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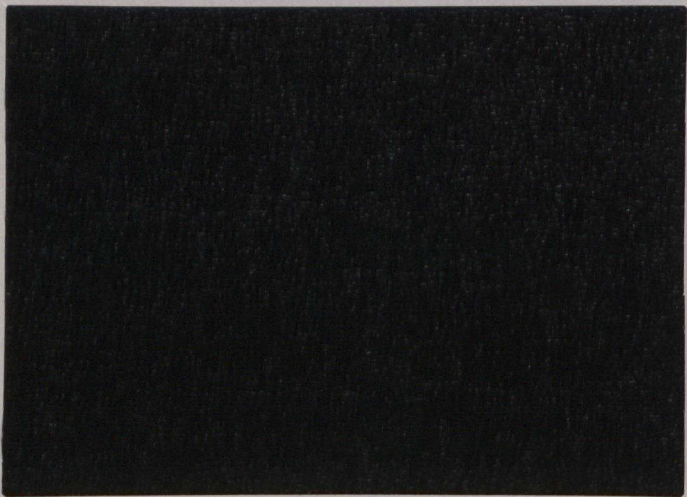
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WORKING PAPER 25

**THE CONTROL OF CHEMICAL AND  
BIOLOGICAL WEAPONS (CBW):  
STRENGTHENING INTERNATIONAL  
VERIFICATION AND COMPLIANCE**

Summary of a Conference held in Toronto  
4-5 April 1989  
by Dianne DeMille

July 1990



PREFACE

Institute for Peace and Security Working Papers, the result of research work in progress at the beginning of a conference, are often intended for later publication by the Institute or another publisher, and are regarded by the Institute to be of immediate value for discussion in limited numbers - mostly to specialists in the field. The opinions expressed in the papers are those of the participants and do not necessarily represent the views of the Institute and its Board of Directors.

The author, Dianne DeMille, was, at the time of the writing of this report, an editor on staff at the Institute.

Dept. of External Affairs  
Min. des Affaires extérieures

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## PREFACE

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## CONDENSÉ

Des armes chimiques ont été utilisées dans la Guerre du Golfe. Certains pays du Moyen-Orient ont indiqué clairement leur intention de constituer des stocks d'armes chimiques pour dissuader Israël de lancer contre eux les armes nucléaires qu'il aurait, dit-on. Ajoutés à d'autres événements récents, ces incidents ont conféré un certain caractère d'urgence aux pourparlers multilatéraux visant une interdiction des armes chimiques.

La Conférence de Paris sur l'interdiction des armes chimiques a été convoquée en 1989 avec un délai de préavis assez court, et les participants ont été nombreux, ce qui témoigne à quel point on est conscient, dans le monde entier, de l'insuffisance des règlements actuels en matière de limitation des armements chimiques. Les États qui ont pris part à la Conférence ont exhorté les délégués à la Conférence du désarmement (CD), à Genève, à redoubler d'efforts pour élaborer une convention sur les armes chimiques.

En 1988, huit organisations non gouvernementales canadiennes, sous la présidence de Walter Dorn, ont formé le Groupe de travail international de surveillance et de vérification.\* L'un des objectifs de ce Groupe consiste à faire prendre conscience au public de l'importance que revêt la vérification de certains traités internationaux (dont les traités faisant intervenir des armes biologiques et chimiques) et de la difficulté que présente cette vérification. C'est la raison pour laquelle les membres du Groupe ont décidé d'organiser un atelier public et un débat avec des orateurs invités.

Le Groupe de travail s'est également fixé comme objectif d'approfondir les connaissances dans ce domaine. On a donc mis sur pied un atelier réservé aux spécialistes, qui se sont attaqués aux problèmes les plus complexes auxquels sont confrontés les rédacteurs de la future convention sur les armes chimiques. Des représentants de l'ONU, de l'URSS, des É.-U., d'Europe et du Moyen-Orient se sont réunis pour voir quels étaient les principaux obstacles techniques, politiques et économiques à l'élaboration d'une convention sur les armes chimiques.

Troisième objectif du Groupe de travail, transmettre des connaissances spécialisées aux gouvernements et aux instances internationales compétentes. On espérait que l'atelier organisé à l'intention des spécialistes permettrait de formuler un certain nombre de recommandations précises qui pourraient être adressées au gouvernement canadien, aux délégués de la CD et à d'autres organisations multilatérales ayant un intérêt dans ce domaine.

Ainsi, le Groupe de travail a organisé un forum d'éducation publique pour donner un certain nombre d'informations historiques et techniques sur le sujet, un débat ouvert au cours duquel le public a pu poser des questions à certains spécialistes et un atelier réservé aux experts, qui a été l'occasion de discuter de certains points plus techniques. L'atelier final a été divisé en petits groupes de discussion, chacun d'entre eux ayant rédigé une recommandation en bonne et due forme sur la façon dont nous pourrions progresser sur le chemin de l'élaboration d'une convention sur les armes chimiques.

Ce rapport résume les délibérations de chacune de ces réunions. Il ne se veut pas une transcription intégrale ou partielle. L'auteure a plutôt essayé d'exprimer en ses propres termes ce qui lui avait paru être les thèmes principaux de la conférence.

Vous trouverez aux annexes I et II certains documents plus techniques sur les agents de la guerre chimiques et sur leurs moyens de détection. Les autres annexes contiennent des documents qui pourraient utilement compléter le texte.

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\* Les huit organisations membres du Groupe de travail sont les suivantes : Science et paix, Mouvement canadien pour une fédération mondiale, Anciens combattants contre les armes nucléaires, Avocats en faveur d'une conscience sociale, Institut Dundas de recherche sur la paix, Engineers for Nuclear Disarmament, le Groupe des 78 et la Voix des femmes.



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## GLOSSARY OF TERMS AND ACRONYMS

- aerosol: the suspension of tiny droplets of liquid or solid particles which can travel through the air for some distance before falling to earth
- agent: refers to a chemical or biological substance which can be used in warfare; in some definitions, an agent does not become a weapon until it is placed within a munition or delivery system
- asphyxiating: refers to agents which interfere with breathing and cause death or incapacitation of the victim
- binary weapons: chemical weapons comprised of two substances which are harmless if kept separate, but which become harmful or lethal upon mixing
- BWC: Biological Weapons Convention; first signed in 1972; entered into force in 1975; next review in 1991
- CBW: Chemical and Biological Weapons
- CD: Conference on Disarmament; a multilateral negotiating forum which meets in Geneva; forty nations participate under the auspices of the United Nations
- CW: Chemical Weapons
- CWC: Chemical Weapons Convention; currently being negotiated at the CD; a ban on development, production and stockpiling of chemical weapons
- GP: Geneva Protocol; first signed in 1925; see Appendix III
- Halabja: Iraqi village near border with Iran; subjected to CW attack by Iraqi government in March 1988; village was populated by Iraqi Kurds
- IAEA: International Atomic Energy Agency; established in 1957; verifies compliance with the NPT
- NPT: Non-Proliferation Treaty; instrument to halt the spread of nuclear weapons; first signed in 1968; entered into force in 1970
- OPCW: Organization for the Prohibition of Chemical Weapons; an "international authority," similar to the IAEA, to be set up under the CWC for the verification of compliance with the convention

- precursor: a chemical which can be used as the basis for the production of a chemical warfare agent
- simulant: a chemical agent or biological lifeform that can be used in CBW research in place of a noxious agent. It is chosen because it has similar properties but is not as harmful.
- toxin: a poisonous substance produced by a bacteria, fungus or the like, which can be used as an agent in warfare.

## INTRODUCTION

Chemical weapons were used in the Gulf War. Some Mid-East nations have stated explicitly that they intend to stockpile chemical weapons as a deterrent to the presumed Israeli nuclear capability. These and other recent events have engendered a sense of urgency at the multilateral talks aimed at banning chemical weapons.

The 1989 Paris Conference on the Prohibition of Chemical Weapons was convened on short notice and was well attended, reflecting the worldwide concern about the current inadequate constraints on chemical warfare. States attending the Paris Conference urged the delegates to the Conference on Disarmament (CD) in Geneva to intensify their efforts to formulate a verifiable Chemical Weapons Convention (CWC).

In 1988, eight Canadian non-governmental organizations, under the chairmanship of Walter Dorn, formed the Working Group on International Surveillance and Verification.<sup>1</sup> One of its goals is to increase public awareness of the importance and the difficulty of verifying certain international treaties, including those involving chemical and biological weapons (CBW). For this purpose, they decided to hold a public seminar and panel discussion.

Another goal of the Working Group is to advance expert knowledge in the field. To this end, an experts' workshop was also organized, to grapple with some of the knottier problems facing the drafters of the CWC. Representatives from the UN, the USSR, the US, Europe, and the Middle East came together to discuss the question: What are the major technical, political and economic hurdles in the way of a CWC?

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<sup>1</sup> The eight member organizations of the Working Group are: Science for Peace, World Federalists of Canada, Veterans Against Nuclear Arms, Lawyers for Social Responsibility, Peace Research Institute--Dundas, Engineers for Nuclear Disarmament, Group of 78, and the Voice of Women.

A third objective of the Working Group is to communicate expert knowledge to governments and relevant international bodies. From the experts' workshop it was hoped that some useful, specific recommendations would emerge which could be sent to the Canadian government, the delegates at the CD, and other multilateral organizations with an interest in this field.

Thus, the Working Group organized a Public Education Forum to provide some historical and technical background on the subject; an Open Panel Discussion, where the public could direct questions at some of the experts; and an Experts' Workshop, where some of the more technical details could be discussed. The final Workshop broke up into small Discussion Groups and each of these came up with a Formal Recommendation on how we might make progress toward a Chemical Weapons Convention.

This report summarizes the presentations and other contributions by participants at each of these gatherings. It is not intended as a transcript, in whole or in part. Rather the author has put into her own words what she judged to be the key themes of the conference. Some of the more technical material on chemical warfare agents and their detection will be found in Appendices I and II. Other appendices contain documents that may provide useful supplements to the text.

## OVERVIEW: THE USE AND CONTROL OF CHEMICAL AND BIOLOGICAL WARFARE

### BIOLOGICAL WARFARE: ITS USE AND CONTROL UNDER THE BWC

Arthur Forer, of the Department of Biology at York University, discussed the nature of biological weapons (BW). He defined biological warfare as the use of living material -- funguses, bacteria, viruses -- to cause deleterious effects in enemy troops during war. Biological agents have no immediate effect because they have a lengthy incubation time. The amount of the delay has to be acceptable to make a particular agent acceptable for use in war. The goal is to cause disease in humans, or in animal stocks and food crops.

From a US Army training manual, published in the 1960s, the objective of BW was to "weaken or destroy the target group's ability to wage war." Brigadier Rothschild, in a 1964 book entitled, *Tomorrow's Weapons*, cited the advantage of BW over more conventional arms: "the costs are lower." Spreading the material in aerosols -- tiny droplets suspended in air -- became the preferred method of dispersal. The trick was to incapacitate or kill enemy soldiers, without having your own troops contract the disease. It was helpful if it were a disease for which your own soldiers were immunized, but not if the enemy troops were also immunized against the same disease.

Thus, these became the three main areas of BW research:

How does the agent behave in aerosol form?

How can it be disseminated effectively?

How can your own troops be protected?

Forer's discussion of BW research in Canada is included in the second section following, on Canadian Issues.

\* \* \*

Barbara Hatch Rosenberg, of the Memorial Sloan-Kettering Cancer Centre in New York, gave a brief history of the development of biological warfare. She then summarized

the terms of the 1972 Biological Weapons Convention (BWC) and emphasized the importance of developing rapid, expert investigations into any allegations of use.

### Recent Developments in Biological Warfare

After World War II, research into BW continued into the 1950s. In 1955, however, the UK began to close down its BW production facilities and to destroy its stockpiles. Unfortunately, the US did not follow its lead. During the Korean War, China and North Korea accused the US of using BW. There was no adequate investigation of this allegation, and thus the issue was never resolved.

In the 1970s, the US Army attempted to develop a strain of bacteria which was resistant to all the major antibiotics possessed by the other side, but not resistant to some of the new antibiotics that the US had developed. It is not difficult to appreciate the danger posed to public health of releasing bacteria which are resistant to a wide range of the cheapest, most easily available antibiotics.

Beginning in 1969, President Nixon requested a review of BW policy. As a result of that review, the US unilaterally renounced biological weapons and ceased all offensive BW research. In 1971, the US began destroying its BW stockpiles. The weapons were considered "unpredictable and uncontrollable." In addition, their military usefulness was limited because they could not be used to destroy the weapons of the adversary.

### The Biological Weapons Convention

The 1972 Biological Weapons Convention (BWC) bans the development, stockpiling and use of BW indefinitely. Originally, this treaty was to have included CW, but many nations considered a complete ban on chemical weapons to be unverifiable. In addition, it was argued that possession of CW was necessary for deterrence.



The BWC, said Dr. Rosenberg, came just in time. In 1972, the discovery of restriction enzymes made possible the new field of genetic engineering, also referred to as recombinant DNA technology. At the 1980 BWC Review Conference, some delegates expressed the fear that this new technology might not be covered by the treaty. However, the Conference confirmed that the BWC would apply to this new area of biology as well.

Forer cautioned, though, that the trade journals run many advertisements, paid for by the US Army, seeking skilled technicians in the field of recombinant DNA technology. In the opinion of Forer, this new field provides a potential for the development of many novel biological agents. In addition, the different genetic backgrounds of different ethnic groups means that, theoretically, it may be possible to develop agents which are specific for the 'marker' genes of another ethnic group. The possibility of such weapons are already being written about in various military journals.

### Investigating Allegations of Use

In 1979, there was an outbreak of anthrax near Sverdlovsk in the Soviet Union, which, the US claimed, had resulted from the accidental release from a stockpile of the biological agent. No international inspections were undertaken at the time and so the real cause of the outbreak will never be known with certainty. "This is why it is essential," said Dr. Rosenberg, "to have the means for international verification, including on-site inspections."

