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NIE 11-10-63
27 December 1963

NATIONAL INTELLIGENCE ESTIMATE

NUMBER 11-10-63

Soviet Capabilities and Intentions with Respect to Chemical Warfare

Submitted by the
DIRECTOR OF CENTRAL INTELLIGENCE
Concurred in by the
UNITED STATES INTELLIGENCE BOARD
As indicated overleaf
27 DECEMBER 1963

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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, Defense, the Army, the Navy, the Air Force, and NSA.

Concurring:

Director of Intelligence and Research, Department of State
Director, Defense Intelligence Agency
Assistant Chief of Staff for Intelligence, Department of the Army
Assistant Chief of Naval Operations (Intelligence), Department of the Navy
Assistant Chief of Staff, Intelligence, USAF
Director of the National Security Agency

Abstaining:

The Atomic Energy Commission Representative to the USIB, and the Assistant Director, Federal Bureau of Investigation, the subject being outside of their jurisdiction.

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SOVIET CAPABILITIES AND INTENTIONS WITH RESPECT TO CHEMICAL WARFARE

THE PROBLEM

To assess the capabilities and intentions of the USSR to employ toxic chemical warfare agents in military operations, especially against NATO in Europe, over about the next five years.

CONCLUSIONS

A. Our evidence indicates that Soviet organization, equipment, training, and research and development can support substantial toxic chemical warfare operations. There is insufficient evidence of toxic agent production rates or amounts in stock to make a reliable estimate of the scale on which they could conduct these operations. Main reliance now appears to be on the very toxic nerve agents. Research and development are continuing, including efforts to develop nonlethal incapacitating agents. (*Paras. 1–11 and 24*)

B. The Soviets have a variety of chemical munitions for theater operations, but we believe that their use in a long-range strategic role is not now planned. (*Paras. 9, 12–16, 18–23*)

C. Soviet and European Satellite forces possess a wide range of equipment for defense against chemical warfare, but they still lack a satisfactory means of timely nerve agent detection. Civil defense capabilities are considerably lower than those of the military. (*Paras. 24–28*)

D. We believe that the Soviet leaders think of chemical weapons as essentially tactical weapons, but they consistently group them with nuclear weapons as "weapons of mass destruction."

The Soviet leaders thus probably consider them subject to the same political constraints as those imposed on nuclear weapons, and any decision regarding their initial use almost certainly would be made at the highest political level. (*Paras. 13 and 14*)

E. The Soviet leaders almost certainly would authorize the use of toxic chemical agents by their theater field forces in a general nuclear war. In a limited war in which no nuclear weapons were being used, they would probably not initiate the use of chemical weapons. (*Paras. 17, 29–34*)

DISCUSSION

I. AVAILABILITY OF TOXIC AGENTS IN THE USSR

Types of Agents

1. The standard toxic agents now in the Soviet arsenal fall into two main categories: those which first saw use in World War I and the nerve agents which derive from German and Soviet research before and during World War II. The World War I agents still in the Soviet arsenal are mustard, mustard mixed with lewisite, hydrogen cyanide, and phosgene. Mustard, the primary toxic used in World War I, is a very persistent, blistering agent with a high toxicity. Hydrogen cyanide and phosgene are nonpersistent lethal agents which Soviet CW tactics prescribe for use in certain situations when tactical gas surprise can be achieved or the battle plan calls for early occupation of the enemy position.

2. Although nerve agents have never been employed in warfare, laboratory and field testing have shown them to be extremely toxic. Unlike the older agents, these organophosphorus chemicals are practically odorless, and no technique for their timely detection has been perfected. One class of nerve agents, known in the West as "G" agents because of their German origin, present 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. The Soviet inventory includes at least two "G" agents and one "V" agent, as follows: [1]

Sarin (GB). This nerve agent, the standard US agent in the "G" series, is about 10 times as toxic as mustard gas. It is considered in the West to be a nonpersistent agent suitable for use against a target which must be occupied by friendly troops, but Soviet research has shown that sarin can persist for several days in cold weather. At least limited production of sarin is believed to have begun in the USSR in the late 1940's.

Soman (GD). Another agent in the "G" series, soman is more persistent than sarin and presents a greater skin hazard to masked troops.

[1] There is good evidence that a tabun-like compound was synthesized in the USSR during World War II while the Germans were developing tabun (GA) itself. However, tabun has been characterized in a classified Soviet article of 1961 as "significantly inferior" to other nerve agents. Production has probably now ceased, but some may still be in the stockpile.

According to Soviet research, soman contamination may last for several months in cold weather. Soman cannot be countered satisfactorily by atropine, the standard antidote for the other nerve agents, but a recent Czechoslovak article announced the development of an improved antidote.

