

SOVIET CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES (NIE 11-11-69)

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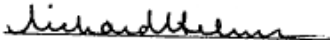
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**Soviet Chemical and Biological
Warfare Capabilities**
CIA HISTORICAL REVIEW PROGRAM
RELEASE AS SANITIZED

Submitted by



DIRECTOR OF CENTRAL INTELLIGENCE

Concurred in by the

UNITED STATES INTELLIGENCE BOARD

As indicated overleaf

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The following intelligence organizations participated in the preparation of this estimate:

The Central Intelligence Agency and the intelligence organizations of the Departments of State and Defense, and the NSA.

Concurring:

Dr. R. J. Smith, for the Deputy Director, Central Intelligence
Mr. Thomas L. Hughes, the Director of Intelligence and Research, Department of State
Lt. Gen. Joseph F. Carroll, the Director, Defense Intelligence Agency
Lt. Gen. Marshall S. Carter, the Director, National Security Agency
Mr. Charles A. Sommer, for the Assistant General Manager, Atomic Energy Commission

Abstaining:

Mr. William O. Cregar, for the Assistant Director, Federal Bureau of Investigation, the subject being outside of his jurisdiction.

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SOVIET CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES

THE ESTIMATE

I. TOXIC CHEMICAL WARFARE

A. General

1. Throughout its history the Soviet Union has placed heavy emphasis on the development of chemical warfare (CW) capabilities. In early years this emphasis derived largely from the disastrous effects of World War I chemical attacks against the Russians by the Germans. Although CW was not used during World War II, the Soviets had an ample supply of chemical munitions and required no assistance in this respect from their allies. After World War II, the Soviets continued their CW development, aided by the seizure of German nerve agent production facilities and personnel.

2. In post-World War II years, the sharp expansion of the Soviet CW program was probably due in large part to a lag in nuclear weapons availability. Classified Soviet documents suggest that as late as 1961 up to two-thirds of the warheads for tactical missiles and Frogs were chemical rather than nuclear.

3. In recent years the numbers of nuclear weapons available to Soviet theater forces has increased significantly and the proportion of chemical warheads for tactical missiles and rockets has probably declined to about one-third. However, continued stress on the importance of chemical munitions is evident in Soviet military writings, organization, training, and armament, suggesting that the Soviets will continue to retain a significant proportion of chemical warheads in inventory.

B. Doctrine Governing Use

4. Soviet military documents and exercises indicate that the Soviets appreciate both the capabilities and limitations of toxic chemical weapons. They appear to be satisfied that these weapons can play an important part in theater operations; documents and exercises stress their utility in a number of specific tactical situations. On the other hand, we have no evidence of any consideration of the use of chemical munitions in long-range delivery systems, either independently or in conjunction with strategic nuclear weapons, and we believe that their use in a strategic role is not now planned.

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5. While the USSR appears to have decided that chemical weapons are essentially tactical weapons, toxic chemical agents have been regularly and consistently grouped with nuclear weapons as "weapons of mass destruction" in political declarations and in classified military writings. Soviet field service regulations characterize modern combat either as waged with weapons of mass destruction, including chemical weapons, or as waged with conventional means. Thus it appears that the Soviets think of these chemical weapons as subject to the same political constraints as those imposed upon the use of nuclear weapons. In other words, we believe that the initial use of either of these types of weapons would be a matter for decision at the highest political level.

6. Classified and unclassified writings provide strong evidence that the Soviets see no restraints on the use of toxic chemicals in situations involving the use of nuclear weapons on any scale. They would almost certainly use chemical weapons in the event of general nuclear war. We believe, however, that they would not initiate their use in a conventional conflict against an opponent capable of retaliation in kind. They would almost certainly retaliate in kind if attacked with chemical weapons, and they might use toxic chemicals in a nonnuclear war against a power incapable of retaliation in kind.

