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JOINT INTELLIGENCE COMMITTEE

JICM-38-  
1 February

*Rec'd from JCS*  
*2/3/54 - mwb*  
*esa*

MEMORANDUM FOR THE ASSISTANT TO THE DIRECTOR,  
FEDERAL BUREAU OF INVESTIGATION

b6 Per FBI  
b7C

Subject: Estimate of Soviet Capability  
for Waging Biological and  
Chemical Warfare

b6 Per FBI  
b7C

The attached estimates, approved by the Joint  
Intelligence Committee on 29 January 1954, are  
forwarded for your information on a "SPECIAL  
HANDLING REQUIRED - NOT RELEASABLE TO FOREIGN  
NATIONALS" basis.

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FOR THE JOINT INTELLIGENCE COMMITTEE:

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*2*  
*17*

(b)(1),(b)(3):50 USC §403(g) Section 6

W. G. HOLADIA  
Lt. Colonel, USAF  
Secretary

*W. G. Holadia*

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APPENDIX "A"

ESTIMATE OF SOVIET CAPABILITY FOR WAGING BIOLOGICAL WARFARE

SUMMARY

Although there is no positive evidence of a Soviet biological warfare (BW) program, from what is known about normal bacteriological research programs certain conclusions can be drawn regarding Soviet BW capabilities:

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a. While the scope and degree of activity are consistent with an expanding public health, medical and veterinary program, Soviet research and experience with pathogenic micro-organisms and their toxic products enhances their over-all BW potential.

b. The possibility exists that one or several Soviet research establishments and test areas, under strictest security, may be involved in a BW program, although none of the known research laboratories and institutes can be directly associated with such activity.

c. If the Soviets elect to devote their resources to this purpose, they are capable of producing BW agents for large scale use. The production of BW agents for clandestine use offers no problem.

d. Although there is no firm evidence of Soviet development of overt methods for the dissemination of BW agents, certain capabilities are indicated by interests in ground and aerial munitions and devices which could be applied to BW.

e. It can be assumed that the Soviets are capable of the clandestine dissemination of certain epizootic diseases of animals. Through clandestine measures the USSR could

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f. While the Soviet BW defense capabilities are handicapped by certain deficiencies, an expanding antibiotics industry, the large importation of antibiotics from the West, and past experience in civil defense and chemical warfare defense produce the capability to give some protection to essential industries and essential personnel against all forms of warfare including BW.

1. There are some indications that the USSR has BW defensive capabilities and to a lesser extent offensive capabilities, both resulting from known normal bacteriological research programs. There is no positive evidence of a Soviet biological warfare (BW) program either in research and development or in the production of BW agents for large scale overt or clandestine use.

2. Specific information concerning the importance of BW in Soviet strategy is lacking. Soviet recognition of the potentialities of BW was indicated during World War II by their interrogation of captured German and Japanese personnel, and following the war at the Khabarovsk trials of Japanese war criminals. The Soviet position on the utilization of BW has been indicated by their declaration that they will not be bound by the restrictions of the Geneva Convention, of which they are signatories, if another country wages BW against them. Together with the Communist propaganda accusing the United States of ~~initiating BW in the Korean conflict~~, this could be interpreted as a political measure designed to prepare the Soviet people and the rest of the world for Soviet employment of BW.

3. Information on Soviet science points to considerable research and experience with pathogenic micro-organisms and their toxic products, which enhances the BW potential of the USSR. The

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scientific literature; Pasteurella pestis (plague), various strains of Brucella (undulant fever), Pasteurella tularensis (tularemia), Bacillus anthracis (anthrax), Clostridium botulinum toxin (botulism), fungus toxins including that of Stachybotrys alternans and Aspergillus, viruses of psittacosis (parrot fever), hoof and mouth disease, rinderpest and hog cholera. Several of these organisms are candidate BW agents and the remainder have a potential use in this field. Soviet research in regard to these organisms appears to be good; it includes investigations on biochemical structure, purification, mutation (either naturally or artificially induced), cultivation and storage, and development of immunological methods of control. The results claimed for some of these investigations, if true, would be remarkable. However, Soviet statements as to scientific achievement in certain fields of biology cannot be accepted as factual without more detail regarding the procedures employed which would permit verification by other investigators. The presentations of Soviet research papers at recent international scientific congresses, and the discussions by attending Soviet scientists indicates, in general, that Soviet research achievements are not on a par with those of the United States and other Western countries. Nevertheless, Soviet research activity indicates a general scientific capability which could be applied to BW.

