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# CHEMICAL WARFARE STUDY: SUMMARY REPORT

Gen. Frederick J. Kroesen (Ret.), et al

*Performed under subcontract for*  
INSTITUTE FOR DEFENSE ANALYSES

Burdeshaw Associates, Ltd.  
4701 Sangamore Road  
Bethesda, Maryland 20816

February 1985

*Prepared for*  
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Contract MDA 903 84 C 0031  
Task T-3-200

## PREFACE

This study was conducted by the Burdeshaw Associates, Ltd., under subcontract from the Institute for Defense Analyses. IDA supported this research effort because it provides a view of chemical warfare--the analysis of chemical warfare issues and operations from the military commander's point of view--that complements, in a unique manner, the research being done by IDA for the OSD and the OJCS.

This report contributes significantly to an understanding and an awareness of the issues and problems surrounding the use of chemical weapons.

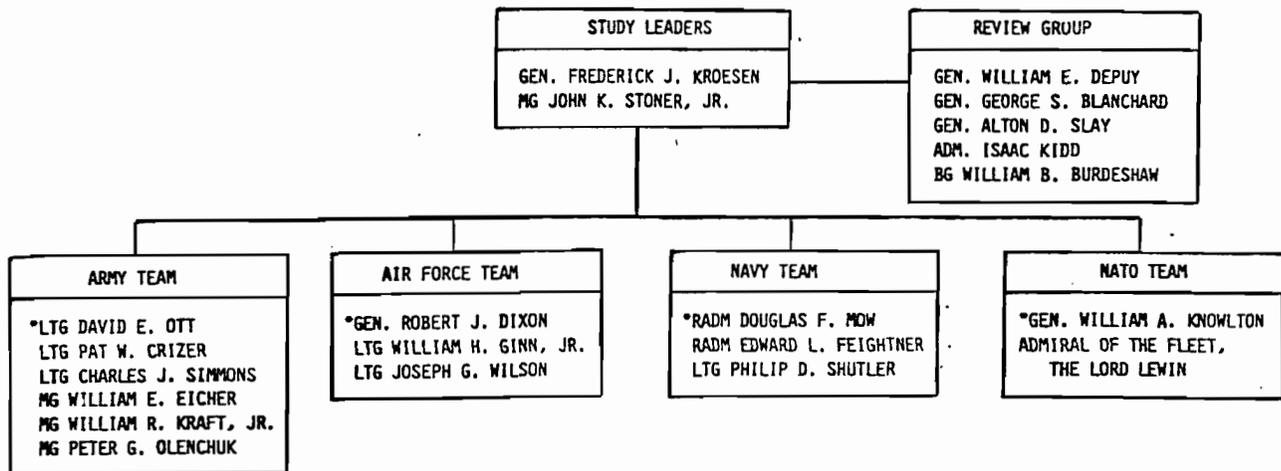
The study was conducted in response to DoD Task Order MDA 903 84C 0031 : T-3-200.

## PROLOGUE

"We are unaware of the enormity of our problem, of the vulnerability of our forces to an attack, and of the high risk of defeat if they are not provided an ability to fight back, to retaliate "with stones of equal weight from catapults of comparable power."

- Anonymous

# STUDY ORGANIZATION



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## INTRODUCTION

In the fall of 1983, Burdeshaw Associates, Ltd. engaged in a study to compile a "comprehensive assessment of the probable nature of a future chemical conflict" which could be used as a base upon which U.S. policies, concepts, and doctrines appropriate for a national chemical warfare program could be developed. The study was commissioned by a Department of Defense Task Order\* implemented by an Institute for Defense Analyses contract\*\* for the services of the BAL corporation. It was instigated by a growing perception that the threat of chemical warfare was increasing as the capabilities of U.S. forces continued to erode. In recent years, the intelligence community has become more aware of a continuing Soviet development of chemical agents and delivery means, and an apparent willingness to use or at least to test the effects of these developments in the field. Just as inimical to U.S. interests has been the use of chemicals by other powers and the threat of chemicals in the hands of terrorists.

The study was accomplished by 21 retired military officers, all flag officers of one- to five-star rank, representing all of the U.S. armed services and one other NATO nation. It provided, in narrative form, the collective military knowledge, experience, and judgment of this group regarding chemical warfare. They were guided by the estimates and projections of the U.S. intelligence community and by the current and proposed chemical defense program of the Department of Defense and the military services.

