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DETECTING CHEMICAL WAR: THE REAGAN FORMULA

INTRODUCTION

Congress again is debating the Reagan Administration's program to deter chemical warfare by modernizing America's aging and obsolescent inventory of chemical weapons. History teaches that chemical warfare erupts only against weak and unprotected forces incapable of retaliating. To prevent chemical attack, the U.S.-- in World War II and after--has had ready an arsenal prepared to respond in kind. No longer. In the past decade, America's chemical arsenal has grown increasingly weaker. This the Administration is attempting to reverse with a cautious force modernization program.¹

Fourteen years ago, the United States unilaterally halted production of chemical weapons to pave the way for negotiation of a chemical weapons convention. Yet Moscow responded with an unprecedented buildup of chemical warfare forces.² Since then, grim evidence has mounted of Soviet violations of the 1972 Biological Warfare Treaty and the 1925 Geneva Protocol--including the mysterious release of anthrax from a major biological plant in

¹ For a description and analysis of the U.S. chemical deterrent program see: Caspar W. Weinberger, Annual Report to Congress, FY 1983, III-143-48 and FY 1984, 237-239; Theodore S. Gold, Deputy Assistant Secretary of Defense for Chemical Matters, "U.S. Chemical Warfare Policy and Program," NATO's Sixteen Nations, Vol. 28, February-March 1983, pp. 66 -71; Richard L. Wagner and Theodore S. Gold, "Why We Can't Avoid Developing Chemical Weapons," Defense, July 1982, pp. 3-11.

² C. J. Dick, "Soviet Chemical Warfare Capabilities," International Defense Review, Vol. 14, 1981, pp. 989-996; Amoretta M. Hoeber, The Chemistry of Defeat: Asymmetries in U.S. and Soviet Chemical Warfare Postures, (Cambridge, Massachusetts: Institute for Foreign Policy Analysis, Inc., Special Report, December 1981), pp. 36-51.

Sverdlovsk in April 1979. Soviet use of chemical agents against Afghan freedom fighters has been amply documented and the mycotoxins employed by Vietnamese troops in Laos and Cambodia almost certainly are of Soviet origin.³

The Reagan modernization proposal is a necessary response to the growing threat posed by the Soviet Union. The Administration is not seeking to match Moscow's offensive capabilities. The modest upgrading of U.S. chemical arsenal, rather, is designed to deter adversaries from using chemical weapons and to lay the groundwork for a complete and verifiable ban on their use.⁴

BACKGROUND

The Geneva Protocol of 1925 was drafted after the use of chemical weapons in World War I.⁵ It prohibited the first-use of chemicals but in no way proscribed development or stockpiling of chemical weapons or their use in retaliation. Even though the United States did not ratify the Protocol until 1975, its policy on chemical warfare has always accorded with the Protocol, pledging not to use chemical weapons first, while maintaining a defensive and retaliatory capability as a deterrent.

During the 1960s, public concern over the storage, transport, disposal, and testing of chemical munitions was sparked by a series of accidents purportedly involving chemical weapons.⁶ Open-air testing was prohibited by P.L. 91-441, and restrictions

³ Soviet Biological Warfare Activities, Committee Report, Permanent Select Committee on Intelligence, U.S. House of Representatives, June 1980; Use of Chemical Weapons in Asia, Current Policy No. 342, and Chemical Warfare in Southeast Asia and Afghanistan, Special Report No. 98, March 22, 1982; Chemical Warfare in Southeast Asia and Afghanistan: An Update, Special Report No. 104, November 1982, U.S. Department of State; James A. Phillips, "Moscow's Poison War: Mounting Evidence of Battlefield Atrocities," Heritage Foundation Background No. 165, February 5, 1982.

⁴ See: Remarks of Vice President George Bush at the United Nations Committee on Disarmament, February 4, 1983 and the statement by Ambassador Louis G. Fields, Jr. before the same body on February 10, 1983, when he submitted a comprehensive U.S. negotiating platform entitled U.S. Detailed Views on the Contents of a Chemical Weapons Ban.

⁵ Germany initiated the widespread use of chlorine gas and later phosgene at Ypres on the Franco-Belgian border on April 22, 1915. Relatively crude protection against these respiratory agents soon rendered them useless for offensive operations against protected troops. As a counter to respirators, the Germans then developed and first used Mustard gas, a blistering agent that required total body protection.

⁶ Evidence that the death of 2,200 sheep was caused by the Army's testing of VX at Dugway Proving Grounds in Utah is shaky. Joseph D. Douglass, Jr., "Chemical Weapons: An Imbalance of Terror," Strategic Review, Vol. 10, Summer 1982, pp. 36-47.

were imposed on other chemical weapons activities by P.L. 91-121 in 1969. Public opposition to chemical weapons was further fueled by the use of riot control agents and defoliants in Vietnam, despite their questionable military utility.

President Nixon in 1969 unilaterally renounced the use of biological weapons under any circumstances and ordered the destruction of all existing stockpiles. On the same occasion, he reaffirmed the U.S. pledge not to use chemical weapons first and ordered a review of the U.S. chemical deterrent posture. This presidential action, however, was prompted more by the mistaken notion of serious Soviet interest in a ban on chemical and biological agents than by expressions of public concern.⁷

At about the same time, the Army decided to cease production of unitary chemical munitions so as to defuse the public scare about their alleged environmental hazards. Technical breakthroughs also promised the development of safer weapons that would not pose the risks associated with the storage, maintenance, transport, handling under combat conditions, and terminal disposal of unitary munitions. A vigorous research and engineering program established the technical feasibility of the binary concept.⁸ Beginning in 1975, the Army requested funding for the construction of a binary weapons production facility at the Pine Bluff Arsenal, Arkansas, which was denied.

Subsequent funding requests were defeated.⁹ During the Carter Administration no appropriations/authorizations were requested. It required a congressional initiative in 1980 to

⁷ Ibid., p. 43.