IT MUST BE STRESSED, HOWEVER, THAT THE SCOPE AND DEGREE OF  
~~ACTIVITY OF THESE INVESTIGATIONS ARE CONSISTENT WITH THOSE~~  
REQUIRED FOR AN EXPANDING PUBLIC HEALTH, MEDICAL AND VETERINARY  
PROGRAM.

4. The USSR has an extensive network of research laboratories and institutes under the Ministry of Health, the Academy of Science, and the Academy of Medical Science, which include those

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devoted to military medical science. While firm evidence is lacking connecting these establishments to BW, information available on several of them, concerning their activities, equipment, and scientific personnel employed, indicates a BW research and development capability and permits the conclusion that they could be readily diverted to an active BW program at any time. The possibility, therefore, exists that one or several Soviet research establishments and test areas may, under strictest security, be involved in a BW program, without the nature of their activities being disclosed.

5. Although there is no evidence of such activity, the production of BW agents for either overt or clandestine use should not present any insurmountable obstacle to the USSR if they elect to use their scarce scientific personnel, highly skilled technicians, and critical equipment and supplies for this purpose. The following factors contribute to the Soviet capability to produce BW agents:

a. Large scale BW requires the mass production of BW agents including bacteria, viruses or fungi. That the

(b)(1)



by U. S. standards to convert an antibiotic plant to the production of BW agents.

b. The mass production of viruses or rickettsia for BW purposes, while offering considerably greater problems, can be achieved by the USSR if they choose to expend

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c. The Soviets are capable of production of fungi pathogenic to plants, but more difficulties would be presented in producing fungi affecting animals. The USSR has manufactured selected chemical weed killers and recent trials on a field scale have been reported.

d. Soviet interest and research during the last several years in developing dried forms of bacteria and viruses, and the acquisition of freeze-drying equipment, ostensibly for blood plasma processing, contribute to the Soviet capability of producing and storing BW agents.

e. Production of BW agents for clandestine use offers no considerable problem.

6. There is no firm evidence of Soviet development of overt methods for the dissemination of BW agents. However, certain capabilities are indicated by Soviet interests in single and cluster type bombs, artillery shells, aerial spray tanks and aerosol dissemination with emphasis on propulsion of aerosols.

7. Clandestine dissemination of BW agents does not present any problem. It is assumed that the Soviets, either in peace or war, are capable of covertly introducing into another country certain epizootic diseases of animals--such as hoof and mouth disease, (b)(1) -which could cause serious damage to the food supply of that nation. There is a possibility that plant diseases could be introduced similarly.

However, effective employment would depend on a favorable combination of (b)(1) Against humans it appears doubtful that through clandestine measures the Soviets could produce serious epidemics, although it appears feasible that BW agents could be employed against selected

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8. Soviet BW defense capabilities are seriously handicapped by deficiencies in public health, sanitation, livestock management, and plant protection. There is evidence that some of these deficiencies gradually are being overcome. Soviet medical and veterinary scientific literature reveals intensive research on infectious diseases, on methods of immunization, and on other measures to control diseases in man and animals, although the effectiveness of these activities is not known. Progress in the antibiotic and other pharmaceutical industries contribute to Soviet BW defense capabilities. It is estimated that with the help of certain satellites, notably East Germany, the USSR is approaching self-sufficiency in the production of penicillin and that other antibiotics will be produced in increasing amounts within the next several years. In the meantime, extensive continued importation of antibiotics from the West has given the USSR a stockpile of penicillin estimated to be sufficient for the requirements of the military forces for the first three years of a major war. Stockpiles of other antibiotics cannot be estimated but indigenous production and importation are **undoubtedly** rapidly augmenting existing stocks which will contribute to BW defense capabilities.

