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## 29. The elimination of chemical and biological weapons

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### I. Introduction

This paper presents an overview of the 1993 Chemical Weapons Convention (CWC) and the 1972 Biological and Toxin Weapons Convention (BTWC). It also addresses the destruction of chemical and biological weapons (CBW) in Iraq mandated by United Nations Security Council Resolution 687 (1991), which lays down the conditions for the ceasefire in the 1991 Persian Gulf War. The final section describes the efforts of the United Nations Special Commission on Iraq (UNSCOM) to eliminate Iraq's CBW capabilities between 1991 and 1999 and UNSCOM's replacement by a new body, the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC), in December 1999.

Progress on the implementation of the CWC continues. The four declared possessors of chemical weapons (CW)—India, South Korea, Russia and the USA—have begun destruction operations, and previously outstanding issues are gradually being resolved. Nevertheless, problems relating to the timely execution of certain treaty obligations by some states continue to generate tension among parties to the convention.

The parties to the BTWC are negotiating an additional legally binding protocol in order to equip the convention with instruments to monitor and enforce compliance and to organize international cooperation between states parties for peaceful purposes. Progress is being made on several technical issues, and the industrialized and developing countries have undertaken initiatives to bridge their differences on non-proliferation and technical cooperation. However, the issue of monitoring compliance with the future regime remains the main stumbling block. Some hope nevertheless exists that the negotiations can be concluded successfully before the fifth Review Conference of the BTWC is held, in 2001.

In 1999 UNSCOM ceased to exist. Its demise was a long-drawn-out process which involved the systematic obstruction of the UNSCOM inspections by Iraq and highly charged political altercations among the permanent members of the UN Security Council. The failure of UNSCOM has potential long-term implications. Between 1991 and 1999 the Security Council, succumbing to the short-term interests of individual members, proved unable to deal with a blatant and determined violator of its own rules as well as the generally accepted norms against the acquisition, possession or use of chemical, bio-

logical or nuclear weapons. For major disarmament treaties such as the BTWC and the CWC, the Security Council is the ultimate arbiter in the case of material breaches. The experience of UNSCOM raises serious doubts about the Security Council's ability or willingness to uphold fundamental norms in the name of the international community in the case of a determined and persistent violator. Few cases will be as clear-cut as that of Iraq.

## II. The Chemical Weapons Convention

The CWC is without doubt the strongest global disarmament treaty to date. It contains elaborate verification measures and lays down certain rules of state behaviour in time of peace and war. The overall purpose of the CWC is to prevent the possibility of CW use. States parties can never under any circumstances engage in any military preparations for offensive chemical warfare and therefore forgo the option of in-kind deterrence or retaliation. In order to oversee effective implementation the CWC has established an international body, the Organisation for the Prohibition of Chemical Weapons (OPCW), located in The Hague.

The CWC was opened for signature on 13 January 1993 and entered into force on 29 April 1997 following the deposit of the required 65th ratification 180 days earlier. As of 1 January 2001, 141 states had become parties and an additional 35 states had signed the convention. The convention has been successful in attracting the ratifications of states in regions of intense conflict. The OPCW continues to undertake diplomatic steps to secure further ratifications or accessions, especially by states in Africa and the Middle East.

A key element in defining the CWC's scope is the so-called general purpose criterion. Under the general purpose criterion, certain purposes for which objects may be employed are prohibited, but not the objects themselves. The convention thus defines CW as any toxic chemical or its precursors intended for purposes other than those not prohibited by the CWC as well as munitions, devices or equipment specifically designed to be used with them. Permitted purposes include industrial, agricultural and medical applications, research and development of protection and defence against CW, and domestic law enforcement and riot control.

The general purpose criterion affords two major advantages. First, the CWC is not restricted to compounds which are explicitly listed in the convention. Thus, the discovery of a new potential chemical warfare agent will not undermine the CWC regime because it will be automatically banned if it has no justifiable non-military purpose. Moreover, the research installation or production facility where the new CW agent was made can become the object of inspection under the CWC. Second, the general purpose criterion allows the international community to deal with dual-use commodities. Many of the chemicals covered by the convention have widespread civilian application. Because it is possible to distinguish between permitted and prohibited activ-

ties, it is not necessary to determine the intrinsic threat posed by a chemical compound or a piece of equipment.