C. Tactical Doctrine

7. Soviet tactical doctrine for the use of "weapons of mass destruction" prescribes the employment of CW primarily in close coordination with nuclear weapons, so as to capitalize on the particular attributes of each. The doctrine indicates that CW may be used instead of nuclear weapons, for example, in an area of engagement where material damage to the target is to be avoided. Through surprise and employment in mass, toxic agent munitions are intended to provide large-scale casualties and demoralization throughout the tactical zone of operations, thereby permitting rapid maneuver and seizure of critical objectives of fast-moving ground forces.

8. There is good evidence that, once the Soviet Government has decided to use weapons of mass destruction, the *front*¹ commander will normally determine the operations in which chemical agents will be used, the numbers and types of weapons allotted, and coordination with use of other munitions. To fulfill local tasks, chemical weapons would be used on the decision of divisional commanders.

9. Soviet CW doctrine provides for chemical attacks against the "rear areas as a whole," indicating a more extensive use of toxic chemical weapons at greater distances behind front lines than is usually considered in Western planning. Such a concept is noted particularly in Soviet doctrine for neutralization of enemy missile sites, including those for longer range missiles designated

¹ In the Soviet Army, a *front* is a wartime organization composed of several field armies. Although similar to a US army group, a *front* is not directly comparable.

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as "operational-tactical," and in the provision of chemical warhead options for missiles that have ranges up to 300 nautical miles (n.m.).

10. Targets for coverage by chemical weapons, designated in Soviet doctrine, include areas of offensive or defensive combat, areas of troop concentration, command posts, control points, missile sites, and reserves. Chemical munitions are particularly useful when an attacking force wishes to cause casualties, but to leave undamaged enemy facilities such as airfields, bridges, and roads, as well as combat equipment and auxiliary materials. They can also be used to deny the use of terrain.

11. According to Soviet doctrine, tube and multiple rocket type artillery are the major means of disseminating toxic CW munitions in close combat. These means may be supplemented by chemical bombs delivered by fighter-bomber aircraft. The fire offensive is to begin with "massed group and single strikes" delivering chemical as well as nuclear and conventional munitions. Chemical agents delivered by missiles as well as by aircraft would be used against enemy targets in the rear and also to prepare for the landing of amphibious or airborne forces in enemy territory. Coordination of nuclear and chemical weapons, particularly in connection with missile delivery, is a well-published point in Soviet military doctrine. Operationally, the chemical missile would be targeted from 5 to 10 kilometers (km) from the predicted impact point of a nuclear missile and would be used at the same time. By this tactic, personnel that have been protected from nuclear radiation and blast by the "shadow effect" of terrain features would be exposed to the effect of the chemical agent.

12. [

] evidence indicates that it then was the Soviet practice to use the greater portion of the chemical warheads in operations subsequent to the initial, predominantly nuclear, strike. Since 1961, the ratio of chemical to nuclear warheads has declined. Recent evidence indicates the Soviets still intend to use the greater portion of chemical warheads subsequent to the initial strike.

13. Soviet CW doctrine seeks "practically instantaneous annihilation of personnel" through coverage of large areas by heavy, lethal concentrations of toxic agents. The Soviets envisage the delivery of such heavy concentrations by massive-fill missile warheads detonated at fairly high altitudes. Soviet military literature refers to the achievement of up to 80 percent casualties in impact areas; the 80 percent figure contrasts sharply with Western CW concepts which visualize no requirement to achieve over 30 percent casualties. This Soviet CW doctrine probably reflects both a traditional penchant for massed fires and the earlier need to compete with nuclear warheads as "weapons of mass destruction." The doctrine also helps to explain large Soviet CW agent stockpiles.

