STUDY PROJECT

UNITED STATES NATIONAL STRATEGY AND DEFENSE POLICY OBJECTIVES AFTER CHEMICAL DISARMAMENT

BY

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19 MARCH 1989

U.S. ARMY WAR COLLEGE, CARLISLE BARRACKS, PA 17013-5050

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) U.S. NATIONAL STRATEGY & DEFENSE POLICY OBJECTIVES AFTER CHEMICAL DISARMAMENT		5. TYPE OF REPORT & PERIOD COVERED Group Study 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) DAVID HARRISON,LTC JAN ROBERTS, LTC (P)		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. ARMY WAR COLLEGE CBKS, PA 17013-5050		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE ~~25~~ Mar89 13. NUMBER OF PAGES 112
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLAS 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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USAWC MILITARY STUDIES PROGRAM PAPER

UNITED STATES NATIONAL STRATEGY AND DEFENSE POLICY OBJECTIVES AFTER CHEMICAL DISARMAMENT

A GROUP STUDY PROJECT

by

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19 March 1989

ABSTRACT

AUTHORS: David Harrison, LTC, CM
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TITLE: United States National Strategy and Defense Policy Objectives After Chemical Disarmament

FORMAT: Group Study Project

DATE: 25 March 1989 PAGES: 111 CLASSIFICATION: unclassified

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PREFACE

The ultimate goal of the present administration is the attainment of a total verifiable ban on chemical weapons. With the possibility of signing some form of a chemical treaty in the forseeable future, it is appropriate that the National Strategy and Defense Policy be examined in light of such an agreement.

Nominated as an area for research and analysis by the Director of Nuclear and Chemical, Office of the Deputy Chief of Staff for Operations, Deparment of the Army, the scope of the study is as follows:

--an analysis of the threat posed by the Soviet Union and the emerging threat in the Third World to include international terrorism.

--an examination and analysis of our current chemical warfare policy and its value as a deterrent.

--a history of chemical weapons negotiations and an analysis of major differences remaining to be negotiated in the current treaty.

--an analysis of the risks posed by the current treaty with regard to verification, enforcement, proliferation, sanctions, chemical defense, research and development, and non-lethal chemical programs.

--a subjective analysis of the risks versus the traditional elements of national power: military, socio-psychological or the will of the people, international politics and economics was performed to formulate a balanced national strategy and defense policy.

--finally, National Security Strategy and Defense Policy Objectives for Chemical Warfare are recommended.

Though not within the original scope of the study, biological warfare is discussed throughout the study because of its close relationship to chemical warfare and the emerging genetic engineering technology which allows for the production of agents not covered by the Biological Convention of 1972 nor the chemical weapons treaty in its present format.

CHAPTER 1

Introduction

STATEMENT OF THE PROBLEM

Determine the best United States chemical warfare (CW) strategy and defence policy objectives (and associated risks) following agreement on an international chemical weapons ban treaty.

CHEMICAL WARFARE ENVIRONMENT

Recent developments in CW technology, weaponization, and proliferation have dramatically increased the awareness of the threat to the national security interests of the United States (US) and its allies. Numerous incidents of chemical weapons employment throughout the world, and especially in the Iraq-Iran war, have resulted in the breakdown of the moral prohibitions which have held the horrors of CW in check for the last 70 years. The last two years have been marked by lessening of tensions between the US and the Soviet Union and by some progress in chemical arms control. By contrast, the Third World has exploded with an arms race aimed at acquiring a chemical and biological (CB) weapons capability considered the "poor man's atom bomb." The recent unprecedented use of chemical weapons and toxins throughout the world has met with a surprising degree of complacency among world governments. In addition, new

technologies promise to revolutionize the capability to produce even more deadly and more militarily significant CB weapons. This world situation has prompted the US to launch an aggressive diplomatic initiative, aimed at raising international awareness of the CW threat, curtailing proliferation and ultimately banning all chemical weapons. At the same time, the US is producing new binary munitions and destroying unitary chemical stocks in an effort to add credibility to its long neglected CW retaliatory capability and to acquire leverage necessary for successful disarmament negotiations. CW disarmament is a high priority for the Bush administration which believes that an international agreement to ban CW can be reached during its tenure. However, the US 1984 proposal that requires a global, verifiable ban, poses serious obstacles to quick world agreement. Third World nations in particular feel that such a ban would deny them a significant, inexpensive defense advantage over their neighbors, some of whom may already possess a CW capability. As arguments concerning confidence/risk versus threat continue to plague CW negotiators, momentum for action in the CW arena is steadily increasing, and an international agreement in some from seems likely in the near future.

STUDY OBJECTIVES

The goal of this study is to analyze the risks associated with CW policy options available to the US following an international agreement, and to recommend those options which provide the most deterrent value and best protect the

security interests of the US and its allies. Critical to assessing the risks is a thorough analysis of the current chemical/biological warfare (CBW) threat which has increased drastically in this decade. The objectives are to examine:

-the current CW threat.

-current US CW policy, capability and initiatives.

-the deterrent value of the current US policy.

-current CW treaty proposals.

-policy options following a treaty.

-and assess the risks associated with the treaty proposals and policy options; and

-reach conclusions and recommend the policy options which pose the least risk and provide the most CW deterrent value.

STUDY METHODOLOGY

The data for this study was gathered from individual research of unclassified reports, studies, public news media and other writings on CBW. In addition, numerous phone conversations and personal interviews were conducted with senior officials at Headquarters, Dept. of the Army, Office of the Joint Chiefs of Staff, Arms Control and Disarmament Agency, State Department, US Army Chemical Research, Development and Engineering Command, Project Manager Binary Munitions, Project Manager Chemical Demilitarization, and US Army Toxic and Hazardous Materials Agency. The information provided in this study comes only from

the public domain. The study is kept unclassified to provide the opportunity for the widest dissemination possible.

SCOPE OF THE STUDY

This study is designed to provide information and options from which decision makers within the Department of Defense can base their CW programs and decisions. The study also provides a background for further detailed analysis on CW issues. There are two assumptions on which the study is based. First, the US will sign an international convention banning the production, stockpiling and use of CW weapons, which differs little on substantive issues from the 1984 US CW disarmament proposal. Second, based on past performance of similar international treaties, the goals of universal acceptance and strict adherence to a CW treaty cannot be guaranteed.

The risk assessment is based on the current global CW threat. The rapidly changing nature of the threat environment has been the subject of daily newspaper articles throughout late 1988 and early 1989, and much startling information has been revealed about CW use, capability and proliferation especially concerning Third World nations. As indicated by MG William Burns, director of the US Arms Control and Disarmament Agency; because the CW threat has changed and is no longer provided by the Soviets alone, the current US treaty proposal may no longer meet the national interests of the United States.[1] Therefore this study begins with an assessment of the CW threat, looking in some detail at that posed by the Soviet Union, Third

World countries and terrorist elements worldwide. Appendixes 1 through 3 provide threat details as well as an account of the evidence which substantiates conclusions used in the defense option analysis. The US CB policy, capabilities and programs are also reviewed, in order to put the overall threat into perspective and to determine the deterrent value of the US program. A discussion of current CW treaty proposals follows, from which the necessary changes in the US policy can be derived. The CW policy options, to include the treaty, are then analyzed and risks associated with each are discussed. Recommendations are then made for a CW strategy and a set of defense policy objectives for the United States.

Chapters II and III and Appendixes 1 through 4 contain primarily background information dealing with the current CBW threat and US CW policy and program status. Readers well versed in these areas may wish to read only Chapters IV through VI which contain treaty information, the defense policy analysis and recommendations.

CHAPTER I ENDNOTES

1. William Burns, Director, US Arms Control and Disarmament Agency. Personal Interview. Carlisle: 8 February, 1989.

CHAPTER II

THE CHEMICAL/BIOLOGICAL WARFARE (CBW) THREAT

SECTION 1

SOVIET CHEMICAL/BIOLOGICAL (CB) THREAT

POLITICAL CLIMATE

This threat assessment is presented during a political climate of lessening tensions between the US and Soviet Union, concerning CW issues. The two nations exchanged visits to chemical weapons facilities in 1986. Soviets and representatives from other nations visited the Tooele Army Depot chemical munition demiliteriazation operation and the US and others visited parts of the Soviet Shikhany Chemical facility.[1] Following an extensive CW modernization program, the Soviets announced in 1987 that they had stopped CW production and in 1989 that they intend to build a CW munition destruction facility to destroy a part of their CW stocks. The quantity was not identified.[2] Some progress was also made on the U.N. sponsored Chemical Arms negotiations in Geneva, when the Soviets indicated that they would now agree in principle with the major tenets of the US CW ban proposal of 1984, and would work to solve problems in treaty verification and implementation. Soviet Premier Gorbachev also indicated that because of severe economic difficulties, some defense programs may have to be cut. However,

as President Reagan said in his annual report to Congress in Jan. 1988 ". . . we will continue to judge the Soviets by their actions, rather than their words, and to found our National Security Strategy on a realistic view of Soviet arms and capabilities."[3] From 1969 through 1986, the US halted its production of chemical weapons and hoped that the Soviets would take similar action. However, during the same period, the Soviets pursued an energetic research and development program, stockpiled large quantities of CW agents, maintained an extensive agent production capability, deployed chemical weapons with modern delivery systems, trained extensively in CW, and used chemical and toxin weapons in low and mid intensity conflicts even though the Soviet Union is a signator to the 1925 Geneva Protocol.[4] In the field of CB warfare there indeed has been a dichotomy between Soviet words and actions.

SOVIET CB WARFARE CAPABILITY

The first criterion of threat credibility is capability, and the Soviet Union maintains and continues to upgrade the world's most formidable offensive and defensive CW capability. Recent changes in doctrine and unit organization have removed CW from the category of weapons of mass destruction and have made it a powerful complement to conventional offensive operations, in both the operational and strategic contexts. Soviet offensive and defensive CW capabilities, as well as equipment, training, organizational and doctrinal changes are discussed in detail in Appendix 1.

RESEARCH AND DEVELOPMENT

The extensive and continuous Soviet chemical and biological warfare (CBW) research and development program has been conducted since the early 1930's and now represents a most serious threat. The highly active Shikhany Chemical Warfare Proving Grounds, one of the primary Soviet CBW test centers, continues to grow in size and sophistication, and contains test grids for a multitude of CBW agent delivery means.[5] The Shikany complex also houses research and development (R&D) and agent production facilities. Over forty civilian and military agencies conduct CBW research along with numerous other associated medical and industrial institutions. The R&D effort has always received priority of funds and resources but recently has been characterized by augmented funding and increased security precautions. Current Soviet R&D programs are directed toward improving the whole range of CBW agents with regard to effectiveness, penetrability, selectivity, stability, and predictability. In addition, the programs investigate antidotes and improvements in protective equipment.[6]

The science of genetic engineering provides the capability to produce a whole new generation of CBW agents which the Soviets feel can revolutionize the style and from of the warfare. Figure 2.1, located at the end of this chapter, identifies the chemical/biological spectrum.[7] The Soviets believe that many of the mid-spectrum CB agents have great military significance. Novel toxins, designer drugs and bioregulators have been produced through genetic engineering techniques.[8] Many toxins are much

more effective as lethal or incapacitating agents than chemical poisons.[9] The employment of toxin weapons may have another advantage. While they are more toxic than chemical weapons, friendly forces can be protected from their effects by inoculation or antidote. These characteristics, plus the fact that toxins are extremely difficult to detect, increase their desirability as CBW agents and their utility as a combat force multiplier. Tab A, Appendix I lists common toxins and those with the greatest potential as Toxin Warfare (TW) agents[10] as well as a list of BW toxins, their symptoms and effects.[11] Numerous toxins can also be produced efficiently and tailor-made for unique weaponization. For example, over 300 new highly toxic mycotoxins alone have been discovered, any of which can become a TW agent.[12] The Soviets have used toxins such as these in Afghanistan repeatedly since 1980 and are suspected of providing toxins to the Vietnamese who used them in Laos and Cambodia in the late 1970's.[13] Toxins, being poisonous substances produced by living organism, are banned as warfare agents by the 1972 Biological Weapons and Toxin (BWT) Convention, to which both the US and the Soviet Union are signators.[14] However, many toxins can be chemically synthesized in the laboratory and are called artificial toxins. Because the 1972 BWT Convention does not adequately define toxins, the Soviets have a good case for considering artificial toxins as chemical agents not subject to the 1972 BW Convention.[15] The Soviets recognize the revolutionary opportunities afforded by toxin warfare and may be aggressively taking advantage of treaty loopholes or disregarding

treaty requirements to achieve a decided advantage. The US continues to consider all TW banned by the Biological Weapons Convention. The concentration of the Soviet R&D efforts in the mid-spectrum, where the biological or chemical nature of the agents is not clearly defined, coupled with developments of new genetic engineering techniques have produced a Soviet capability not found in the western world. This aspect of the Soviet CBW capability poses the most formidable threat for the US through the 1990's. In addition to their extensive advances in TW, evidence indicates that the Soviets are developing a capability to defeat current US and allied individual and collective protective measures. Mask penetrants, or chemicals which destroy mask filters or make them ineffective seem close at hand if not already in the Soviet inventory.[16] When these chemicals are employed with a lethal chemical agent in a Soviet version of a binary munitions, the victim force would be doubly at risk. The force would suffer the disadvantages of the cumbersome protective clothing but would not be protected from the lethal agent after the penetrant did its work.[17] The Soviets also appear to be developing explosives that spray needle-like flechettes to pierce holes in protective overgarments.[18] Employed with lethal CW agents, these explosives could defeat the CW protective clothing of the US and its allies.

INTENT

The second criterion of threat credibility is intent. The Soviet concept of the nature of war looks coherently at the

battlefield from the Soviet Military District (TVD) to the area of operation, covering the complete spectrum of conflict from strategy to tactics. It implies a thorough optimization of all forces and weapon systems including CBW, and keys on the operational art.[19] Considering the Soviet capabilities discussed above, it is evident that the Soviet forces are well prepared to conduct offensive CBW operation. This extensive preparation itself implies intent. The Soviets maintain the largest CW stockpile in the world. That capability represents much more than is necessary for retaliatory or defensive operations. Soviet intent to use CW is also manifest in the force structure, training and equipment design. This integration appears designed to support the Soviet principle of maintaining the tempo of the offensive. The duality of weapons delivery systems to include chemical rounds, bombs, and warheads, and the forward deployment of chemical weapons into Eastern European countries facing NATO forces, reinforces the seriousness of the Soviet intent to use CW. In addition, the Soviets have devoted major resources to research, development, storing and testing CBW weapons, and they maintain extensive facilities for those purposes throughout the Soviet Union. The Presidential Warfare Review Commission in 1985, after reviewing Soviet CW capabilities and past actions, concluded that "The evidence is more than sufficient to establish a major Soviet program to produce, and in time of war to employ, chemical weapons."[20]

The most conclusive evidence which indicates the Soviet willingness to use CBW is the fact that they employed CBW in

Afghanistan throughout this decade and are strongly suspected of supplying the CBW agents used by the Vietnamese in Laos and Cambodia and used by the Cubans against Angolan rebels in 1988.[21] The Commission finds that,

> "There also is clear evidence of Soviet use of chemical weapons of more than one kind in Afghanistan. This not only confirms the lack of any Soviet scruples in employing chemical warfare. It is also another instance in which a country that is armed with chemical weapons has not hesitated to use them against one that is not. Further, it reflects the Soviet inclusion of chemical attacks in ordinary military tactics, as well as willingness to test new substances on a defenseless population, refining their chemical warfare operational techniques and doctrine, and improving their readiness to use those weapons elsewhere."[22]

Soviet CBW is now decoupled from nuclear operations and appears to be ranked in the conventional inventory.[23] This decoupling increases CBW employment options as well as the likelihood of early CBW employment by Soviet forces in a conventional conflict.