VR–55. Recent articles in classified Soviet military journals have referred to an agent designated VR–55, used for the bulk-fill of chemical warheads for tactical guided missiles and FROG's.[2] Although we have little information on the physical properties of VR–55, we deduce from these articles that it is more volatile than the very persistent standard US agent, "VX," and about 25 times more toxic than sarin. It has been described as rapid in action, and effective by both inhalation and skin penetration. Its persistence in lethal concentrations on terrain and materiel is stated to be from one to three days.

Evidence of Production and Stockpiling

3. Our evidence regarding the Soviet chemical warfare program relates largely to the development and the tactical use, rather than to the production, of chemical agents. We know that Soviet research on toxic agents has been extensive; numerous articles in the Soviet scientific literature attest to an intensive effort to develop simple, inexpensive processes for the production of nerve agents. In the 1950's, one research group devised a new sarin process much improved over the German scheme. The Soviet process for this "G" agent uses materials and procedures which are also called for in the production of some of the more toxic members of the "V" agent family. Another research group developed a process which yields a less toxic "V" agent or an organophosphorus insecticide, depending on the ingredient introduced in the final step. More recently, in 1961, the Soviets announced an inexpensive process for producing pinacolyl alcohol, needed in soman production and previously not economically available.

4. We also know that the Soviets have extensive facilities for the storage of toxic agents both in bulk and in filled munitions. We have identified about 10 major depots which we believe are devoted primarily to the storage of toxic agents.[3] Some of these are quite large and have been considerably expanded and improved since first photographed during World War II. Assuming that the entire capacity of these facilities is utilized for toxic agent storage, that the criteria for access and safety are comparable to those of the US, and that the floorspace devoted to bulk storage is twice that devoted to filled munitions, approximately 300,000 tons of toxic agents could be stored under roof at these depots.

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[2] Free Rocket Over Ground; c.f., Honest John.

[3] See Map for locations of these and other Soviet chemical warfare facilities.

5. In addition, at a few general munitions depots, there are small, isolated areas which may be devoted to the storage of toxic agent munitions, and at one suspect tactical guided missile depot, there is a large area containing especially designed buildings which we believe are intended for the storage of toxic agent warheads. In general, however, storage specifications for such munitions as toxic-filled artillery shells need not differ significantly from those for storage of other ordnance items. We have therefore not been able to identify other mixed depots, although Soviet CW tactics and delivery systems argue strongly that others exist. More important, we find no basis for a confident calculation of any particular total quantity of agents and munitions likely to be in storage at any of these depots.

6. We cannot firmly identify any Soviet chemical plant producing nerve agents. The best candidates are two factories which produced toxic agents in World War II, and are located close to facilities for munitions loading and toxic agent storage. Three other plants which also produced toxic agents in World War II are now major Soviet producers of heavy chemicals, including organophosphorus insecticides. Because of the hazards involved, they are unlikely to be engaged in the simultaneous production of nerve agents, but they may be producing essential intermediate chemicals and could constitute an industrial reserve capacity. A production facility at the Central Chemical Proving Ground at Shikhany may also be involved in nerve agent production.

7. Classified Soviet statements that munitions filled with nerve agents are available to Sovet forces convince us that quantity production has occurred. We lack direct evidence on production rates, on the amounts which may be in storage at the depots we have identified, and on the composition of existing stocks. Such estimates as we have attempted to make involve so many assumptions that margins of error are extremely high. We do not believe that the Soviet storage capacity is being utilized to its maximum, but we think it prudent to assume that the total toxic agent stockpile, both in depots and available to tactical units, is at least 50,000 tons.[4]

8. In any event, we believe the Soviets have not carried on a production program with a sense of urgency. We have seen no evidence of priorities for related chemical industries or for the construction of new storage facilities. Moreover, moderate production rates would provide substantial stocks. For example, a single nerve agent production facility of moderate size can produce 100 tons of agent per day, and we calculate from Soviet data that this quantity could be used to fill 200–300

[4] This judgment supersedes that expressed in the CW sections of previous NIE's, which have included quantitative estimates of the Soviet toxic agent stockpile.

tactical missile warheads, *or* about 575 FROG warheads, *or* some 800 550-lb. aerial bombs.

9. Although some CW munitions are probably immediately available to Soviet tactical units, logistical problems might affect the Soviets' ability to bring their stored CW stocks into play against NATO forces in Europe. Of the major depots we believe devoted primarily to the storage of toxic agents, about 75 percent of the total capacity is in the Western and Central USSR and about 25 percent in the Far East. Nearly all that in the Western and Central USSR is located in the Volga and Turkestan Military Districts. It is therefore not well sited for use in a war in the West which began with short warning times and involved heavy interdiction of transportation facilities.