⁸ Binary chemical weapons are designed with two relatively harmless and nontoxic chemicals. In the case of the 155mm GB chemical artillery projectile, one chemical is filled and stored in the artillery shell itself. The other chemical is stored separately and filled into the second chamber of the shell before the projectile is loaded into the gun. The two chemicals, difluoro and isopropyl alcohol amine, combine in flight to form GB, a nonpersistent nerve agent.

⁹ The funding request for the 155mm GB projectile production facility was resubmitted in FY 1976, up to \$8.8 million from \$5.5 million in FY 1975. This request was again refused with the argument that one more year should be allowed to determine progress in arms control negotiations on chemical weapons, and the \$8.8 million was reprogrammed for the procurement of defensive equipment. As a result, no budget submission was made for FY 1977. In FY 1978, this item in the amount of \$15.3 million was deleted within the Administration despite strong protests by the Secretary of Defense. The Department of the Army was directed in the defense guidance to continue plans for a production facility with no accompanying commitment to production. This was in line with President Carter's directive of June 1977 that no actions would be taken to improve the retaliatory stockpile. This decision was to be reviewed at the beginning of the FY 1980 budget cycle in the light of progress made in arms control talks with the Soviets.

provide minimal funding of \$3.15 million for the construction of a binary plant in FY 1981. The FY 1981 Supplemental request of \$20 million for the 155mm GB-2 projectile plant was also approved and funds were appropriated.¹⁰

Since 1969, the Department of Defense had maintained only a minimal Chemical Preparedness Program for perfecting defensive equipment against chemical agents and maintaining the existing stockpile of chemical agents. The neglect of the U.S. deterrent capabilities is epitomized by the Army's attempt to dissolve its Chemical Corps. Funding levels for chemical warfare programs declined steadily during the 1970s, from \$145.5 million in 1972 to \$111 million in 1978. Reacting to evidence from the Yom Kippur War of formidable Soviet collective protection capabilities for crews of armed vehicles, Congress, in P.L. 95-79, directed the Army in 1977 to improve its own collective protection systems. Yet no additional funds were appropriated for that purpose.

The Reagan Administration Approach

Upon coming to power, the Administration initiated a long-term program designed to remedy the most glaring deficiencies of the present U.S. chemical warfare posture. Growing concern about Soviet chemical warfare capabilities, the increasingly doubtful adequacy of the U.S. retaliatory posture and persisting lack of sufficient defensive gear, and hardening evidence of Soviet use of chemical weapons in Afghanistan combined to shape the Reagan Administration's program to enhance the U.S. chemical warfare preparedness and deterrent posture.¹¹

Funding levels for all chemical warfare related programs increased from \$259 million in FY 1981 to \$532 million in FY 1982 and \$705 million in FY 1983. The Administration is currently requesting close to \$1 billion for FY 1984 and plans to spend between \$4 billion and \$6 billion over a five-year period. Roughly 70 percent of these program funds will be expended for the improvement of protective measures, and some 10 percent have been designated for weapons demilitarization. Only about 10 percent of the total chemical warfare budget request is slated for the procurement of new munitions with the remaining 20 percent going toward inventory maintenance and the construction of a production base.

In 1981, the Reagan Administration won supplementary funding for the binary plant at Pine Bluff, Arkansas, which stopped short of actual production of lethal nerve gas agents; this would have required presidential certification of an existing national

¹⁰ Brad Roberts, Chemical Warfare: Background and Issues, Issue Brief No. 81081, Congressional Research Service, August 30, 1982; Congressional Record, September 10 and 16, 1980.

¹¹ Amoretta M. Hoeber, op. cit., p. 14.

security need pursuant to P.L. 91-121. Certification was submitted on February 8, 1982, accompanying FY 1983 funding requests of \$105 million for the binary nerve gas munitions program, \$54 million of which was designated for the procurement of 155mm GB2 nerve agent artillery projectiles; it was deleted in conference. For FY 1984, \$61 million was originally requested for munitions procurement; \$43.2 million has been withdrawn by the Defense Department because of engineering problems on the Navy's Bigeye 500-pound bomb.

In 1982, the Senate followed the recommendation of the Armed Services Committee and endorsed the President's program after narrowly defeating an amendment sponsored by Senator Gary Hart (D-Colo.), to prohibit the \$54 million funding for weapon procurement and to transfer that funding to the procurement of defensive equipment. Three amendments were added, however, during the floor debate. Two called on the President to intensify arms control efforts and the third, sponsored by Senator Mark Hatfield (R-Ore.), circumscribed the scope of the weapons production program by prohibiting munitions procurement in excess of the requirements of the U.S. armed forces, whereby effectively rejecting munitions procurement for NATO forces.¹²

The House did not follow the recommendation of its Armed Services Committee. Instead, it removed the production funds for the 155mm shell from the defense authorization bill. Through Conference Committee action, the production funds for the binary weapon were deleted.

In renewing its efforts to obtain funding for the actual production of binary weapons, the Reagan Administration confronts again the same group of Senators and Congressmen who opposed modernization of chemical weapons inventory throughout the 1970s and defeated the funding requests in FY 1983. Again the debate revolves around two hotly contested issues: the quantity and the quality of Soviet military preparedness for chemical warfare; and the sufficiency of the present U.S. retaliatory systems, especially as it relates to the adequacy of the current chemical weapons stockpile.

THE SOVIET CHEMICAL WARFARE POSTURE

Experts agree that the Soviet Union maintains the most elaborate chemical warfare capabilities of any military forces. The Soviets have a balanced mix of defensive equipment and offensive weapons, a military doctrine that integrates chemical warfare operations with the use of conventional and nuclear weapons, and thoroughly train all military personnel in the conduct of combat operations on a contaminated battlefield. Chemical troops,

¹² Congressional Record, May 6, 13, and 20, 1982.

numbering about 85,000 men today, were created as an independent service in 1924 and, subsequently, four chemical schools, several dedicated chemical munitions factories, and some seventy chemical warfare training grounds were established by the Soviet armed forces. Soviet troops train with live chemical munitions at a cost of several dozen fatalities annually.