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D. Chemical Agents

Nerve Agents

14. Nerve agents have never been employed in major warfare,² but laboratory and field testing have shown them to be extremely toxic. Unlike the older agents, these organophosphorus chemicals are practically odorless, and the problem of timely warning has not been solved. One class of nerve agents, known in the West as "G" agents because of their German origin, is relatively volatile and presents a lethal hazard by either inhalation of a minute quantity or contamination of unbroken skin by about one gram of agent. A family of even more toxic nerve agents, known in the West as "V" agents, has been developed since World War II. These present a hazard primarily by skin contamination because of their much lower volatility, but a very small drop (on the order of 0.01 gram) can be lethal. Since World War II, the Soviets have produced several of these nerve agents of increasing toxicity and effectiveness.

15. The first nerve agent developed and adopted by the Soviets was tabun, a G-agent, the quantity production of which probably began about 1946 or shortly thereafter. Manufacture of the agent probably continued through the 1950's, but stopped when emphasis shifted to other agents. Existing stocks of tabun, whether in bulk or in filled munitions, have gradually diminished as the result of agent deterioration. Nevertheless we believe that about half the Soviet tabun stock is still available.

16. The G-agent, sarin, became known to the Soviets at the close of World War II, when they took over the German production facility. Quantity production of sarin in the USSR probably began about 1960. Production of another G-agent, soman, probably began about a year later. It is more toxic than sarin; no adequate therapy is known. Both of these agents are now in the Soviet stockpile. Soman is available both in the normal liquid form and as a thickened agent.

17. At least one V-agent is in the Soviet arsenal and available for employment. This type of agent may have been known to the Soviets as early as 1953, but they definitely obtained information on V-agents from Western sources in 1955 and 1956. Under priority action and assuming Soviet knowledge of the existence of V-agents as early as 1953, V-agent production could have begun as early as 1956; in any case, at least one agent of this type had probably entered stockpile by the late 1950's or early 1960's.

18. The agent used as a chemical fill in tactical rockets, ballistic missiles, and cruise missiles is described in Soviet sources as an "agent of the VR-55 type." The lack of evidence as to the exact nature of this agent is a major gap in our knowledge of Soviet CW capabilities. It appears to be a persistent nerve agent or nerve agent mixture that is at least two or three times more toxic than the Western agent VX, and 25 times as toxic as sarin. According to Soviet sources, VR-55 reaches the ground in vapor, aerosol, and droplet form and is persistent

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for one to three days. To obtain this effect the Soviets may use a thickener to retard evaporation during the fall. It has also been suggested that VR-55 might be a mixture of a highly toxic V-agent with an unknown, extremely toxic, semi-persistent G-agent. The highly persistent V-agent might retard the evaporation of the more volatile G-agents to permit sufficient G-agent to reach the ground and supply the vapor hazard.

Older Agents

19. World War I-type agents still in the Soviet stockpile include hydrogen cyanide, mustard, and phosgene. Hydrogen cyanide is a tactical, nonpersistent agent. The Soviets claim the ability to produce and maintain an effective concentration lasting from 10 to 15 minutes over an area. A thickened or otherwise evaporation-retarded agent form may be used since hydrogen cyanide normally dissipates rapidly. Since the cyanides are common items produced by the chemical industry, military supply would probably come from diversion of industrial production rather than from a special facility.

20. The vesicant agent, mustard, either alone or mixed with lewisite, is an important agent in the Soviet arsenal. Manufacture of mustard in the USSR took place in both World Wars. There is no information which indicates current production.

21. Phosgene is another World War I agent that is still in the Soviet stockpile. The chemical industry uses phosgene as a common reactant, and the chemical is readily available. Although its toxicity is low compared to that of nerve agents and its volatility is high, its lack of persistence, cheapness, and ready availability seem to influence Soviet retention of the agent in their CW stockpile.

Incapacitants

22. The USSR is working on CW incapacitants such as the US hallucinogen BZ or an agent very closely related to it, as well as other types of hallucinogens. We believe that the Soviets have a good understanding of the chemistry of these agents and their mode of action, but there is no firm evidence that an incapacitant has been put into the Soviet CW stockpile.