The final aspect of the Soviet threat concerns treaties and agreements. The Soviet violations of international treaties such as the 1925 Geneva Protocol, the Anti-Ballistic Missile Treaty and the 1972 Biological Weapons and Toxin Treaty, lower the confidence level that they will uphold the requirements of these and any other CBW treaty in the future, with any greater impunity.[24]

SECTION 2

THIRD WORLD CHEMICAL/BIOLOGICAL WARFARE THREAT

PROLIFERATION AND USE

Chemical weapons proliferation is occurring among Third World countries at an alarming rate. With proliferation has come increased use of such weapons as a matter of course in conventional and low intensity conflicts. It was this extensive proliferation, and especially the Iran-Iraq CW use, which prompted President Reagan to say in his farewell speech to the UN General Assembly, that the use of chemical weapons has imperiled ". . . the moral and legal strictures that have held these weapons in check. . ."[25] US intelligence estimates that sixteen nations now possess or have the capability to produce CW weapons.[26] This number represents a historical high. Some analysts place the number of the CW club at 24 nations.[27] Besides the US, Soviet Union, France, and Iraq, which possess a CW capability, Iran, Libya, Israel, Syria, Egypt, North Korea, South Korea, Ethiopia, Burma, China, Thailand, Vietnam, and Taiwan are suspected to be capable of manufacturing and deploying weapons.[28] Syria, Iraq, Iran, Saudi Arabia and Israel also possess long range ballistic missiles which could serve as excellent chemical agent delivery means.[29] The number of nations with a CW capability is almost irrelevant. Since weapons are easy and inexpensive to make or obtain, almost any nation which desired to do so could obtain a CW capability. In addition, because the production of insecticides, fertilizers,

and pharmaceuticals uses the same or similar processes and facilities as does the production of chemical agents, the clandestine manufacture of such agents is easy to hide.

Some CW proliferation can be attributed to Soviet military assistance.[30] It is probable that Soviet CBW agents and delivery systems are available to their client nations and surrogates throughout the world.[31] The evidence indicated above concerning CBW employment in Afghanistan, Cambodia, Laos and Angola substantiates significant Soviet complicity in such proliferation. Many nations however are acquiring their own CW capability, independent of the Soviet assistance.

Intent to use CBW has been amply demonstrated by Third World governments. CBW capability and use are summarized in Appendix 2 for several nations whose affairs impact the national security interests of the United States. Note that the recent CW use by Egypt, Iraq, Iran, Ethiopia, Afghanistan, Vietnam, Cuba, the Sudan, and Libya in conventional conflicts has firmly placed CW into the category of a routine conventional munition rather than that of a weapon of mass destruction.

US ALLIES -- SOURCE OF PROLIFERATION

It is apparent that the 1925 Geneva Protocol, the 1972 Biological Weapon and Toxin Convention, and moral discipline were not sufficient to halt the proliferation or use of CB weapons. Many believe these treaties were unsuccessful because of a lack of effective verification and compliance provisions, a situation the United States is attempting to remedy with its current

chemical disarmament proposal. However, the Soviet Union and self development are not the only causes of the growing chemical weapons proliferation. Chemical and industrial firms of the US allies and friends seem to be as much a cause of proliferation as the Soviets. US evidence confirms that West German companies assisted by Belgian shippers, were instrumental in building the Libyan chemical weapons plant and that Japan provided the technology and material for a machine tool shop which is already turning out stainless-steel bomb casings.[32] West Germans also helped build chemical weapons plants in Iraq and Syria and are now assisting in the construction of a pesticide plant in Iran which can easily be converted into a chemical weapons facility.[33] In addition, French, Dutch, Swiss and Italian chemical companies have also been identified as assisting Iran, Iraq, Syria and Libya to develop their chemical arms facilities.[34] Third World attempts to acquire a CW capability have even touched the US business community as indicated by the arrest of a New Jersey executive in January 1989 by US customs officials for conspiring to export Sarin nerve agent to Iran.[35] It is evident here that the threat of proliferation of chemical weapons is manifold and use of sanctions to control this threat will surely meet with much difficulty.

COMPLACENCY

One reason that CW proliferation is occurring at such an accelerated pace is world wide complacency concerning chemical weapons use. Although the Iraqi use of CW had continued for

eight years and other CW use as indicated above had occurred during the same time, no serious diplomatic objection, economic sanction or threat of sanction was made by the non-involved nations of the world. The UN did pass a toothless resolution condemning Iraq for its CW use to no avail. It is interesting to note that most of the CW initiators were signators to the 1925 Geneva Protocol banning CW use.

In late 1988, President Reagan called for a world wide conference to reaffirm commitments to the 1925 Geneva accord, which was held in Paris, France in January 1989. One hundred and forty-nine nations reaffirmed no first use of poison gas, as a result of the conference. However, the delegates failed to censure Iran for routine use of CW on the battlefield, which was one of the primary events which prompted the conference in the first place.[36] The conference also failed to achieve a consensus on sanctions for nations who proliferate or use CW although the conference statement called for early completion of the total-ban disarmament negotiations being conducted in Geneva, Switzerland.[37]

The reaction of the US to Iraq's use of CW also has been called into question. The US is perceived as not reacting more strongly because it wanted the war to be tilted in favor of Iraq against Iran. Even following the Iraqi CW attacks on Kurdish rebels, the Administration vehemently opposed congressional action aimed at imposing economic sanctions on Iraq.[43] It is also interesting to note that the Senate resolution calling for a trade embargo against Iraq only mentions the CW use against the

Kurdish rebels, a human rights issue, and not the routine battlefield use of CW against Iran.

The very limited success of the Australian Working Group, a 19-nation pact pledged to impose export controls on certain CW precursor chemicals, points to world complacency or a reluctance to impede trade in order to halt CW proliferation.[39] Considering the actions of the US and other world governments, it appears as though the motivation for objection to CW use is political or economic in nature and not due to a moral abhorrence of the evils of chemical killers.

WEAPONS OF CHOICE

The fear of CW becoming common place in the prosecution of conventional war has now been realized. The Iraqi use of CW against Kurdish civilians of its own population, the Vietnamese use in Cambodia and Laos, the alleged use by Cubans against Angolan rebels and the systematic use by the Soviets/Afghans against the Mujahedin, were apparently as a matter of convenience. This use takes CW out of the category of weapons of mass destruction and places it into a conventional munitions inventory for common or even desired use in selected battlefield situations. In addition, the CW successes achieved by the Iraqis in halting Iranian human wave attacks as well as the success of the Vietnamese and Soviets in their CW use, has encouraged other Third World nations to seek a CW capability. Such a capability is seen by Third World countries as an equalizer against their neighbors who possess greater military strength or as a self-defense measure because their neighbor may already possess a CW

capability. The race is on in the Third World for what is termed "the poor man's atom bomb," i.e., an offensive chemical weapons capability.

Such a changing attitude and expanded CW capability among Third World nations greatly increases the risk of chemical attack on US forces as they deploy to meet emergencies in Third World trouble spots such as the Middle East and Southeast Asia. Also, the increased CW threat to neighboring nations, friendly or allied with the US, promotes regional instability and jeopardizes the attainment of US national security interests. However, the most menacing possibility is that the breakdown of moral inhibitions and political sanctions may in turn lead to the same proliferation and use of biological weapons in the Third World.

SECTION 3

CHEMICAL/BIOLOGICAL TERRORISM

THREAT TO US NATIONAL SECURITY

Chemical and biological (CB) agents are ideal terrorist weapons. The essence of terrorism is to cause fear and intimidate populations, governments or military forces. Weapons capable of causing mass destruction such as nuclear, chemical or biological weapons cause the greatest fear. As acts of terrorism become more common place terrorists will turn to more horrific means to grab news media headlines and promote their cause. CB weapons are the next likely step on the escalation ladder of terrorism.

CB agents have been used by terrorist groups and have posed serious threats to our national security and that of our allies in the recent past. Some of these terrorist incidents wereconducted by international or foreign state-supported terrorist groups, and state sponsored assassins. Others were initiated by terrorist groups internal to the US. The US has become a target for most terrorist organizations of the world. Its porous borders and active news media make it a lucrative target. In addition, since most terrorist groups are leftist-marxist oriented organizations, the US rather than the Soviet Union is the likely target of choice. Arab groups, among the world's most active terrorists, blame the US for Israeli actions because of the US support for Israel. Therefore, organizations such as the Palestine Liberation Organization (PLO) have targeted primarily US personnel and property abroad. At least twelve internal and more than 55 foreign terrorist groups which live in the US contain zealots and crazies capable of making the decision to use CB weapons in order to gain publicity, extract ransom or achieve revenge.[40]

GREATEST TERRORIST, CB THREAT

Modern state sponsored terrorism is used as an instrument of foreign policy, operates using sophisticated intelligence resources and has access to sophisticated technologies, such as plastic explosives, weapons undetectable by airport security devices and electronic triggering devices. International terrorism today can be viewed as war by proxy where terrorists

engage in aggression while avoiding retaliation.[41] Terrorist acts are being viewed as foreign policy rather than as the heinous crimes they are. The foremost sponsor of terrorism today is Libyan leader Colonel Moammar Gadhafi. He has overtly supported international terrorism, including the Arab world's leading terrorist, Abu Nidal and is currently sending arms to the Irish Republican Army, which is fighting to get the British out of Northern Ireland.[42] Denounced as an unstable and erratic leader, he acquired and used CW in his recent war with Chad. In 1988 he completed construction of a facility to make chemical weapons in Libya and his CW capability has been confirmed by the US, Britain and the Soviet Union.[43] His acquisition of a CW capability coupled with his willingness to supply arms to and support terrorist organizations give him the capability to conduct chemical warfare by proxy, through international terrorist organizations, without the fear of direct retaliation. That is the real CW terrorist threat to the US today. A quick assessment of the battlefield indicates that US military installations and embassies are primary terrorist targets for such CW attacks and that they, as well as cities in the US and Europe, are not prepared psychologically or physically, to cope with such attacks. Warning is nonexistent, intelligence is scant, populations are unprotected and the capability to handle the resulting CW casualties is extremely limited.[44] The Gadhafi-CW-Terrorist threat presents a significant challenge for the new Bush Administration as well as US military and State Department planners worldwide.

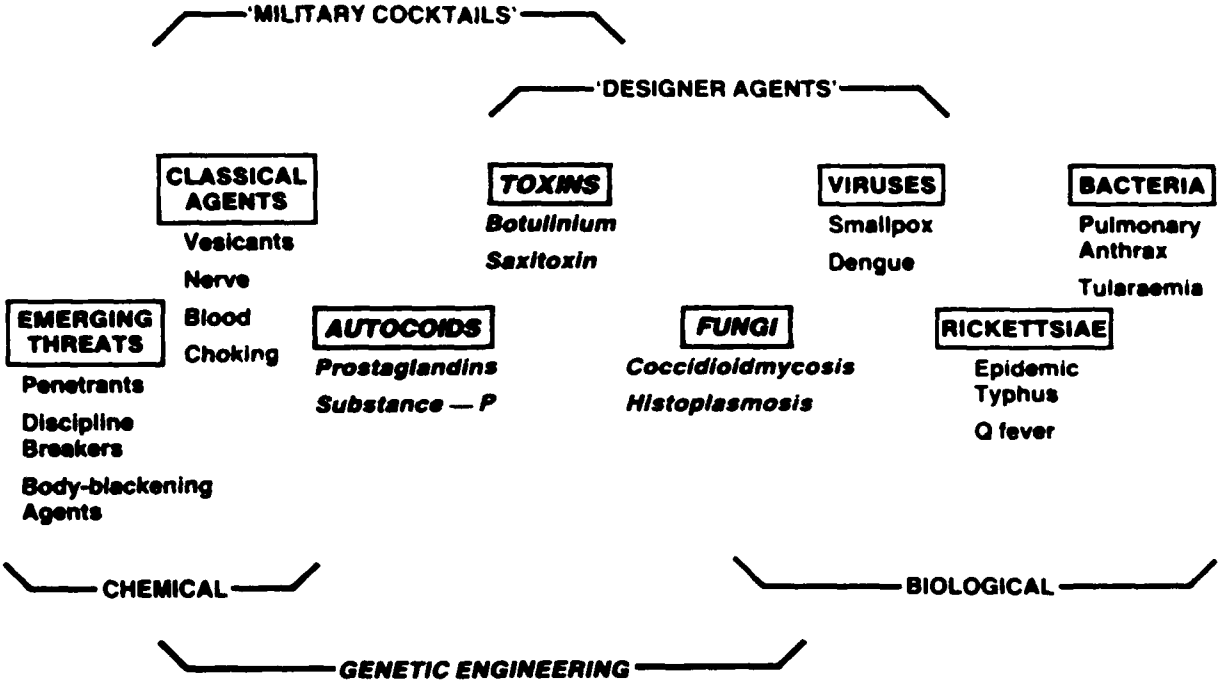

FIGURE 2.1 CHEMICAL AND BIOLOGICAL SPECTRUM.

Moammar Gadhafi, *46, a colonel and commander in chief of Libyan armed forces, has held power since 1969, when he led a military overthrow of Libya's monarchy. He has been denounced as a terrorist by world leaders, including President Reagan.*

Moammar Gadhafi

FIGURE 2.2 TERRORIST THREAT.

CHAPTER II ENDNOTES

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CHAPTER III

UNITED STATES CHEMICAL/BIOLOGICAL WARFARE POLICY

US POLICY

The US policy concerning CBW includes these elements.

1. No use, storage or production of biological agents or toxins.

2. No first use of chemical weapons.

3. Active negotiations for a verifiable ban on the use, production and stockpiling of chemical weapons.

4. The maintenance of protective measures for defense against chemical attack.

5. Deterrence, by threat of retaliation in kind.[1]

The policy concerning BW and toxins was established with the ratification by the US of the 1972 Biological Weapons and Toxin Convention in 1975.[2] At that time all aspects of the BW program were eliminated except for defensive research. The no first use of chemical weapons element includes not only lethal chemicals but also herbicides and non-lethal tear gas when used in warfare.[3] The US is committed to aggressive negotiations to eliminate chemical weapons. Currently, negotiators are struggling with complex issues such as achieving a global ban, preserving industry's rights in verification and constructing an organizational structure to oversee the ban. Bilateral talks also continue with the Soviet Union and are focused on

verification issues and mechanisms of entering a ban into force.[4] In addition, the US is seeking to raise world awareness of the need for a CW ban through diplomatic condemnations of use and proliferation, and through international conferences like the Paris conference of January 1989. CW negotiations will be discussed in detail in Chapters IV and V.