One of the major objectives of the CWC is the verified destruction of all existing CW stockpiles and production and other CW-related facilities within 10 years after entry into force. Not more than an extra five years may be granted in exceptional cases. A state party is responsible for the destruction of all CW and production and other CW-related facilities on its territory or under its jurisdiction and control, as well as for any CW it may have abandoned after 1925 on the territory of another party without the consent of the latter. It must also declare abandoned CW and old CW which were produced either before 1925 or between 1925 and 1946 but which have deteriorated to such an extent that they are no longer usable. All locations where CW are stored or destroyed are subject to verification through on-site inspection and monitoring with on-site instruments. Destruction of the CW agents must be essentially irreversible so that the resulting chemical compounds are unsuitable for CW production. Parties cannot dispose of CW by dumping them in water, burying them or burning CW in open pits. Parties must assign the highest priority to ensuring the protection of people and the environment during the transport, sampling, storage and destruction of CW.

The CWC also establishes a comprehensive verification regime to ensure that no illegal activities take place within states that are parties to the CWC. The regime affects both the military sector and civilian chemical industry. It seeks to balance confidence in compliance with the protection of national security interests and industrial proprietary information. Verification consists essentially of regular reporting requirements, on-site inspections and, in the case of well-founded suspicions, challenge inspections.

The activities of the chemical industry are monitored through declarations and on-site inspections. The nature of an industrial facility's obligations depends on the types and quantities of chemicals it produces, processes, transfers and consumes. The convention categorizes chemical compounds of particular concern in schedules depending on their relative importance for the production of CW agents or for legitimate civilian manufacturing processes. Each list has different reporting requirements. Schedule 1 contains compounds 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 chemicals that are key 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 convention also places reporting requirements on firms which produce discrete organic chemicals that are not on any of the schedules; it also contains special requirements for firms that produce unscheduled discrete organic chemicals with the elements fluorine, phosphorus or sulphur.

If non-compliance with the CWC is suspected, any state party has the right to request an on-site challenge inspection on the territory of another party. The inspected party may neither refuse an inspection nor improperly restrict the

access of the inspection team. The challenge inspection is a politically delicate instrument and serves as a safety net should the routine system fail.

While the CWC bans chemical warfare, parties can nonetheless be faced with a chemical threat or the use of CW by another political entity. The CWC therefore provides for a range of remedial or preventive measures. For instance, it explicitly authorizes parties to equip themselves with the most efficient protection against CW agents. As chemical agents affect their target through environmental mediation, interposing a barrier will significantly reduce the military advantage an attacker might hope to gain from the use of chemical weapons and thus diminish their attraction. Moreover, the CWC stipulates that each party has the right to request and receive assistance and protection against the use or threat of use of CW. The requests for assistance and protection must be made through the OPCW, a guarantee for non-discriminatory application.

The CWC also deals with the transfer of chemicals among states parties and between parties and non-parties. In the past, the inability to distinguish unambiguously between chemicals used as warfare agents and those that have peaceful industrial purposes rendered any ban on their trade or transfer impractical because of the impossibility of verifying the end-use in the recipient state. The general purpose criterion addresses this problem. Each party is expressly forbidden to transfer chemical weapons, directly or indirectly, to other parties, non-parties or sub-national entities under any circumstances. It further disallows any activity that would assist, encourage or induce anyone to engage in an undertaking that contravenes the convention. Specific legislation must be adopted by each party to prevent any natural or legal person from undertaking activities prohibited by the CWC on its territory.

In addition to their significance for verification and reporting routines, the three schedules of the CWC also form the basis of an export control regime among states parties and between parties and non-parties. The overriding criterion is that none of the transactions may contravene the basic purpose of the CWC. The CWC thus makes a sharp distinction between parties and other countries regarding trade relations. Parties are granted overall rights for permitted chemical activities and international cooperation among themselves. By implication, other countries cannot fully enjoy such rights.

The CWC is the most elaborate disarmament treaty ever negotiated. This is reflected in the need to establish a special international body to oversee its implementation. Although several arms limitation and disarmament agreements have entrusted international organs or organizations with implementation functions, the size and scope of responsibilities of the OPCW are unprecedented. A party automatically becomes a member of the OPCW. Membership cannot be withdrawn although specific rights or privileges can be lost if a party's behaviour is not in line with the requirements of the convention.

Following the opening for signature of the CWC in 1993 the Preparatory Commission (PrepCom) for the OPCW was established. It laid the foundations of the OPCW by setting up the necessary infrastructure and developing the

necessary procedures for the implementation of the CWC. The OPCW consists of three organs; the Conference of States Parties, the Executive Council and the Technical Secretariat. It is complemented by a National Authority in each of the states parties.

The highest decision-making body is the Conference of States Parties, in which all parties have one representative and one vote. This reflects the underlying principle in the CWC that all parties are treated in an equal and non-discriminatory manner. The treaty is so far the only global arms control agreement to do this. The body's main responsibilities are to oversee implementation of and compliance with the CWC. It meets in annual sessions to adopt the programme of work and approve the OPCW budget; five sessions have taken place since entry into force. Special sessions may be convened if the need arises. In order to evaluate the overall operation of the CWC and in particular the process of destruction of CW and related facilities, special review conferences will take place 5 and 10 years after entry into force of the CWC.