Future Developments in Agents and Stockpiles

10. We expect Soviet research on toxic agents to continue. Efforts are probably underway to develop agents with improved field characteristics which would be useful in further complicating Western problems in detection, protection, first aid, and decontamination. Both scientific and military literature make it clear that an effort is being made to develop nonlethal incapacitating agents, and a formal requirement for such agents may exist. An agent causing temporary mental incapacitation might be available for field use as early as 1965 and another causing temporary physical incapacitation might be ready by 1968.

11. We see no reason why present production and storage facilities should either be substantially enlarged or reduced. Losses of properly stored agents are minimal, and continued production of the newer agents could be used either to enlarge total capabilities or to retire older munitions from active stocks. If the Soviets desired to reduce or terminate agent production, facilities could be shifted to the production of organophosphorus insecticides. Expansion of production facilities for these insecticides is being planned as part of the current agricultural improvement program. This expansion probably would enlarge the industrial reserve for production of nerve agents. In sum, we believe that chemical munitions will continue to be available, perhaps in larger quantities and in more effective form, and that substantially increased production could be undertaken fairly quickly if desired.

II. SOVIET CW POLICY AND DOCTRINE

12. Toxic chemical munitions possess certain advantages and disadvantages when compared with other munitions. They can achieve a wider area of lethal coverage than high explosives and their effects are more persistent. Unlike either high explosives or nuclear weapons, they can destroy personnel without destroying installations. Chemical weapons may be more effective than other weapons against personnel in

hardened targets. Even the threat of their use may lower the combat effectiveness of well-disciplined troops by forcing them to carry and use encumbering protective gear. On the other hand, weather may reduce or negate their effects, proper protection and adequate warning may achieve similar results, and proper dissemination of the agent is required in order to achieve effective results.

13. 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. In sharp contrast, we have no evidence of any kind to associate chemical weapons with long-range strategic attack, either independently or in conjunction with strategic nuclear weapons, and we believe that their use in a long-range strategic role is not now planned. However, if they came to believe strategic CW attack would be militarily rewarding, the Soviets could provide chemical munitions for their long-range delivery systems, i.e., those discussed in NIE 11-8-63.

14. 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 proposals on disarmament invariably link toxic chemicals with nuclear weapons. The latest available 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.

15. 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 by fast-moving ground forces.

16. There is good evidence from classified writings that, once the Soviet government has decided to use weapons of mass destruction, the

front[5] commander will normally determine the operations in which chemical agents will be used, the numbers and types of weapons allotted, coordination with other munitions, etc. Special chemical officers and troop units assigned at all levels are charged with providing technical advice. To fulfill local tasks, chemical weapons would be used on the decision of divisional commanders.

17. The Soviets probably do not consider that they have adequate stocks of nuclear weapons for their theater forces. Only recently have their planners been able to think in terms of committing up to a few hundred nuclear weapons, virtually all with yields in the kiloton range, to a typical *front* operation. Thus, in addition to being available to the theater forces for those operations to which they are particularly well adapted, chemical weapons have probably also been provided to make up for a deficiency in the number of nuclear weapons which might be deemed necessary for the conduct of tactical operations in a general war. Eventually, a greater degree of nuclear plenty could diminish emphasis on toxic agents for theater forces except in those special situations for which chemical weapons are especially suited.

III. BLOC CW DELIVERY AND DEFENSIVE CAPABILITIES

Soviet CW Delivery Systems

18. *FROG's and Guided Missiles.* The Soviets began developing toxic agent warheads for tactical rockets and guided missiles at least as early as 1957, and in 1959 they stated that such warheads were available. Articles in classified military journals provide good technical data on the VR–55 delivery capabilities of: (a) the FROG–4, a free rocket with a maximum range of 26 nm; (b) the SS–1–B, a ballistic missile with a range of 150 nm; and (c) the SS–C–1, a cruise missile with a range of about 300 nm. In addition, data indicates that a CW warhead has been provided for another cruise missile with a maximum range of about 150 nm.

19. These articles make it clear that in the case of the FROG and the ballistic missile, the Soviets expect to achieve wide area coverage by opening bulk-fill warheads at altitude: above 1,250 feet for the FROG and above 5,000 feet for the ballistic missile. From these same articles, evidence which is less conclusive leads us to believe that cruise missiles probably also employ bulk-fill warheads to be detonated at similar altitudes to achieve large-area coverage.[6] The lack of US experience to

[5] 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.