CHEMICAL WARFARE DEFENSE

As former Secretary of Defense, John Carlucci indicated in his FY89 annual report to Congress ". . . an effective chemical defense capability is necessary to deter war, or to fight and win if deterrence fails."[5] The defensive capability along with the retaliatory capability has acted as an effective deterrent to CW against the United States. Doctrinally, the program cornerstones of the fourth element of CW policy include contamination avoidance, protection and decontaminization. Recent improvements have been made in each of these areas. Products of the CW defense program include a significantly improved protective mask for ground crews and aircrews, a lightweight vehicle decontamination system, improved decontamination kits and a hand-held chemical agent monitor, which determines the presence of chemical agents on equipment or personnel. Fixed and portable collective protection systems are also being purchased. In addition, R&D efforts are under way to provide capabilities and improvements such as a Nuclear Biological and Chemical (NBC) reconnaissance vehicle, medical pretreatments and antidotes, a stand-off chemical detector using frequency-agile lasers, generic detectors of all agents using receptor site technology and non-aqueous

decontamination devices for electronics and sensitive material.[6] The development and fielding of the NBC recon vehicle and a stand off agent detector will eliminate significant longstanding gaps in the CW defense capability and will give maneuver units the ability to detect and avoid contaminated areas.[7] The burdensome nature of individual protection remains a major problem and results in serious degradation of combat effectiveness. A summary of chemical defense capabilities and planned improvements is shown in figure 3.1 at the end of this chapter.[8]

CW RETALIATORY CAPABILITY

The fifth element of the US CW policy, a retaliatory capability, forms the bulwark of CW deterrence. For this offensive CW capability to be an effective deterrent it must be credible and capable of achieving policy goals. Currently, the US chemical warfare toxic chemical stockpile consists of approximately 30,000 agent tons and includes four basic agents.[9] These are the persistent nerve agent VX, the nonpersistent nerve agent sarin (GB), the mustard agents H, HD, and HT, and the hallucinogenic, incapacitating agent (BZ).[10] Chemical munitions consist mainly of artillery shells, a few bombs, obsolete battlefield rockets, land mines and mortar shells all made in the 1950's and 1960's along with one-ton drums of toxic agent stored in bulk form dating back to the early 1940's.[11] This unitary chemical munitions stockpile is stored at Johnston Stoll in the Pacific; one site in Europe; Aberdeen Proving Ground, MD; Pine Bluff Arsenal, AR; Umatilla Army Depot,

OR; Tooele Army Depot, UT; Lexington-Blue Grass Army Depot, KY; Anniston Army Depot, AL; Pueblo Army Depot, CO; and Newport Army Ammunition Plant, IN.[12]

This aging stockpile is rapidly losing its deterrent value. The Department of Defense estimates that only 28% of the stockpile can be used effectively and that only 7% of the munitions manufactured with agent contained, can be fully effective on the battlefield.[13] Some of the critical stockpile defects include leaking and hazardous munitions, obsolete agents, mismatched agent types with weapons systems, and lack of certified delivery aircraft for bombs and spray tanks.[14] The most critical deficiency concerns the lack of a credible capability to reach targets beyond artillery range.

Efforts to upgrade the CW retaliatory capability include the production of a lesser quantity of binary munitions to replace the aged stockpile of unitary munitions. Binary munition production began in December, 1987 after an 18 year moratorium, and is scheduled to produce a 155mm artillery projectile with nonpersistent nerve agent and the BIG EYE Bomb employing a persistent nerve agent.[15] The binary munitions involve the use of two nonlethal chemicals stored separately until employed on the battlefield. When rounds are assembled for employment, the two canisters of chemicals are inserted, and the chemicals are mixed after the munition is fired and on its way to the target. The binary design greatly facilitates storage and handling of the munitions which are no longer lethally hazardous to maintain. See Appendix 4 for additional information concerning the

design and advantages of the binary CW munition. The US chemical retaliatory capabilities are summarized in Figure 3.2.[16]

The demilitarization of the obsolete unitary chemical stockpile was required by the 1986 DOD Authorization Act (Public Law 99-145) in conjunction with the production of binary CW weapons. "ARMY FOCUS" magazine provides the following summary of the demilitarization program.

> "The Army began disposal operations for incapacitant agent BZ at Pine Bluff Arsenal in May 1988. Johnston Atoll Chemical Agent Disposal System (JACADS) is the full scale lethal agent demilitarization facility and will begin disposal operations in December 1990. Funding for the construction of a demilitarization facility at Tooele is programmed for FY89 along with the chemical training facility at Aberdeen Proving Ground, MD. Based on the experience gained at Tooele, three additional sites (Pine Bluff, Umatilla, and Anniston) are programmed for FY91. Construction of the remaining four sites (Pueblo, Newport, Lexington-Blue Grass, and Aberdeen) are programmed in FY92. The programmatic Environmental Impact Statement and the Record of Decision have been completed. Site-specific environmental impact statements will be completed for each site. Demilitarization will be conducted at each of the CONUS sites using a process of reverse assembly and incineration as endorsed by the National Academy of Sciences."[17]

The destruction of unitary obsolete stocks is scheduled to be completed by 1997, although some public concern has been voiced over the adequacy of safety precautions involved with chemical munition destruction procedures.

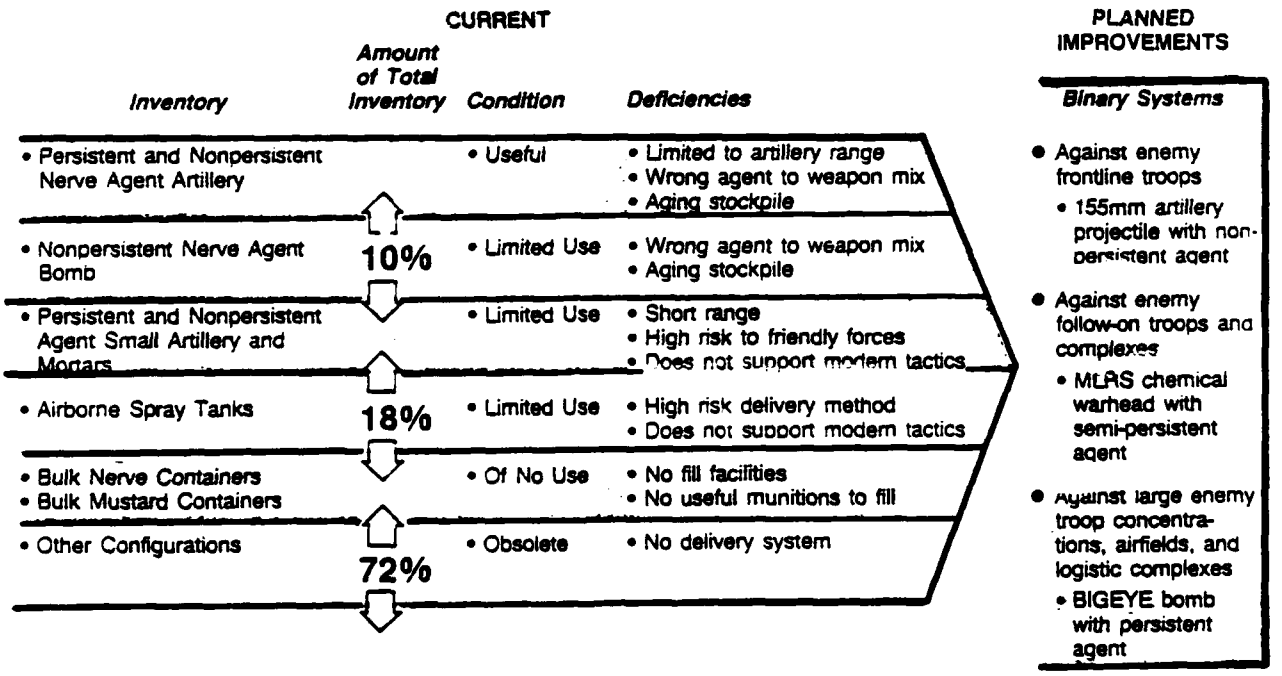
US Chemical Warfare Protection Capabilities

Category	Currently Used	Planned Improvements
• Individual protection	• Protective mask • Protective overgarment	• Improved mask • Less restrictive overgarments
• Collective protection	• Limited shelters	• Transportable shelters • Fixed site shelters • Shipboard upgrades • Portable modular systems
• Detection and warning	• Detection paper • Chemical agent alarm • Chemical agent detector kit	• Hand-held monitor • Unattended remote sensor • Point scanner • NBC recon vehicle
• Decontamination	• Individual decontamination • Decontamination apparatus • Chemical agent–resistant coatings • Lightweight decontamination system	• Non-water-based decontamination

As of 30 September 1987

FIGURE 3.1

US Chemical Retaliatory Capabilities



As of 30 September 1987

FIGURE 3.2

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CHAPTER IV

Chemical Weapons Treaty

Attempts to ban chemical warfare are not unprecedented. On 17 June 1925, twenty-eight states signed the Geneva Protocol, prohibiting the use in war of asphyxiating, poisonous or other gases and all analogous liquids, materials and devices. Some one hundred states have since adhered to the Protocol although several qualified their ratification. A standard of international law was established, although it has been breached on several occasions. The Protocol permitted the development, production, stockpiling and transfer of chemical weapons but had no provision for the investigation of alleged violations. It also provided for the right of states to retaliate in kind. Strenuous efforts have been made since 1968 to devise a more comprehensive agreement with means to detect violations and verify compliance.[1]

During the 1950's and 1960's, chemical and biological warfare was discussed intermittently by the UN General Assembly, usually in conjunction with other disarmament proposals. In 1969 the British proposed to the Conference Committee on Disarmament (CCD) that chemical and biological weapons be considered separately and that biological weapons be addressed first. The result was a convention containing a mere fifteen articles banning production and use of biological weapons. The Convention has since incurred considerable criticism, particularly over its

lack of verification procedures. Of significance, however, Article IX of the Biological Warfare (BW) Convention commits all parties to negotiate "in good faith" toward "the recognized objective of effective prohibition of chemical weapons."[2]

The discussions on banning chemical warfare have been ongoing since 1972. There were major differences between opposing blocs in early negotiations. Many of these differences were subsequently resolved, especially the less controversial issues. In 1976 the United States and Soviets announced the first round of bilateral talks fulfilling a commitment made by President Nixon and Secretary Brezhnev in July 1974 and reaffirmed by President Ford and Brezhnev in November 1974.[3] The first of eleven talks took place in 1976, and the talks were adjourned in 1980. Unresolved major issues were verification and compliance. "During this period the bilateral talks overshadowed the endeavor of the CCD and diminished their significance."[4]

In the early 1980's Soviet American relations deteriorated sharply over the issues of chemical and biological weapons. The Reagan administration protested vigorously over the alleged use of chemical and biological weapons in Afghanistan and Indochina. Compounding American concerns was the report in late 1979 that a large number of casualties occurring in Sverdlovsk, USSR from pulmonary anthrax after accidental release of the disease-causing organism from a suspected biological warfare facility in the city. The American intelligence community concluded that such a large number of casualties would have resulted from inhalation of anthrax spores "which could only have escaped from a military

facility."[5] The incident exposed a serious weakness in the BW Convention, the lack of means of verification.

Multilateral talks resumed in 1982. In his first visit to the United Nations Forty-nation Conference on Disarmament (CD) in 1983, Vice President George Bush affirmed, "the key to an effective convention is the firm assurance of compliance through effective verification . . . it is an absolute necessity to any future agreement."[6] In August 1984, the United States proposed a draft treaty which called for a comprehensive, global effectively verifiable ban on chemical weapons. This draft, CD 500, formed the basis for future discussions.

CD 500 differed from its predecessors in several important aspects. The most significant was Article X of the treaty which called for mandatory on-site inspections by an international body within 48 hours. The challenge inspection not only included previously identified and declared production facilities, but also suspected production by private chemical industries.[7]

Also differing from previous proposals, the draft treaty places chemicals in three separate categories or schedules: super-toxic, lethal chemicals banned by the treaty, key precursor chemicals, and large volume commercial chemicals to be reported. These schedules reflect the possibility of the utility of commercially produced chemicals for military purposes.

The Soviets had refused to accept the verification aspects of the CD 500 until August 1987. In a major policy change, the Soviets not only admitted for the first time that they even possessed chemical weapons, but also stated that they would agree

to challenge inspections. It is interesting to note that this policy change closely followed US Congressional approval of funding for the modernization of the US chemical stockpile. Since this seemingly major breakthrough, little progress has been made. While both the US and Soviets have accepted verification in principle, agreement has not been reached on how to design and implement verification procedures.

Facing increased use and proliferation of chemical weapons throughout the world especially in the Middle East, President Reagan in September 1988 called for an international meeting to discourage the use of chemical weapons.[8] While agreement among the 40-nation CD is still several years off, this was seen as an interim step to slow proliferation and use of chemical weapons.[9]

In January 1989, a conference was held in Paris with representatives from some 149 nations in attendance. While all US objectives were not achieved, 149 nations signed a compromise agreement. The agreement fell short of US expectations in the areas of chemical arms export control and economic sanctions. Both were omitted from the final document in the interest of unanimity of the outcome. The discussions are expected to provide significant political impetus to the 40-nation CD in Geneva.

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CHAPTER V

ANALYSIS

INTRODUCTION

The CW threat, US CW posture and treaty proposals provide the basis for analyzing the defense policy options available to the US following acceptance of an international agreement. The policy options chosen for consideration are:

1. A treaty banning CW production, storage and use, which is global, verifiable and enforcable.

2. Active programs aimed at halting CBW proliferation.

3. Nuclear weapons retaliation for a CW attack against US or allied forces.

4. Maintaining a limited CW security stockpile for a specified period of time.

5. Maintaining a CW defensive protection posture.

6. A system of sanctions against nations which use or proliferate CBW.

7. Continuing the development and execution of chemical programs which produce combat power multipliers and are not prohibited by the treaty unnder consideration or previous CBW conventions.

8. A strong CBW defensive research and development program.

The analysis will describe and discuss the advantages and disadvantages of each defense policy option. Each policy option will then be evaluated subjectively, based on its merit as a CW

deterrent. Each opton will be evaluated also based on its ability to support the traditional elements of national power, i.e., the military, socio-psycological or the will of the people, economy and diplomacy. The most viable set of options will then be recommended to support the national security strategy following a CW treaty. The first option discussed is the treaty.

VERIFIABLE CHEMICAL WEAPONS BAN TREATY---RISK

While the possibility of achieving a chemical weapons ban treaty runs high, the possibility of such a treaty achieving the complete deterrence of chemical weapons is distinctly remote. The US proposal calls for a complete, global and verifiable ban. Serious difficulties must be overcome to meet each of these criteria.

While the United States has stated that the ban must include all chemical weapons, the treaty in its present form is not all encompassing. The treaty divides the chemical agents into three schedules: A, B and C. Schedule A , the super toxic lethal chemicals, contains four nerve agents: a mustard agent, an incapacitating agent, a toxin and the key precursor for binary agent. Schedule B identifies chemicals produced in large quantities which have peacetime application but have uses that can be diverted for wartime use. These dual purpose chemicals are carbonyl chloride (phosgene), hydrogen cyanide, cyanogen chloride and trinitromethane. Three others on the list are precursors for nerve agents. Schedule C chemicals are precursors

for nerve agents not covered in Schedule B, a mustard agent, and BZ (an incapacitant). These chemicals have some commercial value, but not to the extent of those in the other schedules.

Western nations have been sufficiently concerned about the role and potential of new chemical and biological agents produced by rapid developments in Soviet technology, especially genetic engineering. This emerging technology together with new delivery systems, declared conventional war doctrine and a decreasing emphasis on the use of battlefield nuclear weapons could increase the possibility that such weapons would be used. The problem is compounded by the fact that the Soviet chemical warfare and biological warfare programs are very closely and thoroughly integrated. Furthermore, the distinction between chemical and biological agents becomes blurred in the middle of the spectrum, and is often difficult to maintain in the light of advanced R&D into bio-technically derived agents and biological response modifiers. The very nature of these agents makes it virtually impossible to obtain any satisfactory agreement on control or prohibition, either through effective verification, or because military stocks can be rapidly manufactured from an existing legitimate civil industrial production base, either agricultural, medical or industrial.[1] In addition, the Soviets have unilaterally redefined toxins as chemical rather than biological agents. The US considers toxins banned under the 1972 biological agent and toxin ban treaty to which both superpowers are signators. Enacting the current chemical weapons ban treaty proposal without re-addressing the total toxins issue would

constitute a ban for the US, but not the Soviet Union. Genetic engineering technology has been applied to producing novel agents in the laboratory which can neither be identified nor medically treated. This is another area where the Soviets are concentrating their R&D efforts.[2] Technology in novel agent development is proceeding at such a rapid pace that it may be possible to create treaty loopholes even if the toxin issue is resolved.

A global ban on chemical weapons is certainly a laudable goal, but extremely complicated, in both its technical details and its political forum of forty nations. The convention in its present form can not be global. There are nations outside the 40-nation conference who will probably never sign a treaty and who possess or could easily acquire a chemical capability. Non-signatories present a real treaty stumbling block, and both the US and Soviet Union have emphasized their commitment to the requirement that all countries possessing a chemical capability agree to the ban. This eventuality is highly unlikely if not impossible.