The Executive Council is a representative organ, consisting of 41 members representing the five regional groups (Africa, Asia, Eastern Europe, Latin America and the Caribbean, and Western European and other states). It meets in regular sessions and in between sessions as often as may be required. Its main responsibility is to oversee and direct the implementation of the CWC. The Executive Council also considers the draft programme and budget of the OPCW to be submitted to the Conference of States Parties. Special responsibilities relate to concerns of non-compliance. Although subordinated to the Conference of States Parties, the Executive Council is highly influential because of its permanent nature.

The Technical Secretariat, headed by the Director-General, is responsible for the practical work of the OPCW. Its main task is to organize and coordinate the complex verification activities. These activities are performed by the Inspectorate, the main component of the Technical Secretariat, and its team of international inspectors.

The National Authority is a body established by each state party to serve as liaison between the party's government and the OPCW and the National Authorities of other states parties. The principal task of the National Authority is to collect all relevant information from civilian and military facilities whose activities fall within the scope of the CWC and report the technical and other verification-related data to the Technical Secretariat. The National Authority also acts as the point of contact and the host for the international inspection teams entering the country.

The CWC is one of the most complex disarmament undertakings so far. It completely delegitimizes chemical warfare and links this ban to an obligation of verified destruction of CW. Monitoring and verification are two key components of the convention, and they are designed to generate high levels of trust in the disarmament regime and among parties. Implementation difficulties are resolved by the parties. The principal element remains coopera-

tion rather than confrontation so that states parties can be assisted to meet their obligations.

### III. The Biological and Toxin Weapons Convention

The BTWC was opened for signature on 10 April 1972 and entered into force on 26 March 1975. Negotiations on the prohibition of CBW began in 1968 within the framework of the Eighteen-Nation Committee on Disarmament (renamed the Conference of the Committee on Disarmament in 1969). An agreement on CBW almost immediately proved difficult to achieve. Instead, a two-step approach was chosen by which the issue of biological disarmament was addressed first. Several countries felt that a separate agreement was easier to achieve because of the widespread belief at the time that biological weapons (BW) had limited military utility. As of 1 January 2001, 144 states had become party to the convention and an additional 18 had signed it.

The BTWC was the first disarmament treaty in the true sense of the word. It bans the development, production and stockpiling of an entire class of weapons and orders the destruction of existing stocks. In addition, at the fourth Review Conference, in 1996, states parties to the BTWC expressly declared BW use in war unlawful under all circumstances (thus reinforcing the prohibition of the 1925 Geneva Protocol in this respect). The prohibition of BW employment is absolute.

In the cold war context, with the negotiating countries divided in the Western, Socialist, and Neutral and Non-Aligned blocs, the treaty-making process was complicated. One consequence is the lack of verification measures in the BTWC. Violations or allegations of BW use have proved difficult to follow up and they have placed a great strain on the convention. The absence of verification measures was highlighted in 1979 by the outbreak of anthrax near Sverdlovsk (now Yekaterinburg), which the West persistently attributed to a prohibited Soviet military programme. In 1993 Russian President Boris Yeltsin all but acknowledged that the former Soviet Union, in spite of the fact that it was a co-depository of the convention, had continued an offensive BW programme. Serious concern continues to exist about Russia's compliance with the BTWC. Trilateral verification and transparency exercises by the three co-depositaries of the BTWC (Russia, the UK and the USA) have come to a halt, feeding suspicions of Russian non-compliance.

Following the 1991 Persian Gulf War, UNSCOM uncovered an extensive Iraqi offensive BW programme, although Iraq was a signatory to the BTWC. These findings proved the reality of BW proliferation. Growing awareness of the dangers of BW proliferation has led to the multilateral coordination of national export controls on BW materials and related dual-use equipment. The March 1995 nerve agent attacks in the Tokyo underground and the subsequent realization that the religious sect responsible for them was also seeking to

acquire BW (but was unsuccessful) have heightened awareness of the risks of proliferation to sub-state actors.

Finally, the Chemical Weapons Convention has set high standards of verifiability, transparency and international cooperation and further highlighted the inadequacies of the BTWC regime.

