the court about a group of CBW experts, led by Libyan Abdul Razak, which met regularly to exchange information and discuss developments in the field. It included 'Russians, Libyans, East Germans, Chinese, Americans and Swiss', and Basson admitted to having supplied the group with the results of research conducted at Protechnik.²⁴⁴ The trial concluded in April 2002; Basson was acquitted.

VII. Conclusions

The process of strengthening the BTWC suffered a serious setback in 2001 with the suspension of the AHG as an appropriate forum to negotiate measures to reinforce the BTWC regime. The Fifth Review Conference has been suspended until November 2002. These developments leave the BTWC a weak disarmament treaty that lacks compliance, enforcement and verification provisions at a time when rapid technological advances in the fields of biology and biotechnology are straining the convention. In addition, the anthrax-contaminated letters in the USA underscore the reality of the use of biological agents for terrorist purposes. Despite the evident urgency of these developments the international community is not united in its approach to them. The US preference for addressing the proliferation threat by means of national policy initiatives and technology development programmes may lead other states to adopt a similar policy, which in turn might lead to international competition in BW defence. Many such activities are similar to those for the development of an offensive BW programme. In the absence of international instruments to generate transparency with respect to these activities, suspicion about the intent of other states could easily lead to an international biological armament competition. This would be more likely if the reconvened Fifth Review Conference fails to reach a final declaration in November 2002.

In contrast to the BTWC, the CWC has a functioning verification regime and all parties appear committed to its fundamental principles. The four states that are declared possessors of CW are moving forward with the destruction of their stockpiles and CW-related installations, although it appears increasingly likely that the final destruction deadlines will need to be extended for Russia

²⁴¹ Basson trial, week 49 report, 1 Aug. 2001.

²⁴² 'The continuing trial of Wouter Basson' (note 237), pp. 30–31.

²⁴³ Dispatch Online, 27 Sep. 2001, URL <<http://www.dispatch.co.za/2001/09/27/southafrica/MBASSON.htm>>.

²⁴⁴ 'The continuing trial of Wouter Basson' (note 239), pp. 23–24. Protechnik's activities were in the field of CW defence. It is currently South Africa's single small-scale facility, as defined by the CWC.

and the USA. The OPCW faces financial difficulties because some of its operational procedures require modification and because not all parties prioritize their obligations, such as the reimbursement of inspection costs. In accordance with the obligations of the CWC, the OPCW must consider how and where to devote its inspection resources, particularly as regards the chemical industry. Consequently, further financial shortfalls could seriously hamper some of its core activities. The OPCW also has a responsibility to assist parties to implement the CWC and in emergencies, such as the use or threat of use of CW. Failure to meet these obligations could lead states to question the relevance of the convention.

The First Review Conference of the States Parties to the CWC will be held in 2003. The quality of the preparatory work and the selection of implementation issues will be critical to its success. A high-level political commitment will be necessary to prevent inconclusive discussions on outstanding implementation issues. Failure to address fundamental issues could jeopardize the long-term viability of a relatively strong disarmament treaty.

The attacks of 11 September 2001 increased the sense of vulnerability to indiscriminate mass-casualty terrorism throughout the world. This sense of vulnerability was further augmented by a series of letters containing very high-grade anthrax particles that were sent to representatives of the US media and politicians. Five people died and another 17 contracted the disease. However, despite their coincidence in time the two events appear unrelated (except perhaps that the sender of the letters wanted to exploit the anxiety already present). The al-Qaeda attacks were driven by fanaticism opposed to the values of the dominant power in world politics. The anthrax-contaminated letters were possibly sent by a highly qualified scientist whose motives remain obscure. Despite the difference in scale, both events demonstrated the potential for social and economic disruption.

The BTWC and the CWC are not a panacea for dealing with CB terrorism, but they establish a core set of norms that govern the behaviour of states, companies and individuals. They offer a first line of defence against the terrorist use of CB agents by complicating the efforts of terrorists to acquire such weapons. In this context, too, the failure to achieve a protocol to the BTWC signifies that in the foreseeable future it will not be possible to establish an emergency assistance set-up in the event of the use of biological agents similar to the one being developed under the CWC.