Soviet military doctrine envisages the offensive use of chemical weapons and frankly acknowledges their combat utility.¹³ Soviet chemical warfare doctrine supports massive, surprise attacks against a broad spectrum of targets ranging from the edge of the battlefield to rear areas such as airfields, logistic support facilities, and troop concentrations; it also calls for rapid offensive strikes to quickly dislodge "enemy" defenses. In order to suppress resistance of defending forces, Soviet strategists plan to exploit the principle of mass and the element of surprise. Chemical weapons are particularly well suited to support offensive operations and, indeed, Soviet planners view all military capabilities as organically related, generating a synergistic effect when used in combination. Therefore, it is not unreasonable to surmise that Soviet strategists envision the use of all available military capabilities in order to inflict maximum damage and attain their combat objective.

Soviet military organization and protective equipment are designed to ensure effective combat operation in a contaminated environment. All modern tanks and armored combat vehicles provide crews protection against radiological and chemical contamination.¹⁴ Positively pressurized vehicle interiors together with air filtration systems allow crews to move freely and to operate weapons systems unencumbered by bulky garments, hoods, and gloves that retard combat effectiveness. Other new generation combat vehicles, including support vehicles, missile transporters, and launching platforms as well as command vehicles are equipped with supplies of individual protective materials. While these lack certain advantages of collective crew protection systems, they permit the crews to leave their vehicles and to perform combat operations in the surrounding area without prior vehicle decontamination.

Collective protection systems when combined with extensive decontamination equipment allow Soviet forces to rapidly traverse

¹³ For a detailed discussion see Christopher N. Donnelly, "Winning the NBC War: Soviet Army Theory and Practice," International Defense Review, No. 8, 1981, pp. 989-996 and J. S. Finan, "Soviet Interest and Possible Tactical Use of Chemical Weapons," Canadian Defense Quarterly, Vol. 4, 1974, pp. 11-14.

¹⁴ David C. Isby, Weapons and Tactics of the Soviet Army, (London: Jane's, 1981), pp. 214-219. Specific capabilities of Soviet equipment are also discussed by Amoretta M. Hoeber, op. cit., pp. 40-44.

contaminated battlefields and to pierce through lines of defense without significant degradation of their combat effectiveness. Each Soviet tank and motorized rifle division has a chemical warfare battalion with over sixty vehicles, half of which are decontamination trucks. Soviet forces field several models of decontamination trucks, among them the ARS-12U that is probably the most versatile. It has the capability of decontaminating with chemical solvents twelve battle tanks in rapid order without requiring replenishment.

The TMS-65s decontamination vehicle, first detected with Soviet forces in the mid-1960s, is a truck with a turbojet engine powered spraying device that is said to have the capability of decontaminating the outer surfaces of a tank in less than one minute when operating in pairs.¹⁵ Soviet forces also maintain steam-cleaning equipment, which is somewhat less effective but remains useful in view of Soviet tolerance of considerable levels of contamination.

The heavy emphasis on decontamination equipment indicates that Soviet planning anticipates a significant role for persistent and nonpersistent chemical agents in any future war in Europe or elsewhere. In view of the limited inventory of these agents among NATO forces, it must be concluded that Soviet forces plan to use them in support of their offensive operations. This conclusion is further substantiated by the virtual inability of NATO forces to sustain combat in a contaminated environment for an extensive period of time.¹⁶

Soviet forces are also well equipped for decontamination of personnel. The protective gear worn by Soviet soldiers consists of the standard ShM respirator and the ZFK-58 heavy suits of cloth-lined rubber as well as rubberized boots. This gear is inferior to NATO's new vinyl suits which "breathe" through a layer of activated charcoal acting as a chemical filtration system that reduces heat buildup. Heat stress caused by Soviet suits within a short time of wearing forces Soviet soldiers to seek shelter to change their clothing, which is then decontaminated and reissued. NATO overalls, on the other hand, are less cumbersome to wear and can be worn for a longer period, which diminishes combat degradation, but they have to be discarded

¹⁵ Amoretta M. Hoeber, *op. cit.*, pp. 40-44.

¹⁶ According to the Department of Defense, "the current inability to conduct sustained operations in a CW environment is attributable to shortfalls in unit defensive equipment...and, importantly, shortfalls in war reserve quantities of individual protective clothing. Hearings on Military Posture, Committee on Armed Services, U.S. Senate, Part 1, Department of Defense Authorization for Appropriations for FY 1983, p. 767.

after use due to a progressive loss of protection resulting from exposure to chemical agents.¹⁷

Each Soviet soldier also carries a personal weapons decontamination kit as well as an MSP-18 medical treatment kit containing antidotes to a variety of chemical agents. The IPP-V individual skin therapy kit is part of the standard equipment carried by all Soviet frontline soldiers. The Soviet inventory contains other equipment for which no U.S. counterparts exist.¹⁸

Soviet forces field sophisticated radiation and chemical detection devices. The truck-mounted GSP-1 and GSP-1M alert troops with visual and audible alarms to contamination. These devices are also mounted on various reconnaissance vehicles. In addition, Soviet forces are equipped with portable detectors capable of identifying specific chemical agents. They assist troops in determining quickly the appropriate antidote when caught by a surprise chemical attack.

In effect, the same protective equipment ostensibly acquired for defensive purposes provides the Soviet forces with the capability of initiating chemical warfare. Soviet protective systems are far in excess of reasonable defense requirements against an "enemy" who is poorly equipped and trained for both defensive and offensive chemical warfare.¹⁹

Precise estimates of Soviet offensive chemical capabilities are difficult to obtain, but experts agree that the Soviet Union maintains an extensive stockpile of chemical weapons and delivery systems.²⁰ Furthermore, according to recent U.S. intelligence estimates, the Soviets maintain 106 chemical factories designated for military production.²¹ The extent to which chemical agents have been manufactured into munitions is uncertain and estimates

¹⁷ Matthew Meselson and Julian P. Robinson, "Chemical Warfare and Chemical Disarmament," Scientific American, Vol. 242, April 1980, pp. 39-47. According to the 1981 Defense Science Board report, the U.S. suits can be worn for fourteen days consecutively and still provide the required minimum six hours of protection against chemical agents. This feature permits U.S. troops to guard against a surprise attack with chemical weapons but does not notably enhance their ability to remain in a chemical environment without ancillary equipment.