Equally as unlikely is the achievement of a totally verifiable ban. Verification to some degree of risk is achievable, but the ease with which chemical and biological agents are produced and stored allows for clandestine production of militarily significant quantities without detection. While, as pointed out earlier, the Soviets and most of the countries involved in the negotiations have accepted verification in the form of challenge inspections in principle, China and India have

not agreed.[3] However, even though the Soviets and others have agreed to on-site inspections in principle, they have a great deal of difficulty agreeing on the verification process itself.

Negotiators have found that verifying a chemical weapons ban is even more complex than verifying a nuclear arms agreement.

> "Unlike their nuclear counterparts, chemical weapons have no unique signature. Their chemical precursors can easily be obtained through the world market, and they can be produced clandestinely in commercial pesticide or fertilizer plants. Unlike other arms control agreements, verification cannot be achieved by national technical means such as photoreconnaissance satellites, radar, electronic surveillance, seismic instrumentation or air sampling. Such methods might identify suspicious production or storage facilities, but only on-site inspections, if unimpeded and promptly undertaken, could verify such suspicions."[4]

Total verification is simply not possible. It can only aim at a high probability of discovering any militarily significant violation of the treaty.[5]

> "By doing so, they act as a deterrent; they compound the political risks and costs of treaty evasions and remind states that they are parties to a legally binding agreement, violation of which casts doubts on their international commitments in other areas."[6]

These judgements will vary from state to state, as will assessments of "military significant" capability. Melelson and Robinson in their book "Chemical Warfare and Chemical Disarmament" argue:

> "that the effectiveness of verification measures is enhanced by a high level of chemical defense. Good defense greatly raises the scale of chemical warfare preparation making concealment more difficult and intrusive inspection less necessary."[7]

The administration wants a complete verifiable ban, but has begun to hedge some of its bets. General William Burns, director of the US Arms Control and Disarmament Agency, recently stated,

"No country in the world has offered a system that has a reasonable chance of verification." Another official added, "You can raise your level of confidence but you can't verify." In the Paris meeting in January 1989 , the US team stressed sanctions rather than elimination of chemical weapons. And privately some Washington officials stated that the possession of chemical weapons by opposing forces and the ability to retaliate in kind might be a safer bet than total elimination.[8]

Articles III, X, and XI of the current draft treaty calls for reporting requirements and on-site inspections within 48 hours of a challenge team. The main purpose of challenge inspections will be two-fold: "to clear up any suspicion of violations of the convention and secondly to discourage violations by taking away from a potential violator any hope of concealing a prohibited activity."[10]

These three articles (III, X, and XI) could have an adverse impact on the American chemical industry. The reporting requirements and the systematic on-site inspections of Article III and the no-notice inspections of Articles X and XI could damage the chemical industry. The inspections apply to all government owned or government controlled facilities. Legally, "government controlled" encompasses all facilities that are under contract to the government and all facilities that are subject to the federal regulatory requirements of a government. In the United States this includes almost all private companies that do business with the government. Based on that definition, virtually the entire chemical industry, some 65 facilities would

be subject to on-site inspections.[12]

The reporting requirements of Article III could compromise proprietary information in the form of divulging manufacturing process secrets. The requirements could also be perceived as an open invitation to obtain industrial secrets.[13] By visiting the facilities and observing the physical layout, coupled with the requirement of Article III to provide certain chemical samples, inspectors would gain access to the details of the manufacturing process.

One interpretation of the sudden change in Soviet thought on verification is possible Soviet intrusion into the West's advanced chemical industry. Another more cynical view is that the Soviets have decided that the US will never reach an agreement that would have verification loopholes and that the Soviets can reap enormous public realtions benefits from championing such a ban.[14]

One promising development has been attempts by industrial leaders of other countries to develop verification procedures that would not compromise proprietary information. Industry experts and negotiators held an informal meeting in Geneva in July 1988. A follow-up meeting with chemical industry representives was held in January 1989. The participants discussed approaches on the issues of protocols, protection of industrial secrets, chemicals not covered by the treaty, and monitoring requirements.[15]

Of the nations which might sign a chemical weapons treaty only a few would be affected militarily, but virtually all would

be subject to the verification procedures for their chemical industries. So an effective world-wide ban depends not only on military verification procedures, but the willingness of nations to open their chemical industry to such scrutiny.[16]

"Ultimately compliance, and not verification, is the key issue, and the record of attempts to enforce treaty violations by international sanctions has been hardly inspiring."[17] A nation may bind itself in agreement not to promote chemical disarmament, but does so in order to lull others into a false sense of security, and to provide itself with the option of taking advantage of other's relaxation of countermeasures under a clandestine production program. Such fear, implying belief in the readiness of governments to commit themselves to treaties of international law with which they had no intention of complying, would be a manifestation of the most extreme form of mistrust among nations.[18] As Charles Flowerree observes "at bottom, all multilateral treaties relating to arms control and disarmament rely on the self-interest of the contracting parties and on the restraining effects of would be violators."[19] However, restraints have not always worked even when backed by threat of sanction. When vital interests of nations have been at stake, some have been willing to accept the political ramifications of treaty violations and incurring the wrath of world opinion. "Compliance, in short, remains a voluntary action and can neither be easily enforced or taken for granted."[20]

The current chemical ban proposal shares one aspect with previous international treaties, which has led to violations by

signators. That is, it contains no effective means of enforcement. Measures such a censure, withholding economic or military aid or military action are difficult enough to consider in cases of overt use of chemical weapons, but addressing the non-proliferation requirement violations with an appropriate response, especially when it involves friends and allies is indeed a difficult undertaking. Considering the complacency of world government reaction to the chemical weapons use by Iraq and other chemical incidents in Afghanistan and Cambodia, future coordinated and meaningful enforcement actions would be unsuccessful. However, in this case it means that an aggressor nation would not be significantly deterred from violating the treaty, if significant advantage could be achieved. One only has to look to the 1925 Geneva Convention and subsequent treaties. "As moral sounding and politically uplifting as these appear, the violation of these accords proves that, in reality, war dictates its own rules."[21]

It has been proposed in Article XIII of the current treaty that each signator to the convention should have the right to request assistance in the event that chemical weapons have been used against it. Riddled with escape routes, this clause fairly reflects international realities, but the scope and methodology for such assistance remains to be determined.

Because of the difficulties in acquiring global acceptance and agreement on effective verification and enforcement procedures, there is a danger that for political expedience or popular emotion, the US may enter into a treaty that lacks adequate provisions in the three vital areas of verification,

definition of chemical weapons, compliance and enforcement. One possible eventuality is that the US might enter into a bilateral agreement with the Soviet Union and relax its long standing verification requirements in the spirit of Glasnost and a renewed confidence in a Soviet desire to adhere to treaty restrictions. This speculation is enhanced by the campaign promise of President-elect George Bush who said, "if I'm remembered for anything, it would be this: a complete and total ban on chemical weapons, . . . their destruction forever. That's my solemn mission."[22] An unverifiable bilateral treaty, of course, ignores the Third World threat as well as the Soviet threat posed by the mid-spectrum agents not covered by the treaty and treaty loopholes. This eventuality would eliminate the deterrent value of the US chemical and biological policy.

Amy Hober and Douglas Feith put it very well in a recent New York Times article. The article stated:

> "There is a price to be paid when bad treaties are promulgated and when any treaty is violated. It cheapens currency. It promotes disrespect for all treaties, whether dealing with arms control, human rights, or protection of prisoners of war. And the price that is paid is not distributed evenly. Democratic nations, whose internal checks on government action enforce compliance with their international obligations, suffer disproportionately. . . . But arms control treaties are international law--no more, no less. They are as potent or ineffective as international law in general. If international law is a bad joke--if treaties can be violated profitably and with impunity--then arms control too becomes a joke, with the laugh being on the states that comply with their treaty obligations."[23]

MG William Burns, Director, Arms Control and Disarmament Agency (ACDA) stated to the authors that the current treaty was not verifiable. He further indicated that the US should perhaps

"scrap" the current treaty and pursue a policy of arms reduction with the goal of a total ban only after the nations of the world achieve a level of confidence that such a ban is obtainable.[24] The next day, President George Bush in his budget address to Congress stated:

> "Chemical weapons must be banned from the face of the earth, never to be used again. This won't be easy. Verification will be difficult. But civilization and human decency demand that we try."[25]

To our knowledge this is the first public admission by Mr. Bush that there are perhaps some problems with verification. Only time will tell if his statement has any significance.

HALT PROLIFERATION---RISK

Any final agreement on a verifiable ban on chemical weapons is probably several years away. In the interim it is imperative that the nations of the world use all possible means to inhibit the proliferation of chemical weapons. For many years after World War II only the US, Soviet Union and France possessed chemical weapons. Today at least twenty states are thought to have a chemical weapons capability with as many as ten more showing an interest.[26]

With this trend in mind, verification and enforcement of a treaty present major challenges. The threat from countries outside the 40-nation conference and that of non-signators must be thoroughly and realistically examined before a final agreement is signed. To sign such an accord without a thorough threat

assessment could be destabalizing and could create an imbalance of chemical weapons. The acquisition of chemical weapons by one country increases the probability of acquisition by its rivals.[27] The more that these weapons are assimilated the greater the risk of use. It is also entirely feasible that countries, particularly those in the Third World, could use chemical weapons to offset a perceived or real conventional weapon superiority by an opponent.

While there has been much written lately in the media about actions to be taken against those who use chemical weapons, little or no action has been forthcoming. This could perhaps, be partly because chemical weapons use thus far has remained confined to the more remote areas of the world or has involved one Third World country against another. Thus far the use of chemical weapons has not brought any great outcry from the West or Soviets nor any great public concern.

One only has to look at the use of chemical weapons in 1988 by Iraq against the Kurds. While the United States vehemently denounced the attacks, it didn't impose any penalty, perhaps due all or in part to the US's continued favoritism to Iraq over Iran. Certainly the Reagan administration deserves credit for its denunciation of Iraq and for sounding the alarm about Libya's chemical production facility in October 1988. It's puzzling however that having done so, the US seemed to back off. In September 1988, the Senate passed a strong sanctions bill against Iraq for its use of chemicals. A few days later the administration labeled the bill as premature and called instead for a worldwide meeting on chemical weapons in January 1989.

Nearly 150 nations attended the chemical weapons conference in Paris. While the US sought agreement on sanctions, embargos and export controls, an agreement could not be reached and thus the conference fell short of expectations. While a compromise was signed by 149 nations pledging not to use chemical weapons, the sought after language on sanctions and export controls was deleted form the final agreement to gain unanimity.[28] This is indeed a heavy price to pay for political reasons. As long as countries of the world continue their attitude of complacency toward the use and spread of chemical weapons, proliferation is likely to continue.

Another factor in the threat, in addition to control of chemicals themselves is the growing world market for aging missiles, cast off by the superpowers because their range and accuracy are no longer sufficient for nuclear warheads. But with a missle like the Soviet SCUD B loaded with a lighter chemical warhead the range can be extended and inaccuracy is no longer a problem since chemicals would spread over a large area downwind.[29]

While little success has been achieved in punishing states using chemical arms, some progress has been made in controlling their export. Both the US and Soviet Union have cut off exports of certain chemicals to countries suspected of using them adversely. Since 1984 the United States either unilaterally or in cooperation with others has sought to control export of chemicals which could be used for illegal purposes. Representatives of 19 countries, under the auspices of the Australian Group, have struggled to implement new export

regulations to curb the trade of such materials. Thirty-seven chemicals which are potentially related to chemical weapons manufacturing are subject to export controls and require validating license for export everywhere except Canada. In recent years, the United States identified 16 additional chemicals which while having legitimate commercial use were being sought for chemical warfare purposes by Iran, Iraq and Syria. These sixteen chemicals were placed under foreign policy export control in 1984, 1986, and 1987 for those particular countries. Libya had previously been restricted from receiving chemicals as part of the US trade embargo against it. In addition, in 1985 the US and several other countries created a Chemical Warning List which serves to help countries identify and avoid transaction which could assist other countries in producing chemical weapons.[30]

To date success has been limited. One only has to look at the recent sale of chemicals, materials, and technology for a chemical weapons plant by a private company in West Germany to Libya. Germany is also a major source for Third World nuclear programs. The country's export laws are full of loopholes, and Bonn had deliberately kept export laws weak to promote trade.[31] Following exposure of the Libyan sale, the West German government adopted a series of measures to increase penalties and increase enforcement powers against illegal exports of technology and equipment to be used for arms production.[32]

Some progress in stopping or controlling proliferation has been made, but much remains to be done. Many nations are in agreement, and publically decree that proliferation must be

stopped, but when it comes to action on an illegal use of chemicals, little if any action is forthcoming. Certainly, world politics and long-standing trade agreements compound the problem, but these must be overcome if we are to succeed. Or perhaps it's just "too hard."

RETALIATION, NUCLEAR/CONVENTIONAL---RISK

Many would argue that a chemical stockpile is not required, and that in NATO the threat of a tactical nuclear strike in retaliation to a Soviet chemical attack is a sufficient deterrent. Their assumption demonstrates a lack of Western appreciation regarding the Soviet concept of military doctrine, their understanding of the laws of war, risk calculation and decision making. Secondly, such a premise presupposes a clearly identifiable Soviet chemical attack and furthermore assumes NATO C^3 structure will be sufficiently responsive to react within the requisite time-frame to ensure the nuclear response is seen to be in direct retaliation to a specific instance of Soviet chemical use.[33] Would the US or NATO respond with a theater nuclear option in the case of non-lethal chemicals or incapacitants? Or what would be the response to the use of chemicals against a unit of only company or battalion size? The argument also runs counter to the whole trend of NATO thinking since the adoption of flexible response. With the onset of nuclear parity, NATO has heded American pleas and urged its members to improve their conventional forces and raise the nuclear threshold (or at least prevent it from eroding). The

modernization of the American chemical stockpile complements this concern and American wishes are critical since neither the British or French nuclear deterrents are likely to be invoked following a Soviet chemical attack in Central Europe. Successive American administrations have made it abundantly clear that they do not regard nuclear escalation as an appropriate response to chemical attack, although they have not ruled out the possibility of escalation at a later stage in the war.[34] Lastly, the tactical nuclear option also presupposes that the threshold for the use of nuclear and chemical weapons are the same. The threshold for the use of nuclear weapons is, however, higher than that of chemical weapons. The nuclear response is, in fact, asymmetrical and therefore not a deterrent to chemical warfare.[35]

Chemical weapons also provide an additional rung in the response and escalation ladder, raising the nuclear threshold of any conflict. The flexible response scenario of a NATO nuclear retaliation for limited chemical attacks by the Warsaw pact is difficult to visualize and could fuel an alliance splitting or decoupling attempt by the Soviets.[36] There is some validity to the argument posed by analysts who maintain that chemical weapons parity among Third World nations might act as nuclear parity between the two superpowers and form the basis for conflict avoidance and no war. However, because the devastation caused by chemical weapons in no way approximates that caused by a nuclear capability, it is doubtful that anything but chemical warfare would be deterred.

The argument for a massive conventional strike in response to a chemical attack is dependent upon the relative strength of the attacker. Deterrence is a state of mind brought about by the existence of a credible threat of unacceptable counteraction. Accepting that definition, the overwhelming superiority of the Soviets in terms of size of their forces in both men and equipment make it unlikely that any conventional strike that the US or NATO could inflict, would be sufficient to deter a chemical strike. On the other hand, in cases like Libya and other Third World countries the threat of a conventional response against military and economic targets would probably be sufficient to deter chemical use notwithstanding the fourth principle of a credible deterrence: communication with a rational leader. Indeed, that is certainly questionable in at least one Third World country--Libya.