In 1981, the US accused Vietnam of using Yellow Rain in its war against Cambodia. The US charged that the USSR had provided Vietnam with trichothecene mycotoxins. The USSR denied the charge.

Dr. Matthew Meselson, a Harvard professor of biology, published a series of papers on this debate. His study has shown quite conclusively, said Rosenberg, that the samples retrieved consisted mainly of the excreta of honey bees. Some analysts speculated that the pollen, which forms the bulk of bee excreta, had become mouldy and that the mould had

produced the toxin. In their estimation, there had never been any use of toxin weapons by Vietnam.

As agreed at the Second BWC Review Conference held in 1986, states party to the BWC convened a meeting of experts. The purpose of this meeting was to attempt to define modalities to carry out the confidence building measures agreed at the Review Conference.

\* \* \*

There may be lessons to be learned from the implementation of the BWC that can be applicable to the creation of an effective convention on chemical weapons.

## HISTORICAL OVERVIEW OF CHEMICAL WARFARE

Dr. Richard Kapp, who teaches history at Ryerson Polytechnical Institute in Toronto, presented an overview of the history of the use of chemical weapons and the various attempts to control chemical warfare (CW) in the twentieth century.

### Early Efforts at International Diplomacy

Before WWI, there were some efforts to prohibit the use of CW. For instance, in 1899, an international conference was held in the Hague for the purpose of reducing the use of force among nations. In one of the declarations that emerged, the signatories agreed to "abstain from the use of projectiles the sole object of which is the diffusion of asphyxiating or deleterious gases." The follow-up conference of 1907 reaffirmed this particular declaration, but did not take steps to establish enforcement machinery.

### World War I and Chemical Warfare

During the First World War, the unexpected deadlock produced by trench warfare was a frustration for military leaders. Poison gases were deployed by both sides in an

attempt to overcome this impasse. In 1915, the French used tear gas against German troops. On 22 April 1915, Germany unleashed a new weapon, chlorine gas, using it against French troops along the Western Front. This first attack proved very successful: a huge gap was produced in the Allied defensive line. About five thousand soldiers were killed by asphyxiation. The lining of their bronchial tubes and lungs became inflamed and produced so much fluid that the soldiers drowned in their own mucus.

However, a second attack on the Allied line, this time against Canadians, failed because the defenders wrapped their faces in towels and handkerchiefs soaked in their own urine. In subsequent attacks, the Germans did not take into account changing wind conditions; hence, there were casualties among the attacking forces.

The Allies rapidly developed their own CW capabilities, producing chlorine and other gases. Because all armies developed an adequate defensive capability, the early German advantage in CW was fleeting. In the international propaganda war, Britain was able to capitalize on Germany's first use of chlorine gas. Accused of barbarism, Germany lost support among the neutral nations. In spite of these problems, German CW technology became increasingly sophisticated over the next three years. Forty-five new agents were created, including phosgene and mustard gas. By the summer of 1918, fifty percent of Germany's artillery munitions contained chemical agents.

The Allies retaliated; combinations of toxic materials were tried. There was a rapid escalation of delivery systems, with the development of new mortars and artillery pieces. Strategic use of CW against civilian populations was considered but was rejected for a combination of moral, technical, and political reasons.

During World War I, the use of chemical weapons resulted in about one million casualties, ten percent of which were fatal. That one million represents less than four percent of the total number of casualties which occurred during this war. Thus, the vast majority of deaths and maimings were due to conventional weapons. Furthermore, the use of chemical weapons did not win a single battle.

Kapp asked the question: Why do we feel such an aversion to this form of warfare? Part of the answer, he said, is that poison gases cause unnecessary suffering, out of all proportion to their efficacy as military weapons. But beyond this simple calculation, there is something deeper, an affront to what we might call "chivalry" or "martial virtue". Chemical weapons reduce a soldier to the level of an exterminator. And the vermin he is exterminating are not only soldiers, but civilians -- sometimes his own countrymen.

### Developments Between the World Wars

After the war, the great powers maintained the CW facilities that they had developed during the war, and other states decided to develop their own CW capacity. However, beginning at the 1918 armistice, there arose a campaign to control chemical weapons. Public outrage linked CW with the hideous devastation of WWI. Governments were compelled to pay lip service at least, to the notion of prohibiting these weapons.

The 1918 Versailles peace treaty described chemical weapons as a prohibited form of warfare. Germany was banned from manufacturing or importing CW. In 1922, the US sponsored the conference leading to the Washington Naval Treaty, which was an attempt to generalize this prohibition. Article V of that Treaty states that CW have been "justly condemned by the general opinion of the civilized world," and that the prohibition of such weapons should be "universally accepted as a part of international law." However, France refused to ratify the treaty, for reasons other than Article V. It was feared that the momentum towards CW prohibition would decrease.

Fortunately, in 1925 the League of Nations seized the initiative by sponsoring a Geneva conference to discuss, among other things, ways of preventing the trade in toxic gases. The delegates could not agree on this issue. Those nations without facilities of their own argued that, if attacked with CW, they would have no alternative but to import these weapons from another country in order to retaliate.

As an interim step, the delegates decided simply to reaffirm Article V of the earlier Washington Naval Treaty, with the addition of a restriction on bacteriological agents. The resulting document, banning the use of chemical and bacteriological weapons, is usually referred to as the 1925 Geneva Protocol. (See Appendix IV.)

The Geneva Protocol has a number of shortcomings. Many countries -- including Canada -- ratified the document subject to certain reservations. For example, the ban would not apply in relations with countries which had not signed the Protocol. More important, countries reserved the right to retaliate if attacked with chemical or bacteriological weapons.

Riot control agents such as tear gas were not included. The document said nothing about verification, nor about penalties to be imposed for non-compliance. There was no ban on developing, producing and stockpiling these weapons. The Geneva Protocol is simply a ban on use, and, for many states, solely a ban on first use.

The US Senate bowed to lobbying by the chemical industry and refused to ratify the document at all. Cautious about the intentions of the US, its potential adversary, Japan also declined to ratify the Protocol.

In the World Disarmament Conference of 1932-1934, diplomats attempted to rectify the shortcomings of the 1925 document. The UK proposed a permanent disarmament commission which would have limited investigative powers so that inspectors could go into a country and examine what the chemical companies were doing.

At that time, the climate in international relations was deteriorating. The US and the UK especially wanted positive results from this conference. They were willing to forgo their own preparations to develop chemical and bacteriological weapons in order to draw other nations into signing an agreement. However, the insuperable obstacle to an agreement was the proposal for collective security.

Many nations wanted a guarantee that, if any one of them were attacked with chemical or bacteriological weapons, the other signatories would mount a joint response against the aggressor or aggressors. It was hoped that such a guarantee of collective retaliation would act as a deterrent.

The US and the UK refused to agree to specific sanctions in advance and further progress was blocked. In 1933, Nazi Germany withdrew from the conference. In 1935, Italy invaded Abyssinia (now Ethiopia). Although Italy had signed the Geneva Protocol in 1925 and ratified the agreement in 1928, there was ample proof that Italy had used mustard gas in its attack against Abyssinia. In spite of this proof, the League of Nations was unable to take collective action, mainly because the UK and France wanted to maintain good relations with fascist Italy.

The great powers decided to stockpile CW for the purpose of deterrence and for use in the development of defensive capabilities. During the late 1930s, the UK distributed gas masks to its citizens. In 1936, Nazi Germany developed a powerful nerve gas, Tabun, which interferes with the chemical signal between the nerve and the muscle. Exposure to Tabun brings death within minutes. This new toxin was being produced on a massive scale just as the inevitability of another major European war was becoming more apparent.

## World War II

By the time World War II broke out, all major belligerents had equipped themselves for CW against soldiers and civilians. Far more chemical weapons were produced during WWII than had been produced during WWI. Chemical weapons were, in principle, available to commanders on almost all of the major battlefields. Why weren't they used?

This question is much debated among military historians. We should not assume that simple CW deterrence was at work. On many occasions the great powers came close to using CW on the battlefield. For example, the British were ready to spray their own beaches with mustard gas should the Germans invade. Towards the end of the war, Germany was

the only country that possessed nerve gases, and Hitler was considering their use them against the Allied forces. Available evidence suggests that subordinates sabotaged his orders. The US military planned to use CW against the Japanese-held islands in the Pacific, but President Roosevelt refused to allow it.

The question remains: Why were CW not used? Certainly the 1925 Geneva Protocol had a restraining effect, but there were other factors as well. During WWI, it was the interminable, frustrating stalemates that had created the incentive to use CW. The early stages of the Second World War were characterized by short, decisive battles using tanks and aircraft. An army could win a battle quickly and avoid getting bogged down in an intractable stand-off. Thus, the temptation to use CW was not as strong. In addition, whatever incentive there was may have been outweighed by the many problems associated with the use of chemical weapons.

#### Changes Brought About by the Nuclear Era

The destruction of Hiroshima and Nagasaki by two US atomic bombs, Kapp argued, changed the status of chemical weapons. Nuclear warfare replaced CW as the main "counter-city" threat; the strategic use of CW was considered obsolete.

In 1945, the defeated Axis powers were compelled to renounce the possession of CBW. In the 1950s, the UK voluntarily joined in this renunciation. Unfortunately, the newly-emerged superpowers, the USSR and the US, showed keen interest in the nerve gas research carried out by the Germans, and in the biological warfare techniques developed by the Japanese. Both superpowers soon mounted their own battlefield capability in these new technologies.

Today, only the superpowers admit to the possession of chemical weapons. However, a number of nations are believed to possess a CW capability, and many more are thought to be moving along that path. Middle Eastern countries link chemical weapons with nuclear weapons because there is convincing evidence that Israel possesses nuclear weapons. They

are unwilling to forgo chemical weapons, which they see as an effective deterrent, until Israel gives up its nuclear arms.

In addition to the horizontal proliferation of chemical weapons, there is also continuing vertical proliferation. For example, the US has developed a new generation of binary chemical weapons. Third World countries are just as concerned about this form of proliferation. Export controls may seem like a good idea to the nations of the North but they represent an unfair impediment to necessary technology transfers to the developing nations. Many of the controlled chemicals have a variety of commercial industrial uses. Restricted access to those chemicals will inhibit economic growth in the Third World.

Furthermore, if there is a global ban on chemical weapons, developing nations may need financial assistance in the implementation of the CWC. The process of destroying banned chemicals will be very costly. In fact, it is more expensive to destroy these chemicals safely than it is to develop them in the first place. Thus, the viewpoint of the developing South is very different from that of the already industrialized North. However, in spite of these differences, the completion of a verifiable convention banning the production, stockpiling and use of chemical weapons has become a matter of great urgency.



RECENT DEVELOPMENTS TOWARD A CHEMICAL WEAPONS CONVENTION <sup>2</sup>

The Conference on Disarmament (CD), comprising forty nations, is involved in a variety of different multilateral arms control negotiations. The members of the ad hoc committee on CW are working on a draft of a Convention on Chemical Weapons (CWC). In addition to those states that play a direct role in these CW talks, several countries are present as observers to the proceedings. Gordon Vachon, of the Department of External

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<sup>2</sup> Since this conference took place in April 1989, the United States and the Soviet Union have entered into a bilateral agreement on chemical weapons. At the June 1990 Washington Summit, Presidents Bush and Gorbachev signed an agreement which calls for the destruction -- beginning in 1992 and ending in 2002 and in a safe and environmentally sound manner -- of all but a declared stockpile for each side of 5,000 tons of chemical agents. On-site inspection will confirm that destruction has taken place. Both countries have agreed to cease chemical weapons production when the bilateral destruction agreement enters into force. Other key provisions of the agreement are:

- o destruction of at least fifty percent of declared stocks by the end of 1999.
- o annual exchange of data on stockpile levels.
- o details of inspection procedures to be worked out by 31 December 1990.
- o the US and USSR will take steps to encourage all chemical weapon capable states to become parties to the multilateral convention, and to this end the US and USSR agree that:
  - a.) both countries will accelerate their destruction of chemical weapons under a global CW convention so that by the eighth year after it enters into force, the US and USSR will have reduced their declared stocks to no more than 500 tons.
  - b.) both countries will propose that a special conference be convened at the end of the eighth year of a multilateral convention to determine whether participation in the convention is sufficient to complete the elimination of CW stocks over the following two years.

[source: United States Information Service, US-USSR Chemical Weapons Destruction Agreement fact sheet, 1 June 1990.]

Affairs, summarized the current state of negotiations on chemical weapons which are taking place at the CD in Geneva.

In January 1989, the Geneva negotiations were given a boost by the international conference held in Paris. Delegates at that conference focused on the recent use of CW, concerns about proliferation, and the need for a binding, verifiable CWC. The Paris conference called on the CD "to redouble its efforts." The new CD chairman, representing France, realized that there were a number of major issues that needed to be tackled. So that each problem could be studied thoroughly, he established five working groups:

1. verification (chaired by the FRG)
2. legal and political issues (Egypt)
3. institutional issues (India)
4. technical matters (Sweden)
5. transition period (GDR).

Although nothing is officially agreed until there is a signed convention, there are a number of areas where some shared views are emerging:

1. There should be an international authority created to monitor compliance.
2. All existing chemical weapons should be secured under the international authority upon entry into force of the convention.
3. CW production facilities should be closed and destroyed within ten years of entry into force of the convention.
4. There should be national measures to ensure that there is no development, production, stockpiling or transfers of chemical weapons.
5. There should be a list of chemicals which are a particular risk to the convention.

There are, however, many areas where there is not yet agreement among the delegates to the CD:

1. There is no definition for a chemical weapon.
2. There is no agreed destruction timetable.
3. There is the question of who controls subsidiaries operating in foreign countries?
4. Chemical industries worry that industrial confidentiality could not be maintained in the face of on-site inspections.
5. There is disagreement over the suggestion that a state party should be assisted by other signatories if it is attacked by CW.
6. Nations debate whether the issues of international development and technology transfer should be included in these disarmament talks.