Stockpile and Further Production

23. The Soviets have an extensive stockpile of various toxic chemical agents and munitions designed for employment with a variety of tactical ground, air and naval weapons. Central chemical depots under national control are believed to be in each military district. We estimate that the Soviet agent stockpile is on the order of 275,000 tons, but there is some recent evidence which suggests that this figure may be high. We believe that over half the stockpile consists of modern nerve agents and the remainder of older chemicals such as hydrogen cyanide, mustard, and phosgene.

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24. Soviet toxic chemical production capacity is expanding. Current stockpiles appear adequate for wartime operational requirements; additional stocks may be deemed necessary by the Soviets on the assumption that some would be destroyed in the event of strategic attacks, or would be immobilized in their generally remote depots by the disruption of transportation systems.

E. Chemical Munitions

25. The USSR has a wide variety of modern ground, air, and naval munitions designed to disseminate lethal and harassing agents, screening and signaling smokes, and flame and incendiary agents. During World War II, toxic CW munitions included shells, mines, multiple ground-launched chemical rockets, massive-fill and cluster bombs, and aerial spray tanks. Since then the Soviets have been very successful in developing new toxic agents for dissemination by the most modern means, such as missiles, and also in adapting older agents for dissemination by modern weapons, such as highly mobile rocket artillery.

Ground Munitions

26. The Soviet ground forces have a variety of toxic chemical delivery means including artillery and mortar shells, multiple rail- and tube-launched rockets, Frog systems, and Scud tactical ballistic missiles. This array of offensive weapons would enable the Soviets to create a toxic environment over a large area. Any or all of these weapons could also be used in defensive tactics and could be supplemented by the Soviet stocks of chemical mines, used alone or interspersed in high explosive (HE) minefields. Burning-type munitions, such as grenades, pots, and candles, filled with irritant agents would also be used to produce casualties or to degrade the enemy's combat capability by forcing troops to mask.

27. Smaller caliber tube artillery rounds were toxic-filled up to and during the World War II years. Chemical rounds are probably now available for light and medium artillery and the 120 mm mortar. Sarin, soman, mustard, and mustard-lewisite mixtures would probably be used to fill Soviet artillery and mortar shells, and hydrogen cyanide might also be used. Chemical artillery shells are suitable for use on small area or point targets and would be available as "gas" (toxic) or "fragmentation-gas" rounds. Fragmentation-gas rounds have unthickened nerve agents or mustard as the fill and are fitted with relatively large bursters so that the chemical agent is disseminated almost entirely as an aerosol or vapor. Chemical rounds with low order bursters and point detonating fuzes are used to disseminate persistent chemical agents such as mustard for heavy liquid contamination on the target and to disseminate volatile nonpersistent agents such as hydrogen cyanide at ground level. Airburst rounds with low order bursters are designed to obtain larger, more even area coverage than can be obtained with the groundburst types. They are normally filled with persistent type agents such as mustard and possibly thickened soman.

28. Bulk-fill warheads are probably available for multiple-rail rocket launchers capable of firing 140 mm, 200 mm, or 240 mm rockets. Because of their high

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rate of fire and high ratio of chemical fill to total weight of round, these weapons are ideal for quickly covering large-area tactical targets with toxic concentrations of nonpersistent agents.

29. The Soviets consider chemical landmines especially useful in defensive situations. The USSR has pressure-activated and electrically detonated chemical landmines. During World War II these were filled with mustard or mustard-lewisite mixtures; while some mines may still have these fillings, newer agents may be used now.

30. Soviet tactical missiles and rockets with massive-fill warheads are the primary means for delivering heavy concentrations of VR-55. The Soviets maintain that the optimal altitude (i.e., altitude providing maximum ground coverage) for the detonation of Frog-delivered massive fill warheads is 400 meters, and that for Scud-delivered warheads, 1,600 to 2,000 meters. Using this technique, the results obtained with the Frog warhead are described by the Soviets as 80 percent casualties over one-third of a square mile; with the Scud warhead, 80 percent casualties over three-fourths of a square mile. Lesser percentages of casualties are claimed downwind from these areas of maximum agent concentration. The Soviet description of effects obtainable with these techniques is presumably based on optimum weather conditions. The inaccuracies in the Frog and Scud systems would also have to be taken into account in a Soviet decision to employ massive-fill, high-altitude CW attack. The Frog CW warhead probably contains about 400 pounds of agent, and the Scud warhead about 800.