¹⁸ A comparison of U.S. personnel and equipment decontamination capabilities is contained in Chemical Warfare: Many Unanswered Questions, GAO Report IPE-83-6, April 29, 1983, pp. 42-48.

¹⁹ Amoretta M. Hoerber and Joseph D. Douglass, Jr., "The Neglected Threat of Chemical Warfare," International Security, Vol. 3, 1978, pp. 55-82.

²⁰ John Erickson, "The Soviet Union's Growing Arsenal of Chemical Warfare," Strategic Review, Vol. 7, 1979, pp. 63-71.

²¹ J. Kenneth Crelling, Chemical Warfare Capabilities--The Warsaw Pact Countries (Charlottesville, Virginia: U.S. Army Foreign Science and Technology Center, October 31, 1979).

range from 5 to 30 percent of all stockpiled ordnance. The Soviet stockpiles contain a great variety of nerve gases, blistering agents, and toxins. There are also indications of stores of hydrogen cyanide, a blood agent first used in World War I, and some inventory of incapacitating agents.²²

Chemical weapons can be delivered by Soviet forces against a broad array of targets. The Soviets are credited in unclassified literature with the capability of delivering chemical munitions with all major tactical weapons systems--missiles, rockets and multiple rocket launching systems, bombs, and aerial spray tanks--giving them the capability of striking anywhere within NATO. Most significantly, the Soviet armed forces maintain a balanced mix of short- and long-range delivery systems with which to apply both persistent and nonpersistent agents. Many uncertainties about the nature of Soviet chemical warfare preparations persist, but assuming that the estimates of Soviet capabilities are reasonably accurate, the threat posed to the United States and its allies is serious indeed.

THE PROGRESSIVE ATROPHY OF THE U.S. CHEMICAL DETERRENT

The decision in 1969 to cease production of chemical munitions has limited the size and quality of the United States chemical retaliatory stockpile. Despite the Army's intention to halt production of chemical weapons only temporarily while awaiting the development of binary weapons, the United States has lived with a de facto moratorium on chemical weapons manufacture for the past fourteen years. Owing to inadequate maintenance as well as natural aging of weapons components and chemical agents, the U.S. stockpile has deteriorated dramatically. In effect, 11 percent of all weaponized chemical agents are unservicable. Most of these are M-55 rockets filled with GB and VX nerve agents as well as 155mm howitzer projectiles.

U.S. capabilities are further constrained by a mismatch between munitions and available delivery systems. For instance, multiple rocket launchers have been withdrawn from active service and the standard 105mm howitzer is being phased out and currently in use only with a few Marine battalions and two air-mobile divisions. The old 155mm gun is also being replaced by a new, extended range howitzer and, while the old 155mm munitions are compatible with the replacement, they cannot be fired at its full

²² David C. Isby, op. cit., p. 214 and "Todeswolken über Europa," Der Spiegel, February 22, 1982, pp. 32-52. Evidence of Soviet forward deployment of chemical munitions is widely available. John Erickson, op. cit., estimates that as much as 50 percent of all munitions stockpiled in Eastern Europe contain chemical agents.

range.²³ The appalling condition of the U.S. retaliatory stockpile was cogently summed up by an Army estimate that "current U.S. stockpiles amount to only 25 percent of the needed deterrent, and that by 1990...the U.S. will no longer have a military usable stockpile of chemical munitions and ground based delivery systems."²⁴

Fully 61 percent of the entire agent tonnage in the U.S. chemical stockpile consists of bulk agents stored in one-ton containers at three arsenals in the U.S. Most of this is mustard gas (41 percent), a blistering agent. Bulk GB nonpersistent nerve gas accounts for 14 percent of the stockpile, last produced in 1957. Persistent VX nerve gas, last produced in 1967, accounts for 6 percent of bulk agents. Bulk agents are of no military utility, however, without facilities to fill them into munitions. No facilities at present are equipped to handle mustard gas. The GB weapons production facility at the Rocky Mountain Arsenal near Denver, Colorado, has not operated since 1969 and is not being maintained. Extensive and time-consuming renovations would be required to bring the plant back into operation.

The militarily attractive VX, a persistent nerve agent of great value for area denial or contamination of enemy logistic facilities, airfields, and command posts, cannot be munitionized as well. VX filled weapons were originally produced at the Newport Army Ammunition Plant, Newport, Indiana, which has been shut down for fourteen years and would require extensive refurbishing before munitions could be filled there again. According to congressional testimony²⁵, bulk agents can be used as fill only for a small number of Navy refillable spray tanks for aerial applications of chemical agents. Spray tanks, however, are largely obsolete because of technological advances in anti-aircraft defenses. The same applies to VX loaded into Air Force TMU-28/B spray tanks, which are the only means to deliver persistent agents against rear echelon targets. The Air Force maintains a small inventory of 500-lb. and 750-lb. bombs filled with nonpersistent agents that are of limited utility for deep strikes against enemy installations because the risks associated with their delivery is disproportional to their military effect against all targets other than unprotected troop staging areas. Because no filling facilities are available, more persistent agents like VX or mustard gas cannot be loaded into bombs which could offer a stop-gap measure to mitigate temporarily the total lack of U.S. persistent agent, long-range capability until the binary "big-eye" bomb becomes available.

²³ Theodore S. Gold, Statement April 7, 1983, op. cit., p. 9. Dr. Gold also notes that the 4.2 inch mortar is being phased out because its short range of 4 kilometers renders it of limited utility.

²⁴ Deborah M. Kyle, "Chemical Warfare," Armed Forces Journal International, November 1981, p. 57.

²⁵ Theodore S. Gold, Statement April 7, 1983, op. cit., 8.