These and other sticking points were raised in the publicly attended panel discussion in the evening, and were pursued in more detail at the subsequent day-long experts' workshop.

## PANEL DISCUSSION -- TOWARDS A CHEMICAL WEAPONS CONVENTION

Before the panel began, Mr. Behtash, a representative from the Embassy of the Islamic Republic of Iran, delivered a speech giving the Iranian perspective on the use of chemical weapons in the Gulf War. That presentation is reproduced in Appendix VII. The panel moderator for the evening was Gordon Vachon, of the Department of External Affairs of Canada. The panelists were Barbara Seiders, Nikita Smidovich, and Barbara Rosenberg.

### SOME US CONCERNS

Dr. Barbara Seiders, of the US Arms Control and Disarmament Agency, was a participant in the UN Secretary-General's Group of Qualified Experts. This Experts' Group was established in response to a resolution of the General Assembly. The mandate of the Group was: "to elaborate guidelines and procedures for timely and efficient investigation of the possible use of chemical and biological weapons."

Seiders summarized US policy and US hopes for CWC. Since, at the time of this conference, the Bush administration was reviewing its arms control policy, Seiders described the general policies of the Reagan era which were expected to carry forward in the Bush administration. The US, she said, remained committed to the elimination of CW, but would retain a retaliatory capability until there is a "global, effectively verifiable treaty."

US research and development in CW is restricted to finding more effective methods of defence and decontamination. The US is very active in the area of non-proliferation of CBW. In Geneva, the US is working hard to negotiate a CWC. However, said Seiders, there are still a number of remaining problems with verification.

There are activities which would be prohibited under the convention that would be difficult to verify. For example, even small amounts of a chemical or biological agent could be a threat. These could be produced and stored, and would be almost impossible to detect.

For the US, Seiders explained, verification was one of the major concerns standing in the way of the CW convention.

However, Seiders did list some recent international developments which, she said, showed some reasons for optimism. The success of the widely-attended Paris Conference was a testimony to the global nature of the CW problem, as well as to the necessity for global participation in its solution. The 1980 Review Conference on the BWC led to data exchanges between signatories. In 1987, the USSR admitted that it had a stockpile of CW and invited CD delegates to visit Shikhany on the Volga River and inspect these types of weapons. The efforts of the Australia Group have encouraged cooperation among diverse nations to slow proliferation of CW capability. (See Appendix II.) Finally, a number of countries, previously uninterested, have asked to participate as observers at the CD in Geneva.

#### THE PERSPECTIVE OF THE USSR

The next panelist was Nikita Smidovich, acting director of the Chemical Weapons Division, Foreign Ministry of the USSR. He was formerly a member of the Soviet delegation to the CD in Geneva.

It is important to establish a CW Convention soon, he said, before novel agents can be produced. The most recent chemical agent, VX, was developed in the 1950s; something new may be on the horizon. The world needs a complete ban on CW with reliable, effective verification. Smidovich agreed with Seiders that it is important to ask whether a ban on development of new agents is going to be verifiable. Some form of monitoring over new laboratories and over the synthesis of new agents will be necessary.

At the last session of the CD, reported Smidovich, the Soviet Union proposed that there be data exchanges and trial inspections among the negotiating countries. There needs to be openness in the data submitted to the negotiations. For example, the USSR is the only country that has revealed the volume of its CW stockpiles. The West was able to

inspect the CW stockpile at Shikhany, and the Soviet Union visited the US facility at Tooele, Utah. The USSR has also been invited to installations in the UK, the FRG, and Canada.

Mr. Smidovich stated quite emphatically that, in the Soviet view, the only way that a complete ban on CW could be achieved was through the adoption of a regime of international, on-site inspections: "anytime, anyplace." Referring to Seiders' remark -- that small amounts of agent would be difficult to detect -- Mr. Smidovich said that the only lasting solution was a global, verifiable CW convention. For example, suppose there were a chemical plant that the US suspected another country of having produced a small, but threatening amount of agent. Only with a convention in place could the US launch a challenge inspection. "It is true that it is difficult to detect small-scale production of chemical agents," he said, "but it's much more difficult if we don't have a convention."

Barbara Rosenberg was also a member of this panel. Her opening remarks have been incorporated into the section above giving an overview of biological warfare and the BWC. Rosenberg fielded questions from the floor as did the other panelists. That discussion follows.

#### DISCUSSION AND QUESTIONS FROM THE FLOOR

[In some cases, the questions and responses have been condensed or paraphrased.]

Q: Can export controls limit the proliferation of CW?

Seiders replied that export controls have made it more difficult for countries to achieve a CW capability, but they have not been completely effective and they will not work forever.

Q: Since research will not be banned by a CW Convention, perhaps governments should be made to share the results of their defence and verification research programmes or conduct such research in internationally-run laboratories. In this way, research would be truly defensive and the countries would be fully prepared.

Smidovich replied that similar ideas were expressed at the CD negotiations. What is being negotiated now, he said, is a provision for assistance to any nation in case of attack. This might mean supplying protective equipment, for example. The details have not been finalized. Exchanging information on defence research is an interesting possibility, but some states cherish what they have achieved in this field. So, it has not been discussed.

Q: Nearly seventy-five percent of the arms that were used by Iraq in the Gulf War were imported from the Soviet Union. Could not your country, Dr. Smidovich, have boycotted the sale of arms to Iraq in response to their repeated use of CW, or would that have conflicted with your self-oriented foreign policy?

Smidovich: I can assure you that the Soviet Union did not supply that CW capability to Iraq.

The questioner rejoined that his point had been misunderstood. He had been referring to the conventional weapons that the USSR had sold to Iraq. Should not the Soviet Union have withheld those arms in the light of Iraq's CW use?

Smidovich replied that there had been a number of different ideas put forward about boycotting different countries in the region. It had been a very hot international issue, but nothing had been resolved.

An Eritrean student from the University of Toronto alleged that the government of Ethiopia had been stockpiling CW for years, supplied by the Soviet Union. Now, the government has expelled all foreigners, including journalists. It is feared that the government intends to use the CW against the Eritrean People's Liberation Front. Is there something the Soviet Union can do to prevent this tragedy?

Smidovich replied that the USSR has never supplied CW to any other country, including Ethiopia.

Q: What is the size of the CW stockpiles in various countries?

Smidovich said that the Soviet Union had recently made public the fact that its CW stockpile does not exceed fifty thousand tons. This refers to the weight of the chemical agents themselves.

Seiders said that the US congressional record has, for some time, contained the locations, composition, and munition types of the US CW stockpile. The quantities are not available.

Q: Can CW stockpiles be monitored from space-based satellites, perhaps using laser techniques? There must be some leakage at the storage sites. And are there not some on-site analytical procedures that might be used? For example, there are highly sensitive devices called "sniffers" which use mass spectrometers. Would it be possible to foil this type of detector by disguising the "chemical signatures" of some of the agents?

Seiders said that she was sceptical about the effectiveness of space-based technology for international monitoring of the existence of undeclared CW production or storage. CW can be produced and stored illegally, indistinguishable from other legitimate chemical, industrial and military operations. Furthermore, any system available to the international inspectorate would be limited in its capabilities, and therefore, in its effectiveness. In addition, such monitoring would have to cover all military and civilian chemical facilities worldwide. That would put an enormous strain on any such capability.

Smidovich agreed with Seiders on this point. The Soviet Union, he said, is concentrating on on-site inspections.

Q: Is there a public health hazard with open-air testing of agents? Are there regulations in the US restricting this testing?

Rosenburg answered that, in the 1950s and 60s, the US Army released some live biological agents without public announcement. Since then, as a result of congressional hearings, the



Army has been restricted to using simulants -- microbes which are like the agents in many ways but which are non-infectious.

One questioner wondered whether military chemicals were subject to the same environmental controls as industrial chemicals? The answer from both the US and the USSR representatives was: yes.

Another question had to do with the protection of civilians. Seiders asserted that a country like Iran, even with inexpensive technology, could save lives and reduce suffering if it were ever again attacked with chemical weapons. Any country threatened in this way, she said, should concentrate on the technologies associated with remote detection, and collective protection. The public should be warned as soon as possible to get indoors. If even small, inexpensive measures are taken, civilians can be protected to some degree.

Q: What is holding up the CW Convention?

Smidovich recommended that the Bush Administration conclude its review of arms control policy as rapidly as possible so that the US and the USSR could resume bilateral negotiations.

Seiders pointed out that the CD involved forty nations trying reach agreement on a convention. In addition, some nations which are chemical-weapons capable are not participating in these talks. Eventually, it will be necessary for all these nations to sign the treaty. She repeated her earlier assertion that there were still significant verification problems standing in the way of an agreement.

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One of the topics that was discussed at length during the open seminars was citizen concern about the kind of CW research being done in Canada, and what effect that research might have on the negotiations for a CWC. The following section pulls together

some of those questions and some of the ways in which the government of Canada has responded to citizen concern.

## CANADIAN ISSUES AND CITIZENS' CONCERNS

### CANADIAN POLICIES AND INITIATIVES

Gordon Vachon, of the Department of External Affairs, described the diplomatic activities of the Canadian government regarding CBW issues. Canada, said Mr. Vachon, is a party to the 1925 Geneva Protocol and the 1972 BWC. When Canada ratified the Geneva Protocol in 1930, it entered reservations, as did many other countries. Canadian government spokesmen argue that a verifiable CWC, which would ban these weapons altogether, might lead officials to reconsider the reservations entered under the Protocol.

In a variety of forums, Canada has attempted to strengthen existing treaties. For example, Canada has contributed a set of procedures for investigating allegations of use. In addition, Canada is working on ways to combat the proliferation of CBW.

#### Investigation of Allegations of Use

In the late 1970s and early 1980s, concerns about the use of CBW were raised at the UN General Assembly, leading to a resolution which called on the Secretary-General to investigate the allegations of use. Canada supported this resolution. During the 1980s, Canada did extensive research in support of this role for the Secretary-General in CBW investigations. In November 1985, Canada published a *Handbook for the Investigation of Allegations of the Use of Chemical or Biological Weapons*, which outlined procedures that could be used in such investigations by the Secretary-General. Further Canadian research led to the development of sensors which could be used by investigators. This work was presented to the Secretary-General in 1987.

#### Combatting Proliferation of Chemical Agents

Several countries, referred to as the "Australia Group", have compiled a list of chemicals which should be put under export control in order to cut down on the possibility

of new countries developing chemical weapons. In 1984, after the use of CW in the Gulf War was confirmed, Canada put five chemicals under export controls and has added nine more since.

### Canadian Activity at the Conference on Disarmament in Geneva

By far the most productive Canadian diplomatic activities in this area, said Vachon, have been at the CD in Geneva. Early in the 1980s, Canada focused its attention on the need for an international organization equipped with multilateral verification machinery to monitor compliance with a CWC.

In 1983, Canada chaired the Ad Hoc Working Group on CW. At first there had been no negotiating mandate for this group, but in 1984 such a mandate was achieved under Canadian chairmanship. A document, the forerunner of the current "rolling text," was passed on to the succeeding Swedish chairman.

### CANADIAN MILITARY RESEARCH AT SUFFIELD, ALBERTA

Arthur Forer addressed the question of what type of research was being done in Canada. The official response, he said, was that Canada does only defensive research. In fact, in defensive work, researchers look for antibiotics or vaccines against biological agents, in order to protect their own troops. However, a key aspect of offensive research is to find antibiotics or vaccines against the very agents that are intended for use against the enemy -- the purpose being to protect the personnel of the attacking forces. From the outside the two types of research look identical. In war, as in sports, offense and defence are intertwined.

In addition, in order to prepare an adequate defence, one must anticipate and mimic the offense. This fact was acknowledged explicitly in the official report on the expansion of the US facility in Utah. The US military must develop offensive BW capability in order to

develop a defence against these weapons. It should be remembered that we perform our research in cooperation with the US and the UK.

If one wants to know what research is done here in Canada, some of the information is available in the open literature published by the Defence Research Establishment, Suffield, Alberta. In a survey spanning 1982 to 1988, Forer found the following types of research:

- o How do bacteria survive dispersal in aerosols?
- o Recombinant DNA components in bacteria
- o How do viruses and bacteria evoke the immune response?
- o Toxins (an area of overlap between BW and CW)
- o Aerosol immunization using fowl as target population.

Forer recommended that all Canadian BW research be done under the auspices of the UN and directed specifically at developing methods for strengthening international verification.

Presenting information about the research and development branch of the Department of National Defence was Peter Lockwood. For thirteen years he was head of the chemistry section of the Defence Research Establishment at Suffield in Alberta. In particular, he addressed the problems of detecting chemical and biological agents. Detection, he said, was an important area of the research into defence against these agents. Soldiers need a system which will let them know that an agent is present with sufficient warning to allow them to put on protective clothing.

In addition, troops need to be able to get out of their cumbersome suits as soon as possible; this too requires sensitive, effective detection methods. Available detectors have been designed to pick up the presence of an agent whether it has been disseminated as a solid, vapour or liquid aerosol. Detectors can have three different functions: alarm, monitor or identification. Alarms are designed to give as much warning of attack as possible.

Monitors determine when the contamination has dropped to safe levels. Identifiers can specify the agent being used. The most desirable detectors, said Lockwood, are those that combine most or all of these functions.

There are a number of other considerations in the design of an effective detector. It should not be prone to false alarms. An agent may kill soldiers only at high doses. However, even at much lower doses, it may be able to severely incapacitate troops. Thus, a detector must be sensitive enough to disclose even small amounts of the agent. (See Appendix III.)

Lockwood said that the research being done at the Suffield installation -- research into effective detection technology -- is driven by the security needs of the nation, but he pointed out that sophisticated means of detecting and identifying agents would also be applicable to the verification of any chemical weapons convention that might emerge from the Conference on Disarmament in Geneva. Canada would be willing, he said, to contribute its expertise in this area to the international verification agency that would accompany such a convention.