[6] According to Soviet data, they expect to achieve 80 percent casualties among exposed personnel over an area of about ⅓ square mile with the FROG, ¾ square mile with the ballistic missile, and about 1¼ square miles with the cruise missiles.

date with bulk-filled missile warheads and with agent release at such altitudes, coupled with our scant knowledge of the physical properties of VR–55, make it impossible for us to judge the agent effectiveness and area coverage the Soviets are likely to achieve with warheads of this type. However, they probably have explored the advantages and disadvantages of this concept of warhead design and appear to have confidence in the technique.

20. *Aerial Munitions.*[1] For agent delivery by aircraft, Soviet World War II CW munitions included spray tanks, individual bombs, and bomblet clusters. Although we believe Soviet interest in aerial spray dissemination has continued, we possess no information that a spray tank system suitable for use with high-performance jet aircraft is now operational. The line-dropping of small chemical bombs at regular intervals can achieve comparable results and there are recent indications that the Soviets have adopted this alternative technique.

21. *Artillery, Rocket, and Other Ground Delivery Systems.* The Soviets have toxic chemical rounds for all artillery pieces of 85-mm caliber and larger. Toxic rounds are probably available for all types of mortars and for multiple-rail artillery rocket launchers. Because of their high rate of fire, Soviet tactics recommend these rockets for employment in intense barrages, which might last a minute or less, to cover large-area tactical targets with surprise concentrations of toxic agents. In addition, a number of other CW delivery systems are available for support of theater force units. In general, the Soviets regard these other systems as defensive in nature, to be used to channel attacking enemy forces by creating barriers. Spray systems suitable for direct terrain contamination exist in a variety of forms. Turbine generators producing smokes and aerosols also can blanket areas with heavy concentrations of toxic materials. Pressure-activated and electrically detonated land mines, older models of which were filled with mustard or mustard-lewisite mixtures, may now also have hydrogen cyanide or nerve agent fill.

22. *Naval Munitions.* Toxic agent warheads may be available for naval cruise missiles. These could be used against both naval and land targets. Naval 85-mm and 100-mm shells and rockets with chemical fill are available, and recent information indicates the stockpiling of 130-mm and 152-mm chemical shells for destroyers and cruisers. All surface combatant ships are equipped to generate both screening and toxic smokes and are prepared, as are submarines, to release floating generators for creating toxic smoke screens and spray. Toxic muni-

[1] For a detailed description of agents used to fill aerial and ground munitions and their intended uses, see Annex A.

tions apparently are not normally stored aboard ship in peacetime. We believe it highly unlikely that chemical warheads are provided for naval ballistic missiles.

Toxic Agent Delivery Capabilities of the European Satellite Armies

23. All Satellite forces have artillery and aircraft capable of delivering agent munitions. In addition, some Satellite armies have received FROG's and short-range ballistic missiles and most others are likely to get them soon. We are confident that the Satellites have been informed of the Soviet CW capabilities with all these delivery systems, and there is good information, some of it quite recent, on Satellite training in the offensive use of toxic munitions. The Czechs, the East Germans, and possibly the Poles, have some capability to manufacture nerve agents, but the USSR has probably maintained close surveillance over such limited production as has occurred. The Soviets have almost certainly sought to keep the Satellite armies essentially dependent upon the USSR for these weapons, and we have no evidence that the Satellites possess toxic agents beyond the quantity required for their modest research and training programs. We believe the Satellites would not employ toxic chemical munitions except upon Soviet direction or authorization. More important, their extensive use would require considerable Soviet support.

Strengths and Weaknesses of CW Defense Preparations

24. The Bloc military possesses a wide range of equipment for use in chemical defense, much of it of recent design.[8] Extensive training in its use is integral to military exercises for all forces—ground, naval, and air—and dilute toxic agents are 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.[9] 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.

25. The single most critical weakness in chemical defense throughout the Bloc is the problem of nerve agent detection. Although some manual and automatic detectors for these agents are available, we do not know of any which is sufficiently sensitive to assure human safety.

26. According to the most recent available field service regulations, Soviet combat units are to avoid chemical and nuclear contamination insofar as may be practicable while accomplishing their missions. Units

[8] For a more definite analysis of Bloc CW defense preparations, see Annex B.

[9] For a detailed description of the formal military organization for CW, see Annex C.

exposed to contamination then would be sent to facilities to be established by chemical troops for treatment and decontamination. Although the equipment and procedures to be used at these facilities appear adequate to the task, we have no basis for estimating the extent of availability of individual items. We judge that the chemical defense equipment supplied the individual combat soldier is technically adequate to protect him in a toxic environment for only a short time, restricting his unit to limited tactical objectives.