OFFENSIVE CHEMICAL WEAPONS CAPABILITY, SECURITY STOCKPILE--RISK

The US offensive chemical retaliatory capability provides the most credible deterrent to chemical warfare. Historical example substantiates the deterrent value of an offensive capability. The most notable example is that provided by the restraint exercised by the allies and Germany, which both possessed chemical weapons in WWII. The reduction in use of chemical weapons in WWI and in the recent Iran-Iraq conflict when both sides acquired the chemical capability, also supports the argument. A retaliatory capability sends a message understood by all potential aggressor nations and a similar message has proven

effective in negotiations concerning other arms treaties such as the intermediate nuclear force (INF) and Anti-ballistic Missile (ABM) treaties. Dealing from a position of strength, represented by modernizing chemical stocks with binary munitions, seems to have been effective again in bringing the Soviets to an agreement in principle concerning chemical weapons.[37]

In their FY89 Army posture statement, Secretary of the Army John O'Marsh, Jr., and Army Chief of Staff, General Carl E. Vuono conclude that "Even with the best defensive measures, an enemy can force us to bear the burden of casualties and of operating in protective equipment unless we have a credible offensive realiatory capability."[38] As substantiated by historical example, the US offensive CW retaliatory capability provides the greatest deterrent to chemical warfare.[39]

The reason why an offensive chemical capability is such a credible deterrent is that it has the potential of successfully attacking a Soviet operational center of gravity, the tempo of offensive operations. The possibility of slowing and fixing assault forces by causing them to assume a chemical defensive posture would allow the opponent to regroup and reinforce. This could result in a loss of the initiative, spelling defeat of Soviet warfare doctrine. The fact that the Soviets have now accepted in principle the US chemical treaty proposal emphasizes their concern. The Soviets reacted similiarly when another center of gravity dealing with logistic bases and the Soviet homeland was threatened by the INF.

Another value of the US offensive chemical capability is that it holds in check the Soviet and Third World ability to

negate US technological advancements in conventional weaponry, such as optically guided munitions, smart bombs, assault breakers and hi-tech programs like SDI, airland battle 2000 and neutron bombs, with cheap chem/bio weapons and their existing missile technology.[40] A retaliatory capability not only checks an inexpensive means of overcoming our advanced technology and causes additional expense for the overtaxed Soviet economy as it strives to catch up, but it also serves as a deterrent against Soviet or Third World use.

Should we reach an agreement and an accord is entered into force, some nations have expressed concern over maintaining security during a ten year transition phase. As detailed in the draft convention "each state party possessing chemical weapons shall begin destruction not later than one year after it becomes a party to the convention; and all stockpiles must be destroyed by the end of the tenth year after the entry into force of the convention." The concept of undiminished security during this transition is important to most countries participating in the conference. Although the draft treaty allows for the development of chemical protective equipment and training, it has not assuaged the fear of some nations. To this end France initially proposed that countries with a small chemical stockpile be allowed to maintain their stocks until the end of the ten year period. The proposal went on to suggest that these countries be permitted to add to their stockpiles during the destruction phase so that some level of parity could be achieved with the superpowers' reduction schedule. The French argued that nations

with smaller stockpiles were at greater risk as they would lose their stocks more quickly during the transition phase. Although the French are now appearing to be modifying their stance, the issue of maintaining a small security stockpile as a deterrent at least during the near term may have merit. A recent research paper at the Air War College proposed the maintenance of such a stockpile. In the absence of a comprehensive globally verifiable ban, the treaty could be modified based on realities of the potential threat from non-signators or potential "cheaters." The proposal suggests a small stockpile and a single production facility be publicly declared and for purposes of verification be made accessible to challenge inspection.[41]

Indeed, the proposal has some merit. In the absence of the total ban we desire, this deterrent capability enhances national security; the absence of such a deterrent increases risk. The stockpile must be modern, safe and reliable. And it need not, in our case, be forward deployed, a major political consideration. Although forward deployment of chemical weapons can enhance their value, deterrence can be achieved without it. Further, Europe is not the only area where we face a chemical threat and a stockpile stored in the US provides flexibility for worldwide crisis deployment options. This is especially true of the binary stockpile which is not hazardous and easily transportable. Given the current political situation in Europe, the forward deployment of our modernized stockpile (binary) would be very controversial. Although our allies in Europe rely on us for chemical warfare deterrence, the issue need not be pushed unless there are threat changes.

Limited security stockpiles, under international supervision, will compensate for both the contingency that some states with chemical weapons will not sign the convention and the realization that no system of verification is adequate.

DEFENSIVE PROTECTIVE MEASURES ONLY--RISK

Although they comprise a very important part of the US NBC deterrent, defensive measures alone do not provide a credible deterrent against chemical attack. Opponents of this position would argue that history is replete with examples which show that successful chemical attacks resulted only when the force attacked had little or no chemical protection. Such examples are Axis vs. Allies in WWII, Italy vs. Ethiopia, Egypt vs. Yemen, Vietnam vs. Laos-Cambodia, Iraq vs. Iran, early in the war, Iraq vs. Kurds, and Cubans vs. Angolan rebels. Some also reason that when adequate protection was obtained by both sides chemical warfare ceased to be effective and diminished in tactical importance. Such was the case in WWI and the recent Iran-Iraq conflict. Proponents of the defense fail to note that none of these unprotected victims had an offensive chemical capability either. The aggressor in each case therefore had no fear of retaliation, making their decision to attack with lethal chemicals less hazardous and more likely.

Defensive protection measures place the defenders at great disadvantage. Current studies indicate that chemical protection degrades, by 40% plus, an individual's or unit's ability to perform its tactical mission. For example, the Combined Arms in

a Nuclear/Chemical Environment (CANE) study produced startling results. It tested the ARTEP task performance of a mechanized infantry platoon, operating as part of a tank company in a nuclear/chemical environment (NCE) for 72 hours. The major findings concerning the platoon's ability to perform its mission while in full NCE protection are as follows:[42]

- A 34% increase of platoon leader KIA's in the attack, 23% increases in the defense.
- Radio transmissions length increased 47%.
- No. of transmissions during battle increased 100%.
- Face to face verbal communication effectiveness decreased 50%.
- Casualties per enemy attack increased 75%.
- 20% of M16 shots fired, were fired at friendly personnel.
- Firing rate decreased 20% in defense and 40% in the attack.
- Twice as long to complete an attack.
- Calls for indirect fire increased 209% and were longer in NCE.
- Poor camouflaging activities; cut by 15% first day, 30% second day and no camouflaging by the third day.

Therefore, required to react to an aggressor's chemical capability, while not being able to place him at the same disadvantage, the US would be using chemical protection as a weapon against itself, achieving a level of degradation which can only ensure enemy success.

Another disadvantage to the chemical-defense-only deterrent is the fact that it can be defeated by chemical attack. Newly developed agents called mask penetrants and discipline breakers, while not lethal themselves, can be employed with customary lethal agents to circumvent current protective mask technology. Considering that the Soviets possess this capability and the Third World can easily obtain it, the absence of a retaliatory capability in the defense only scenario places US forces at great risk.

Finally, the psycological and morale problems associated with the defense only posture would be unsurmountable. An army, knowing that its opponent has a weapon which can significantly degrade its performance, penetrate its protective measures and cause lethalities, when, at the same time, it cannot place the opponent at a similar disadvantage, will be extremely difficult to motivate.

Adopting a strong defensive posture as the only CBW deterrent exposes a tactical vulnerability, significantly degrades force performance, and causes severe morale problems. Unless universal disarmament is guaranteed, this policy would lead to defeat in a CW encounter with a major power. In a Third World contingency, such a policy could easily lead to an initial US military setback abainst an inferior force, causing national embarrassment and a possible protracted, rather than a rapidly concluded conflict, along with all the inherent difficulties and trauma which that eventuality entails.

SANCTIONS--RISK

The imposition of sanctions on countries which use or proliferate CW or on firms involved in CW trade can act as a deterrent but has definite drawbacks. The sanctions considered would be dipolmatic, economic or military in nature with diplomatic sanctions being the least severe censure. The recent experiences as described in Chapter II, vividly portray the complacency with which the world governments, to include that of the US, dealt with CW use. It is reasonable to believe that

future use would meet with similar complacency, and for good reason. Sanction would have to global to be effective. Actions on the part of a few governments would be detrimental to those governments and would not bring about the desired result. For example, if the US applied economic sanctions against a Third World country for CW use, that country would obtain the needed trade elsewhere. The protection of trade is a strong reason not to sanction. Another is that nations involved in use or proliferation may be allies as in the recent examples discussed earlier, and sanctions would only cause conflict and alliance splitting. Sanctions against enemies may serve to heat up a cold conflict and sanctions against the Third World could put the US into a conflict of which it wasn't part initially. It is likely also that sanctions would bring reprisal from the aggressor nation or its allies, or even state supported terrorist groups where the Third World is concerned. Finally, as in the cases concerning Libya, Germany, Japan, Iraq and Iran in the past year, it is extremely difficult to determine the culprits in CW proliferation and difficult to convince the world that CW use has actually occurred. Although President Bush favors the use of sancitons in his answer to halting CW, serious difficulties would be encountered if sanctions are not applied universally by all or most all nations of the world.

NON-LETHAL CHEMICAL WEAPONS--RISK

The US conducts a number of chemical programs which produce combat multipliers to the force and are not anti-personnel in nature. Such programs are non-lethal in nature, but they deal with what are considered chemical agents. These programs, in various stages of development, production and fielding, will yield products such as battlefield and signal smokes, obscurrants, anti-material agents and herbicides. The proposed treaty does not address the use, production or storage of these products and their battlefield advantage potential make them too lucrative an opportunity to ignore. However, work on such programs could cause concern that the intent of the CW ban treaty was being circumvented. Such efforts also could raise suspicion in the internaional community about US credibility in adhering to treaty reequirements. The Soviets and Third World nations have similar chemical programs in being and the treaty is not expected to reduce or eliminate their efforts in these areas, especially since such programs hold the potential to cheaply defeat new high-tech battlefield weapon systems.

The risk concerning chemical programs not covered by the treaty is that, in the spirit of an accord, the US might unilaterally discontinue such programs. A unilateral action would not only remove US combat multipliers from the battlefield but also would place US forces at the disadvantage of defending against enemy non-lethal chemical agents which diminish the value of the US equalizer, new technologies.

CW DEFENSIVE RESEARCH AND DEVELOPMENT--RISK

The Soviet Union currently conducts the most extensive CBW research and development (R&D) program in the world and has great experience in new technologies such as genetic engineering. The Soviets have developed new CBW agents, have weaponized them and have used them throughout the last decade. The US runs a distant second in the amount spent on CW R&D , but has recognized the potential of new technologies in the CBW field to revolutionize the conduct or war. A continued R&D effort seems essential to the defense against new agents or treaty loopholes and to keep up with emerging technologies which have the potential of producing agents not covered by international convention. Since most defensive R&D CW efforts are contracted to the civilian sector, the economy benefits. The economy is also the beneficiary of new technologies discovered such as genetic engineering, since the scope of these R&D efforts has potential application far beyond military defense.

Defensive CW R&D effort however can also be construed as having an offensive CW application and domestic concerns for the US adherence to the intent of the treaty may arise. In addition, a strong R&D program may serve to raise apprehensions abroad about the US intent to adhere to the international agreement. It is reasonable to believe that the extensive Soviet R&D program and that of the Warsaw Pact nations will continue after the treaty, since defensive CW R&D efforts are not prohibited.

STRATEGY, DEFENSE POLICY FORMULATION

The current national security strategy concerning chemical warfare is to deter CW and fight and win in a CW conflict if deterrence fails.[43] The policy objectives which support this strategy include no first use of CW, a strong defensive posture, aggressive disarmament negotiations and a retaliation in kind. This strategy ably supports the US national interests, which are listed below.[44]

- The survival of the US as a free and independent state.
- A healthy and growing US economy.
- A stable and secure world, free of major threats to US interests.
- Growth of human freedom, democratic institutions and free market economies linked by a fair and open international trading system.
- Healthy and vigorous alliance relationships.

Since the US national interests are not likely to change, the national security strategy following a CW ban treaty should differ little from the current strategy. However, the defense policy objectives may change based on the CW deterrent or risk reduction value of the treaty.

To determine the best options to support the national security strategy of deter, or fight and win if deterrence fails, the CW deterrent value of each option has been evaluated with respect to its support of the traditional elements of national power. These elements are the military, the socio-psycological or the will of the people, diplomacy and the economy. The summary of the analysis is shown in Figure 5.1. A value from 0 to 4 is assigned for each option as it relates to each of the four elements, based on the reasoning given below. The totals of

the vertical axis (far right) depict the overall value of each option to deter or reduce the risk of CW. The totals of the horizontal axis (bottom) indicate the value of the set of options to support each element of power. The set of options which most equitably supports the elements of national power will represent the best defense policy to adopt following an international agreement. That set of options is comprised of those with the greatest deterrent value and will be identified as the recommended defense policy. While the values assigned to each category are subjective, the conclusions reached represent the authors' best judgement regarding each option, based on the analysis of information presented in this paper. In the judgement of the authors, the matrix values identified represent a current realistic appraisal of each option considered.

	MILITARY	SOCIO-PSYCOLOGICAL	DIPLOMACY	ECONOMY	TOTAL
TREATY	2	3	4	2	= 11
HALT PROLIFERATION	4	2	1	1	= 8
NUCLEAR RETALIATION	4	2	0	0	= 6
SECURITY STOCKPILE	4	2	2	3	= 11
DEFENSE MEASURES	4	3	2	4	= 13
SANCTIONS	2	2	0	1	= 5
CHEM PROGRAMS	4	4	2	3	= 13
RESEARCH/DEVELOP	4	3	2	4	= 13
TOTAL	28	21	13	18	

Figure 5.1 Analysis Matrix

Treaty--The confidence levels among nations are too low and the problems of loopholes, non-signators, and cheating are too substantial to consider the treaty of great value as protection for military forces, especially in the years immediately following its enactment. It will hold more value for the public which will view it as the moral alternative to the horrors of CW. Its greatest value is in the international arena where it will be viewed as a morally superior act and will relieve anxieties of nations who may fear US offensive CW. Economically, the treaty is of moderate value. It will reduce defense programs and CW defense contracting abroad but some economic gain may be realized through verification organizations and technologies needed to implement treaty requirements.

Halt Proliferation--Stopping the proliferation of CW has great value for the military, especially concerning contingency operations in the Third World. The public would have much less concern for allocating resources to halt proliferation, and economically the curtailment in trade of technologies and substances considered possible contributors to CW will lower the value of this option further. Diplomatically, while the "have" nations may applaud US efforts, the "have nots" in the Third World would view such efforts with disdain and possible retaliation.

Nuclear Retaliation for Chemical Attack--Such a policy would act as a great deterrent for the military and holds some value as a cheap and emotional retaliation means, for the public. However, diplomatically it is not credible to use nuclear

retaliation against limited objective CW attacks or terrortis use, and it has no positive value economically.

Security Stockpile--The retaliatory capability is the greatest CW deterrent for the military. The public may consider it of less value for possible physical hazard problems and moral issues. While it too would generate some defense spending, internationally it may generate much apprehension concerning the US intent to adhere to the treaty requirements.

CW Defense Measures--A CW defensive posture is essential to the military even though its deterrent value is diminished by its degrading effect on mission performance and its vulnerability to new CW agents. The public may consider it of less value because of the defense dollars needed and because of the apparent reduction of the threat. Internationally, a strong defense may be viewed with great suspicion but economically defense spending will be enhanced.

Sanctions--The application of sanctions for CW use or proliferation does very little to protect the military and may cause, not deter conflict. While morally commendable, the people, economy and diplomacy would find very little value in causing conflict with friends, allies or enemies, incurring cost and curtailing trade in the process.