This report is a condensed and unclassified summary of the report completed and submitted in 1984 to satisfy the terms of the cited contract.

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\*DOD Task Order MDA 903 84 C 0031: T-3-200

\*\*IDA Sub-contract MDA-0018-7

## THE STUDY

The general purpose of the chemical warfare study was to describe a chemical environment and its impact on the capabilities and effectiveness of military forces and their operations. The study addressed a NATO scenario set in a 1990 time block, with NATO forces employed to oppose a Warsaw Pact general offensive aimed to overrun West Germany and the Benelux countries. The scenario was conventional, that is, it depicted the generally accepted Warsaw Pact force commitments, avenues of approach and axes of advance, and a NATO forward defense strategy using the forces available after about seven days of mobilization and deployment. U.S. Forces were organized, equipped and modernized in accordance with the current Five Year Defense Program, however, it was assumed that no binary munitions production had been authorized and that there had been no redistribution of current stocks.

Based on the general scenario, the authors of the report prepared a campaign plan and subordinate ground, air, and naval operations concepts for Warsaw Pact forces. These concepts, in addition to addressing normal maneuver and fire power schemes, consider in some detail the question "Why chemicals?" and express the military significance of the advantages and disadvantages of employing these weapons.

The study group also prepared a NATO defense plan, expressing, in the role of the Supreme Allied Commander and his major subordinates, air, naval, and ground operational concepts designed to prevent a Warsaw Pact success. Their study considered the question "What if chemicals?" and explored the capabilities and conditions of readiness of the NATO forces to cope with a chemical attack.

The report then describes, in vignette and anecdotal form, a collection of events which might occur in a war waged in conformance with the campaign plans of both sides. From these

descriptions, the authors derived their findings concerning the capabilities and limitations of U.S. forces and presented an appraisal of the impact of chemical weapons on the ability of NATO forces to withstand a Warsaw Pact offensive.

#### FINDINGS

The findings of the study address five principal subjects which are discussed in the following paragraphs.

First, the threat, i.e. enemy capabilities and the potential for employment of chemical weapons in support of military operations. The study group did not develop an independent intelligence analysis of the threat posed by Soviet and other Warsaw Pact chemical warfare capabilities. They did, however, review current intelligence information and synthesize their findings into a compilation of facts and estimates which provided a common base for the other parts of the study.

The fact that there was not to be an intelligence analysis did not preclude the study group from recognizing that the 1969 U.S. moratorium on chemical production apparently triggered a reduction in priority and in interest in chemical matters in the intelligence community; consequently, our knowledge today lacks depth and reliability. We need more information to determine the scope and range of Soviet capabilities, and certainly of Soviet intentions. Nevertheless, we know enough to be extremely concerned that the threat is serious, the potential for use is likely, and that the consequences of use will be significant. Soviet forces possess a versatile array of agents which can damage the nervous systems, blood systems, or respiratory systems of soldiers or sailors or airmen opposing them; they possess delivery means which can deposit those agents throughout the land areas of NATO where they can attack air bases, seaports or population centers as well as front line troops, and they can strike ships or convoys at sea, even in the expanses of the

Atlantic Ocean. We found no reason to be complacent about their potential or their intent.

The following is an extract from a vignette found in the report which describes the situation at a naval base in Southern Europe at the time the base is struck by enemy air and missiles launched from Libyan bases. The scene is portrayed through the eyes of Petty Officer Sam Barnes, an air controller working in the control tower and is illustrative of what might be happening at hundreds of NATO installations.\*

Suddenly, in the light from the explosions Barnes noticed a small group of airmen suddenly seize their throats and crouch over with convulsions. Strange, Barnes thought, but darkness returned to the scene as his attention was immediately drawn elsewhere. Again, a flashing light outlined the small group near the tower. Now they were writhing on the ground and each man seemed to be gasping for air. "My God, it must be gas! A chemical attack!" Suddenly Barnes remembered he had taken his chemical protective gear to the barracks two days ago to mark the mask with his name. The seriousness of his situation now began to become clear. He was horrified and looked about wildly for additional clothing. There was none available. In fact, two others in the tower were in the same predicament. Almost immediately Barnes' eyes began to burn and he felt a tightness in his upper chest and throat. In only a second or two more, he began to have difficulty breathing and felt extremely nauseous. In his final moments of consciousness he took one last look around the field from the tower. The hangars, shops, barracks, refueling pits, fuel storage areas, ordnance storage areas were all damaged. Fire and smoke were everywhere, and the gas emanating from the chemical warheads had begun to take a terrible toll. Air operations ceased. The wounded and dying were everywhere and the survivors from the explosions were rapidly succumbing to the chemical agents. Very few of the base personnel had managed to get into their protective gear in time. Darkness made the visual detection of any chemical impossible and there were too few detectors on the base.