27. Current civil defense preparations and medical training throughout the Bloc are directed primarily against nuclear effects. The Soviets have conducted systematic civil defense training for chemical defense for a number of years, but only a low level of chemical defense preparedness has been achieved and shortages of masks and other specialized equipment are general and widespread, especially in the European Satellites.

28. 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.

IV. FACTORS AFFECTING SOVIET INTENTIONS TO EMPLOY CHEMICAL WEAPONS

29. Several general conclusions emerge from the preceding analysis: Soviet stocks of chemical munitions are probably substantial; the Soviets have developed a capability for the use of chemical munitions in tactical situations but do not now plan for their long-range strategic use; they have made extensive preparations for defense against chemical agents but there are several key weaknesses in their defense capabilities; they regard chemical weapons as "weapons of mass destruction" and any decision regarding their initial use almost certainly would be made at the highest political level.

30. We believe, in light of the above, that the Soviet leaders almost certainly would authorize the use of chemical warfare agents by their field forces—to the extent and in the manner *front* commanders desired—in the event of a general nuclear war. In such circumstances, they would probably regard toxic chemical weapons as an important element in the execution of planned ground operations in Europe and the Far East. Any political inhibitions or legal restrictions upon their use almost certainly would be regarded as insignificant once a general nuclear conflict had begun—whether or not the other side employed them.

31. On the other hand, in a limited conflict, the decision to use chemical weapons almost certainly would be regarded as an important politi-

cal decision. The tactical advantage to be gained, particularly if there were a shortage of nuclear weapons, of course would be a factor, but it would be overshadowed by such considerations as the likelihood that the other side would respond in kind, the danger that the use of chemical weapons would precipitate the use of nuclear weapons, and the political image which the USSR was attempting to project to those not involved.

32. We cannot foresee, of course, all the different types of situations which might arise, and indeed even if we could, it would be impossible to estimate with confidence Soviet responses to postulated circumstances. There are, however, a few judgments or signposts which may be deduced from Soviet policies and behavior. For example, we have estimated that if Soviet forces became involved in a local war, the Soviet leaders would seek to keep the war as limited as possible so as to minimize the chances of its escalation into general war. We have also estimated that they therefore would not initiate the use of nuclear weapons. We believe they would regard the initiation of chemical warfare in much the same way; they would fear that their use of chemical munitions would be regarded by the West as an indication that the USSR was raising the stakes; they would fear that the Western response would be the initiation of nuclear warfare.

33. A less clear situation would exist if there were a local war in progress in which the use of tactical nuclear weapons had already been initiated. The danger of escalation would be extremely high from the moment nuclear weapons were used, and we believe that the Soviets would fully appreciate this. For this reason, we believe that in such a case they would seek to bring hostilities to a conclusion as quickly as possible. If, however, they were unwilling to move toward a termination of the conflict, they would probably not regard the use of chemical agents as adding materially to the existing risk of escalation and would probably therefore authorize their use by field commanders.

34. A new situation might arise if, later in the period, the Soviets came to have nonlethal incapacitating agents available for field use. Should this happen, they might make their capability public and speak of the humaneness of such weapons. If such propaganda struck a responsive chord in world opinion, they might then come to feel that they could use them in limited war situations without the opprobrium associated with lethal chemical weapons; indeed, they might even use them in preference to conventional weapons whenever possible. However, in the absence of such prior public acceptance, the Soviet leaders would probably feel that the political drawbacks to their use would still be substantial and that their introduction would, to some degree at least, noticeably increase the danger of escalation.

ANNEX A

ESTIMATED AGENT FILLS AND TACTICAL USES OF SOVIET GROUND AND AERIAL CW MUNITIONS

For many years, the Soviets have had both gas and gas/fragmentation shells and bombs. As the former may be filled with either nonpersistent or persistent toxic agents, we have found it convenient to distinguish three categories as follows:

1. *Gas (Nonpersistent).* These are to be used to achieve surprise, lethal concentrations among unmasked enemy troops and to neutralize targets which are soon to be occupied by friendly ground and parachute forces. The standard agent for shells, artillery rockets, and bombs probably is hydrogen cyanide, although some munitions filled with phosgene may be in the inventory. Aerial bombs of this category are available in several sizes up to 1,100 pounds.

2. *Gas (Persistent).* These are to be used against unmasked and masked troops in the open and to achieve area and materiel contamination of long duration. Soviet practice with persistent agents indicates that artillery shells are to be detonated at heights above the ground of several hundred feet. Within this category, aerial bombs are of two types, those which are to be exploded at altitudes of up to thousands of feet—as with CW missile warheads—and those which are to explode on the ground upon impact or after a time delay. In this latter type of bomb, the toxic agent could be contained in a canister to be thrown up by the bomb burst for release of the agent at altitudes comparable to those for artillery shells. The standard agent in this category has been mustard, possibly mixed with lewisite, although some aerial bombs probably now are filled with a persistent "G" agent such as soman. A number of sizes of aerial bombs are available, the largest weighing 3,300 pounds.