## THE BARTON REPORT ON THE SUFFIELD INSTALLATION

Upon discovering the kind of research being carried out at Suffield, an assistant professor of chemistry at the University of Alberta, Mark Hollingsworth, prepared a paper which described the implications of the research activities at Suffield. In 1988, he sent a copy of his paper to a number of politicians. At about the same time, a public outcry was being mounted by the people who live in the area. As a result of the growing controversy, the government appointed a former ambassador to the UN and former Chairman of the Board of Directors of the Institute for Peace and Security, William Barton, to investigate the research installation at Suffield. The *Barton Report* was published in December 1988.

Workshop participants were fortunate enough to be able to hear a presentation by the author of that report during a lunchtime address. What follows are paraphrased excerpts from his speech.

Barton opened with a recognition of the irony inherent in the curve of his career. In 1939, he signed up at a base just outside of Calgary, for a three-week course as an anti-gas instructor. For most of WWII, he served as a chemical warfare officer. In August 1988, when he began his review of Canada's CBW policy, he found that his wartime experience was still relevant. He had come full circle.

His assigned task was straightforward: to confirm that all research, development and training activities at Suffield were purely defensive; that they were conducted in a professional manner, with no threat to public safety or to the environment.

There had been questions in Parliament about the research programme, and a number of citizen groups had submitted letters expressing their concerns. Perrin Beatty, then Minister of National Defence, was anxious to present a response as quickly as possible; he set a deadline of 31 December 1988 for the report. Because of this tight deadline, said Barton, he decided against making any visits to the various concerned groups to hear their presentations.

Citizen groups and individual members of the public were, in general, asking the following questions:

1. Was the Department of National Defence engaged in the development of chemical and/or biological agents for possible offensive use, either on its own behalf or as a surrogate for another government?
2. Was the public or the environment endangered by the research and testing programmes being carried out at Suffield?

Underlying these concerns, said Barton, was the sense that things that the public had a right to know were being concealed.

Barton responded to these particular questions. It is the policy of the Canadian government, he said, that its CBW research shall be solely defensive. This policy is firmly entrenched in the directives of the Department of National Defence and Barton became convinced in the course of his study that this policy was respected at all levels within the Department.

Barton concluded that the Department was making every effort to behave as a "good corporate citizen," taking into account the concerns about public safety at all times. However, Barton did put forward a number of proposals to improve the current practices, and all those proposals were accepted.

The environmental effects of open-air testing merited specific comment. There have been no such tests in recent years, said Barton, but the staff of the Defence Research Establishment would not rule out the desirability of these tests in the future. Barton noted that a professor at the University of Alberta had cited a test performed a number of years ago which involved the release of a small amount of nerve gas -- perhaps a kilogram. This scientist estimated that the gas cloud could have been toxic as far as fifty kilometres downwind.

Of course, the scientists at Suffield do not agree with him. In light of the comprehensive and stringent new environmental legislation adopted in June 1988, Barton suggested, the question of which view is correct should be left for the provincial and federal environmental authorities to decide.

To conclude, Barton repeated an important recommendation from his report: the need for a greater openness to improve public understanding about the kinds of problems facing the armed forces. This would make the goals of the CBW research programme more comprehensible to Canadian citizens.



## WHAT CAN CONCERNED CANADIAN CITIZENS DO?

The first speaker in this session was Diana Chown from the Edmonton Chapter of Voice of Women. She was distressed at the role that Canada was playing in the research into CBW. Canadian citizens should, she said, make themselves aware of what their country is doing in this area, and oppose any activities which might undermine progress toward a Chemical Weapons Convention.

During World War II, said Chown, 125 farms were appropriated for a joint UK/Canada chemical warfare experimental station at Suffield. Today, the centre has about one hundred employees, engaged in the following types of research:

- o design and testing of equipment such as suits and masks
- o development of monitoring equipment to detect nerve gas in the atmosphere
- o procedures for decontamination after CBW attack
- o studying behaviour of liquids, gases and aerosols released into the atmosphere
- o research into antidotes and the potential use of biotechnology (especially, genetic engineering) for CBW
- o investigation of antibodies and the immune system

Since the end of WWII, Canada has agreements with the US and the UK for joint research projects. In 1980, our government re-ratified the Memorandum of Understanding "to integrate the chemical and biological defence programmes of the US, the UK, and Canada." In 1964, we also entered into an ongoing technical cooperation programme with Australia. Canadian citizens, Chown insisted, must oppose this complicity.

For example, the development of binary CW is now at the centre of the US rearmament programme.<sup>3</sup> Even though the Department of National Defence continues to deny it, charged Chown, Suffield's huge testing area is being used to test US binary weapons. As long as the site is shared with the US Department of Defense, and the research that goes on there contributes to the US capability in chemical warfare, then, said Chown, this work must be considered to be offensive research.

Dr. Ursula Franklin contributed to this discussion, stressing the importance of the citizen's role in controversial policies. She said that she had been battling the government for over twenty years, and she realized there is one constant: citizens must work hard to pry out the information that they need. In particular, there has always been a veil of secrecy over this type of research. For example, Canada is only now getting rid of a stock of mustard gas that was supposed to have been destroyed long ago.

Franklin agreed with Vachon that Canada has a significant role to play in the development of verification technology in support of a CWC, but not if we are seen to be supporting the offensive research of the US and the UK. It is up to Canadian citizens to put pressure on politicians to end this form of research and switch to work that is aimed solely at helping to strengthen the verification procedures for a total ban on CBW.

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<sup>3</sup> In December 1987, after an eighteen-year moratorium on production, the United States began stockpiling their so-called "binary" chemical weapons. (See diagram in Appendix II.)

## **EXPERTS' WORKSHOP:**

### **STRENGTHENING INTERNATIONAL VERIFICATION AND COMPLIANCE**

#### **INTRODUCTION**

The purpose of the day-long workshop was to examine specific verification and compliance issues in relation to the following treaties: the 1925 Geneva Protocol, the 1972 Biological Weapons Convention (BWC), and the Chemical Weapons Convention (CWC) now under negotiation. A second goal was to produce a list of recommendations which might prove useful to negotiators.

One of the chairs of the workshop was the late George Ignatieff who was Canada's ambassador to the talks which resulted in the 1972 Biological Weapons Convention. He explained that, at the time of those talks, there was substantial public interest in the treaty because of the outcry over Agent Orange, used as a defoliant in Vietnam.

Those talks did not, however, lead to a strengthening of the 1925 Geneva Protocol. It was argued that each country had the right to maintain stockpiles of whatever weapons it deemed necessary for its defence. Ignatieff said that he had resigned from the foreign service over this issue. In his view, the priority of national sovereignty and the right to retaliation must, in this case, be subordinated to the common interest and to survival.

In discussions of verification and compliance, a point which arises repeatedly is that it is relatively easy to gather data concerning the allegation of use. The difficulty arises when the results must be evaluated. There is, said Ignatieff, a demonstrable need for an international agency of experts to evaluate the data. This agency, or a second one, would be required to coordinate scientific exchange, to promote standardization, and to reinforce safety standards.

## INSTITUTIONAL AND POLITICAL ASPECTS

Gordon Vachon, of the Department of External Affairs of Canada, presented his analysis of some of the primary political issues which are hindering movement toward a CWC. He noted that the world has proof of CW proliferation from Iraqi use of the weapons in the Gulf War. There are other countries which are strongly suspected of having or pursuing a CW capability. The Final Declaration of the 1989 Paris Conference called upon all participants to ensure that no civilian chemicals are diverted for military purposes. (See Appendix VI.)

Vachon acknowledged that this is a very sensitive issue. On the one hand, governments want to ensure that there is no further proliferation of chemical weapons. On the other hand, governments do not want to inhibit normal international trade. The issue is difficult because governments have to rely on sources of intelligence that cannot be made public. At the same time, action must be taken. The 1984 Annual Report of the Secretary-General was a rallying point for many countries to impose controls on certain highly sought-after chemicals.

There is another question, said Vachon: How do we strike a balance between supporting the legitimate development of a chemical industry, and prohibiting the use of certain chemicals for military purposes. Many of the precursors are the same. (See Appendix II.)

Some Middle East nations link progress on the CWC with the elimination of nuclear weapons. They argue that chemical weapons are their only form of deterrent against other weapons of mass destruction. The CWC should not be held up, said Vachon, while we wait for progress in nuclear arms control. It is in the interests of all nations to complete a ban on chemical weapons as soon as possible.

Barbara Seiders emphasized the need to develop methods for effective verification -- for example, model inspections to monitor permitted activity in each country, and

international trial inspections. She suggested that there are lessons to be learned from the Intermediate-range Nuclear Forces (INF) Treaty. It is not a perfectly verifiable treaty, but the verification provisions are augmented by political procedures that enhance the signatories' confidence in mutual compliance. Thus, for the CWC we must search for political solutions where there are no technical solutions.

Nikita Smidovich also emphasized verification as the most important hurdle in the way of a CWC. It is key, he said, that negotiators at the CD pursue the most stringent measures for verifying the treaty. However, during the negotiations, compromises are hammered out and these measures become watered down. "Then we hear the comments: these measures are not stringent enough to verify certain kinds of activities."

The USSR is concerned about the rate of the negotiations. In September, guidelines were agreed for conducting trial inspections. Since then only a few countries have carried out such inspections. If they are truly concerned about moving rapidly towards a convention, then all countries should have worked out how to implement these types of practical measures.

Some countries argue that there must be exceptions to challenge inspections, that some facilities should be excluded. These same countries, Smidovich charged, will turn around and say that the CWC will never be verifiable because it's too easy to hide production activities. The only way to overcome this kind of objection, he said, is to allow every site to be inspected.

The next issue addressed by Smidovich was that of "extra-territorial jurisdiction." The precursors for chemical weapons and the equipment necessary for production are spread throughout the facilities of the multinational chemical companies. The problem is: Which nation has jurisdiction over these companies? The USSR believes that there is a mechanism in place to control the supply of precursors and equipment, extra-territorially.

In the areas of proliferation and use of CW, the USSR supports an investigative role for the Secretary-General, backed up by a team of highly trained experts. However, in order to be effective, this team must have access to the facility in question. States parties to the CWC must agree in advance to accept any investigation ordered by the Secretary-General.

This raised the issue of national sovereignty. He acknowledged the right of a country to defend itself and to assess the compliance of other countries. However, he suggested, the time had come for countries to accept the idea of subjecting themselves to international monitoring.

Douglas Scott, a member of a non-governmental organization, discussed the type of verification system that would be required for a multilateral treaty, as opposed to that for a bilateral treaty. In Geneva, he said, the negotiators for the CWC are discussing a verification system that incorporates four out of the five features which Scott and his group consider essential for verifying a multilateral treaty. The first comprises the procedures for on-site inspection and, possibly, airborne and satellite surveillance.

The second is an international agency to administer the verification system. The CD has agreed on the outline of this agency for the CWC -- the Organization for the Prohibition of Chemical Weapons. [See diagram in Appendix I.] This agency will hire inspectors, instruct them, and receive their reports. These reports will be purely factual with no evaluation.

The third item is a mechanism for evaluating the reports submitted to the agency. Predictably, this is a controversial matter. The final decision of the CD could be that the OPCW will not even be authorized to perform this evaluation function. Scott's group fears that withholding this power from the international agency will weaken the whole verification and compliance system.

Fourth, the agency should be given some authority to determine the kind of response to be made in the case of a violation of the treaty. Presumably, in the case of production

and stockpiling, the response would take the form of persuading the offending nation to discontinue the activity and destroy stockpiles. This matter has not yet been addressed in depth at the CD.

The fifth feature of importance, said Scott, is only hinted at in the "rolling text," the draft version of the CWC. The key words appear under the heading, "National Implementation Measures," Article VII, clause 1: "Each State Party...shall adopt any measures it considers necessary...to prohibit...any activity...prohibited...by this Convention."

Article IV of the 1972 BWC uses very similar wording. (See Appendix V.) There are a few countries, said Scott, which have enacted legislation banning, within their own territory, any activities which are prohibited by the BWC. For example, Australia has enacted legislation which is binding not only on the private sector but also on public officials.

The advantage of this type of legislation is that it would give the international monitoring agency access to the legal system of member states. Scott advocated that Canada should enact legislation like that already in place in Australia. Furthermore, he suggested that the "rolling text" for the CWC be altered to make it even clearer that all signatories would be required to enact this type of legislation.

A participant followed up on a point that had been raised by Douglas Scott: Would an international team of experts, which had been sent to investigate reports of Geneva Protocol violations, be expected to evaluate the data which had been collected during an investigation, or would some other body evaluate it?

Seiders responded that there would be two groups. The qualified experts would be sent out to investigate the site of the alleged use and report their findings to the Secretary-General. A second group, called "expert consultants," would have a broader range of expertise. They would review the collected material and request any additional information that was considered necessary. The next step is not yet agreed. Some suggest that the

consultants should state their judgements about whether use had occurred. Others insist that only the Secretary-General should have the authority to make that kind of judgement.

## TECHNICAL ASPECTS

Ben Sanders was a former manager of the safeguards section of the International Atomic Energy Agency (IAEA). Nations will adhere to international agreements, he said, only if they can be sure, through adequate verification measures, that all parties are in strict compliance. Verification is rather unpopular. It is often resented because it intrudes into sovereign territory. Nowadays, states must accept the notion of an authority outside their own. However, there will always be a sense of confrontation between the verifying agency and the state under investigation.

There may be some specific lessons to be learned from the foundation of the IAEA, said Sanders. By the time of the 1967 Treaty of Tlatelolco and the 1968 Non-Proliferation Treaty, the agency had been in existence for a decade. Thus, the requirement to develop a verification system to deal with these important multilateral treaties meant simply adding staff to an existing administrative structure, as well as an experienced cadre of technical experts. For this reason, Sanders recommended early recruitment of technical experts -- in fact, even before the verification agency is set up.

A representative from the Embassy of Egypt said that the views of the US, the USSR and Canada were well-represented at the workshop, but he had hoped that the views held by the developing nations would also be taken into consideration. Specifically, he reminded participants that Third World nations had a right to develop their chemical industries to the degree achieved by the North. Many of the chemical precursors listed for export control were also used widely for civilian purposes. This problem had to be addressed to the satisfaction of Third World nations before they could be expected to accept a global Chemical Weapons Convention.