Four BTWC review conferences have considered several confidence-building measures. In September 1994 an Ad Hoc Group of Governmental Experts reported to a Special Conference of States Parties that verification measures were possible. An Ad Hoc Group of states parties is now attempting to establish a supplementary protocol, which should include, among other things, verification measures. It is hoped that the negotiation can be finalized before the next review conference, no later than 2001. The discussions, however, have been complicated by rapid progress in biotechnology and genetic engineering, which offer the distinct possibility that designer agents and antidotes could be developed that would make biological warfare controllable. Moreover, because the civilian industry leads these advances, many companies and industry organizations resist intrusive inspection mechanisms for fear of losing critical proprietary information.

The negotiators in the Ad Hoc Group have adopted the rolling text principle for their work and much of the language is still bracketed, indicating alternative propositions or lack of consensus on current wording. Implementation of the future BTWC protocol will inevitably require an organizational structure; the draft protocol envisages the creation of an international body: the Organization for the Prohibition of Bacteriological (Biological) and Toxin Weapons (OPBTW). It is modelled on the OPCW and the Comprehensive Nuclear Test-Ban Treaty Organization. The OPBTW would consist of three organs: the Conference of States Parties, the Executive Council and the Technical Secretariat. The nature and extent of such an organization will depend on the ultimate verification regime, which, apart from different kinds of inspection, also consists of the declarations that states parties will be required to submit. The practice of the CWC verification regime and the experience of UNSCOM will undoubtedly have a major impact on the outcome of these discussions.

The draft protocol envisages three broad mechanisms for monitoring compliance: declarations, visits and investigations. The declarations would contain information on past offensive and defensive BW programmes and present activities and installations of relevance to the protocol. Visits would be on-site activities designed to ensure the completeness and correctness of the submitted declarations. They would be intended to generate confidence in the compliance of other states parties. Investigations, by contrast, would address cases of suspected non-compliance. Following the 13th session of the Ad Hoc Group, held in January 1999, visits and investigations were treated separately, which is psychologically important since visits would be non-confrontational and intended to generate transparency and build confidence, whereas investigations would be accusatorial.

Visits, which aim to validate the declarations, remain the most controversial aspect of the draft protocol. Not only are there large differences of opinion between the regional groups in the Ad Hoc Group, but the Western Group, which has the largest share of relevant industries and research institutions, has thus far been unable to present a unified position. The latest draft protocol envisages three types of visit: (a) visits to clarify declarations; (b) mandatory visits, with annual quota ceilings, to randomly selected facilities in order to follow up on declarations; and (c) voluntary visits to assist in compiling individual facility or national declarations, to resolve ambiguities in declarations, to further assistance and cooperation, or to resolve a particular concern.

The draft protocol distinguishes between two types of investigation. Facility investigations can be initiated in the case of suspicions of illicit activities inside an installation. Field investigations can be launched if BW use is suspected.

At the end of 1999 two major issues remained unresolved. As in 1998, no agreement was achieved on whether the Executive Council of the OPBTW would decide on launching an investigation using the 'red light' or the 'green light' procedure. (Under the 'red light' procedure an investigation would proceed unless a majority of the Council members voted against it. Under the 'green light' procedure, initiation of a challenge inspection would require a majority vote.) The opposing views reflect the concern that the procedure may be abused. Second, there is concern that under the currently proposed mechanisms a field investigation might turn into a facility investigation if, during a field investigation, an unnatural outbreak of disease were to occur that could plausibly be linked to a facility (as, for instance, in the case of the accidental release of anthrax from Sverdlovsk in 1979, when more than 60 people downwind from a military installation died). In particular, there is concern that a field investigation might be used to avoid the complex procedures of a facility investigation.

The question of the right to technical cooperation and development as part of arms control or disarmament treaties has been a politically sensitive issue since the 1968 Non-Proliferation Treaty. Article X of the BTWC deals with opportunities for technology transfers and technical cooperation for peaceful purposes among states parties and requests parties to implement the convention in a manner that does not hamper the economic development of other parties. Article VII of the draft protocol attempts to implement the commitment. However, the discussions remain closely tied to the debate on the role of export controls, and of the Australia Group (AG) in particular, under the future BTWC regime. To a certain extent, the experience of implementing the CWC has reinforced the convictions of the opposing sides in the debate: certain developing countries argue that the AG participants have not changed their export control regulations since the entry into force of the CWC, despite a treaty obligation to review them (several AG participants have in fact reviewed their national export control regulations and concluded that they conform to their CWC obligations), while industrialized states note that many

parties have not yet enacted national legislation to implement the CWC, making it impossible to track transactions in accordance with it.

Speedy international agreement on verification and confidence-building measures for the BTWC is imperative before developments in biotechnology turn biological weapons into controllable battlefield weapons. The manner in which the international community meets these challenges in the near future will determine the strength and future of the BW disarmament regime.