3. *Gas/Fragmentation.* These are to be used to achieve chemical and fragmentation casualties among enemy troops and the contamination, damage, or destruction of materiel and fortifications. Artillery shells probably are filled with mustard or a "G" agent such as sarin, while aerial bombs probably are filled exclusively with the latter. This is the basic type of Soviet chemical bomb, but agent dissemination criteria probably have limited sizes to 550 pounds or less.

ANNEX B

SOVIET AND EUROPEAN SATELLITE CW DEFENSE PREPARATIONS

Soviet Equipment and Procedures for CW Defense

1. The most recent available field service regulations and chemical defense procedures indicate that a Soviet unit is expected to complete its mission, avoiding chemical and nuclear contamination insofar as may be practicable. Formal treatment and decontamination is to be accomplished after the unit is withdrawn from action, at facilities to be established by chemical troops. Before recommitment, the unit would then be replenished with equipment and fresh troops. In World War II, this rebuilding of units was facilitated by paying more attention to the recovery of equipment and vehicles than to the wounded, whose rate of recovery and return to duty was always lower than in Western armies.

2. Until he has completed his mission, the individual Soviet soldier must rely on his mask, a few items of protective clothing, and his personal decontamination self-aid kit. His mask provides comprehensive protection, but we do not know the extent of availability of masks and canisters incorporating modifications announced since the first models appeared in 1950. The mask, which covers the entire head, has weaknesses in that it is not comfortable and severe fogging or frosting occurs in cold weather. A 1962 manual states that even when properly fitted, the mask exerts pressure on the head causing painful sensations and that when worn for long periods, it can cause circulation disturbances. In warm weather, the mask is uncomfortable to the point at which the wearer's efficiency may be impaired. The standard-issue items of protective clothing provide protection against liquid agents for periods which range from less than one minute to about one hour, depending on the item. The capacity of the personal kit would be exceeded by even moderate contamination. An atropine syrette is believed to be included, but a nerve agent decontaminating solution reported to be in production is not known to be on issue. As in other armies, special protective clothing, which furnishes the best and only long-period protection, is reserved for special-duty troops such as those engaged in reconnaissance, decontamination, and the actual handling of toxic agents.

3. Facilities for the mass decontamination of personnel and clothing differ little from standard US mobile showers and laundries, although some newer models of the laundries are specifically designed for the

[p. 14 blank]

decontamination and reclamation of uniforms. For the decontamination of vehicles, large weapons, and terrain, a number of specialized units are available. These range from man-pack portable sprayers and kits designed specifically for machine guns and artillery pieces to large, general-purpose decontamination vehicles. Although all these items appear adequate to the task, we have no basis for estimating the extent of their availability. Throughout the decade, little change in decontamination procedures and equipment will be required, and the Soviets presumably could develop decontaminants to neutralize new agents.

4. Soviet field detector kits apparently are patterned after US models made available during World War II. According to data supplied with the latest available model (1962) of the Soviet kit, it can detect sarin, and presumably other nerve agents, at the very low concentration of 0.0003 milligrams per liter of air. The toxic effects are cumulative, however, and sarin at lesser concentrations can be lethal after several days' exposure. The USSR is aware of Western developments in automatic alarms, including remote alarm systems, and has apparently copied and adopted a US device declassified in 1955, but these automatic detectors are not sufficiently sensitive to assure human safety and probably are not in the field in peacetime. An automatic alarm is mounted on some armored personnel carriers to permit mobile chemical reconnaissance, but we do not know the agents detected or the alarm's sensitivity. Portable field laboratories and truck-mounted laboratory facilities available to chemical troops can detect all toxic agents as well as determine the effectiveness of protective items, but would be useless in most tactical situations. There is no evidence of the development of a long-path infrared system to detect nerve agents at a distance.

Soviet Naval CW Defense Equipment

5. The Soviet Navy is provided with essentially the same equipment for the protection of personnel and agent detection as the ground forces. Ships are equipped with decontamination facilities of various types, including mechanical, chemical and steam sprays, and salt-water washdown—all equally applicable to the removal of radioactive fallout. Provision for sealing the control and operating stations and the mess areas on cruisers and destroyers against the entry of toxic vapors and radioactive particles has been reported, with replacement air to be supplied from cylinders in each sealed chamber. While these measures could be effective, recent US research has shown that a ship's combat effectiveness may be substantially reduced while sealed. Soviet merchant ships under construction in East German shipyards call for such enclosed areas.