Charles Flowerree, a former member of the Secretary-General's Group of Experts, addressed the problem of controlling multinational corporations. The fact is that the country, on whose territory a given corporation operates, does exercise some legal control over that company. Consider, he said, Union Carbide operating in India. If India became a signatory of a CWC, then the Indian government would be responsible for ensuring that Union Carbide did not manufacture any agents that were prohibited by the treaty.

However, said Flowerree, most private companies would not be interested in producing chemical agents -- there's not enough money in it. In addition, if they were caught, they would lose many legitimate industrial contracts for much more lucrative production. And, finally, they would lose their reputation.

#### POSSIBLE PROGRESS

Johan Nordenfelt is Director of Publications and World Disarmament Campaign Branch in the United Nations Department of Disarmament Affairs. He talked about UN activities in the area of verification. Recently, he said, there have been a number of allegations of use of CW in contravention of the 1925 Geneva Protocol. In late 1979 and continuing into 1980, there were allegations of use of CW in Cambodia. The Security Council passed a resolution giving the Secretary-General the authority to investigate those allegations. Unfortunately, he said, the investigation was hampered and no conclusive evidence could be found.

In 1982, another investigation was carried out in Southeast Asia, this time with the help of a group of "qualified experts." This was the first time this term was used; now it is the official term for these data collectors. The Secretary-General was asked, without the benefit of unanimity in the General Assembly, to devise a standard set of procedures for such investigations. A working group was set up to draft a list of procedures. Charles Flowerree, a participant in the workshop, had been a member of that original working group.

By 1983, members of the working group had submitted to the Secretary-General their guidelines and procedures for the investigation of allegations of CW use. In 1984, the Secretary-General began sending investigative teams to the site of the Gulf War, where there had been repeated allegations of CW use. Nine such teams were sent to the region. Although the Secretary-General continued to act under his own authority, from the third mission on, said Nordenfelt, the investigative teams of qualified experts were in fact using the guidelines and procedures put forward by the Secretary-General's working group.

Those investigations established that chemical weapons had been used in the Gulf War. The investigative team, said Nordenfelt, was a bit timid about identifying the user, but eventually it concluded that Iraq had used CW against Iranian soldiers and civilians. In 1984, the Security Council limited itself to a simple statement by the president condemning the use of CW in the Gulf War.

Ronald Sutherland, of the University of Saskatchewan, discussed the institutional machinery for CWC verification. He focused on the difficult issue of monitoring the civilian chemical industry. Any state party can do what it wishes with toxic chemicals, as long as those chemicals and their precursors are not used for making chemical weapons. The problem is exacerbated by the fact that the industry is at different levels of development in different areas of the globe. Mature industries are concerned about losing trade secrets in the process of international verification. The Third World nations fear that their fledgling industries will be stunted.

Over the last few years, industry experts, representing all of the world's major chemical manufacturers, have been invited to Geneva to participate in discussions. Data about plant capacities, processes, quantities, and the like are considered by them to be intellectual property. Any loss of such information could have catastrophic consequences. Industry representatives say that they would not trust an international organization to inspect their facilities and keep the information secret.

In order to ease the burden of inspections, chemicals have been divided into those which pose low, moderate or high risk to the maintenance of a chemical weapons ban. Each of these types of chemicals will have its own verification regime.

In August 1988, verification experts discussed the problem of routine inspections. Sutherland said that they realized how difficult it would be, in practice, to obtain the information necessary and how easy it would be for the inspected party to cheat. In order to verify compliance with a high degree of confidence, it may be necessary to resort to challenge inspections. This is an issue of ongoing debate because some consider challenge inspections to be too intrusive.

\* \* \*

The experts' workshop broke up into small discussion groups in order to discuss in detail specific problems confronting a CWC. The goal was for each group to draft a specific recommendation to submit either to the Canadian government or to the negotiators in Geneva. These recommendations are reproduced verbatim in the following section.

## FORMAL RECOMMENDATIONS

It should be noted that each recommendation comes from a particular discussion group; these statements were not submitted for overall endorsement by workshop participants. Those participants who are representatives of governments or institutions participated in these discussion groups strictly as individuals. Their support for a particular recommendation should in no way suggest the endorsement of their governments or institutions.

### DISCUSSION GROUP I -- OVERCOMING VERIFICATION CHALLENGES

In the light of the experience of the Non-Proliferation Treaty, in which the establishment of a nuclear verification regime benefited from the prior operating experience of the International Atomic Energy Agency, it is recommended that:

- a) training of personnel be undertaken in inspection activities which are and will be required for existing and pending chemical and biological weapons agreements;
- b) international projects be carried out in the area of such training.

### Discussion Group II -- Evaluation, response and other measures to promote compliance

1. In order to strengthen the Biological Weapons Convention and to set an example for other nations, it is recommended that the Canadian Parliament adopt national treaty legislation similar to that passed in Australia, in which the treaty is made binding on all subjects, including government employees.

Also, we recommend the adoption of similar legislation at the time of ratification of the Chemical Weapons Convention.

2. A verification and compliance system under the Chemical Weapons Convention may be viewed as having three stages:
  - i. Data Collection -- objective information is gathered by on-site inspections and other means and is channeled to the evaluating body; provisions could be included to make clear that any obstruction of a legitimate verification exercise would be considered as non-compliance with the convention, and such acts would be published by the Executive Council as such.
  - ii. Data Analysis and Evaluation -- impartial consideration within the verification agency is necessary before deciding on the difference between an anomaly and clear non-compliance. Anomalies need explanation from the suspected party; non-compliance requires a formalized set of responses by the international community.
  - iii. Response -- periodic reporting on the presence or absence of anomalies is a basic requirement. More study is required into possible responses to acts of non-compliance -- for example, punishments such as sanctions or withdrawal of benefits, legal measures, and the like.
3. Under the Chemical Weapons Convention, there is the potential problem that, if the requisite number of ratifications is high -- for instance, sixty -- it may be some time before the treaty enters into force and the application of verification measures for all States Parties may begin. One possible solution is to include a paragraph in the Convention by which ratifying states may declare that the Convention enters into force for them as soon as ten, or fifteen, other states have made the same declaration.

On the basis of such entry into force, for a more limited number of states, a verification organ including a small inspectorate unit can be provisionally set up and start operating when ready. This would ensure that a basic treaty organization is in

place with operational experience, ready to expand as necessary, when the treaty enters into force for a majority of states.

#### Discussion Group III -- Export controls and confidence-building measures

1. After entry into force of a Chemical Weapons Convention, the parties may wish to consider group action on the control of exports of scheduled chemicals to non-parties if there are concerns that the objectives of the Convention are being circumvented. Export controls should, however, not hinder the industrial use of chemicals for peaceful purposes, especially given the needs of the developing countries whose economies might be injured by such controls.
2. Many of the impediments to a convention on chemical weapons are regional in nature. To encourage confidence-building, we recommend that in advance of the completion of a Chemical Weapons Convention:
  - i. there should be information exchanges, and reciprocal visits if appropriate, for confidence-building on a regional basis; and
  - ii. international meetings in connection with the World Disarmament Campaign could focus on chemical weapons negotiations.
3. As a confidence-building measure, states that are parties to the Biological and Toxin Weapons Convention should disclose existing national regulations on import, export, and conveyance of relevant biological and biochemical materials.

#### Discussion Group IV -- The role of citizen reporting and non-governmental organizations (NGOs)

1. We recommend that technological means of verification should be supplemented by the method of citizen reporting. In this method, national leaders would be required by the treaty to announce to their citizens that it is their duty to report any treaty violations that come to their attention, in the course of their work or otherwise. The citizen reporting should be directed to an international verification organization or an international non-governmental body. The anonymity of citizens reporting would be protected, and asylum would be provided in case of accidental disclosures.
  
2. We recommend that NGO activity be manifested in two new ways. First, that citizen groups be organized on a national and international level to receive the information on verification activities -- including citizen reports. We suggest that this body be responsible for constructing a global picture of chemical and biological weapons activity and reporting irregularities as they become apparent. This body could be modeled after such groups as Amnesty International.

Second, we suggest that one provision of a Chemical Weapons Convention be that each signatory be obligated to deposit all chemical and biological agent antidote information with a non-governmental world health body. This body would be responsible for collecting and disseminating public health information about chemical and biological agents.

3. In order to increase the availability of information to non-governmental organizations (NGOs), we propose that the international body of citizens mentioned above also work in close liaison with the policy-makers in the area of chemical and biological weapons control. This arrangement would, for example, provide citizens with the information they need if they are to effectively participate in verification of treaties. The functions of this body would thus involve gathering of information, reporting to governments and acting as a clearing house for information of concern to all.

The proposed that technical aspects of verification should be supported by the method of citizen reporting. In this method, general observations are reported by the treaty to announce to their citizens that it is their duty to report any treaty violation. Citizens are asked to report in the course of their daily lives. The citizen reporting should be directed to an international verification organization or to the interested non-governmental party. If a violation is reported, the organization should be provided in the form of a report.

Second, we suggest that the provision of a Chemical Weapons Convention be that each citizen be required to report all chemical and biological agents and information with a non-governmental body. This body would be responsible for collecting and disseminating public health information about chemical and biological agents. We call this body the "Citizen Reporting Body".

In order to increase the availability of information to non-governmental agencies and the public, we propose that the Convention be amended to require that each citizen be required to report all chemical and biological agents and information with a non-governmental body. This body would be responsible for collecting and disseminating public health information about chemical and biological agents. We call this body the "Citizen Reporting Body".

In order to increase the availability of information to non-governmental agencies and the public, we propose that the Convention be amended to require that each citizen be required to report all chemical and biological agents and information with a non-governmental body. This body would be responsible for collecting and disseminating public health information about chemical and biological agents. We call this body the "Citizen Reporting Body".

(CNC)

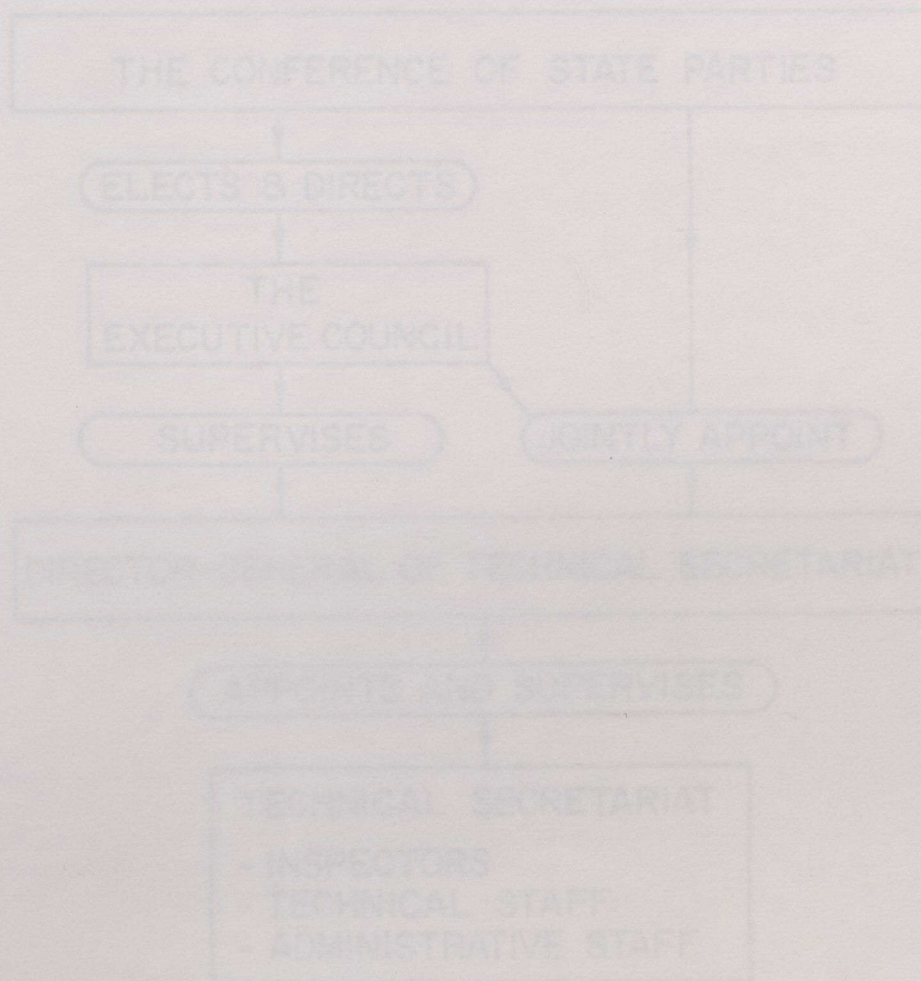


## APPENDIX I

## POSTSCRIPT

Several of the workshop participants are now participating in an "Expert Working Group on Biological and Toxin Weapons Verification" sponsored by the Federation of American Scientists. These are Walter Dorn, Charles Flowerree, Barbara Rosenberg, Ben Sanders, and Douglas Scott.

The FAS Working Group, which also includes Erhart Geissler, Matthew Meselson and Julian Perry Robinson, will submit recommendations in time for the 1991 Biological Weapons Convention Review Conference.