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\*The vignette portrays a scene which might occur in 1990 if the chemical warfare plans, preparations, and readiness remain as they were found to be in 1983.

Some pilots were trying to get airborne. The runway was cratered and taxiways had been hit. A low white cloud sitting directly over the entire base complex punctuated the dead calm of the early morning hour. Operations in the tower had ceased.

Rescue crews in protective chemical gear began to move about the field. The toll included hundreds of men and women, caught without protective clothing, who died within thirty minutes following acute stages of nausea, by loss of muscular control and then unconsciousness. Others suffered nearly the same symptoms but escaped death following a long period of incapacitation. Petty Officer Barnes was one of the latter. He was found an hour after the attack unconscious but alive. He had been exposed only briefly to the chemical toxins as they settled in the cloud just above the ground but beneath the tower elevation where he had been working.

It would be many hours before the base could be operational again. Clean-up and repair proceeded at a snail's pace because of the presence of chemicals which seemed to cover everything. Medical aid was woefully inadequate. Doctors and corpsmen worked steadily for 24, 48 and even 72 hours before fatigue forced a halt. Treatment for chemical victims was not clearly understood by personnel drafted to help serve as medical assistants. Medical supplies of all kinds were quickly used up. In many instances medical packages themselves became contaminated with the chemical residue which lay everywhere.

The second set of findings answers the question "Why chemicals?" Although the study group had to postulate the employment of chemicals in the scenario of the study -- it would not, after all, have been a chemical study without such conditions -- there was a decided requirement to inquire into the advantages and disadvantages of the use of chemicals. As a consequence, the group asked itself why Warsaw Pact forces would or would not, should or should not employ chemical weapons. The answers to those questions are provided in the following paragraphs.

- There is no question that chemicals, employed against an unprepared and unwarned population, military or civilian, can render a target almost instantaneously totally ineffective.

Given a surprise employment of this nature, the impact on a defending force would be devastating and an attacking enemy would encounter little organized resistance.

● It is true that such complete surprise would be unlikely in a NATO-Warsaw Pact confrontation, therefore, the effect on fully warned and prepared forces is a more important question. Here again there is a significant military impact, because warned and prepared forces suffer a severe degradation in capability and effectiveness. Employment by the enemy, particularly an enemy offensive force, drives the defender into protective clothing, an encumbrance which restricts vision, movement and dexterity and which is both enervating and debilitating. Evidence now available suggests that the effectiveness of individuals is reduced immediately by 50% or more, depending upon skills required, and that it deteriorates further over even the shortest periods of time.\* An offensive force, through judicious selection of an agent and of a mixture of persistent and non-persistent gases, can force a defender into a fully protected posture, can attack with troops who need no or only minimum protection, and can create an asymmetry of battlefield effectiveness which almost guarantees success.

The following is extracted from a vignette reporting the activities of a field artillery unit. It illustrates the degradation of its combat effectiveness even though it is a unit which was warned and prepared for a chemical attack.

The field artillery weathered the chemical strike better than most other elements of the 3d Armored Division. The 3AD imposed severe restrictions on firing from main battle positions until absolutely necessary and many batteries had not fired, and therefore, had not been located by the enemy. Most of the batteries that had fired were attacked heavily with

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\*U.S. Army Materiel Systems Analysis Activity (AMSAA) report: The Effects of Chemical Protective Clothing and Equipment on Combat Efficiency.

semipersistent agents and several "suspect areas" were subjected to semipersistent agents resulting in the partial coverage of a few others. The immediate impact was not overwhelming, but it was serious. Soldiers were very tired from their actions earlier in the day. Many were sleeping with protective equipment strewn haphazardly, nearby but not handy.