Satellite Military CW Defense Preparations

6. In the European Satellite armies, chemical defense doctrine is similar to that of the USSR. Units are to avoid chemical and nuclear contamination insofar as practicable while completing their assignment, and are to proceed to decontamination facilities only on orders from higher authority. Adequate supplies of defensive materiel probably are available for initial issue to standing forces but large-scale chemical operations or mobilization would require increased local production or substantial Soviet support. Individual items of protective equipment and the detection kits on issue are similar to Soviet models, with the same limitations, but there seems to be an almost complete lack of equipment on issue for self aid or first aid treatment of nerve agent casualties—a major vulnerability of Bloc forces likely to be overcome later in the decade. Mobile field laboratories and automatic field alarms are either very scarce or not available. A wide variety of decontamination equipment has been noted in the Satellite armies, but we do not know the actual extent of availability.

Bloc Civil Defense Against Toxic Agent Attack

7. In the civilian training courses which the Soviets have conducted almost continually since 1955, considerable improvisation is recommended to overcome persistent shortages of civil defense materiel. In recent years, Soviet civil defense, now subordinate to the Ministry of Defense, has stressed fallout protection rather than chemical defense. Detection kits similar to military models are available for use by trained personnel. The organized training of medical personnel and civil defense cadres to treat gas casualties can be traced to 1954, but the current emphasis is on nuclear weapons' effects. Atropine by tablet or injection is prescribed for the nerve agent casualty but apparently is available only at organized medical centers. Most of the numerous air raid shelters built in the USSR since 1949 have been gas-tight, basement compartments, but many were not equipped for filtered ventilation when last observed. Civil defense instructions issued in 1962 concede that the civilian gas mask, on sale since 1954, may not be available for immediate issue in time of need and users are specifically warned that "in winter, the rubber is likely to harden and the rubber arms of the outlet valve may freeze to the valve box." Safety and decontamination procedures have been well-publicized and special attention has been devoted to winter problems, but here again, substantial shortages may still exist even of the specialized equipment and materials to be used by organized units.

8. Preparations for the antichemical defense of the civilian populations of the European Satellites have produced even less results than

they have in the USSR. An increase in "volunteer" training is in evidence but its effectiveness is doubtful. Very little protective equipment is available and the Soviet civilian gas mask has had limited sales because of its relatively high cost. Capabilities for nerve agent detection are minimal and no atropine is available. Air raid shelter construction has been a part of civil defense planning since 1951, and a number of shelters have reportedly been built. As in the USSR, many were not equipped with suitable filters when observed.

ANNEX C

SOVIET AND SATELLITE ORGANIZATION FOR CHEMICAL WARFARE

1. Chemical warfare activities in the Soviet Union are conducted by a number of organizations subordinate to the Council of Ministers, including the Ministry of Defense, the Ministry of Public Health, the Academy of Sciences, and others. The primary responsibility for the toxic agent program is probably assigned to the Chief of Chemical Troops, who is subordinate to the Commander in Chief of Ground Forces in the Ministry of Defense. His responsibilities include supervision of research, production and procurement, training, development of tactics, and probably the allocation and distribution of toxic munitions and related equipment to all the services. The Chief of Chemical Troops also controls the Military Academy of Chemical Defense in Moscow and other chemical warfare schools, and the Central Chemical Proving Ground at Shikhany. Other proving grounds probably under his control are believed to exist at Semipalatinsk or in the Yakutsk area for the large-scale testing of nerve agents.