#### IV. The elimination of CBW in Iraq

Following the Gulf War, when an international coalition expelled the Iraqi forces from Kuwait, the UN Security Council adopted Resolution 687 on 3 April 1991. The resolution was, in effect, a conditional ceasefire, outlining an extensive plan for the disarmament of Iraq. Part C of the resolution, which covered non-conventional weapons, required Iraq unconditionally to destroy and to undertake never to use, develop, construct or acquire non-conventional weapons or ballistic missiles with a range greater than 150 km. The resolution also dealt with the return of stolen property, accounting for Kuwaiti troops and civilians missing in action, a border settlement, reparations, terrorist acts and the imposition of sanctions against Iraq for non-compliance.

On 19 April 1991 the Security Council set up UNSCOM and charged it with verifying Iraq's compliance with Resolution 687 in respect of its non-conventional weapon programmes. UNSCOM had two basic functions: to inspect and oversee the destruction or elimination of Iraq's CBW and ballistic missile capabilities and their production and storage facilities; and to monitor Iraq over the longer term to ensure continued compliance. The task of inspecting, destroying and removing all of Iraq's nuclear weapon capabilities was assigned to the International Atomic Energy Agency (IAEA). A regime of sanctions was maintained to ensure Iraq's compliance with the provisions of the resolution.

All the UNSCOM activities in Iraq were suspended in 1998, following a year filled with incidents and stand-offs. At that time, after more than seven years of inspections and supervised destruction of large quantities of prohibited weapons, UNSCOM was still not able to certify that it knew the full extent of Iraq's CBW programmes nor that Iraq was fully disarmed of its non-conventional weapons. UNSCOM ceased to exist in 1999. The demise of UNSCOM was a long-drawn-out process involving the systematic obstruction of the UNSCOM inspections by Iraq and highly charged political altercations among the permanent members of the Security Council, which Iraq was able to exploit to its advantage. In an effort to revive the disarmament process, the Security Council adopted Resolution 1284 on 17 December 1999, which among other things replaced UNSCOM with UNMOVIC. The ability of this new organization to carry out its mandate was widely doubted from the beginning. UNMOVIC did not enjoy the full support of the Security Council

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as several members—China, France, Malaysia and Russia—had abstained from voting on Resolution 1284. Moreover, Iraq declared that it was not prepared to cooperate with UNMOVIC and has continually stated that it will not allow any inspections as long as the sanctions against it are maintained. After several months of organizational build-up UNMOVIC announced in August 2000 that it was ready to begin work in Iraq. At the time of writing there is no indication that Iraq will agree to inspections, and the Security Council appears reluctant to step up pressure on Iraq to cooperate with UNMOVIC. Should Iraq decide to cooperate, there are still serious questions as to whether UNMOVIC will be able to complete UNSCOM's tasks. Iraq has not been inspected or monitored since December 1998. UNMOVIC will have to redo all of UNSCOM's work, as Iraq is known to have moved material, equipment and files. This will include the highly confrontational no-notice inspections of sensitive sites. Since 1991 Iraq has perfected its concealment operations.

It has been known since the 1980–88 war with Iran that Iraq was producing large quantities of CW, including mustard agent, tabun and sarin. However, so far no full accounting of the CW programme has been possible. First, Iraq had removed CW, equipment and materials from the main site of the al-Muthanna State Establishment before the first UNSCOM inspection team arrived in Iraq, and a full accounting of these materials has not been forthcoming. Second, Iraq claims that it has destroyed considerable amounts of chemical munitions, agents and precursors unilaterally, a claim that has remained impossible to fully verify because of the lack of documentation. In 1997 UNSCOM found new evidence that Iraq had developed a production capability for VX, the most toxic nerve agent in military arsenals. Iraq had obtained at least 750 tonnes of VX precursor chemicals, and many more tonnes remain unaccounted for. UNSCOM inspectors were reportedly closing in on this programme when the stand-off between Iraq and the UN Security Council started in the autumn of 1997.

Iraq may have produced up to 10 billion doses of anthrax, botulinum toxin and aflatoxin. Anthrax, a highly infectious bacterium, and botulinum toxin, one of the most toxic known substances, are among the most likely candidates for biological warfare agents. The discovery that Iraq was conducting research on aflatoxin, not a traditional BW agent, was surprising. Because it is a carcinogen, the effects of which would manifest themselves only after many years, several Western experts have speculated that the Iraqi programme was intended for purposes of genocide. If it were used against the Kurds, for example, it would be almost impossible to prove biological warfare at the time the symptoms appeared. The Iraqi research programme also focused on other agents—camel pox, gas gangrene, plague, and so on—and included animal testing and (on the basis of circumstantial evidence collected by UNSCOM) possibly human testing. This is still one major issue that requires clarification. It is possible that Iraq has hidden quantities of freeze-dried organisms from its BW programme and would be able to resurrect its research and production