POSTSCRIPT

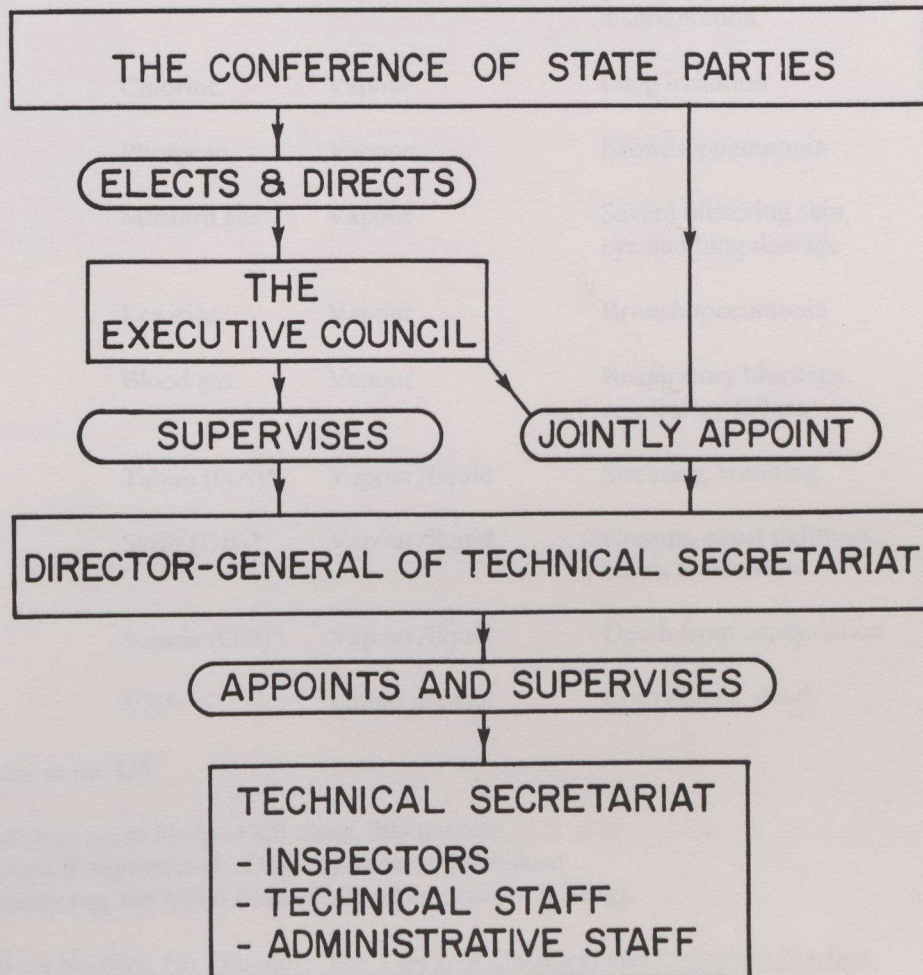
Several of the workshop participants are now participating in an Export Working Group on Biological and Toxic Weapons Verification, sponsored by the Federation of American Scientists. These are Walter Born, Charles Flowerer, Barbara Rosenberg, Ben Sanders, and Douglas Scott.

The TAS Working Group, which also includes Robert Geissler, Matthew Meselson, and Julian Perry Robinson, will submit recommendations in time for the 1991 Biological Weapons Convention Review Conference.

## APPENDIX I

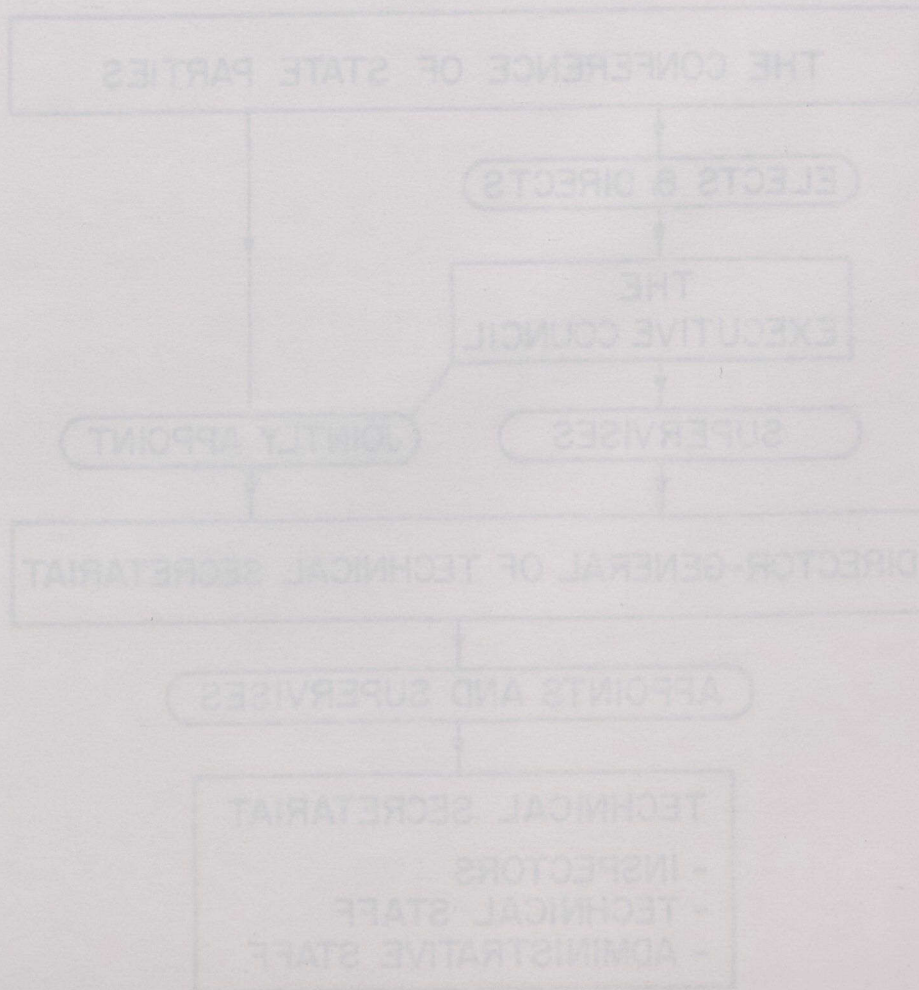
## PROPOSED STRUCTURE OF THE OPCW

The Organization for the Prohibition of Chemical Weapons according to the "rolling text" of the Chemical Weapons Convention (CWC), based on the report of the Ad Hoc Committee on Chemical Weapons to the Conference on Disarmament (CD/881, 3 February 1989.) Diagram designed by Doug Scott and Walter Dorn.



PROPOSED STRUCTURE OF THE OPCW

The Organization for the Prohibition of Chemical Weapons according to the final text of the Chemical Weapons Convention (CWC), based on the report of the Ad Hoc Committee on Chemical Weapons to the Conference on Disarmament (CD/381, 2 February 1989). Diagram designed by Doug Donn and Walter Dyer.



## APPENDIX II

## CHEMICAL WARFARE AGENTS

presented by Victor Snieckus

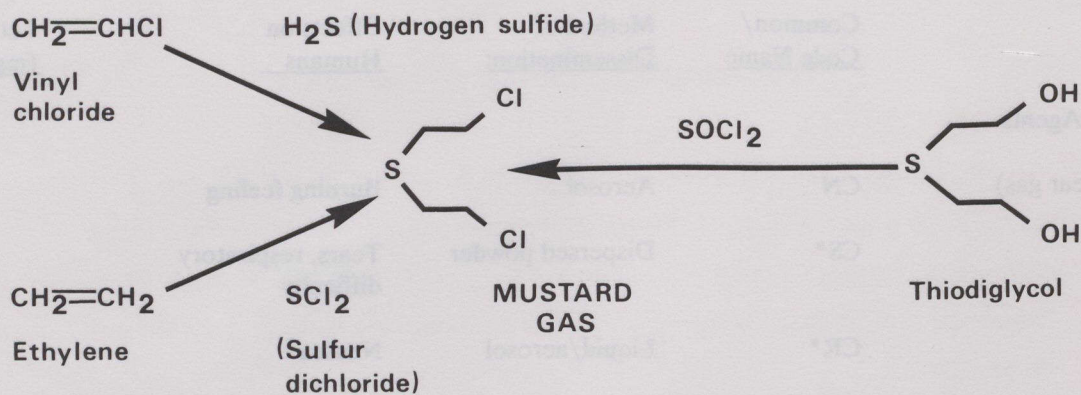
<u>Military Category</u>	<u>Common/ Code Name</u>	<u>Method of Dissemination:</u>	<u>Effects on Humans</u>	<u>Lethal Dosage** (mg-minute/m<sup>3</sup>)</u>
<b>Harassing Agents</b>				
Irritants (tear gas)	CN	Aerosol	Burning feeling	11,000
	CS*	Dispersed powder	Tears, respiratory difficulty	25,000
	CR*	Liquid/aerosol	Nausea	25,000
<b>Casualty Agents</b>				
Incapacitants	BZ*	Aerosol	Psychotropic action, giddiness, disorientation	
Poison gas	Chlorine	Vapour	Lung irritation	19,000
	Phosgene	Vapour	Bronchopneumonia	3,200
	Mustard gas*	Vapour	Severe blistering skin, eye and lung damage	1,500
	Lewisite	Vapour	Bronchopneumonia	1,300
	Blood gas	Vapour	Respiratory blockage, respiratory failure	25,000
Nerve gas	Tabun (GA)*	Vapour/liquid	Sweating, vomiting	400
	Sarin (GB)*	Vapour/liquid	Cramps, chest tightness, coma, convulsions	100
	Soman (GD)*	Vapour/liquid	Death from asphyxiation	50
	VX*	Liquid aerosol	Convulsions, death	10

\* Stockpiled today in the US.

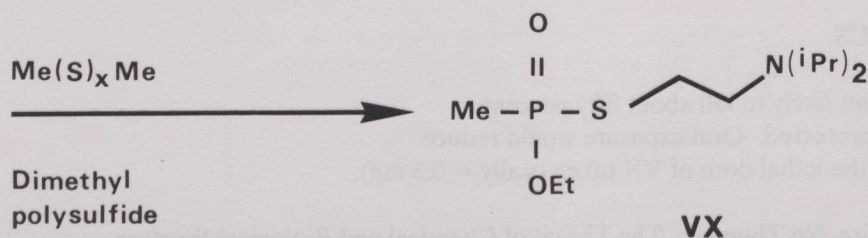
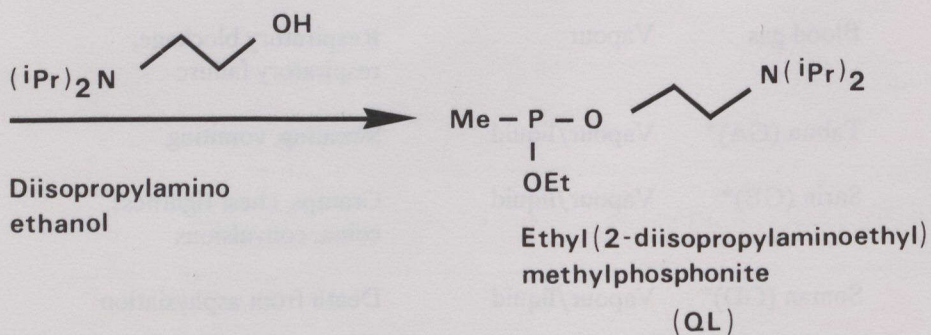
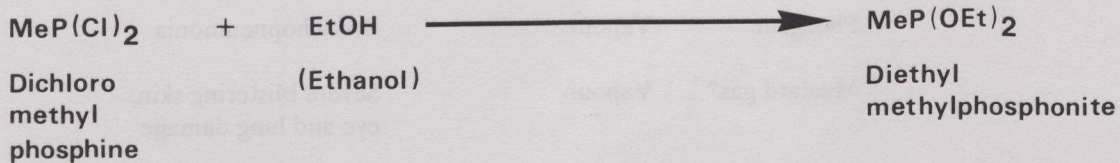
\*\* Amount of airborne agent likely to kill about fifty percent of people exposed if unprotected. Oral exposure would reduce figure dramatically (eg, the lethal dose of VX taken orally = 0.3 mg).

Reproduced from No Fire, No Thunder: The Threat of Chemical and Biological Warfare, by Sean Murphy, Alastair Hay and Steven Rose, Pluto Press, 1984.

## Methods for the Synthesis of Mustard Gas Agents



## Synthesis of VX Nerve Agents



CHEMICALS SUBJECT TO EXPORT CONTROLS IN NATO STATES  
(as of April 1988)

**PROVEN CHEMICAL WARFARE AGENT PRECURSORS**

Number of production steps away from:

<u>Precursor Chemical*</u>	<u>Mustard gas</u>	<u>Tabun (GA)</u>	<u>Sarin (GB)</u>	<u>VX</u>
Sulfur dichloride	1	-	-	-
Thiodiglycol	1	-	-	-
Ethylene	1-2	-	-	-
Vinyl chloride	1	-	-	-
Dimethylphosphoramidic dichloride	-	1	-	-
Methylphosphonyl difluoride	-	-	1	-
Methylphosphonyl dichloride	-	-	1-2	-
Ethyl hydrogen methylphosphonite	-	-	-	1
Methyldichlorophospinepo	-	-	2-3	2-3
Phosphorus trichloride	-	3	2-5	3-4
Phosphoryl chloride	-	2	-	-
Dimethylamine	-	2	-	-
2-Diisopropylaminoethanol	-	-	-	2

\* Using chemical process technology as it existed 25 to 45 years ago.

**Source:** Julian P. Robinson, University of Sussex senior fellow.





Chemicals	Single-step product into which the chemical is convertible*	Countries which apply Australian Group controls													
		NETHERLANDS	US	CANADA	ITALY	NORWAY	DENMARK	SPAIN	UK	LUXEMBOURG	BELGIUM	F.R. GERMANY	FRANCE	PORTUGAL	GREECE
HF***	Nerve agent							●							
(EtO) <sub>2</sub> POH	N-intermediate	●													
MePCl <sub>2</sub>	N-intermediate	●													
<sup>i</sup> Pr <sub>2</sub> NCH <sub>2</sub> CH <sub>2</sub> OH	N-precursor	●													
EtPCl <sub>2</sub>	N-intermediate	●													
Substance QL**	Nerve agent	●													
(EtO) <sub>3</sub> P	N-intermediate	●													
Ph <sub>2</sub> C(OH)COOH	P-precursor	●													
MeP(OEt) <sub>2</sub>	N-precursor	●													
EtPO(OMe) <sub>2</sub>	N-precursor	●													
EtPF <sub>2</sub>	N-precursor	●													
MePF <sub>2</sub>	N-precursor	●													

\* B = Blister agent; N = nerve agent; P = psychochemical agent. Chemical warfare agents are made from "precursors" which are made from "intermediates."