The utility of significant components of the U.S. chemical weapons stockpile is further diminished by problems associated with their storage, transportation, and handling. Most of the chemical weapons are stored at three locales in the continental United States. Only 10 percent are forward deployed to West Germany. In wartime, it would be exceedingly difficult to resupply the quantities of chemical munitions necessary to force Soviet troops to maintain a protective posture.²⁶ Some of the munitions are leaking and cannot be handled safely without protective equipment which will slow shipping to where they are needed. Furthermore, their reliability is uncertain, posing considerable risks to U.S. troops using them.

Thus, despite repeated allegations to the contrary²⁷, much of the nominally impressive stockpile of chemical agents and munitions is militarily useless because it is either undeliverable or antiquated.

The inadequacy of U.S. retaliatory capabilities has been surpassed only by the glaring deficiencies of its protective posture. Because it has always been the U.S. objective to deter the use of chemical weapons and not to initiate their use, the U.S. military has never devoted sufficient attention to equipping and training troops to fight and survive a chemical war. Despite efforts in recent years to correct these shortfalls, it is generally agreed that U.S. and allied forces are incapable of accomplishing their mission objectives under chemical warfare conditions.²⁸ As the ability to defend effectively against enemy use of chemical warfare is an integral part of a viable deterrence posture, it is rather obvious that the U.S. has never had a truly viable deterrent.

²⁶ According to DOD answers to questioning by Senator John Warner (R-Va.), it will take 40 sorties of C-141 aircraft to move 20,000 rounds of 155mm shells to Europe, a number the army considers sufficient to meet initial battlefield requirements. The cost of these missions is very high for unitary agents because the elaborate safety requirements associated with moving them. Binary munitions, on the other hand, do not require special handling and can be shipped by sea like other conventional munitions. Department of Defense Authorization for Appropriations for FY 1983, Part 7, Strategic and Theater Nuclear Forces, Senate Armed Services Committee, March 15, 1982, p. 4820.

²⁷ For instance Senator Mark Hatfield's statement that "(o)ur current stockpile of chemical weapons exceeds any reasonable definition of sufficiency for a deterrent." Press release of Senator Hatfield's office dated April 7, 1983.

²⁸ In his Annual Report to Congress for FY 1982, former Secretary of Defense Harold Brown noted that "at present time, NATO forces lack the capability to defend adequately against the Pact's chemical threat". General Fulwyler expressed the belief that the "lack of a credible capability represents the greatest vulnerability to our forces in service in Europe." Department of Defense Authorization for Appropriations for FY 1983, op. cit., p. 4740.

In the mid-1970s efforts were made to redress the sharp imbalance between U.S. and Soviet chemical defense capabilities and to bring military capabilities into alignment with official doctrine. But these attempts suffered from insufficient funding levels across the entire spectrum of chemical warfare activities. The Reagan Administration correctly identified improvement of the defensive posture as a policy priority and has initiated major steps to remedy the obvious shortcomings. It plans to increase the number of chemical warfare specialists in the Army, which had fallen to about 1,600 men in the mid-1970s, to some 10,000 men and 14 chemical defense companies by FY 1985; and it has strongly invigorated training at the recently reopened Chemical School at Fort McClellan, Alabama.²⁹ The Air Force, which pioneered the "dirty cockpit" concept, will receive funding for the acquisition of enhanced decontamination equipment; and 800 additional defense specialists will be attached to bases in high threat areas, in addition to 707 life support technicians for maintenance of air-crew protective equipment.³⁰ The Navy will undertake research on collective crew protection and plans to upgrade its ability to conduct amphibious missions in a chemical warfare environment.

Efforts are also being accelerated to develop a new protective suit that will be flame resistant and reusable and improve the combat performance of troops wearing protective gear. A new mask is under development which will reduce vision obstruction and will be compatible with other equipment, such as night vision devices.

Pursuant to the initial congressional mandate of PL 95-79 to incorporate collective crew protection systems in tracked combat vehicles, the Army decided in 1978 after extensive studies to develop a hybrid system of combined positively pressured vehicle interiors and ventilated facepieces for crews as the optimal protection system. Early models of the XM-1 tank will be equipped with the ventilated facepiece and will be retrofitted with the positive pressure system when it becomes available.³¹

U.S. forces still suffer serious chemical detection deficiencies despite the introduction of the M256 chemical detection kit and the M8 series of automatic alarms. Both systems appear to have operational problems and remote-area sensing devices are still under development.

One of the most serious deficiencies is a severe shortfall in the number and quality of decontamination equipment. Present capabilities for vehicle decontamination are rudimentary, labor intensive, and time-consuming. New equipment for use at the unit level will become available in the near future.

²⁹ Caspar W. Weinberger, Annual Report to Congress for FY 1983, III-147.

³⁰ Ibid.

³¹ Department of Defense Authorization for Appropriations for FY 1981, Hearings, Committee on the Armed Services, Part 4, June 5, 1980, p. 2661, written replies to questions submitted by Sen. Gary Hart (D-Colo.).

Considerable progress has also been made in developing a chemical warfare doctrine that assimilates chemical weapons and combat requirements and spells out how to conduct defensive and offensive operations in an integrated battlefield. The lack of a well-articulated, comprehensive chemical warfare doctrine has long been the Achilles heel of the U.S. military. It has impeded proper training of troops for chemical warfare and has hampered the accurate assessment of chemical weapons requirements and equipment needs of troops operating in a contaminated environment.

A recently published GAO report derides the U.S. chemical warfare program as ill-conceived, based on alarmist assessments of the Soviet threat, and fraught with technical problems. In particular, it singles out the lack of doctrinal guidance in order to substantiate the claim that the armed services are poorly prepared to objectively identify their chemical warfare needs.³² The GAO report, however, is wrong in using the Army Field Manual FM 3-10 as representative of the poor state of doctrinal direction. The manual was superseded by the much more detailed and instructive FM 21-40 issued in 1977. Since the mid-1970s, the services have also produced a number of documents dealing with the use of anti-personnel chemical agents, e.g., the Air Force manual AFR 1-7, published in September 1979. Definitive instructions for defensive and offensive operations can also be found in documents prepared by the Joint Chiefs of Staff, which are applicable to all services in their combined operations.