**Table 29.1.** Chemical weapons in Iraq, as of January 1999

Iraqi declarations				UNSCOM findings				
A. Type of weapon or equipment	B. Holdings as of Jan. 1991	C. Amount destroyed in 1991 Persian Gulf War	D. Unilateral destruction	E. Amount of C accounted for	F. Amount of D accounted for	G. Destruction under UNSCOM supervision	H. Other	I. Discrepancy
Special munitions <sup>a</sup>	127 941 <sup>b</sup>	41 998	29 662	± 34 000	13 660	40 048	16 263 <sup>c</sup>	± 23 970
<i>Bulk CW agent (tonnes)</i>								
Mustard	295.0					295.0		
Tabun	76.0					76.0		
Sarin and its mixtures	40.0					40.0		
VX	1.5		1.5					1.5
<b>Total</b>	<b>412.5</b>		<b>1.5</b>			<b>411.0</b>		<b>1.5</b>
CW precursor chemicals (tonnes) <sup>d</sup>	3 915 (5 650) <sup>e</sup>	823	242	823 <sup>f</sup>	153 <sup>g</sup>	2 610 <sup>h</sup>	200 + 40 <sup>i</sup>	129–40 <sup>j</sup> (1 864–40) <sup>k</sup>
CW production equipment	553	152 <sup>l</sup>		75		405 <sup>m</sup>	– <sup>n</sup>	73 <sup>o</sup>

<sup>a</sup> Includes aerial bombs, artillery shells, rockets and missile warheads for both chemical and biological warfare agents.

<sup>b</sup> Including 28 615 munitions filled with chemical or biological warfare agents.

<sup>c</sup> The UNSCOM report states that '16 263 munitions were not destroyed, but nevertheless accounted for by UNSCOM. These include 15 616 unfilled munitions which were converted by Iraq for conventional weapons purposes in 1993–94. These also include 438 filled munitions destroyed, according to Iraq, during a fire accident'. A further 2 munitions were removed for analysis outside Iraq. The report gives no explanation for the remaining 207 munitions. However, it adds that the 'numerical discrepancy of several hundred munitions in the overall accounting can be attributed to minor deviations in physical counting of large piles of weapons'. Letter dated 27 January 1999 from the Permanent Representatives of the Netherlands and Slovenia to the United Nations addressed to the President of the Security Council, UN document S/1999/94, 29 Jan. 1999, appendix 2, 'Status of the verification of Iraq's chemical weapons programme', para. 10 (a) and table 1, col. 3, rows 5, 12.

<sup>d</sup> Comprises unused chemicals for chemical weapon production, which require separate accounting.

<sup>e</sup> Iraq declared that it had produced or procured a total of 20 150 tonnes of precursor chemicals and consumed 14 500 tonnes in the production of chemical warfare agents, leaving 5650 tonnes to be accounted for. UN document S/1999/94, 29 Jan. 1999, appendix 2, para. 18. According to Iraq, this variance with the officially declared amount of 3915 tonnes can be attributed to the lack of sufficient information on the actual deliveries by former

suppliers, the consumption of precursors in the production of chemical warfare agents and losses as a consequence of unsuitable storage, spillage, leakage, and so on. UN document S/1999/94, 29 Jan. 1999, appendix 2, para. 20.

<sup>f</sup> UNSCOM confirmed the destruction qualitatively but was not able to make a quantitative verification. UN document S/1999/94, 29 Jan. 1999, appendix 2, para. 21.

<sup>g</sup> UNSCOM found evidence of destruction of additional amounts of precursor chemicals but was unable to verify the quantities.

<sup>h</sup> 2814 tonnes according to the addition of the figures related to the destruction under UNSCOM supervision in UN document S/1999/94, 29 Jan. 1999, appendix 2, table 3, col. 6.

<sup>i</sup> UNSCOM released 200 tonnes of precursor chemicals for civilian use under its supervision. Furthermore, UNSCOM reports that 'tens of tonnes were consumed by Iraq in the 1990s for civilian purposes under UNSCOM supervision'. UN document S/1999/94, 29 Jan. 1999, appendix 2, table 3, col. 6, row 11. As UNSCOM was able to fully account for 2850 tonnes, of which 2610 tonnes were destroyed and 200 tonnes released under its supervision, this Iraqi consumption of precursors is 40 tonnes. UN document S/1999/94, 29 Jan. 1999, appendix 2, para. 21.

<sup>j</sup> Calculation based on available figures as exact quantitative accounting of the precursor chemicals destroyed during the Persian Gulf War and unilaterally by Iraq is impossible. The origin of the amount of 40 tonnes is explained in note i.