Chemical Programs--Chemical programs which produce non-lethal combat multipliers and are not prohibited by the treaty hold great promise for the future and are essential to the military. This option provides no moral objection to the public and enhances defense at low cost. Such programs however, may be

viewed with suspicion form abroad although they provide the economy with defense dollars.

Research and Development--CW defenseive R&D efforts insure that the future is not mortgaged and hold great value for the military, along with the economy which will benefit from the defense dollars spent and new technologies developed. Because of the perception that the R&D efforts could be applied to offensive CW capabilities, this option will hold a lesser value for both the public and international diplomacy.

Accepting the entire list of options discussed as the CW defense policy provides strong support and minimum risk for the military element of power(28), and relatively weaker support for the other three elements, with diplomacy(13) being supported the least. The policy is in jeopardy when more equitable support is not provided for all elements of power. Neglecting support for one element at the expense of strong support for another element may result in insurmountable problems not anticipated by the initial policy. An example of such unbalanced support is the US national security strategy for the Vietnam conflict in the 1960's and 70's. Whereas the military element of power was well supported by the US Vietnam policy, the will of the people or the socio-psycological element was neglected, and policy failure resulted. Therefore, to determine the best CW defense policy in our case, it is necessary to eliminate those options with the least deterrent or risk reduction value and finalize a set of options which more equitably supports all four elements of power, even though some risk, especially to the military must be accepted.

CONCLUSIONS

The policy options dealing with sanctions, halting proliferation and retaliation with nuclear weapons in response to chemical attack provide the lowest overall deterrent value and are eliminated in order to attain a better balance among the four power elements. The set of policy options left yields the relative balance of military - 18, socio-psycological - 15, diplomacy - 12, and economy - 16. This policy includes maintaining a limited security stockpile for a specified period of time. The security stockpile rates relatively high in overall deterrent value, although it is not a part of the current US treaty proposal and was rejected in substance when it was proposed by the French.

Our decision to include the stockpile option, even though equitability among the elements of power is comparable without it, was made for several reasons, i.e. the difficulties involved with treaty universality, verification and enforcement, poor treaty confidence levels, the disadvantages of the defense only posture and the significant risk to the military incurred by the lack of deterrent value resulting from the elimination of a retaliatory capability. Since the deterrent value of the treaty is not guaranteed, it is prudent to maintain a security stockpile until it can be demonstrated that the treaty will deter chemical warfare. As President Reagan indicated, we base our programs on actions not intentions or words. CW should be no exception to this principle. Therefore, since a retaliatory capability provides the greatest deterrent, its size is limited to that

which is militarily insignificant to large scale offensive operations and duration temporary, the security stockpile is recommended until confidence in the treaty's ability to deter CW is attained. The current US convention proposal on chemical disarmament should be modified to include the maintenance of a temporary, limited chemical security stockpile in order to insure deterrence and international stability. The study recommendations are summarized in Chapter VI.

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CHAPTER VI

RECOMMENDATIONS

Nation Security Strategy - Chemical Warfare

Deter chemical warfare and fight and win in a chemical warfare environment if deterrence fails.

Defense Policy - Chemical Warfare

1. Support the requirements of a global verifiable treaty banning the production, storage and use of chemical weapons.
2. Maintain protective measures for defense against chemical attack.
3. Conduct a research and development program aimed at defense against chemical warfare.
4. Maintain a program to develop and produce such non-lethal chemical combat multipliers such as smokes, obscurants and anti-plant and anti-material agents which are not prohibited by international convention.
5. Maintain a chemical weapons retaliatory security stockpile which is militarily insignificant for large scale offensive operations, for a temporary period (10 years) until the ability of the treaty to deter Chemical Warfare has been assured.

APPENDIX 1--SOVIET CBW CAPABILITIES

SOVIET CW WARFARE CAPABILITY - OFFENSIVE

CW Agents

While the Soviets claim to pursue only a defense against CW, the size and scope of their CW programs provide them tremendous offensive capability.[1] The Soviet Union maintains and continues to upgrade the world's most formidable offensive and defensive CW capability.[2] This capability represents the greatest military imbalance between the US and the Soviet forces. The Soviets have admitted having a poisonous substance stockpile of up to 50,000 agent tons; the largest known CW stockpile in the world.[3] The estimate of the Soviet stockpile varies greatly among analysts form 120,000 to 700,000 agent tons. Considering such factors as recent production rates, the impressive growth of the Soviet chemical industry and the increase in stocks at storage depots, a stockpile in excess of 300,000 agent tons is a reasonable estimate. The Soviet stockpile is estimated to consist of the traditional CW agents as listed in Figure A1-1, located at the end of Appendix 1.[4] Their main lethal agents are:

Nerve agents (sarin GB, soman GD, a V-series agent)
Blister agents (mustard H, lewisite L, mixture H and L)
Blood agents (hydrogen cyanide AC)
Choking agent (phosgene CG)[5]

Incapacitants are not specifically identified but the Soviets are reported to have used agents causing unconsciousness for an hour or more in Afghanistan.[6] The U.S.S.R. has been

working on the use of psychochemicals, which can be used with other agents to penetrate mask filters or cause troops to unmask.[7] The recent evidence of Soviet CW trials in Afghanistan suggests that incapacitants may now be incorporated into weapon systems.[8] CW use by the Soviets and their allies in Afghanistan, Laos and Cambodia also indicates that toxins form part of the Soviet CB agent inventory.[9] Toxic smoke, containing a mixture of CW agents, from irritants to V nerve agents, are also available to Soviet ground forces.[10]

CW Agents Production, Storage, Delivery Means

Fourteen Soviet CW production facilities are known and more may exist. Production is concentrated in the eastern part of the Soviet Union in the ten areas identified at Figure A1-2.[11]

Soviet storage depots contain agent-filled munitions, bulk containers of agent, as well as protective masks and suits and decontamination solution and vehicles. They are highly secured areas and are serviced by rail lines for rapid CW mobilization. The amounts of agent, material and weapons have continued to increase significantly since the late 1960's as indicated by Figure A1-3.[12] CW storage depots are located throughout the Soviet Union in the areas identified by Figure A1-4.[13] In addition, and in keeping with the Soviet doctrine on CW, chemical munitions are forward deployed to eastern European countries for possible use against NATO forces as indicated in Figure A1-5.[14] Chemical munitions are considered routinely available and are part of the regular equipment of Soviet artillery units.[15] CBW

materials are highly resourced commodities and all aspects of their security are the responsibility of the KGB. This includes CW production plants security, and in transit and storage site security matters. Chemical Service Staffs are required to operate in accordance with KGB standards.[16]

Soviet CW agent dissemination and delivery means provide coverage throughtout the operational depth of the theater. Chemical warheads are deployed on sixteen modern weapon systems, which include howitzer rounds, aircraft bombs, mortar rounds, land mines, grenades, multiple rocket launchers, free rocket over ground (FROG) and tactical ballistic missiles.[17] Aircraft and helicopter spray tanks are also used for chemical agent dissemination and evidence indicates that a cruise missile chemical warhead is developed.[18] Figure A1-6 shows the range of Soviet CW capable weapon systems.[19]

SOVIET CB WARFARE CAPABILITY--DEFENSIVE

Organization

In his FY89 Annual Report to Congress, Secretary of Defense Carlucci revealed that "...the Soviets have more than 60,000 chemical warfare personnel and over 30,000 chemical, biological and radiological (CBR) related vehicles deployed with chemical troops."[20] There are also approximately 40,000 other Soviet ground trooops involved in performing chemical missions as well as additional chemical personnel assigned to the Sovet Air Force and Strategic Rocket Forces.[21] The Soviet CW organization is directed by Headquarters Chemical Troops organized under the

Ministry of Defense and commanded by a three star general.[22] The extensive CW organization, forces and equipment are unmatched worldwide. Great emphasis has been placed recently on restructuring and modernizing these CW defense forces. Since 1980, a significant restructuring of the organization has improved Soviet force ability to operate in a contaminated environment and to maintain the tempo of the offensive so critical to the success of Soviet warfighting doctrine. Increased CW reconnaissance and detection capabilities at Army and front levels now allow fast identification of contaminated areas, permit by passing and quick, partial decontamination in order to continue the offensive tempo.[23] Restructuring included the following at unit levels indicated:

a. Division - CW Battalion reduced to Company
b. Regiment - CW Company reduced to Platoon
c. Army - CW Battalions reorganized into specialized battalions and companies such as special decontamination battalions, radiological and chemical reconnaissance battalions, smoke battalions, flame battalions, nuclear burst location units and analytical computation stations.
d. Front - Chemical Defense Brigade - augmented by a variety of independent chemical defense battalions.[24]

EQUIPEMENT AND TRAINING

For personal CW protection, Soviet forces are provided excellent protective masks, suits, and decontamination kits. Vehicle decontamination devices and chemical and radiological detection devices are also abundant at all levels of organization.[25] Soviet CW defense units are being fully equipped and modernized. Chemical defense systems are also integrated into all aspects of equipping the Soviet forces.

Every combat vehicle fielded, for example, contains a built in collective protection system and many combat support vehicles and ships are equipped with a protective filtration system.[26] In addition, the extensive Soviet CW decontamination capability has been enhanced by the new ARS 14, equipment and terrain decontamination apparatus, and the TMS-65 jet engine, hot exhaust gas, tank decon apparatus.[27]

The Soviets consider training in CW a very serious matter. CW training actually begins in the grade school and covers detection, decontamination, and individual protection.[28] For the military, in addition to the extensive specialized training given to the Chemical Troops, the general force spends approximately 15% of its training time on CW subjects. There are in excess of 200 CW training areas where all forces are introduced to realistic CW environments. Many exercises are conducted with actual or live CW agents in addition to agent simulants.[29]

DOCTRINE

Operational Threat--The Soviets possess the chemical weapons and delivery means to attack targets through the tactical and operational depth of the battlefield. This capability poses a serious threat to the operational centers of gravity of both NATO and US contingency forces. These centers of gravity include reinforcing and resupply capabilities and the theater nuclear force which is the basis of the NATO defense strategy. Figure A1-7 graphically depicts the Soviet capability to attack deep as well as near the troop line of contact.[30]

Since the late 1970's the Soviets changed their doctrine for employment of CW munitions, from a heavy volume of massed fires along the front line to a limited more selective attack of key targets throughout the depth of the battlefield.[31] The attacks involve surprise and possible commando raids and include as targets airfields, naval bases, troop concentrations, supply routes, artillery and armor formations, amphibious and heliborne landing forces, nuclear delivery means, command control facilities, ports and storage depots.[32] NATO static and easily predetermined targets are those which are considered most immediately at risk from CBW attack.[33] Such targets , for example reinforcing ports, airfields, prepositioned equipment or POMCUS sites and nuclear storage depots, represent probable NATO operational centers of gravity and are the least defendable against CBW attack. The Soviet shift in doctrine represents greater compatability with the major Soviet principle of war which is the need for mobility and high rates of combat operation, or the tempo of the offensive.

Limiting chemical employment to key areas, the Soviets can fight unencumbered elsewhere and concentrate decontamination efforts at the time and in the areas of their choosing.[34] The doctrine also enhances the raising of the nuclear threshold. By employing CW against discrete targets in limited areas they can cause hesitation on the part of western political authorities to respond with nuclear weapons. Many analysts feel that the new Soviet doctrine makes it more rather that less likely that they will use chemical weapons in a conventional conflict.[35]

If the decision to employ CW is made by the Soviet political authorities, the Supreme High Command would integrate CW operations and execute the plan.[36] An example of a possible employment against battlefield targets to effect a breakthrough and keep up the offensive tempo through the rear areas is represented by Figure A1-8.[37] Most CW weapons and delivery means are represented here in employing CW agents of increasingly greater persistancy from the FLOT targets toward targets in the rear areas.

STRATEGIC THREAT

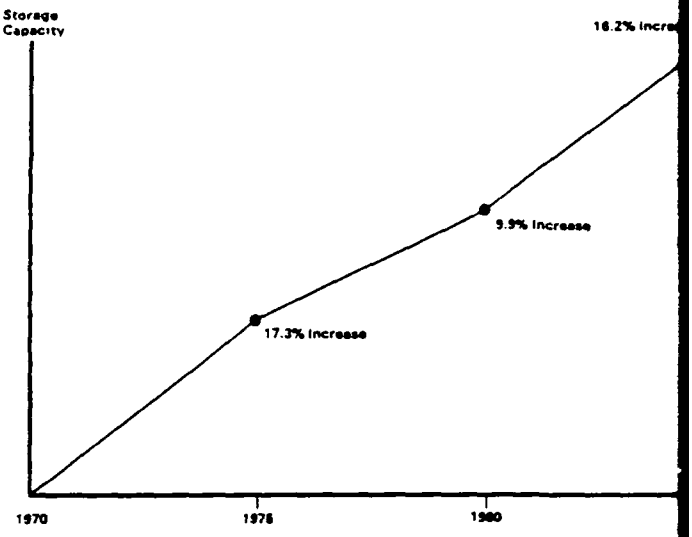
Since the Soviet approach to CB warfare has also been political and psychological in nature, potential attack or black mail on selected civilian populations with such weapons in order to achieve a political response, may be likely and could result in the achievement of strategic centers of gravity, i.e. the government or the will of the people. This concept, in conjunction with Soviet development of new CB agents, tailored to provide specific responses for selected targets, and existing long range delivery means, give the Soviets a strategic CW capability, i.e. the capability to attack national capitols, economic centers and industrial targets from well behind the FLOT or from the Soviet Union, and use CBW for much the same purpose as they use strategic nuclear weapons today. The Soviets view this capability as a quantum change in the nature and practice of war.[38]

POTENTIAL SOVIET AGENTS

Chemical or common name	US symbol	Types of delivery vehicle currently available
INCAPACITANTS		
Chloroacetophenone	CN	
Diphenylchloroarsine	DA	
Adamsite	DM	
Unspecified K agents	K	Aircraft fragmentation bombs
WORLD WAR I/II LETHAL AGENTS, NON-PERSISTENT		
Chloropicrin	PS	
Phosgene	CG	
Diphosgene	DP	
Cyanogen chloride	CK	
Hydrogen cyanide	AC	Massive aircraft bombs, artillery shell, rockets, missiles (FROG and SCUD types)
WORLD WAR I/II LETHAL AGENTS, PER-SISTENT		
Mustard gas	H	Aircraft fragmentation bombs
Mustard/lewisite mix	HL	Landmines
Nitrogen mustard	HN3	
NERVE GASES		
Unspecified	G	Artillery shell, rockets, missiles (FROG and SCUD types)
Tabun	GA	
Sarin	GB	
Soman	GD	
Soman, thickened	GD	Massive aircraft bombs
VR—55*		

*VR-55 is said to be the Soviet code symbol for a nerve gas, now commonly supposed to be thickened Soman.

FIGURE A1-1 POTENTIAL SOVIET CW AGENTS.



Expansion of storage capacity at Soviet chemical warfare depots has been signif

FIGURE A1-2.

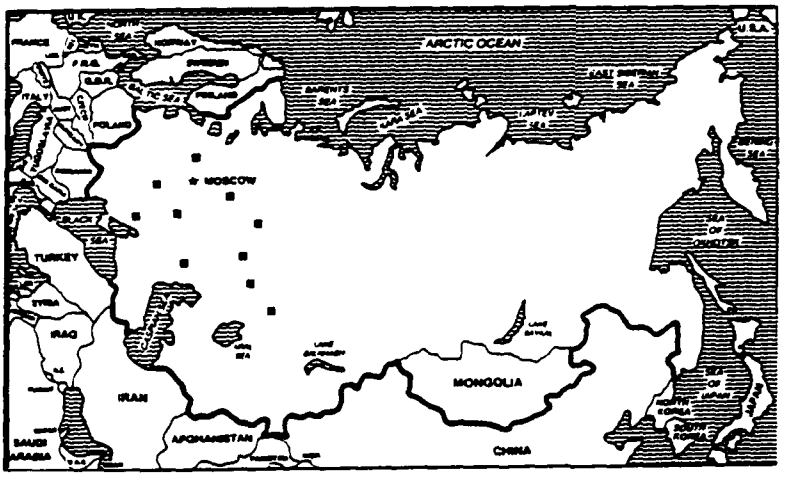


FIGURE A1-3 CW PRODUCTION SITES.