The initiatives of the Reagan Administration to enhance the defensive chemical warfare posture of the U.S. military have prompted similar efforts by the European allies as part of NATO's long-term force modernization program. The pace of qualitative and quantitative improvements of their defensive equipment has been slowed, however, by budgetary pressures and the lack of significant production facilities for defensive gear in most NATO countries.³³ It may well take until the end of the decade until the stipulated targets of the force improvement program will be reached. These efforts will increase the survivability of NATO forces on an integrated battlefield but will still not enable them to withstand effectively a Soviet assault conducted with a combination of chemical and conventional weapons. Only a substantial modernization of chemical munitions will negate the

³² Stripped from all its analytical window-dressing, this portrayal emerges from the GAO report Chemical Weapons: Many Unanswered Questions. That this reflects an accurate reading of the report's conclusions is supported by the use to which it has been put by congressional critics without evoking a rebuttal from its authors.

³³ Helmut Stelzmüller, "NBC Defense - NATO Needs New Devices," Military Technology, Vol. 8, 1983, pp. 24-35; Northern European Security Issues, Report of a Staff Study Mission to Five NATO Countries and Sweden, November 29 - December 14, 1982, to the Committee on Foreign Affairs, U.S. House of Representatives, 1983, pp. 11-13.

battlefield advantages that Soviet offensive doctrine intends to exploit.

THE SOVIET CHEMICAL THREAT TO WESTERN EUROPE

Soviet doctrine makes chemical weapons an integral part of an overall warfare strategy. While it is quite possible that the Soviets might prefer to limit their operations to the conventional level if they thought that would enable them to reach their objectives, the use of chemical munitions is clearly being contemplated as a probable contingency.

The overarching objective of Soviet strategy in the NATO context is to quickly disable and overrun the defending forces and to penetrate NATO territory at a rapid pace. In order to accomplish this objective, Soviet forces will seek to wear down and cause high rates of attrition in the frontline forces, debilitate airfields and key points in the chains of command, and to interdict the supply lines of the defender. Short of the use of nuclear weapons, chemical weapons are particularly suitable for these purposes.

First, in order to deny the Soviets the battlefield advantages associated with a surprise use of chemical munitions, NATO forces must maintain a protective posture at all times. This invariably impedes their ability to mount an effective defense against the attacker who can operate without performance-degrading gear. Thus, the threat of chemical warfare alone works to the disadvantage of NATO. Second, a surprise attack with chemical weapons will result in 10 percent immediate casualties and high rates of attrition resulting from physical exhaustion due to heat-stress, delayed effects of chemical agents, and the likely breakdown of communications between the commander and his troops. Troop discipline will also suffer from the psychological stress of fighting in a contaminated environment.

Third, Soviet commanders can shield the flanks of their advancing columns through the application of persistent chemical agents which will deny the defender the terrain from which to stage effective counterattacks. Fourth, through deep strikes against rear area targets using a combination of chemical and conventional munitions, the Soviets cannot only disrupt the orderly conduct of supply operations and troop reinforcements but, through the so-called force-multiplier effect cripple the operation of airports, port facilities, and supply depots for a prolonged period of time. A combined chemical conventional raid against airports can significantly extend the time required for runway repairs and can limit the number of sorties from these airfields. This could prove invaluable in Soviet attempts to secure air superiority in the European theater. Fifth, chemical munitions of the nonpersistent variety are highly attractive for the preparation of drop zones for airborne assaults behind the frontlines. Sixth, the use of chemical munitions in lieu of

nuclear weapons will help avoid damage to targets of potential future value, such as airfields, bridges, and industrial facilities. Seventh, chemical weapons are exceptionally well suited for combat operations in urban areas and, in view of the population density in central Europe, these areas will likely be prime targets for Soviet chemical warfare attacks. Finally, chemical munitions filled with persistent agents could easily be used to disable NATO's nuclear capabilities by inhibiting their swift relocation or their use against advancing Soviet troops.

The offensive use of chemical weapons is of indisputable military utility to the implementation of Soviet strategic doctrine and attainment of its military objectives. Their use will greatly complicate NATO's mission of arresting a Soviet onslaught with conventional weapons and will likely trigger early recourse to nuclear weapons. Thus, to rely on nuclear deterrence of chemical warfare is completely unrealistic.

Contrary to the contention that a retaliatory chemical capability does not add to, but may even detract from, NATO's ability to deter the use of chemical warfare, a capability for retaliation-in-kind is indispensable for successful deterrence of chemical warfare by the Soviet Union. Many European analysts argue that the possession of such a capability will make the use of chemical weapons more likely because it may convince the Soviets of a diminished resolve of NATO countries to resort to nuclear weapons. Thus, in their view, increased reliance on chemical weapons to deter a Russian chemical attack could be costly in terms of reducing NATO's ability to deter the outbreak of war in central Europe.³⁴

This line of reasoning is premised on the obviously false assumption that chemical weapons are of limited military utility. Moreover, it fails to recognize that the threat of nuclear escalation in retaliation to chemical attacks lowers the nuclear threshold and is not credible in the absence of outright nuclear superiority. NATO's theater nuclear superiority has vanished and given way to parity on the strategic level and Soviet theater nuclear superiority. Hence, such a deterrence posture lacks credibility. Retaliation-in-kind with chemical weapons, on the other hand, is fundamentally de-escalatory because NATO forces will only continue what the other side had already started. The objective is to limit the intensity and duration of chemical warfare by denying the advantages of using chemical warfare. Forcing

³⁴ See, for example, Uwe Nerlich, "Chemical Warfare Policy Alternatives: Defensive and Negotiating Options, in David S. Yost (ed.) NATO's Strategic Options: Arms Control and Defense, (New York: Pergamon Press, 1981) pp. 203-214; Hans Rühle, "Chemische Waffen und Europäische Sicherheit 1980-1990", Europäische Wehrkunde, Vol. 27(1), January 1978, pp. 5-10; J. P. Perry Robinson, "Chemical Weapons and Europe", Survival, Vol. 24(1), January/February 1982, pp. 9-18.

the attacker into a similar force-degrading protective posture and inflicting comparable losses and combat conditions will negate most benefits of offensive chemical warfare operations. It should then be beyond doubt that an exclusively defensive posture will be insufficient for deterrence and will not contribute to redressing the asymmetries on the battlefield.