Word that a massive chemical attack had been launched resulted in a great hustle to get in a proper posture. Panic was the exception because these troops had been in battle and the nature of the battery positions permitted junior leaders to exert positive control and direction. Nevertheless, continuing the battle in protective ensemble began very soon to create serious heat casualties. From the time of the Soviet attack, the field artillery worked and fought at a fever pitch and the effort of handling tons of ammunition proved soon to be beyond the physical capacities of the soldiers. The sustained firing rate dropped to only 25 percent of that expected. Normally, the firing rate is limited by the heating of cannon tubes, but the tired troops, debilitated by the heat buildup in their protective clothing, could not fire fast enough to overheat the cannons. This condition resulted in a significant degradation in field artillery performance. Difficulty in seeing with masks on and the difficulty of talking through the mask added to this degradation.

The Soviets were aware that their chemical strike had not hit a high percentage of the artillery batteries, and so in the hours that followed, as they located these positions, they included chemicals in the concentrations of their counterbattery fires. This, of course, kept the NATO field artillery personnel in their protective ensemble all the time.

Within 24 hours, the artillery men ran into another problem. Ammunition at their supply points had been subjected to chemical attack and the result was the forward movement of contaminated ammunition. The paucity of decontamination equipment resulted in a Hobson's choice between accepting contaminated ammunition or not receiving any at all! Contaminated ammunition posed a problem for firing units. They had no on-site capability to decontaminate arriving ammunition, therefore, to unload, store and fire it required troops to be in the full protective ensemble, a very serious problem in the hours that followed.

In summary field artillery units, even though warned and prepared, suffered from three major problems: chemical casualties, fatigue and heat

prostration, and contaminated ammunition. The result was an immediate, continuing and growing loss of effectiveness.

- It is also true that, regardless of the degree of warning and preparation, chemical agents, historically and by projection, are demoralizing and generate panic. Since nothing is more destructive of military capabilities, the introduction of panic among NATO forces becomes an attractive aim for enemy war planners. In addition, the employment of chemicals will provide a strong signal of determination to win at all costs and contribute simultaneously to sapping the will of the defense forces and the populations depending on them.

- There are innumerable opportunities for using chemicals selectively, or "surgically" against critical targets. Special forces, equipped with grenade-sized chemical weapons can attack headquarters, communications nodes or control towers and put them out of action. Single or small clusters of chemical rockets can disrupt air and seaport operations, shutting them down when the threat of follow-on attack prevents an ill-equipped work force from returning to their jobs. Given the potential for covert deployment of special forces before the outset of an offensive, this capability is a very serious threat. The cost-effectiveness and the risks associated with such uses in comparison with any other means of accomplishing the same results make this type of employment most attractive for an attacking army.

The following is an extract of a vignette reporting the impact of an attack on the U.S. European Command headquarters in Stuttgart on the morning of the Warsaw Pact Offensive. It is illustrative of the impact of a selective, limited use of chemicals.

The dawn of day May 13, 1990, started typically at Patch Barracks near Stuttgart. The light was just beginning to make the post visible; there was a ground fog hugging the sidewalks and roads. The little collection of old German barracks, converted to staff functions for the headquarters, seemed almost to be a

Bavarian village. In the midst of them but not much higher than the surrounding buildings was the European Command (EUCOM) Command Center - a key link in the United States command and control chain. Suddenly, at about 0415 hours, the calm of the post was shattered by a series of explosions, and a part of the command building crumbled. The console from which all European command activities were directed was buried under a mass of rubble and ceased to function. The wave of over-pressure shattered windows around the headquarters building and collapsed the antenna tower.

Within two minutes a more muted, duller explosion portended results that were more catastrophic. Unbeknownst to all of the personnel of the EUCOM headquarters and the families who lived at the post, a chemical cloud was now drifting over the Patch Barracks.

In a second floor apartment, Major John Swift awakened at the first blast. Instinct led him to throw on his clothes in order to be of some help if there had been an explosion of a boiler or some other catastrophe. It was at that point that he heard the second explosion. The idea of gas crossed his mind, but only briefly. All military personnel of the European Command had been fitted for gas masks, but they were locked in a supply room somewhere. It was planned that they would be issued in the event that Soviet use of chemical warfare became a possibility. However, there were no masks for Margot, his wife, or for their two sons. All died within minutes.

At EUCOM headquarters, the gas masks rested largely untouched in the supply room of the headquarters company of the garrison at Patch Barracks. The keys to the supply room were held by Sergeant 1st Class Schmidt. Sergeant Schmidt lived on the compound and should have been able to get to the supply room very quickly; unfortunately, he had been among the first chemical casualties and had collapsed before getting more than forty feet from his house on the way to his office.