<sup>k</sup> Calculation based on amounts accounted for by UNSCOM. The origin of the amount of 40 tonnes is explained in note i.

<sup>l</sup> Calculation based on Iraq's total declarations minus pieces of equipment destroyed under UNSCOM supervision. UN document S/1999/94, 29 Jan. 1999, appendix 2, table 4, cols 2, 3.

<sup>m</sup> According to the other calculations (see SIPRI Yearbook 2000, appendix 9B) the figure should be 401. UN document S/1999/94, 29 Jan. 1999, appendix 2, table 4, col. 3.

<sup>n</sup> Several tens of pieces of equipment were buried under the debris of production buildings destroyed in the Gulf War.

<sup>o</sup> The discrepancy may be explained in part or whole by the destruction of the equipment during the Gulf War. The amount would be 76 if based on the figure in note m.

Source: Letter dated 27 January 1999 from the Permanent Representatives of the Netherlands and Slovenia to the United Nations addressed to the President of the Security Council, UN document S/1999/94, 29 Jan. 1999.

**Table 29.2.** Biological weapons in Iraq, as of January 1999

Iraqi declarations			UNSCOM findings <sup>a</sup>
Type of weapon or equipment	Amount declared in 'full, final and complete disclosures' (FFCDs)	Material balances	Assessment of Iraqi declarations
Al-Hussein missile warheads (BW)	25	All destroyed unilaterally	Not supported by conclusive evidence
<i>Warhead fillings<sup>b</sup></i>			Analysis of samples from excavated remnants of warhead containers does not support FFCDs; locations of remnants are inconsistent with FFCDs; consequently, there are major doubts about the accounts of weapon fillings, deployment and subsequent destruction
Botulinum toxin	16		R-400 declaration changed several times; account in the 1997 FFCD was incomplete and inaccurate according to review by international experts
Anthrax spores	5		Only partial verification of destruction of bombs
Aflatoxin	4		
R-400 aerial bombs (BW)	200	157 filled and 43 unfilled bombs destroyed unilaterally	
<i>Bomb fillings</i>			
Botulinum toxin	100		No validation of data in Iraq's declarations; 12 more drop tanks may have been modified for BW use; there was verification of destruction of 3 drop tanks by Iraq but no physical evidence to support Iraq's claim that 1 drop tank was destroyed in the war
Anthrax spores	50		
Aflatoxin	7		
Aircraft drop tanks <sup>c</sup>	4	1 destroyed in the 1991 air campaign; 3 destroyed unilaterally by Iraq	

Aerosol generators	June 1996 FFCD includes description of devices but does not state number produced; production of 12 aerosol generators acknowledged in interviews with Iraqi personnel	No Iraqi declaration about disposal	Aerosol generators have not been accounted for
Mobile storage tanks for agents	47	Unknown number destroyed, but not specified whether unilaterally or in Persian Gulf War <sup>d</sup>	Remnants of c. 22 destroyed tanks turned over to UNSCOM; remnants of 2 more tanks found; rest unaccounted for
Bulk botulinum toxin <sup>e</sup>	19 180 l.	10 820 l. filled in missile warheads and bombs; 499–569 l. used in field trials; 118 l. wasted in handling; 7665–7735 l. destroyed unilaterally	Iraq's statements unsupported; unable to verify amount of botulinum toxin produced; unable to verify Iraq's material balance
Bulk anthrax spores	8 445 l./	4975 l. filled in missile warheads and bombs; 52.2 l. wasted in handling; 3412 l. destroyed unilaterally	Statements in 1997 FFCDs unsupported; unable to verify amount of anthrax produced; unable to verify Iraq's material balance
Bulk aflatoxin	2 200 l.	1120 l. filled in missile warheads and bombs; 231–301 l. used in field trials; 30.5 l. wasted in handling; 900–970 l. destroyed unilaterally	Statements in 1997 FFCDs unsupported; unable to verify amount of aflatoxin produced; unable to verify Iraq's material balance
Bulk <i>Clostridium perfringens</i>	340 l.	338 l. unilaterally destroyed	Neither figure verified
Bulk ricin	10 l. (produced from 100 kg castor beans)	All used in field trials	Neither figure verified
Bulk wheat cover smut	Not quantifiable	All unilaterally destroyed	Neither declaration verified
Growth media	--		Generally unable to verify the figures <sup>f</sup>
Casein	17 554 kg	7074 kg used in botulinum toxin production; 145 kg lost or wasted; 10 335 kg destroyed under UNSCOM supervision	Minimum of 460 kg unaccounted for based on UNSCOM importation data
Thioglycollate broth	6 036 kg	4130 kg used in botulinum toxin production; 58 kg lost or wasted; 1848 kg destroyed under UNSCOM supervision	Minimum of 80 kg unaccounted for based on UNSCOM importation data