Naval Munitions

31. Soviet literature indicates considerable training emphasis on CW in the navy. Any or all of the Soviet Navy's cruise missiles could carry chemical warheads, but shipboard storage might prove hazardous. The most likely candidate for such warheads are those cruise missiles used by naval coastal defense units.

32. The Shaddock cruise missile can carry an agent payload of about 1,200 pounds about 300 n.m. The warhead may be a massive-fill type such as those for the Frogs and Scuds, and similarly detonated. The Soviets may also have developed a technique for the release of chemicals on a line from a cruise missile.

33. The Soviet Navy probably has 85 mm and 100 mm chemical shells for naval guns. Recent information indicates the stockpiling of 130 mm chemical shells for destroyers and 152 mm chemical shells for cruisers. Such shells are stored in port and placed on ships only during major exercises or in wartime.

Air Munitions

34. Soviet air munitions include massive-fill and cluster bombs, and possibly spray dissemination devices. The specific characteristics of Soviet chemical bombs are not known positively, but World War II types included individual bombs and bomblet clusters for disseminating lethal and harassing agents. Soviet crop-dusting activity indicates an excellent capability for spraying toxic agents

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from low performance aircraft. Spray tanks were developed in World War II for both fighters and bombers, but we have no evidence of such equipment for modern Soviet high performance aircraft. The Soviets have air-to-surface missiles which are capable of carrying CW agent payloads. Soviet aerial incendiary bombs probably include individual bombs filled with white phosphorus, thermite, napalm-type agents, or "Pirogel" (a mixture of powdered metal and petroleum products), and clusters of bomblets with thermite or thermite-HE fillings.

F. Chemical Warfare Defense

35. The Soviets possess large quantities of a wide range of equipment for use in chemical defense, much of it of recent design. Extensive training in its use is integral to military exercises for all Soviet and East European forces—ground, naval, and air—and dilute toxic agents are sometimes employed in this training. Equipment and training for CW defense are combined with that for radiological defense, and the special chemical troops are responsible for both types of defense. The dual nature of such defense is stressed in military training, and there are a number of recent examples of Soviet forces donning chemical defense equipment following simulated nuclear strikes.

36. The single most critical weakness in Soviet chemical defense is the problem of nerve agent detection. The Soviets have some manual and automatic devices for the detection of local concentrations of nerve agents, but we do not believe they are capable of giving timely warning of chemical attack.

37. We judge that the chemical defense equipment supplied the individual Soviet combat soldier is technically adequate to protect him in a toxic environment for a limited time, depending on the nature and concentration of the agent. Soviet troops exposed to contamination would be treated at decontamination facilities established by chemical troops. The equipment and procedures to be used at these facilities appear to be technically adequate.

38. Chemical warfare defense is stressed in Soviet civil defense indoctrination and exercises. Civil defense organizations are supplied with chemical defense equipment and gas masks are available for purchase by the general populace. We believe it unlikely, however, that any significant portion of the population has acquired protective equipment.

39. We believe that the Soviets will continue research and development on chemical defense, but we have no evidence regarding particular lines of development. We presume that major attention will be devoted to problems of nerve agent detection, protection, and treatment.

G. Direction and Organization of the Chemical Warfare Program

40. The principal responsibility for the program lies with the Chief of Chemical Troops, subordinate directly to the Commander in Chief of the Ground Forces. Administrative control of the Chemical Troops, including those in the Military District organization, is maintained by the Chief of Chemical Troops.