Rescue efforts and an attempt to reconstruct the communications links were both hampered by a combination of the destruction from the large Soviet rocket which had hit the building and the persistence of the chemical agent which limited any effort to gain access to the area. A Brigadier General from U.S. Army Europe, flying in an alternate command plane over the area, suddenly found himself disconnected from his parent headquarters and apparently responsible for the functions normally carried on by a four-star general and a complete staff.

● The preservation of infrastructure is another important advantage offered by the use of chemical weapons, particularly for a force bent on the subjugation of territory and people. Reducing or eliminating the need for high explosive munitions to support the advance of forces provides a high payoff when buildings, bridges, and stocks of supplies can be captured intact.

● Finally, and perhaps most significant, the use of chemical weapons can be expected to accelerate the pace of battle and the speed of the offensive to a degree which almost forecloses upon effective countermeasures. Increasing the speed and mass of breakthroughs and other penetration operations simultaneously compresses the time available to NATO for deliberating whether and where to employ its firepower, and can well result in progress which certainly complicates if it does not deny the ability or the wisdom of tactical nuclear counter-strikes.

The disadvantages of employing chemicals are of three basic distinctions. First the invitation for retaliation which subjects ones own forces to the same effectiveness degradation as that imposed upon the enemy. Second is the significance of the world's repugnance to the employment of weapons long touted to be immoral and disgusting. The third, and most serious, is the potential for triggering desperate measures by the enemy, i.e., a lowering of the threshold of nuclear response as the only hope of denying quick success.

● Given the inadequate defense and lack of any significant retaliatory capability among the NATO forces, the first disadvantage is almost inconsequential to a Soviet decision. The limited amounts of short-range, obsolescent chemical munitions available to NATO will be no deterrent to their use by the Warsaw Pact.

● Given the history of a Soviet lack of concern for world opinion, the second disadvantage is also of little consequence. Suspected use of chemical agents in Southeast Asia and Afghanistan is an indication of a willingness to risk world disapproval when tactical or strategic success is at stake.

● It is the third disadvantage which must give Soviet planners pause in their considerations concerning the employment of chemicals. The stated NATO policy, that imminent defeat will be countered with nuclear weapons, is a serious proclamation. Against that policy, the planner must consider the impact of chemicals on the pace of battle and the promise of a rapid conquest which would preclude the probability of the nuclear counterstrike. The study group believed that a well planned, well executed offensive campaign might well be foreseen as more than sufficient to overcome this disadvantage, particularly under circumstances which would cause the Warsaw Pact to undertake such a campaign in the first place.

The report reflects that after reviewing the advantages and disadvantages of supporting his attack with chemicals, the Warsaw Pact commander informs his superior that ". . .we would be militarily foolish if we did not employ these weapons."

The third set of findings deals with the question "What if chemicals?" In addition to the impact that is portrayed in the vignettes associated with the "Why chemicals?" question addressed above, the study group found that NATO military forces are not adequately equipped, trained, or prepared for chemical warfare. Individual soldiers, sailors, and airmen are equipped to survive, but not to be combat effective under chemical attack. Collective protection is almost nonexistent, and it would be next to impossible to rearm and refuel aircraft or repair tanks or maintain a functioning headquarters in a chemical environment. Civilian employees at POMCUS sites, contract workers at supply and maintenance facilities, and the work force which operates the ports of Antwerp, Bremerhaven, etc., have no protection. In

addition to all of the limitations on defensive capabilities, the ability to retaliate is severely limited. Only the U.S. has an immediately available stock of weapons and delivery means and they are in numbers and ranges that constitute, at best, a token response capability.

The fourth set of findings establishes that current Department of Defense programs do address current shortfalls and inadequacies of our intelligence effort and our defensive means. There is no question that we will be better prepared for chemical attack in 1990 than we are now, presuming continued Congressional support for the program. Nevertheless, and although great improvement can be predicted as chemical training and readiness gain higher priority in all services, U.S. forces even then will not be able to sustain an adequate, effective combat posture against a prolonged chemical attack. Individual protection, collective protection, alert and warning systems, and decontamination will all continue to be inadequate. Defensive measures done alone will not provide insurance against enemy use of chemicals. Our forces need a retaliatory capability, more varied and versatile delivery means, and vastly improved defensive means that will guarantee the continued functioning of both personnel and installations. All of these things are possible, none is assured by our current approved programs.