9. Soviet experience in civil defense and chemical warfare defense should add to their BW defensive capabilities. Some of the equipment used in CW defense, including such items as decontaminating equipment, protective clothing, gas masks, and collective protectors, can also be used in BW defense. There is no evidence of a current implementation of a comprehensive civil defense program in the USSR and the people are clearly apathetic toward civil defense. However, there is a framework which could be rapidly expanded after the outbreak of war to



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APPENDIX "B"

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ESTIMATE OF SOVIET CAPABILITY FOR WAGING CHEMICAL WARFARE

SUMMARY

In estimating that the Soviets have a capability of waging chemical warfare (CW) on a large scale for a prolonged period of time, the following conclusions are made:

a. Soviet research is of sufficient caliber so that research is probably directed toward the production and effects of known nerve gases and toward the development of new nerve gases and other types of new chemical agents.

b. It is estimated that the Soviet Bloc can produce annually 120,000 to 140,000 metric tons of filled ground and aerial CW munitions of which about a fourth would be the nerve gas GA (tabun). It is anticipated that within several years the Soviets will be producing in quantity either GB (sarin) or a more effective nerve gas.

c. It is estimated that the existing Soviet stockpile of toxic chemical agents is approximately 200,000 metric tons, of which approximately 30,000 tons is GA (tabun). The bulk of the remainder is probably mustard.

d. Air weapons, bulk dissemination equipment and ground weapons are indicated as the three major methods employed by the Soviets for the dissemination of CW agents.

~~It can be expected that the Soviets will stress the development of CW munitions suitable for use by high-speed jet aircraft.~~

e. Training in defense against chemical attack forms an integral part of the training of the Soviet armed forces. This training coupled with the availability of adequate

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1. It is estimated that the USSR has the capability to engage in chemical warfare (CW) on a large scale for a prolonged period. Soviet CW preparations during World War II demonstrated their ability to manufacture toxic agents, to design simple but adequate weapons and munitions, and to provide protection for their troops. Since World War II there are indications that large stockpiles of CW agents and munitions have been maintained. Furthermore, while the Soviet chemical industry still has large limitations, considerable progress over the last ten years has increased their estimated productive capacity of toxic chemicals. The capture of German stocks of nerve gases, and certain German scientists who had been engaged in the research and production of these agents, has given the USSR an estimated capability of using GA (tabun) on a large scale and it is anticipated that, within the next several years, either GB (sarin) or a more effective nerve gas will be produced in quantity. There are reports of continuing emphasis on CW discipline within the Soviet armed forces.

2. There is no information on the utilization of CW in Soviet strategical planning. However, as in the case of BW, it is assumed that the USSR would not consider itself bound by the Geneva Convention if another country waged CW against her.

3. It can be assumed that Soviet scientists of good caliber are engaged in CW research. This research is probably directed ~~not only toward the production of the known nerve gases and~~ determining their effects, but also toward the development of new nerve gases or other types of new chemical agents. The selection of new chemical agents will probably be directed toward those with the following characteristics:

a. Those which are easy to produce from raw materials

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c. Those which destroy the protective contents of the gas mask cannister and make it ineffective against other chemical agents.

From this direction of research it is possible that they may develop either a new chemical agent or an agent that has been given relatively little consideration previously.

4. On the basis of available installed plant capacity, the annual chlorine production of the USSR is estimated to be approximately 300,000 metric tons a year as of January 1954. On the assumption that 10 percent of the annual chlorine production can be devoted to the manufacture of toxic chemical agents, it is estimated that the Soviet Bloc can produce annually, 40,000 to 47,000 metric tons of agent, which is equivalent to 120,000 to 140,000 metric tons of filled ground and aerial CW munitions, of which about a fourth would be nerve gas. The nerve gas agent believed to be under production by the Soviets is GA (tabun). The Soviets undoubtedly realize that GB (sarin) is a more effective agent, but are believed to have decided on the initial production of GA because of its greater ease of manufacture and because of the availability of German equipment and personnel for its production.