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Other activities under his supervision include various CW schools. The Central Chemical Proving Ground, at Shikhany, and other chemical test areas are directly under the Chief of Chemical Troops. Filling plants and central depots for storage of CW munitions, bulk agents, and other CW material are probably his responsibility.

41. Separate and distinct from the administrative control responsibilities of the Chief of Chemical Troops is the operational control of Chemical Troops, which is maintained by the commanders of military districts, groups of forces, armies, divisions, and smaller units, through the chiefs of chemical troops of the respective elements. The chemical officers so assigned advise their commanders on the use of CW weapons and other CW matters such as detection and decontamination. They also command the chemical troops, such as the chemical battalions assigned at the military district and army level. In peacetime a chemical company is an integral part of a division, and a chemical platoon is part of a regiment. In wartime, appropriate chemical units are also assigned to *fronts*, armies, and battalions. The main duties of these personnel are related to CW defense, including detection and decontamination; they are responsible also for handling toxic munitions and agents in storage and transport.

II. BIOLOGICAL WARFARE

A. General

42. The Soviets are conducting research and development programs on the possible military applications of biological agents. In previous years, virtually all available evidence could be related to Soviet work in epidemiology, public health, and sanitation, and defensive aspects of biological warfare (BW), but recent evidence points to the development of BW weapons.

B. Doctrine Governing Use

43. Soviet documents indicate that the USSR expects NATO to employ BW in the event of war and is preparing to defend against it. We believe that political considerations would weigh heavily against Soviet initiation of BW. In Soviet writings the subject is linked with nuclear and chemical warfare in terms that indicate a high degree of political control and restraint. The Soviet assessment of relative military advantages and disadvantages of the use of BW weapons, as well as the vulnerability of the population, would also impose restraint.

44. We believe it highly unlikely that the Soviets would employ BW in an initial strategic attack, although it might subsequently be used in the course of a general war. BW is especially suitable for clandestine delivery. The Soviets probably believe that BW weapons are of doubtful effectiveness in many tactical situations because of delayed and unpredictable effects. There is, however, some evidence which indicates that *front* commanders would be authorized to employ BW in circumstances in which Warsaw Pact forces were being compelled to withdraw, and that the means to do so could then be provided to them.

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C. Availability of Biological Warfare Agents

45. We believe that, through their own research and open US literature, the Soviets are well aware of the properties of a variety of BW agents, and they have the technical capability to develop, produce, and stockpile them in militarily significant quantities. We have, however, insufficient evidence on which to base an estimate of the types and quantities of BW agents which might be available to the Soviets for offensive use. The Soviets have done research on increasing agent virulence and maintaining high virulence for extended periods of time, retarding aerobiological decay, adapting agents to unusual vectors and testing the infectivity of causative agents of diseases not endemic to a particular geographic area.]

] some of these studies highly suspect of offensive agent research and development. In particular, there appears to be no other satisfactory explanation for Soviet work on the aerosolization of botulinum toxin.

D. Defense Against Biological Warfare

46. The Soviet military establishment includes organizations charged with defense of troops against BW. The Chief Military Medical Directorate of the Ministry of Defense has the prime responsibility for developing methods for defense of personnel and for numerous military and nonmilitary medical research centers which work on BW defense matters. In addition to medical service troops for BW defense, epidemiological services exist at all military levels to provide sanitation and disinfection facilities.

47. Soviet military forces are known to undergo training in BW defensive measures. Defense against BW has been included since 1956 in Soviet civil defense efforts which are now under the control of the Ministry of Defense. Protective equipment is available and contingency plans have been made for mass immunization. There have been some joint civil-military BW defense exercises. These efforts, however, are not of a scale to indicate any meaningful BW civil defense posture.

48. At present the Soviets rely on conventional laboratory techniques for detection and identification of biological agents. There are no indications that Soviet military forces are equipped with automatic BW alarm systems, but a number of prototypes continue to be evaluated.

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