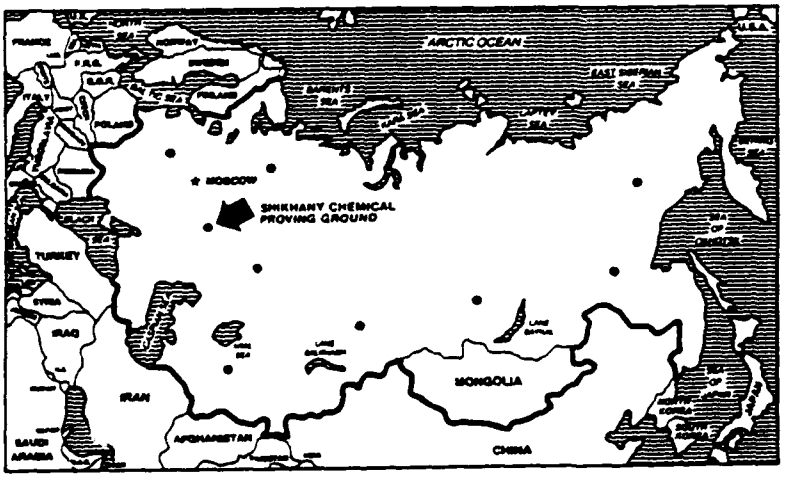


FIGURE A1-4 CW STORAGE SITES.

FIGURE A1-5 FORWARD CW STORAGE SI

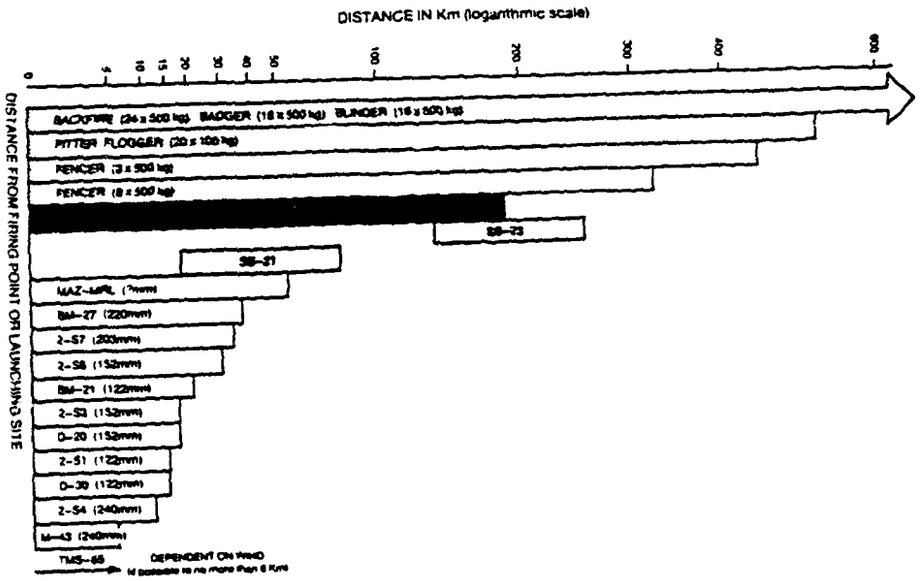


FIGURE A1-6 SOVIET CW DELIVERY MEANS.

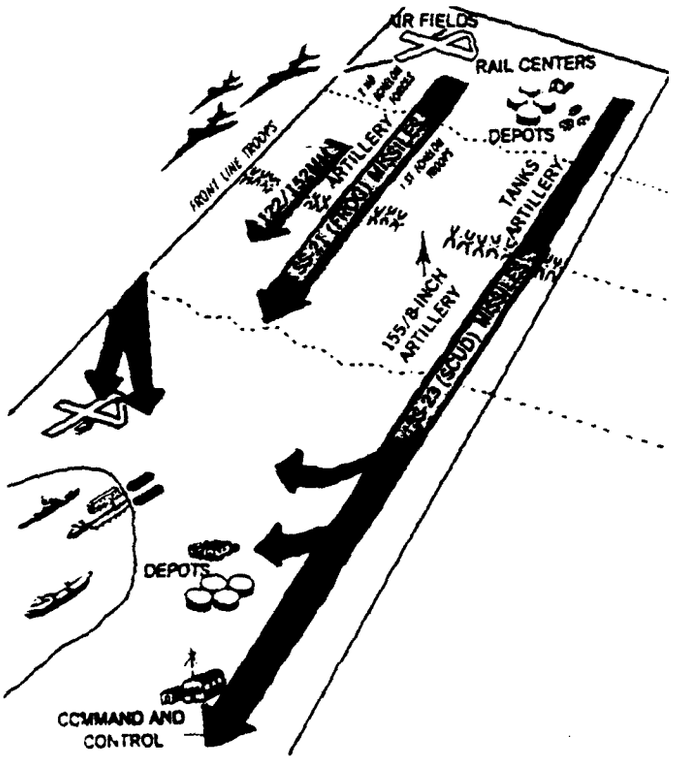


FIGURE A1-7 CW BATTLEFIELD RANGE.

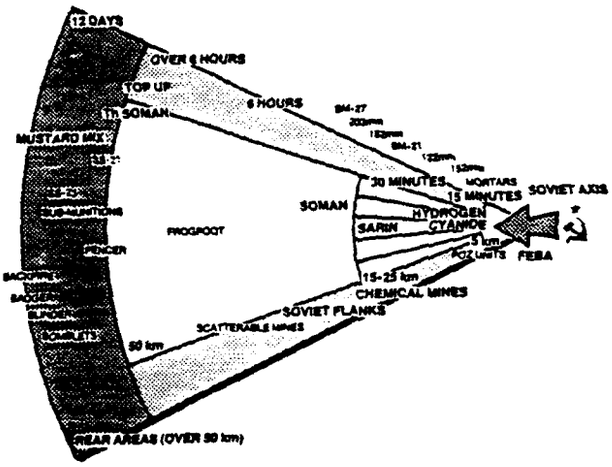


FIGURE A1-8 BREAKTHROUGH WITH CW.

Some biological warfare toxins

Toxin	Produced by	Symptoms	Effect
Staphylococcal enterotoxin	bacteria	Headache, nausea and vomiting, diarrhoea (severe prostration)	Incapacitating from 6–48 hours
Botulinum toxin	bacteria	General weakness, double vision, dizziness, weakness of the muscles	80% lethal without medical care 25% lethal with good medical care taken orally
Trichothecene mycotoxins (yellow rain)	fusaria species of FUNGI	Nausea, vomiting, blood-filled blisters on skin, internal bleeding	Lethal in 5% of cases, an incapacitating agent
Cobra neurotoxin	cobra snake	Numbness, tiredness, clouding of consciousness, dimming of vision, weakness of muscle, paralysis of breathing	Usually lethal
Palytoxin	marine corals	Cardiac arrest due to constriction of blood supply	Lethal. Fast acting when absorbed into skin cut
Ricin	Castor oil plant and seeds	Abdominal pain, fever, burning in the throat, muscle weakness, convulsions, collapse	Lethal with high doses
Tetrodotoxin	puffer fish	Muscular weakness, collapse	Lethal

Selected Toxins and Producing Organi

Producer	Toxin
BACTERIA (including their episomes, plasmids, and viruses)	
Bacillus anthracis	Anthrax toxin[a]
Clostridium botulinum	Botulin A, B, C, D, E
C. tetani	Tetanus toxin
Corynebacterium diphtheriae	Diphtheria toxin[a]
Escherichia coli	heat-labile enterotoxin LT[a] heat-stable enterotoxin ST[a,c]
Pseudomonas aeruginosa	Exotoxin A
Shigella dysenteriae	*Sh. dysenteriae* toxin
Staphylococcus aureus	*Staph.* enterotoxins A, B, C, D, E[b]
Streptococcus pyogenes	Erythrogenic toxin[a]
Vibrio cholerae	Cholera toxin
Anabaena flos-aquae[d]	Anatoxin toxin
Aphanizomenon flos-aquae[d]	Aphanizomenon toxin
Microcystis (Anacystis) cyanea[d]	Microcystin
PROTOZOA (Dinoflagellida)	
Gonyaulax catenella[d]	Saxitoxin ("shellfish poison")
Gymnodinium breve	Red tide toxin (GbtX)
FUNGI	MYCOTOXINS
Aspergillus flavus *A. parasiticus*	Aflatoxins B_1, B_2, G_1, G_2, etc.
Fusarium spec.	- Trichothecenes
F. epiphaeria	Fusarenon-X Nivalenol
F. lateritium	T_2 toxin
F. nivale	Diacetylan alenol Fusarenon-X Nivalenol
F. oxysporum	Diacetylnivalenol Fusarenon-X T_2 toxin
F. sambucinum	Neosolaniol T_2 toxin
F. roseum	Diacetoxyscirpenol Diacetylnivalenol Fusarenon-X HT_2 toxin Neosolaniol Nivalenol T_2 toxin
F. solani	HT_2 toxin Neosolaniol T_2 toxin
F. sporotrichum	HT_2 toxin Neosolaniol T_2 toxin
F. viride	T_2 toxin
PLANTS	
Abrus precatorius *Adenia digitata* *Ricinus* (castor bean)	Abrin Modecin Ricin
COELENTERATA	
Seawasp, box jellyfish (*Chironex fleckeri*) Soft corals (*Palythoa*)	Seawasp toxin Palytoxin
MOLLUSCA	
Mytilus californianus[d] *Mytilus edulis*[d] *Saxidomus giganteus*[d] *Spisula solidissima*[d] and other mussels[d]	Saxitoxin (shellfish poison)
Fish-hunting cone snails (*Conus geographus*, *C. magus*)	α-Conotoxins and other Conotox
AMPHIBIA	
Californian newt (*Taricha torosa*)	Tarichatoxin[e]
Colombian frog (*Phyllobates aurotaenia*)	Batrachotoxin
REPTILIA	
Chinese cobra (*Naja naja atra*)	Cobrotoxin
South-American rattle snake (*Crotalus durissus terrificus*)	Crotoxin
Formosan snake (*Bungarus multicinctus*)	alpha-bungarotoxin beta-bungarotoxin
FISHES	
Deadly dwarf pufferfish (*Arothron nigropunctatus*)	Tetrodotoxin
White-spotted pufferfish (*Arothron meleagris*)	Tetrodotoxin

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APPENDIX 2--THIRD WORLD CBW CAPABILITY AND USE

EGYPT

- Received training, indocrination and material, including nerve gas from the Soviets.
- Throughout the 1960's, officers trained in Moscow at Red Banner Academy of Chemical Defense.[1]

* USE: US confirmed Egypt used chemical mustard bombs against Yemenese Tribesmen in Yemen in 1963-67.[2]

- Began chemical weapons production in the early 60's and acquired a rudimentary biological warfare capability in the 70's.[3]

IRAQ

- Soldiers received Soviet CB warfare training in the 60's.
- Soviets set up a dozen CB training courses in Iraq requiring small amounts of nerve agent.[4]
- Began producing chemical weapons in the early 1980's and able to make 1000 tons annually.[5]

* USE: (1982-86) Used chemical bombs in war with Iran repeatedly. Bombings of Jan. and Feb. 86 resulted in treatment of 8500 casualties of whom 2500 were hospitalized suffering from sulfur mustard burns. Nerve (tabun) and blood (cyanide) agents also appear to have been used. UN verified use in 1984, 1985 and 1986.[6]

* USE: Used chemical weapons against Kurdish rebels in Iraq in March and August 1988.[8]

- Believed to have a biological warfare capability.[9]

ETHIOPIA

- Victims of mustard gas attack by Italians in 1936.
- Obtained chemical weapons, decontamination from Soviets.
- Received follow-up training form Cuban advisers.[10]

* USE: Used chemical weapons against Eritrean rebels.[11]

SYRIA

- Most advanced Arab country in CW. Received the most Soviet aid.
- Manufactures nerve gas and other toxic chemicals. Possesses chemical warheads.
- Believed to have biological warfare capability.[12]

* USE: None known.[13]

ISRAEL

-Acquired CW capability by 1973 in response to Arab neighbors' stockpiling of chemical weapons.[14]

- Can produce chemical weapons. Has mustard and is producing nerve gas.
- No known biological warfare capability; presumed ability to construct one quickly if desired.[15]

* USE: None known.

THAILAND

- Improving defensive CB programs to counter potential nerve gas use by Vietnamese.[16]
- Possession of chemical weapons suspected.[17]
* USE: None known.

TAIWAN

- Chemical weapons development has been a priority since 1979. War defense strategy calls for unrestricted counter attack with chemical weapons, whether the invading force uses them or not.[18]
- Possesses a chemical warfare capability.[19]
* USE: None known.

CHINA

- Was apparently attacked with chemical weapons by the Soviets in 1969 and by the Vietnamese in 1979.
- Has modest CW offensive capability but it is considered militarily insignificant.[20]

IRAN

- Victim of repeated chemical attacks by Iraq 1980-1988.[21]
- Has begun developing chemical weapons in response to Iraqi use.
- Believed developing a biological warfare capability.
* USE: used small quantities of poison gas captured from Iraqis in 1987.[22]

AFGHANISTAN

* USE: The Soviets and the Afghan army have used chemical weapons in Afghanistan against the Mujahedin guerrillas repeatedly and systematically since the early 1980's. Agents used were well known lethal chemicals, experimental agents and biological toxins.[23,24]

VIETNAM

- Possesses chemical and biological weapons probably acquired from the Soviets.[25]
* USE: Laos (late 1970's) "Vietnamese use of Soviet chemical and toxin weapons killed and drove out the rebellious Hmong Tribe, killing 700-1000 persons." The US government concluded the use of mycotoxins or "yellow rain" by the Vietnamese after intensive investigation. It also concluded that a variety of chemical agents were used in Laos.[26]
* USE: Cambodia-The Vietnamese used similar chemical weapons and toxins against Cambodian resistance forces from 1978-83.[27]
* USE: Used chemical weapons against China in 1979.[28]

NORTH KOREA

- Suspected of possessing CW capability and numerous delivery means supplied by the Soviets.[29]
- Suspected of having a BW capability.[30]
* USE: None known.

CUBA

- Possesses offensive and defensive CW capability provided by the Soviets.

* USE: US discovered evidence of nerve gas and other chemical use by Soviet sponsored Cuban troops in Angola against anti-communist Angolan rebels in 1988.[31]

SUDAN

- Possesses chemical bombs believed supplied by Iraq and Libya.

* USE: Sudanese rebels which control southern Sudan alleged that the Sudan government hired Libyan pilots to fly sorties against them which included attacks with chemical bombs. The first chemical attack drove rebels from the captured garrison at Nasir in late 1988 and the other attacks took place at the garrison of Mayom in South Sudan, in November and December 1988.[32]

LIBYA

- Trained in CW by the Soviets.
- May have received chemical agents from Poland in 1980.[33]
- Obtained poison gas in 1987 apparently from Iran.[34]
- Constructed large chemical facility designed to produce toxic chemical weapons in 1988.[35]

* USE: used CW weapons against the military forces of Chad in 1987.[36]

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APPENDIX 3--CHEMICAL/BIOLOGICAL TERRORIST THREAT

WHY USE CB TERRORIST WEAPONS?