The final finding of the study group deals with the modernization programs of the Armed Forces. We are, at great expense, improving our abilities to find the enemy over much wider expanses of terrain, to communicate this intelligence more rapidly to forces in the field, and to react and respond with weapons that are more lethal and of greater ranges and reliability. We are developing new doctrine for the employment of our improved capabilities. But all of this modernization is hostage to the absence of a companion program modernizing our ability to survive and fight in a chemical environment. Even the simplistic employment of chemicals in the scenario depicted in this study is sufficient to cripple the elements of the Army's

"deep attack" doctrine and to immobilize the forces designed to carry it out. The 600-ship Navy, except for its undersea fleet, will remain vulnerable and there are no innovations in our modernization programs that will protect new missiles, aircraft or air base functions from chemical agents. The relative pittance needed to provide an adequate retaliatory capability and thereby satisfy the primary need identified in the study, i.e. deterrence, is a bargain not offered by any other defense program.

#### THE PROGRAM

A final review of the Five Year Defense Programs of the Armed Services and an appraisal of their projected ability to alter the situation predicted by this study reveals the following.

All services recognize four fundamental areas requiring program attention: deterrence, survivability -- both individual and collective -- retaliation, and decontamination. All identify deterrence as the first priority, but each recognizes that an offensive delivery capability is the basic requirement for satisfying the objectives of deterrence, survivability and retaliation. And all services have identified the means to provide adequate delivery systems, usable agents and weapons, and the distribution of stocks essential to a credible deterrence. None, however, have in fact dedicated the resources necessary to a satisfactory recovery from the current conditions of dangerous inadequacy.

The BAL study group believes that the FYDP requires alteration and amendment, first to raise the priority of the overall chemical warfare program to allow it to compete with MX missiles, C-17 aircraft, M1 tanks, and the 600-ship Navy. Given such priority, binary munitions take their rightful place in the

program and a credible deterrence of chemical warfare attains an appropriate stature as a prime defense objective.

There are many shortfalls in our current programs. Imaginative and innovative research is required to provide better detection and warning, better, less debilitating individual protection, and greater assurance of the survivability of combat functions and systems. Decontamination remains a serious challenge that will not be resolved by current programs. But the most serious lack remains that of an obsolete, almost nonexistent offensive capability.

The study group recognizes the moral high ground staked out by this nation's renouncement of chemical production in 1969. We recognize also that our example has failed to halt either the production or use of chemical warfare means by other nations, and that a serious imbalance and a dire threat have resulted from our 15 year moratorium. We advocate nothing more than the steps we believe essential to assure the absence of chemicals from the battlefields on which our forces may be engaged in the future, that is a force ready and able to survive and function in a chemical environment, a force competent to achieve the objectives it has been assigned.

#### SUMMARY

In retrospect, the following are the principal points made in this study:

There are gaps in the U.S. information about the Soviet Union's chemical warfare capability.

The Soviet armed forces are trained, equipped, and willing to employ chemical weapons on the battlefield. Further, reasons sufficient to cause the WARPACT to launch an offensive against

NATO would also be sufficient to support their employment of chemical weapons in that offensive.

U.S. and NATO forces suffer inordinate disadvantage if called upon to mount an effective defense against a Soviet offensive supported by chemical weapons. Defensive equipment will not assure defensive success on a battlefield on which an attacking force can employ chemicals at will and the defensive cannot. The encumbrance of chemical gear is exhausting and debilitating. When one side is forced into such gear while the other side can selectively avoid its use, a decisive combat effectiveness-asymmetry develops. The encumbered force steadily deteriorates in effectiveness and balance can be restored only if offensive retaliation in kind restores symmetry.

The current NATO retaliatory policy, calling for nuclear response to prevent imminent defeat, is suspect under conditions of chemical warfare. The speed of a Soviet offensive exploiting penetrations made possible by chemical attacks will face NATO commanders with enemy forces ranging widely in their rear areas, intermingled with NATO forces and with the civilian population. The nuclear decision under these circumstances will be one fraught with the dangers of very rapid escalation.

Recent and on-going modernization programs for U.S. armed forces are hostage to our failure to modernize our chemical capabilities. Improvements in our ability to generate battlefield intelligence, pass battle data rapidly around the battlefield, and strike enemy forces with effectiveness are impressive. But they are all vulnerable where chemicals are most effective -- the human component. The most effective defense for the personnel operating these systems is a chemical retaliatory capability that either turns off the enemy use of chemicals or creates a like disruption in his modern battle systems.