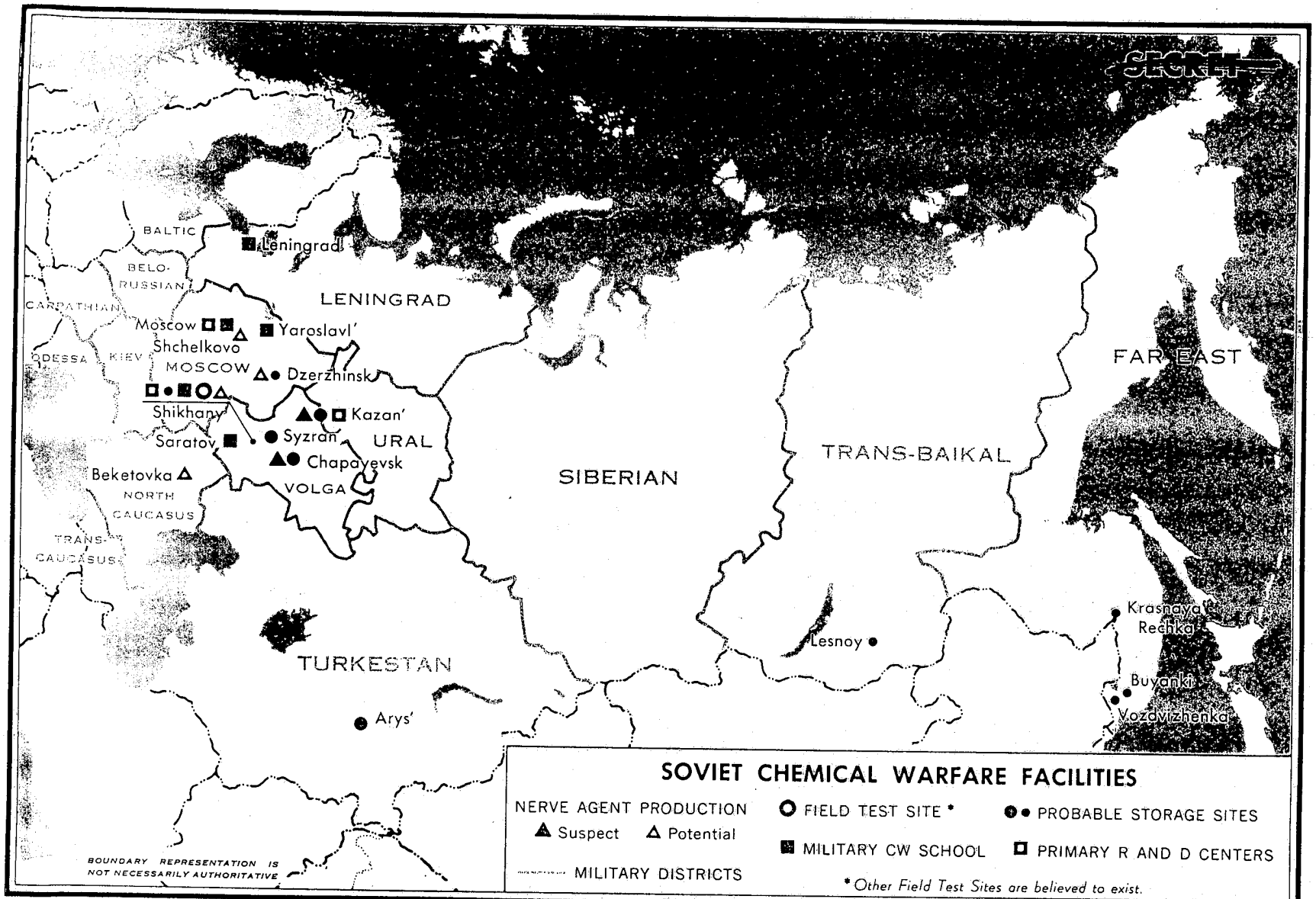
2. In the Soviet Army, staff supervision extends from the Chief of Chemical Troops to the chiefs of specially trained chemical troops units assigned to each operational command. In wartime, chemical troop units would be assigned at *front*, army, division, and regimental levels. In peacetime, they are organic to military districts and groups of forces, armies, divisions, and regiments. The chiefs of these units advise the field commanders on the offensive use of toxic agents and on defense against both chemical and radiological hazards. They also supervise chemical and radiological defense training activities, reconnaissance, and the operation of decontamination facilities and special systems for agent dissemination.

3. Naval chemical warfare is under the direction of the Chief of the Naval Chemical Directorate who has liaison through naval channels with the Ministry of Defense. In the organization of a major unit of the Soviet Navy, the Chemical Warfare Section, headed by a Chief of Chemical Service, is on an equal level with the other operating departments, directly under the Executive Officer. A graduate chemical officer is assigned to each cruiser and to each destroyer and submarine squadron, while noncommissioned officers are assigned to smaller ships.

4. The Chief of Chemical Troops of the Ground Forces advises the Air Forces on chemical and radiological defensive matters through the Chief of the Chemical Service of the Air Forces, who is responsible for training and defensive activities of all units of his branch of the service.

Chemical personnel are assigned to separate air technical divisions and regiments, and to chemical sections of air army depots. Air Force chemical defense units, each consisting of at least one officer and several enlisted personnel, have the primary responsibility for the chemical and radiological defense of each airfield.

5. In addition, such other forces as the Strategic Rocket Forces and the PVO Strany have chemical defense organizations to provide reconnaissance, detection, decontamination, and first aid for chemical and radiation casualties. The Bloc countries follow the general Soviet pattern in their overall organization for CW, with minor variations at the higher levels.



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