A number of practical reaons exist for CB to be a terrorist group's next weapon of choice. First, they are inexpensive. Producing a sophisticated nuclear device would cost hundreds of millions of dollars, whereas Type A botulinus toxin is more deadly than nerve agents, and costs about $400 per kilogram to produce.[1] Secondly, CB weapons can be produced easily and quickly. Their construction requires a minimum of space and tools , and personnel of moderate education. Scientific texts already contain the formulas for nerve agents, mustard gas, LSD and herbicides and in 1971 the US declassified its formula for VX, its most deadly nerve agent. Even the simple design and chemical compounds required for the new binary munition are identified in unclassified newspaper articles.[2] Thirdly, it takes very little CB agent to produce deadly results. Human death can be caused by a single drop of nerve agent. Many biological agents such as anthrax spores and Q fever are highly infectious and rapid acting while easy to produce and disseminate. Fourth, almost any target, military or civilian, is vulnerable to attack by CB agents. "Even the shelter underneath the White House and the command centers in the Pentagon, which have air and water filtration systems, have reportedly flunked simulated studies and mock CB attacks by special "black hat" military teams.[3] US cities are completely defenseless against

a surprise CB attack. Fifth, it is extremely difficult to identify the CB agent used in the attack. Identification of the agent is usually a lengthy process. This allows the agent effects time to spread before an adequate antidote or defensive measure can be determined for use. Few civilian law enforcement agencies or medical alert teams are adequately trained or equipped to detect CB agents. Sixth, CB weapons, compared to nuclear devices pose far less hazard to construct, and much greater reliability in operation. There is ample time for the terrorists to get safely out of range of the CB weapons effects. In addition, operator skill can be honed through testing of CB devices prior to their use.

USE OF CB AGENTS BY TERRORISTS

A partial list of 32 separate terrorist CB incidents is found in TAB A, Appendix 3.[4] The FBI anti-terrorist special operation team requested assistance from the Center of Disease Control since 1981 concerning the potential problem of CB terrorism. This request followed a series of CB incidents such as swimming pools being poisoned in California, supermarket products being laced with cyanide, terrorist attempts to poison urban water systems, railway cars in Austria being contaminated with radioactive iodine and the Paris authorities finding a terrorist laboratory engaged in manufacturing a deadly biological poison.[5] One specific CB incident in 1974 involved the "Alphabet Bomber" who claimed to have nerve agent and said he would come to Washington to kill the President. After an

extensive search by federal law-enforcement officials, the "Alphabet Bomber" was arrested and turned out to be a mentally ill hydraulic engineer who indeed had in his possession a homemade nerve agent.

One of the most serious CB terrorist incidents was conducted against the economy of Israel in 1978 by teh Arab Revolutionary Army Palestinian Commandos. Europeans in three countries became ill after eating oranges, lemons and grapefruit from Israel which were contaminated with mercury, injected under the citrus skins with a syringe. Israel's citrus exports were seriously affected. Follow up attacks on the Israeli economy at this time would have been devastating. Soviets in the past have conducted assassinations using CB weapons. For example, Stefan Bandera, a Ukranian exile was killed when prussic acid was sprayed in his face. In another case, a German electronics engineer, Horst Schwirkmann who found out that the Soviets had planted listening devices throughout the German embassy in Moscow, was sprayed with nitrogen mustard gas which paralyzed him for life. In another CB assassination attempt, Bulgarian secret police attacked two Bulgarian exiles in 1978, one in London and the other in Paris, using umbrellas which fired microscopic pellets containing deadly ricin toxin. One man died but the other lived because surgeons were able to remove the pellet form the tissue in his back before

his body heat melted the wax on the pellet and released the toxin.[6] Figure !3-1 depicts the umbrella and CB pellet device.[7]

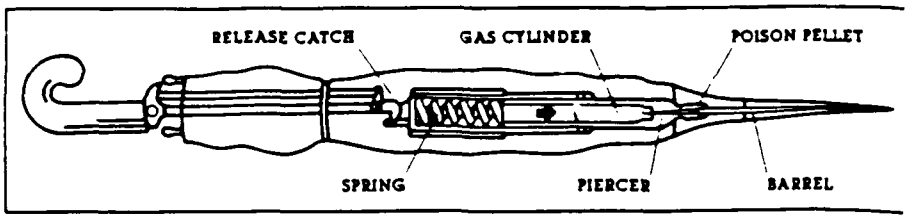
TERRORISM'S TARGET

In addition to the Palestinian Liberation Organization (PLO) which has been responsible for numerous acts of terrorism against US personnel and property abroad, many other terrorist organizations have targeted the US. A Latin-American terroist group which poses a threat is the Sabotage-Armen based in Sweden, reportedly controlled by Moscow and designed to carry out terrorist acts against US interests in Europe. The "Bader Meinhof Gang" and the Red Brigades also conduct leftist sponsored terrorist activities in Europe. Many terrorist incidents have been carried out against US personnel and military bases in recent years. In 1979 there was an attempt on the life of NATO commander GEN Haig. In 1981 an attempt was made to assassinate GEN Krosen CINC, USAREUR. Bombs were exploded at Ramstein and Rhine Main Air Bases and on other military posts in Germany, injuring servicement and civilians, damaging US military housing and servicemens cars.[8] LTC Ray, Asst. Army Attache of the US Embassy was killed in Paris and BG Dozier was abducted and held hostage 42 days by the Italian Red Brigades. US business and military interests and personnel are highly vulnerable to terrorist groups abroad who have the motivation to act and the capability to produce and use CB weapons.

However, foreign terrorists are not the only problem. There are many US terrorist groups which pose a serious threat. The Puerto Rican separatists are among the most vicious terrorist groups. The mainland-based FALN, for example, was responsible for dozens of bombings in the New York area and threatened to strike a nuclear facility. In 1980, 11 armed FALN members were arrested twenty miles from the Two Mile Island Nuclear Power Plant. In 1981, a convicted FALN member indicated that the group planned to kidnap President Reagan's son Ron to exchange him for the 11 imprisoned FALN members.[9] The Macheteros, the Puerto Rican based FALN conterpart, killed US sailors in machine gun attacks and blew up nine NG attack jets in 1980. The Weather Underground and Black Liberation Army have also been involved in a series of armored car robberies in New York city in which three people were killed.[10] They and members of the American Indian Movement (AIM) reportedly have been trained in Cuban, Soviet bloc and PLO training camps. AIM members also show up in Nicaragua, giving support to the Sandinista government. Other US organizations which have committed terrorist acts are the California-based Black Guerrilla Family, the environmental extremist New World Liberation Front, Ku Klux Klan, Posse Comitatus, Minutemen, American Nazis, Anti-Castro Cuban groups and others.[11]

One might ask, if terrorists can easily acquire a CB capability and they have the motivation to commit heinous crimes of terrorism, why haven't they used CB weapons more widely in terrorist actions? There are several answers. First,

conventional munitions have been adequate to produce the surprise, terror and media coverage necessary to substantiate the act. These munitions are a known commodity which are familiar to the terrorist and require little additional training. Second, the terrorist fears personal repraisal for his CB attack which may leave him no safe place to hide. Third, he fears loss of international prestige for his sponsoring state from a target state that has now been pushed too far. Lastly, the terrorist is just as afraid of the horrors of CB weapons as his target population. However, as the need increases for a spectacular and horrifying means to produce terror, CB weapons could come to the forefront and become the terrorists next weapon of choice.



A Bulgarian exile was murdered in London by a weapon similar to this. It fires a tiny pellet containing the poison Ricin, a derivative of the lowly castor bean.

A remarkable piece of microengineering, the hollow pellet was 9/10ths platinum and 1/10th iridium. When the thin coating of wax on the pellet melted due to the body heat of the victim, it released the poison into his system.

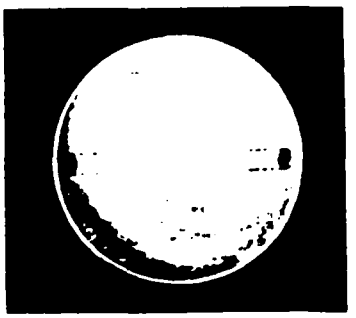


FIGURE A.3-1 CB TERRORIST WEAPON

Selected List of C/B Incidents by Terrorists and Other Nonstate Actors

1944, November	Plot by the Mufti of Jerusalem and German Nazis to poison the wells of Tel Aviv. The authorities discovered ten containers, each holding enough poison to kill 10,000 people.
1972, January	Two youths in Chicago arrested for plotting to introduce typhoid into the city's water system.
1972	Terrorist plot to use CW agents in an attack on a U.S. nuclear storage site in Europe uncovered.
1974, August	Muharem Kerbegovic, the so-called "Alphabet bomber," arrested in Los Angeles after mailing toxic material to a Justice of the U.S. Supreme Court and threatening to kill the President with a home-made nerve agent weapon.
1974, November	Forty-eight people, including the head of the Naples Port Agency, tried on charges arising from a 1973 cholera outbreak.
1976	A nerve agent (sarin) was brought into the United States by Michael Townley for use in an assassination plot against former Chilean Foreign Minister Orlando Letelier. The agent had originally been produced by Chile for possible use against Argentina or Peru, and was smuggled into the U.S. in a Chanel No. 5 atomizer. Subsequent reports surfaced that anti–Castro Cubans in the United States had learned of the Chilean-produced sarin and had asked DINA, the Chilean intelligence organization, for some in connection with their activities.
1976	One kilogram of a precursor of sarin was produced by a chemical engineer in Vienna and offered to bank robbers for 14,000 DM.
1978, February	The Arab Revolutionary Army Palestinian Commandos claimed responsibility for injecting a poisonous solution of mercury into Israeli citrus products.
1978	Libya sent a poison gas letter to a PLO official visiting Tripoli.
1978, September	Assassination of Bulgarian defector Georgi Markov in London using ricin umbrella weapon.
1978, October	Attempted assassination of Bulgarian defector Vladimir Kostov in Paris using ricin umbrella weapon.
1978–1979	Four hundred kilograms of intermediated compounds that could be used for organophosphorous nerve agents were discovered in a terrorist safe house in West Germany.
1979	A shipboard outbreak of gastroenteritis was determined to have been caused by a chemical agent.
1979	Attempted Soviet assassination of Afghanistan President Amin by a cook, who poisoned his food.
1980	Assassination of CIA agent Boris Korczak in McLean, Virginia (Tyson's Corner), using ricin weapon, possibly in umbrella configuration.
1980	Bathtub production of botulin toxin by German Red Army Faction discovered in a safe house at 41A Chaillot Street in Paris.
1980, August	Iraq cleaned out the Syrian Embassy in Baghdad and invited the Syrians to send in a new team of diplomats without the explosives, guns, and vat of poison discovered on the premises when it was raided.
1980	Several embassies in Europe received threats of terrorist use of a mustard agent against them.
1981, January	A Towson State University professor, convicted of shoplifting, attempted to kidnap the store manager in an act of revenge. After a struggle, the professor was arrested. In his car the police discovered a propane cylinder with a gear-driven motor (battery powered) to open the valve (controlled by a clock timer delay). The cylinder contained hydrogen cyanide gas.
1981, May	Herbicide contamination of food items in British grocery stores is discovered.

1981, October	Protestors claimed to have taken infected soil from the Herbidean island of Gruinard and placed it at the chemical defense establishment at Porton Down. The island has been closed to the public since germ warfare experiments on sheep were conducted there in 1941. The anthrax spores used in the experiments can remain dangerous for decades.
1983, March	The President of the Human Rights Commission of El Salvador was killed while investigating reports that the Army was using chemical weapons against civilians.
1983, May	The Israeli government reported that it had uncovered a plot by Israeli Arabs to poison the water in Galilee with an unidentified powder.
1983/4, Spring	The FBI obtained one ounce of ricin in a 35-mm film canister from an individual in Springfield, Massachusetts, who had manufactured it himself. This is believed to be one of several confiscations of ricin.
1984	A Cuban CW instructor defected and testified that Cuba has a stockpile of toxins. "If strategically placed in the Mississippi River," he contended, the toxins would be sufficient to "contaminate one-third of the U.S."
1984, January	A prisoner threatened to release the foot-and-mouth disease virus among livestock in Queensland, Australia, if prison reforms were not undertaken.
1984, September	Restaurants in Oregon were contaminated with *Salmonilla typhimurium*. Rajneesh subsequently implicated an aide.
1984	Tylenol contaminated with arsenic was found in drug and grocery stores. Several deaths resulted.
1984, November	Two Canadians attempt to procure tetanus and botulism cultures from ATCC. Reportedly the first phone order, of less deadly cultures, is filled, and it is not until the second order that ATCC employees become sufficiently suspicious to notify authorities.
1985	Coffee in an Israeli military mess was contaminated with the nerve agent carbamate.
1985	Soft drink and milk dispensers in Japan were dispensing cartons/bottles that had been contaminated by the addition of paraquate.
1986	More contaminated Tylenol was found in U.S. drugstores.

APPENDIX 3 ENDNOTES

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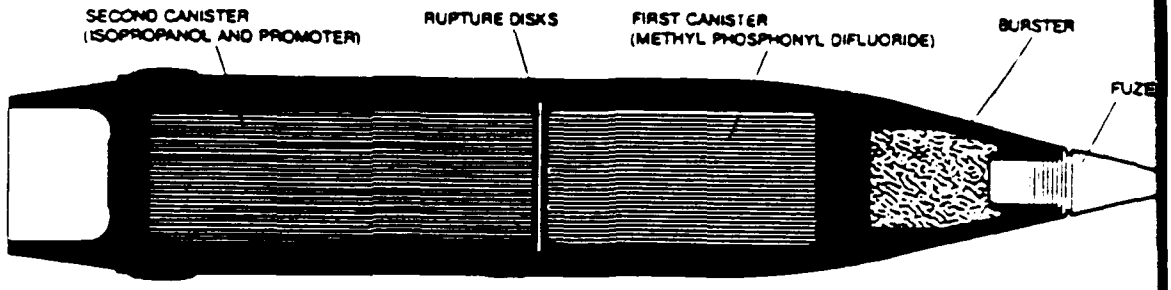
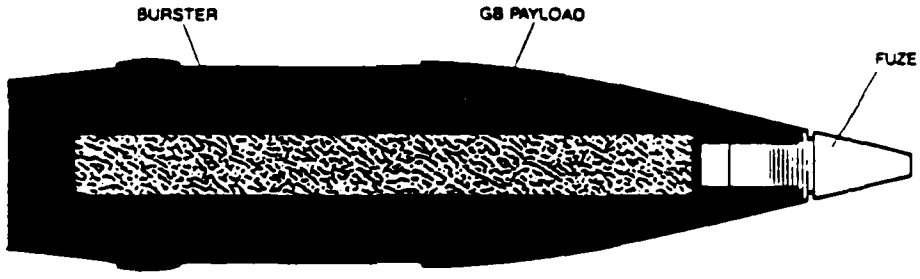
155mm Binary Munition



155mm Unitary Munition



Binary munitions offer the following advantages:

a. Binary munitions are operationally safe; free of complex and costly production, handling, transportation, maintenance, and disposal problems; and potentially more politically acceptable for storage in areas now denied to current chemical munitions containing lethal agents.

b. The use of two nonlethal chemical compounds to form a chemical agent allows for manufacturing simplicity, since complete containment facilities are not required.

c. Usually, one of the binary chemical reactants can be readily procured from industrial sources, thus reducing the necessity of extensive production facilities.

d. Storage and surveillance is likewise simplified. There is no danger of nerve agent leakage, no corrosion of the munition due to the agent, and no degradation of the agent itself. Since the binary reactants are stored separately, no special storage procedures are required other than appropriate security measures; and in the case of surveillance, normal procedures for conventional munitions are applicable.

e. The safety advantages in transportation are equally significant. The two components are handled and shipped separately, eliminating the possibility of the formation of nerve agent even in the event of a catastrophic accident.

f. Disposal of these munitions is a simple, low cost operation. The burster is removed by normal procedures for reuse or disposal. The canisters are removed and the nonlethal contents disposed of, neutralized chemically, or recycled.

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