POLICY IMPLICATIONS

In their quest to derail the program to improve the U.S. chemical deterrent, congressional critics are again basing their opposition on a series of unsubstantiated assertions rather than on a judicious assessment of U.S. capabilities and force requirements.

The Present Stockpile is Inadequate

Critics contend that stockpile deterioration during the U.S. moratorium on chemical munitions production has been negligible, has been arrested, and is being reversed.

The review here of U.S. retaliatory chemical warfare capabilities, however, testifies to the severe shortcomings of the U.S. stockpile. First, the stockpile has a poor agent-munitions mix. In particular, U.S. forces lack a persistent agent, long-range capability which is becoming increasingly important in the context of doctrinal developments envisaging deep-strikes against second-echelon targets. Chemical munitions used in conjunction with terminally guided submunitions against rear-area targets such as troop staging areas could become valuable options in the Army's new conventional defense doctrine known as "Airland Battle 2000". Second, there is a growing mismatch between the munitions stockpile and delivery vehicles in service with U.S. and allied forces.

A distinction must also be drawn between tons of chemical agents and tons of chemical munitions in the stockpile. The former is a rather crude measure of the size of the stockpile because it fails to differentiate between agents stored in bulk form and agents filled into weapons. The other measure grossly distorts the size of the stockpile because it measures the total weight of munitions rather than their content of active agents. Opponents of force modernization tend to use both measurements so as to emphasize the vastness of the existing stockpile even though only a fraction of it retains a residual military utility. Finally, foes of force modernization fail to appreciate sufficiently the logistic and safety problems associated with unitary chemical munitions.

The Shortcomings of Binary Weapons are Exaggerated

Critics charge that binary weapons are of questionable military utility because engineering problems have introduced

operational uncertainties and the binary concept imposes inherent limitations on their use.³⁵

The operational shortcomings of binary weapons that are said to militate against their effectiveness have been vastly overstated and appear large only when no consideration is given to the problems associated with unitary agents. These require elaborate safety precautions in transit and handling on the battlefield. They are also highly vulnerable to Soviet air strikes when stored in unhardened supply depots on the battlefield exposing troops to undue risks. Most chemical munitions in current inventory are also of limited military utility owing to their short range and suboptimal agent mix. The lack of longer-range systems limits the ability of the armed forces to fully capitalize on the so-called force multiplier effect achieved through the combined use of conventional and, preferably, persistent chemical agents against enemy airfields, supply and communications installations, and staging areas.³⁶

Finally, the detractors of binary weapons neglect the substantial advantages of binary weapons when it comes to their demilitarization. Unitary chemical munitions are extremely difficult and costly to demunitionize. Over the past several years, the Army has gained limited experience with the disposal of current stocks, demilitarizing some 13,000 munitions at one small pilot plant. Anticipated costs for the disposal of the entire weapons stockpile range up to \$3 billion in constant FY 1982 dollars. By contrast, the binary weapons are easy to disassemble because they contain no lethal components and, as a result, can be disposed of at negligible costs and environmental risks.

Chemical Munitions Are Weapons of Mass-Destruction

This proposition is usually invoked by those who seek to play on public fear of the horrors of war and attempt to liken chemical weapons to nuclear weapons. The effects, however, are in no way comparable, be it in terms of their destructiveness, persistence, or possible protection against them. While nuclear weapons tend to erase the distinction between combatants and non-combatants, the greater vulnerability of civilian populations than of well protected troops is not an intrinsic feature of

³⁵ GAO report, op. cit., pp. 68-72; Walter Pincus, "Pentagon Finds Unexpected Danger in 'Bigeye' Bomb", op. cit.; Ed Bethune (R.-Ark.), "Chemical and Biological Weapons Found Inefficient and Unsafe," Congressional Record, May 10, 1983. As one of the most articulate critics of the binary weapons program, the Congressman should be aware that the U.S. terminated its biological weapons activities in 1969 and, subsequently, destroyed existing stockpiles.

³⁶ Joseph D. Douglas, Jr., "Chemical Weapons: An Imbalance of Terror," op. cit., p. 38.

chemical warfare but largely a result of inadequate civil defense preparations.

Furthermore, insufficient retaliatory chemical warfare capabilities will ensure that this civilian vulnerability will remain entirely one-sided. The lack of a chemical warfare deterrent will diminish Soviet incentives to refrain from the use of chemical weapons and to conclude a comprehensive and verifiable ban.

Western European Views Are Not Determinative

While it is correct that considerable reservations exist among Europeans concerning the modernization of the retaliatory stockpile and, indeed, the need for its very existence, it is pointless to predict European reactions to a start of U.S. binary munitions production. The relentless Soviet build-up of military capabilities may well engender a heartening reconsideration of NATO's force posture requirements which could result in a decision of NATO councils similar to the two-track decision on Intermediate Nuclear Force deployment.

More to the point, however, the entire argument about European unwillingness to accept deployment of new chemical munitions on their soil neither detracts from nor negates the need for U.S. chemical stockpile modernization. Soviet use of chemical warfare in Afghanistan provides a vivid illustration that theaters for chemical warfare exist outside Europe, for instance in the Persian Gulf and Southern Africa, where the United States must be prepared to deter and, if necessary, to effectively fight a chemical war. It is a display of false deference to allied judgment to allow NATO councils to determine U.S. chemical warfare requirements for other theaters. It epitomizes the pervasiveness of a Eurocentric myopia.