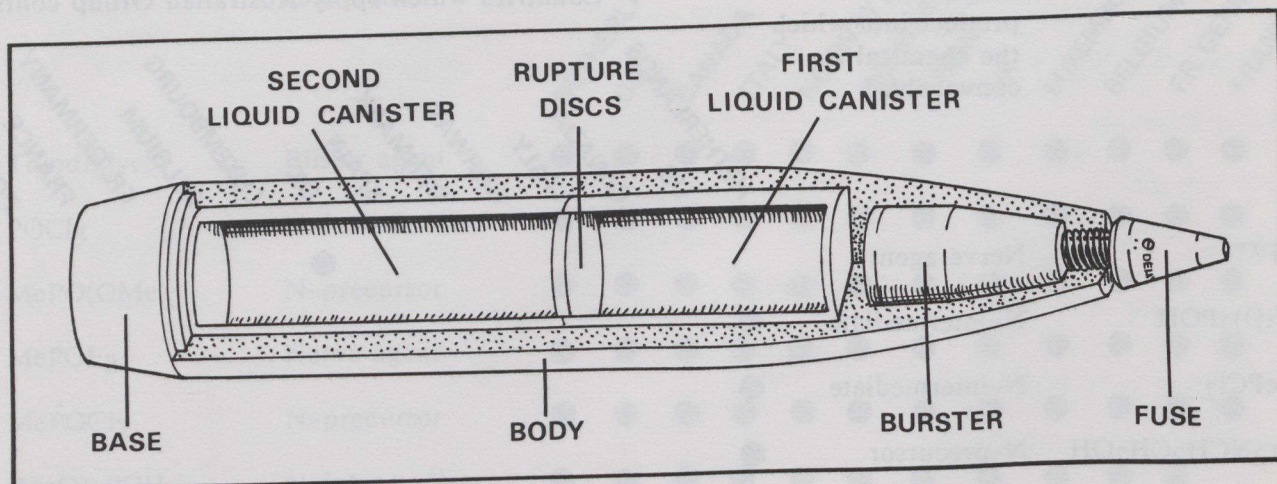
\*\* MeP(OEt)OCH<sub>2</sub>CH<sub>2</sub>NPr<sup>i</sup><sub>2</sub>

\*\*\* Not in draft Chemical Weapons Convention control schedules.

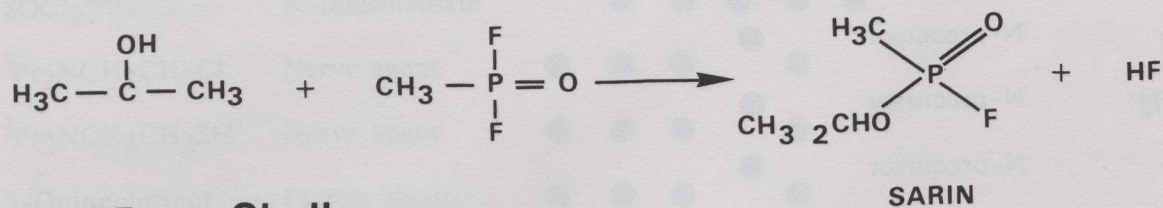
Source: Science Policy Research Unit, University of Sussex, England.

After: Thatcher, G. and Aepfel, T., "Poison on the Wind, Part 1," Christian Science Monitor, 13 December 1988, p. B15.

## BINARY WEAPONS

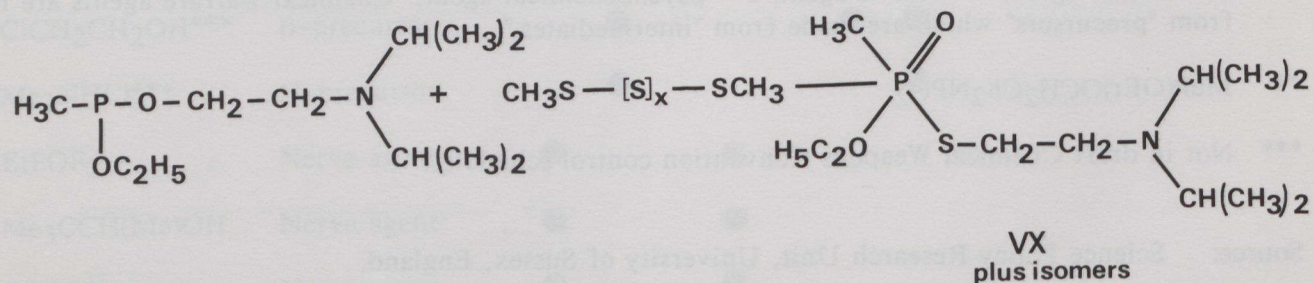


A binary chemical weapons artillery shell holds two canisters. Each canister contains a nonlethal ingredient. The shock of firing ruptures the discs which separate the two canisters. The reactants begin to mix. The spin of the shell in flight continues the mixing of the reactants. The result of the reaction is a lethal nerve gas -- either Sarin (GB) or VX.



↑ 155 mm Shell

↓ 8 inch Shell



## APPENDIX III

## METHODS FOR DETECTING CHEMICAL AGENTS

presented by Peter Lockwood

[In some cases the presentation has been condensed or paraphrased.]

Many different technologies are being used to detect chemical agents as vapours and, in some cases, in solid and liquid aerosols. As mentioned previously, detectors can be divided up by function -- that is, whether they are used as alarms, monitors or identifiers.

Wet chemistry

There is a simple, standard method still being used by most armed forces. The Canadian Forces use a C2 detector kit which passes air over a special absorbent material. Certain chemical solutions are then added. If there is a small amount of an agent trapped in the absorbent material, it will react with the chemical solutions. The appearance of a coloured material reveals the presence of the agent. Unfortunately, it is difficult to maintain this type of kit for long periods and it cannot be automated for use on the battlefield.

Enzyme ticket

This is another common wet chemistry technique for detection of nerve agents. Nerve agents kill by inhibiting a specific enzyme necessary for proper nerve function. Samples of that enzyme, extracted from a cow or eel, can be dried on a piece of paper. To detect a nerve agent, just wet the paper, wave it in the air, and then add some other detector chemicals. This is a very sensitive method which has been automated and used as a CW alarm.

Ion mobility spectrometry

A more modern technology is being used in the United Kingdom as a monitor. The molecules of nerve agent or mustard gas are ionized by a small radioactive source and the

ions drift down a short, electrically charged tube. A computer measures the time that the ion clusters take to move down the tube. The computer is programmed with the drift times of the various known chemical agents. It gives a read-out of the amount of agent present. This chemical agent monitor is small, portable, and requires little maintenance, but can be used only for nerve agents and mustard gas. Furthermore, it is not useful as an alarm. Canadian scientists at Suffield have been able to develop an alarm based on the chemical agent monitor just described. It provides warning of a gas attack and identifies the agent.

There are a number of other technologies that are being considered for use as chemical agent detectors, with varying degrees of success:

- o electron capture
- o infrared spectrophotometry
- o flame ionization
- o flame photometry

These are all common techniques used around the world in the field of analytical chemistry.

One of the major problems facing scientists today is that the chemical structures of new agents are extremely varied. No longer do we have to consider only organophosphorus nerve agents and mustards. The challenge is to develop new detection techniques that allow us to detect these new agents.

Canadian scientists fear that the use of biotechnology by other countries will lead to the development of novel chemical and biological agents. Ironically, the Department of National Defence is turning to biotechnology as a possible solution to problems in CW detection. In addition, biological research into monoclonal antibodies and cellular receptor sites are being evaluated by DND for possible applicability to the development of new detectors.

## APPENDIX IV

**THE 1925 GENEVA PROTOCOL (EXCERPTS)**

The undersigned Plenipotentiaries, in the names of their respective governments:

Whereas the use in war of asphyxiating poisonous or other gases and of all analogous liquids, materials or devices has been justly condemned by the general opinion of the civilized world and --

Whereas the prohibition of such use has been declared in Treaties to which the majority of powers of the world are parties and --

To the end that this prohibition shall be universally accepted as a fact of international law, binding alike the conscience and the practice of nations:

Declare --

That the High Contracting Parties, so far as they are not already Parties to Treaties prohibiting such use, accept this prohibition, agree to extend this prohibition to the use of bacteriological methods of warfare and agree to be bound as between themselves according to the terms of this declaration.

The High contracting Parties will exert every effort to induce other states to accede to the present Protocol. The present Protocol will come into force for each signatory Power as from the date of deposit of its ratification, and from that moment, each Power will be bound as regards other Powers which have already deposited their ratification.

...the Commission has been fully convinced by the general opinion of the ...  
 ...the Commission has been fully convinced by the general opinion of the ...  
 ...the Commission has been fully convinced by the general opinion of the ...

...the Commission has been fully convinced by the general opinion of the ...  
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## APPENDIX V

**SELECTED SECTIONS OF THE 1972  
BIOLOGICAL WEAPONS CONVENTION**

**Convention on the Prohibition of the Development,  
Production and Stockpiling of Bacteriological (Biological)  
and Toxin Weapons and on Their Destruction\***

[Articles IV, V, VI and VII -- General Assembly resolution 2826 (XXVI), annex.]

OPENED FOR SIGNATURE  
AT LONDON, MOSCOW  
AND WASHINGTON:

10 April 1972

ENTERED INTO FORCE:

26 March 1975

DEPOSITARY  
GOVERNMENTS:

Union of Soviet Socialist Republics  
United Kingdom of Great Britain and Northern  
Ireland  
United States of America

---

**Article IV**

Each State Party to this Convention shall, in accordance with its constitutional processes, take any necessary measures to prohibit and prevent the development, production, stockpiling, acquisition or retention of the agents, toxins, weapons, equipment and means of delivery specified in article I of the Convention, within the territory of such State, under its jurisdiction or under its control anywhere.

**Article V**

The States Parties to this Convention undertake to consult one another and to cooperate in solving any problems which may arise in relation to the objective of, or in the application of the provisions of, the Convention. Consultation and cooperation pursuant to this article may also be undertaken through appropriate international procedures within the framework of the United Nations and in accordance with its Charter.

## Article VI

1) Any State Party to this Convention which finds that any other State Party is acting in breach of obligations deriving from the provisions of the Convention may lodge a complaint with the Security Council of the United Nations. Such a complaint should include all possible evidence confirming its validity, as well as a request for its consideration by the Security Council.

2) Each State Party to this Convention undertakes to cooperate in carrying out any investigation which the Security Council may initiate, in accordance with the provisions of the Charter of the United Nations, on the basis of the complaint received by the Council. The Security Council shall inform the States Parties to the Convention of the results of the investigation.

## Article VII

Each State Party to this Convention undertakes to provide or support assistance, in accordance with the United Nations Charter, to any Party to the Convention which so requests, if the Security Council decides that such Party has been exposed to danger as a result of violation of the Convention.



## APPENDIX VI

## FINAL DECLARATION OF THE 1989 PARIS CONFERENCE

The representatives of States participating in the Conference on the Prohibition of Chemical Weapons, bringing together States Parties to the Geneva Protocol of 1925 and other interested States in Paris from 7 to 11 January 1989, solemnly declare the following:

1. The participating States are determined to promote international peace and security throughout the world in accordance with the Charter of the United Nations and to pursue an effective disarmament process. In this context, they are determined to prevent any recourse to chemical weapons by completely eliminating them. They solemnly affirm their commitments not to use chemical weapons and condemn such use. They recall their serious concern at recent violations as established and condemned by the competent organs of the United Nations. They support the humanitarian assistance given to the victims affected by chemical weapons.
2. The participating States recognize the importance and continuing validity of the Protocol for the prohibition of the use in war of asphyxiating, poisonous or other gases and bacteriological methods of warfare, signed on 17 June 1925 in Geneva. States Parties to the Protocol solemnly reaffirm the prohibition as established in it. They call upon all States which have not yet done so to accede to the Protocol.
3. The participating States stress the necessity of concluding, at an early date, a Convention on the prohibition of the development, production, stockpiling and use of all chemical weapons, and on their destruction. This Convention shall be global and comprehensive and effectively verifiable. It should be of unlimited duration. To this end, they call on the Conference on Disarmament in Geneva to redouble its efforts, as a matter of urgency, to resolve expeditiously the remaining issues to conclude the Convention at the earliest date. All States are requested to make, in an appropriate way, a significant contribution to the negotiations in Geneva by undertaking efforts in the relevant fields. The participating States therefore believe that any State wishing to contribute to these negotiations should be able to do so. In addition, in order to achieve as soon as possible the indispensable universal character of the Convention, they call upon all States to become parties thereto as soon as it is concluded.
4. The States participating in the Conference are gravely concerned by the growing danger posed to international peace and security by the risk of the use of chemical weapons as long as such weapons remain and are spread. In this context they stress the need for the early conclusion and entry into force of the Convention, which will be established on a non-discriminatory basis. They deem it necessary, in the meantime, for each State to exercise restraint and to act responsibly in accordance with the purpose of the present declaration.
5. The States participating in the Conference confirm their full support for the United Nations in the discharge of its indispensable role, in conformity with its Charter.

They affirm that the United Nations provides a framework and an instrument enabling the international community to exercise vigilance with respect to the prohibition of the use of chemical weapons. They confirm their support for appropriate and effective steps taken by the United Nations in this respect in conformity with its Charter. They further reaffirm their full support for the Secretary-General in carrying out his responsibilities for investigations in the event of alleged violations of the Geneva Protocol. They express their wish for early completion of the work undertaken to strengthen the efficiency of existing procedures and call for the co-operation of all States, in order to facilitate the action of the Secretary-General.

6. The States participating in the Conference, recalling the final document of the first Special Session of the United Nations General Assembly devoted to Disarmament in 1978, underline the need to pursue with determination their efforts to secure general and complete disarmament under effective international control, so as to ensure the right of all States to peace and security.