Iraqi declarations			UNSCOM findings <sup>a</sup>
Type of weapon or equipment	Amount declared in 'full, final and complete disclosures' (FFCDs)	Material balances	Assessment of Iraqi declarations
Yeast extract	7 070 kg	1964 kg used in botulinum toxin, anthrax and <i>Clostridium perfringens</i> production; 15 kg lost or wasted; 4942 kg destroyed under UNSCOM supervision	Minimum of 520 kg unaccounted for based on UNSCOM importation data
Peptone	1 500 kg	45 kg used in <i>Clostridium perfringens</i> production; 705 kg lost or wasted; 625 kg destroyed under UNSCOM supervision	Minimum of 1100 kg unaccounted for based on UNSCOM importation data

<sup>a</sup> All declarations by Iraq in the FFCDs were repeatedly rejected by UNSCOM and panels of international experts in Sep. 1997, Mar. 1998 and July 1998.

<sup>b</sup> UNSCOM found 7 missile warheads with traces of anthrax as opposed to the 5 declared. Confronted with this evidence, Iraqi officials claimed that they had confused the numbers of BW warheads. In July 1998 Iraq stated to an UNSCOM team that, instead of the declared numbers, there had, in fact, been 16 anthrax missile warheads and 5 botulinum toxin missile warheads. Interview with UNSCOM official, Munich, 25 Oct. 1999; and Letter dated 27 January 1999 from the Permanent Representatives of the Netherlands and Slovenia to the United Nations addressed to the President of the Security Council, UN document S/1999/94, 29 Jan. 1999, appendix 3, section 'Al-Hussein missile warheads'.

<sup>c</sup> Iraq was also developing a pilotless aircraft to carry the drop tanks.

<sup>d</sup> The UNSCOM report does not state whether the Iraqi declaration specified how destruction took place—unilaterally or in the Persian Gulf War.

<sup>e</sup> UNSCOM data only give the volume of bulk agents but not the concentration of the agent in the mix; it is therefore impossible to give the approximate weight of the biological warfare agents.

<sup>f</sup> Based on statements by Iraqi officials, UNSCOM inspectors calculated the following conversion equation for the anthrax bombs: 100 l. of filling = 140 kg (density = ± 1.4), containing 1.2% dried anthrax spores. Per 100 l. there would thus be 1.68 kg of agent. Treven, T., *Saddam's Secrets: The Hunt for Iraq's Hidden Weapons* (Harper Collins: London, 1999), p. 318. On the basis of this equation, Iraq may have produced approximately 141.9 kg of anthrax spores.

<sup>g</sup> Iraq did not report all the growth media that UNSCOM knows it imported. The figures on growth media used in the production of biological warfare agents are derived from estimates of how much agent was produced. According to the Jan. 1999 UNSCOM report, these figures are the result of a theoretical calculation and have little supporting evidence. There are also substantial uncertainties about the amounts declared as lost or wasted.

Source: Letter dated 27 January 1999 from the Permanent Representatives of the Netherlands and Slovenia to the United Nations addressed to the President of the Security Council, UN document S/1999/94, 29 Jan. 1999.

programme quickly. A variety of BW delivery systems were developed—including 155-mm artillery shells, 122-mm rockets, 166 aircraft bombs and 25 warheads for the al-Hussein ballistic missile—for aflatoxin, anthrax and botulinum toxin, the main BW agents discovered by UNSCOM. An experimental spray tank converted from drop tanks was also developed, which would have held 2000 litres of anthrax. The delivery systems may still have been primitive and therefore ineffective, but development was well under way. Tables 29.1 and 29.2 present an overview of Iraq's declarations regarding CBW and of UNSCOM's findings and estimates of weaponry and equipment that still remain unaccounted for.

The experience of UNSCOM is unique in the history of arms control and disarmament. The UN Security Council mandate created the most intrusive verification regime ever: UNSCOM was given extraordinary authority, privileges and access within Iraq. UNSCOM failed in spite of these provisions and this has potential long-term implications. The Security Council proved unable to deal with a blatant and determined violator of its own rules as well as the generally accepted norms against the acquisition, possession or use of chemical, biological and nuclear weapons. For major disarmament treaties, such as the CWC or the BTWC, the Security Council is the ultimate arbiter in the case of material breaches. The experience of UNSCOM raises serious doubts about its ability or willingness to uphold fundamental norms in the name of the international community in the case of a determined and persistent violator. Few cases will be as clear-cut as that of Iraq.

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