Arms Control Can Eliminate Urgent Policy Decision

Opponents of binary weapons production have been arguing for over a decade that a verifiable ban on chemical weapons could absolve the U.S. from the need to modernize its chemical munitions stockpile. They contend moreover that binary weapons would complicate verification and, hence, obstruct a successful conclusion of an arms control agreement. Whether binary stockpiles will hamper verification has not been conclusively established. But it is becoming obvious that the U.S. unilateral moratorium on chemical weapons production has not induced the Soviet Union to exercise similar restraint or to be more forthcoming on the critical issues of verification and compliance. At the same time, it has become equally obvious that any agreement without adequate provisions for on-site inspection will be profoundly flawed. This is continuously being underscored by Soviet violations of the 1972 Biological Warfare Treaty which contains no provisions for verification. The fact that a ban on biological weapons could be reached within a short period of time in the UN Conference of the Committee on Disarmament is less an indication of the

universal aspiration to see these weapons banned than of the lack of U.S. concern with adequate verification. For more than ten years however, attempts to reach a ban on chemical weapons have been stalled by Soviet refusals to permit on-site inspections by international teams of arms control experts.

Since the mid-1970s, the U.S. and the Soviet Union have held exploratory talks and 12 formal negotiating rounds on a common draft for a ban on chemical weapons which produced a joint progress report for consideration by the UN Committee on Disarmament (CD) in July 1980. The report detailed the scope of the proposed ban, the time-frame envisaged for its implementation, and some provisions on treaty compliance but skirted fundamental questions of verification.

In January 1981, the Reagan Administration decided to discontinue bilateral negotiations with the Soviets and to concentrate its efforts on the Chemical Weapons Working Group of the U.N. Committee on Disarmament. This decision was inasmuch an indication of U.S. frustration with persistent Soviet refusals to seriously consider and accept genuinely effective verification and compliance procedures as it stemmed from the desire to expose lagging Soviet cooperation within the multilateral Working Group. It also served the purpose of putting pressure on the Soviet Union with support from non-aligned member countries to accept the U.S. position on verification in light of the unresolved questions surrounding the mysterious release of anthrax at Sverdlovsk and the detection of mycotoxins in Southeast Asia.

In June 1982, at the United Nations Special Session on Disarmament, Soviet Foreign Minister Gromyko presented a draft paper containing indications of a possible shift in the Soviet position on verification. This oblique allusion by Gromyko has been hailed by arms control enthusiasts as a further sign of incipient Soviet willingness to compromise on verification and to reconsider its sine qua non, on-site inspection. Judging from Soviet behavior since issuing this carefully crafted pronouncement, it has been targeted more at the Western arms control community to raise its hope for an agreement and foster opposition to a resumption of U.S. chemical weapons production than it is reflecting a change in the Soviet negotiating position. It appears as if the Soviets are again succeeding in the present budget cycle in fueling the aspirations of the arms control advocates in Congress.

POLICY RECOMMENDATIONS

The Reagan Administration has charted a balanced course for urgently needed improvements of the U.S. chemical deterrent. It has identified critical deficiencies in the U.S. chemical warfare posture and has proposed a number of interrelated steps that require expeditious implementation.

1. Accelerated procurement of protective gear for individual protection and acquisition of wartime reserves.

2. High priority RDT&E of advanced defensive equipment and decontamination devices.
3. Development of collective protection systems for combat vehicles and command posts and retrofitting of existing equipment.
4. Improvement of combat training and specialized training for chemical warfare.
5. Increased manpower assigned to chemical warfare tasks.
6. Greater efforts to conceptualize chemical warfare scenarios, to identify hardware requirements, and to refine doctrinal guidance for weapons use and individual combat performance.
7. Improved maintenance of existing chemical stockpiles and demilitarization of obsolete, unsafe, and unservicable munitions.
8. Establishment of a production base for the "bigeye" spray-bomb and engineering efforts to solve remaining operational problems.
9. Start-up of small-scale production of the 155mm binary shell components in preparation of final assembly.

Furthermore, the Administration should pursue the following initiatives:

1. Explore the engineering feasibility and military usefulness of chemical submunitions for use against rear-area targets.
2. RDT&E of a chemical warhead filled with persistent VX for deployment on Ground Launched Cruise Missiles.
3. Re-examination of naval shipbuilding programs with respect to changes in hull-engineering designs for the purpose of creating a collective protection capability for crews of naval vessels.
4. Hardening of critical command and communications stations against chemical contamination.

On the foreign policy level, the Administration should persist in its efforts to reach a comprehensive and verifiable ban on chemical weapons in Geneva. Simultaneously, it should begin to forge a consensus on the need to modernize the chemical stockpile in the absence of concrete results at the negotiating table by publicizing in stark terms Soviet chemical warfare capabilities and the need to deter their use through a viable countervailing deterrent. As part of this effort, the Administration should also step up consultations with the European NATO allies to reach agreement on the desirability of strengthening deterrence by raising the

nuclear threshold through the deployment of modern chemical munitions in adequate numbers as a deterrent against chemical warfare.

CONCLUSION

The United States unilateral moratorium on chemical weapons production over the past 14 years has brought U.S. ability to respond to a chemical attack to a dangerous low. As a result, the U.S. now is at a crossroads. Continued procrastination and indecision on modernizing its chemical arsenal will further erode America's ability to deter chemical aggression. Ronald Reagan's cautious program is designed to reverse this dangerous trend. Equally important, the Reagan formula will provide a solid basis and incentive for negotiating a verifiable ban on chemical weapons.³⁷

Until such a ban is concluded, however, the U.S. must be able to deter a chemical attack. The battlefields of Afghanistan and Southeast Asia prove that Moscow regards chemicals as an acceptable and useful weapon. The U.S. must take the steps to make chemicals unacceptable.

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³⁷ Congress recently appropriated funds for the MX missile in support of the President's two-pronged strategy for arms control negotiations on strategic nuclear weapons. Congress should allow the Administration to pursue a similar parallel policy on chemical weapons.