**Source:** Paris Conference document CPC/6 Prov., 11 January 1989.

## APPENDIX VII

**THE USE OF CHEMICAL WEAPONS IN THE GULF:  
AN IRANIAN VIEWPOINT**  
by G.H. Behtash

[Remarks have been condensed and, in some cases, paraphrased.]

In the name of God:

I am happy to be here tonight, but I am also sad, because the subject is a really painful one. I am pleased to be able to share with you the Iranian perspective on this subject. I am also convinced that these kinds of conferences can have a significant role in helping to bring about an appropriate understanding of the different aspects of the most horrible weapons of the present century.

I myself come from Iran, a country that has had recent, first-hand experience of the horror and inhumanity of such weapons. However, because our country has been the victim of attack by chemical weapons, we are committed to seeing them entirely outlawed, for the benefit of all humanity. Chemical and biological weapons must never be used against any man, woman or child in any country, in any situation. That is our solid position, one arrived at after having experienced such weapons ourselves.

Of course, such weapons had been used before, primarily during the First World War. Following the war, international indignation led to the Geneva Protocol of 1925 banning use of chemical warfare agents. But, of late, let me remind you that this protocol has been forgotten, ignored, and repeatedly violated.

Resolutions 612 and 620 of the United Nations Security Council give ample proof of use of these weapons. More than 250 incidents were documented by UN investigators. Please let me give you only a few examples; the list is much longer.

As early as 1981, Iraqi artillery bombarded the Iranian city of Khorramshar with chemical shells. Two years later, Iraq's air force bombarded the city of Piranshahr, killing and wounding more than 300. Early in 1986, Iraq bombarded the Faw-Basra highway, killing and injuring more than 8,500. Later that year, Khorramshar was again attacked, with more than 1,000 victims. And, in June of 1987, the town of Sardasht was attacked from the air with chemical agents, killing or wounding more than 8,000 civilians.

Finally, just last year, came a great criminal act. On 18 March 1989, the Iraqi town of Halabja was bombarded from the air with chemical weapons by the Iraqi air force, leaving about 5,000 people dead, most of them women and children.

The first use of chemical weapons in 1981 against Iran was a litmus test of international reaction. Over the following years, international indifference was appalling; there was a complete absence of any proper response to this threat from the world community.

It is clear from reading UN reports that chemical weapon use was developed both in quality and in quantity by Iraq and by those who supported it. At first, attacks were against Iranian military personnel, then they were extended to civilians, and, ultimately, in the horror of Halabja, to the Iraqi people themselves.

Altogether, more than 50,000 Iranians suffered severe to moderate injuries. About 20 percent of all Iranian wounded died, and of this number 10 to 20 percent from mustard gas, 10 percent from cyanide, and the rest from nerve agents.

In recent years, there has been rapid improvement in the chemical weapons systems used against Iran. In 1984, according to US reports, delivery systems were imperfect and many bombs and shells did not explode. But UN observers noted that in 1986, no undetonated bombs could be found. Spray planes were also used in 1986 for the first time, something our government warned against at the time and many times after.

In 1987, short-range ground-to-ground missiles were used against the Islamic Republic of Iran. At the same time, UN teams dispatched to the area witnessed a new nerve agent identified as Sarin. Use of this agent reflected not only far higher toxicity, but also much more sophisticated technology needed for its production. Sarin cannot be produced with the equipment used in normal pesticide plants. In 1988, high volumes and powerful concentrations of nerve agents, particularly Sarin, were used against Iranian forces.

Why did this happen? Why, during the course of the imposed war, did no one seriously confront the extensive and intensive use of these weapons? Why did no international gathering condemn the use of mustard gas, then nerve agents, then cyanide and Sarin? Why was nothing done despite our country's repeated appeals and the treatment of hundreds of victims in hospitals in countries like the Federal Republic of Germany, Belgium, Sweden, the US and Britain?

Today, the situation remains critical. Despite the Paris conference held this January, further strengthening of international mechanisms to control, limit, and finally ban and outlaw all chemical warfare agents remains elusive. The permanent members of the Security Council, notwithstanding their prime responsibility for maintaining international peace, have joined the Geneva Protocol with reservations or upon conditions. But to properly uphold and strengthen the Protocol, all such reservations should be withdrawn.

In the view of the Islamic Republic of Iran, universal acceptance of the Protocol depends on providing incentives for states to join the convention, and for working out punitive measures for violations. If such measures had been applied against Iraq during the 1980s, would that country have used chemical agents against Iran? I suggest that it would not.

Fundamentally, an international climate of tolerance of Iraqi acts, coupled with its ability to procure the technology needed to produce such weapons, were decisive factors. In fact, without the encouragement of some big powers, it is doubtful that Iraq could have produced such weapons and used them on such a large scale.

Clearly, not only must production and use of those weapons be exposed to punitive action, but more importantly, production and transfer of chemical and nerve agents must be banned outright and unconditionally. Ultimately, all chemical weapons must be destroyed under controlled, easily verifiable conditions.

Such a ban must apply to all countries, particularly those powers which still possess large stockpiles of these weapons in their arsenals. These powers have not only continued to produce chemical weapons, but have provided the necessary technology to some Third World countries, and particularly in the volatile Middle East region. Iraq is a case in point. But because the two largest powers continue to maintain these weapons, they constitute the primary danger.

We must learn from our misfortunes, and turn our tragedy into a lesson for humanity. Weapons like this must never again be used in any circumstance, anywhere. Their continued existence poses a grave threat to international peace. They must be destroyed unconditionally, particularly by the great powers.

Chemical weapons should be followed up seriously by the Geneva disarmament conference, and the full weight of international opinion must be focused on efforts to end this menace to humanity. A new convention, to complete the 1925 Geneva Protocol, must be drawn up. This convention must contain specific measures, and it must be ratified by the big powers. The United Nations and other international bodies should be given the necessary executive power to deal with any use of such weapons. Political considerations cannot become an excuse for any government to ignore its duty.

The experience of the last ten years has shown that chemical weapons are the main threat to world peace, even more than nuclear weapons, because they can be produced so cheaply and easily. This is just a simple reason. You can imagine the others yourself. As members of the scientific, medical and particularly the chemistry communities, you know better than I the continual suffering chemical warfare victims will have to endure all their lives.

Today, one year after the horror of Halabja, it is time to mark this tragic anniversary. Iran's Foreign Minister, Dr. Velayati, has stated that it would be appropriate to commemorate the destruction of an entire town by chemical weapons by declaring 18 March as an international day marking mankind's desire to rid the world of such weapons once and for all.

Some of you are chemical and biological scientists, and, as such, more knowledgeable about chemical and biological weapons. Perhaps one of the things chemical scientists could do would be to turn their efforts to creating better ways of nullifying these weapons, and to use all the facilities of chemistry and biology departments of universities to try to help the victims.

Those of you who work for governments can also contribute, by helping draft policies aimed at eliminating the chemical warfare threat. No greater contribution to peace could

be made. Peace, after all, is the greatest ideal, the one beloved and sought after by people throughout the world.

Finally, I would like to offer my sincerest appreciation to the panel for giving me this opportunity to share with you these thoughts. Thank you.

## APPENDIX VIII

## LIST OF PARTICIPANTS

William H. <b>BARTON</b>	Chairman, Canadian Institute for International Peace and Security; Former Canadian Ambassador to the CCD and the UN
G.H. <b>BEHTASH</b>	Embassy of the Islamic Republic of Iran
Jane <b>BOULDEN</b>	Student, Faculty of Law, Queen's University
Peter <b>BROGDEN</b>	Workshop Convenor; Department of Electrical Engineering, Ryerson Polytechnical Institute
Betsy <b>CARR</b>	Voice of Women
Diana <b>CHOWN</b>	Board of Directors, Voice of Women
Ann <b>CROSBY</b>	Voice of Women; Doctoral candidate, International Relations, McMaster University
Dianne <b>DEMILLE</b>	Canadian Institute for International Peace and Security
Walter <b>DORN</b>	UN representative, Science for Peace; Chemical Sensors Group, University of Toronto
John <b>DOVE</b>	Department of Chemistry, University of Toronto
Stephen <b>DUBINCANAC</b>	Montreal Physician; investigated CW use in Iran and Iraq
Eric <b>FAWCETT</b>	Founding President, Science for Peace and SPIN; Department of Physics, University of Toronto
Charlie C. <b>FLOWERREE</b>	Federation of American Scientists, Former US Ambassador to the Conference on Disarmament
Arthur <b>FORER</b>	Department of Biology, York University
Ursula <b>FRANKLIN</b>	Department of Metallurgy, University of Toronto
George <b>IGNATIEFF</b>	Honorary President, Science for Peace; Pugwash Council; Former Canadian Ambassador to the CCD and the UN
Richard <b>KAPP</b>	Department of History, Ryerson Polytechnical Institute
William <b>LAWLER</b>	Former Deputy Director, Department of Disarmament Affairs, UN
Peter A. <b>LOCKWOOD</b>	Chief, Chemistry, Defence Research Establishment, Suffield
Susan <b>MACINTOSH</b>	Vice-President, Nurses for Social Responsibility, Ottawa
Janet <b>MANN</b>	President, Nurses for Social Responsibility, Ottawa

Hanna <b>NEWCOMBE</b>	Director, Peace Research Institute, Dundas
Johan <b>NORDENFELT</b>	Director, Department of Disarmament Affairs, UN
Derek <b>PAUL</b>	Physics, University of Toronto; Science for Peace
Barbara Hatch <b>ROSENBERG</b>	Committee for Responsible Genetics; Memorial Sloan-Kettering Cancer Centre, Rye, New York
Ben <b>SANDERS</b>	Programme for Promoting Nuclear Non-Proliferation, New York; Former executive with Safeguards Division, IAEA
Douglas S. <b>SCOTT</b>	President, The Markland Group; Research Director, Lawyers for Social Responsibility, Toronto
Barbara A.B. <b>SEIDERS</b>	US Arms Control and Disarmament Agency, Washington; UN group of qualified experts on the Geneva Protocol
Nikita P. <b>SMIDOVICH</b>	Director, Chemical Weapons Division, Soviet Foreign Ministry
Victor <b>SNIECKUS</b>	Department of Chemistry, University of Waterloo
Stu <b>SULLIVAN</b>	Ontario Coordinator, Energy and Chemical Workers Union
Ronald <b>SUTHERLAND</b>	Toxicology Research Centre, University of Saskatchewan; Adviser to the Canadian Government on Chemical Disarmament
Gordon <b>VACHON</b>	Verification Unit, Department of External Affairs, Ottawa
John <b>VALLEAU</b>	Department of Chemistry, University of Toronto
Janet <b>WOOD</b>	Department of Biochemistry, University of Guelph
Hasham <b>YOUSSEF</b>	Embassy of Egypt to Canada



## APPENDIX IX

## PROGRAMME

## SESSION I

## PUBLIC SEMINAR: BACKGROUND INFORMATION

Tuesday, 4 April 1989

1:00 pm	Introductory Remarks: Conference Organizers
1:05 - 1:35 pm	Richard Kapp, Department of History, Ryerson Polytechnical Institute
1:35 - 1:45 pm	Questions and Answer Period
1:45 - 2:10 pm	Arthur Forer, Department of Biology, York University
2:10 - 2:20 pm	Questions and Answer Period
2:20 - 2:35 pm	Barbara Rosenberg, Memorial Sloan-Kettering Cancer Centre
2:35 - 2:45 pm	Questions and Answer Period
2:45 - 3:20 pm	Victor Snieckus, Department of Chemistry, University of Waterloo
3:20 - 3:35 pm	Questions and Answer Period
3:35 - 3:45 pm	Coffee Break
3:45 - 4:00 pm	Diana Chown, Voice of Women, Edmonton and Ursula Franklin, Department of Metallurgy, University of Toronto
4:00 - 4:40 pm	Peter Lockwood, Department of National Defence
4:40 - 4:50 pm	Questions and Answer Period
4:50 - 5:30 pm	Gordon Vachon, Department of External Affairs
5:30 - 5:45 pm	Questions and Answer Period

## SESSION II

## PANEL DISCUSSION

Tuesday, 4 April 1989 (8:00 - 10:00 pm)

## PANELISTS:

Gordon Vachon:	Department of External Affairs, Panel Moderator
Barabara Seiders:	US Arms Control and Disarmament Agency -- American policies
Nikita Smidovich:	Foreign Ministry, USSR -- Soviet policies
Barbara Rosenberg:	Sloan Kettering Cancer Centre, New York -- improving compliance with the Biological Weapons Convention

**SESSION III                      EXPERTS' WORKSHOP**Wednesday, 5 April 1989

- 9:05 am                      Introductory Remarks: Conference Organizers
- 9:30 am                      **Institutional and Political Aspects**  
                                     Gordon Vachon, Canada  
                                     Barbara Seiders, US  
                                     Nikita Smidovich, USSR  
                                     Douglas Scott, NGO  
                                     Discussion
- 10:45 am                      Coffee Break
- 11:00 am                      **Technical Aspects**  
                                     Peter Lockwood, DND  
                                     Ben Sanders (IAEA experience)  
                                     Discussion
- 12:00 pm                      Lunch at Faculty Club (Luncheon Speaker: William Barton)
- 2:00 pm                      **International Control of CBW: Possible Progress**  
                                     Johan Nordenfelt (UN/Geneva Protocol)  
                                     Barbara Rosenberg (Biological Weapons Convention)  
                                     Ronald Sutherland (Chemical Weapons Convention)  
                                     Discussion
- 3:00 pm                      Break up into small discussion groups for recommendations on:
1.            Overcoming technical problems in verification confronting the Conference on Disarmament
  2.            Evaluation, response and other measures for promoting compliance
  3.            International export controls and confidence-building measures
  4.            The role of NGOs and citizen reporting
- 4:30 pm                      Reports from Rapporteurs and Discussion
- 5:00 pm                      Coffee Break
- 5:15 pm                      Further discussion
- 6:00 pm                      Finish meeting



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