5. It is estimated that the existing Soviet stockpile of toxic chemical agents is approximately 200,000 metric tons of which approximately 30,000 metric tons is GA (tabun). It is believed that 60 percent of the total stockpile is mustard, the mainstay of the Soviet chemical arsenal. From a consideration of logistic and munition production factors it is believed that unless and until full-scale chemical warfare is initiated only sufficient new agent will be made annually to maintain this stock. Stockpile and production estimates cannot be made of the other known World War II-type CW agents. However, it is known that the Soviets have had an

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6. Information is notably lacking on new developments of CW weapons and munitions in the USSR since 1945, and available information clearly indicates that there has been no major change in the methods of disseminating CW agents. The three major methods continue to be:

a. Air Weapons

- (1) Aerial bombs
- (2) Scatter bombs
- (3) Airplane spray apparatus
- (4) Ampule release gear

b. Bulk Dissemination Equipment

- (1) Contamination vehicles
- (2) Stationary contamination apparatus
- (3) Portable contamination apparatus

c. Ground Weapons

- (1) Mortars
- (2) Artillery
- (3) Rockets
- (4) Land mines
- (5) Grenades

Apparently the Soviets do not believe that explosives are necessary to disseminate chemical agents. Their methods are direct and are designed to place the contamination in large amounts by the most simple means. The Soviets can be expected to stress the development of CW munitions suitable for use by high-speed jet aircraft. This effort should result in the development and standardization of a number of new munitions, including spray tanks and cluster type bombs. Attention is expected to be given to improving techniques for low-level spray operations and to developing methods and devices for high altitude bombing; the development of aerosol-type generators for aerial

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7. Several detection kits are indicated as being standard in the Soviet Army. These kits are capable of detecting the following CW agents: mustard, nitrogen mustard, lewisite, phosgene, diphosgene, hydrogen cyanide, cyanogen chloride, and arsine. There is no information to indicate that the Soviets have an adequate field kit with which to detect the nerve gases.

8. Chemical warfare instruction forms an integral part of the training of the military forces of the USSR and the other Soviet Bloc countries. The training emphasizes the use of the gas mask, including:

- a. Donning of the mask in a limited time;
- b. Wearing of the mask for a specific period of time; and,
- c. Wearing the mask during marches and chemical reconnaissance.

Specialized CW units receive intensive training in both the offensive and defensive aspects of gas warfare. Chemical troops and gas defense personnel of other combat and service elements receive training in specialized CW schools within the armed forces organization.

9. The standard issue military gas mask is the Shlem-Maska with the MO-2 cannister. This gas mask affords adequate protection against the nerve gases and all CW agents except cyanogen chloride. There are several reports that a new cannister, the MO-3, is replacing the MO-2. A special cannister for the removal of carbon monoxide is issued to troops enclosed in tanks and bunkers. The troops are issued protective covers of varying composition, the most common type being single and double layers of impregnated paper. Mustard and GB penetration tests show that the Soviet single layer type is inferior to the U. S. protective

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APPENDIX "A"

ESTIMATE OF SOVIET CAPABILITY FOR WAGING BIOLOGICAL WARFARE

SUMMARY

Although there is no positive evidence of a Soviet biological warfare (BW) program, from what is known about normal bacteriological research programs certain conclusions can be drawn regarding Soviet BW capabilities:

ALL THE INFORMATION CONTAINED  
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a. While the scope and degree of activity are consistent with an expanding public health, medical and veterinary program, Soviet research and experience with pathogenic micro-organisms and their toxic products enhances their over-all BW potential.

b. The possibility exists that one or several Soviet research establishments and test areas, under strictest security, may be involved in a BW program, although none of the known research laboratories and institutes can be directly associated with such activity.

c. If the Soviets elect to devote their resources to this purpose, they are capable of producing BW agents for large scale use. The production of BW agents for clandestine use offers no problem.

d. Although there is no firm evidence of Soviet development of overt methods for the dissemination of BW agents, certain capabilities are indicated by interests in ground and aerial munitions and devices which could be applied to BW.

e. It can be assumed that the Soviets are capable of the clandestine dissemination of certain epizootic diseases of animals. Through clandestine measures the USSR could deliver BW agents against selected targets and key personnel,

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f. While the Soviet BW defense capabilities are handicapped by certain deficiencies, an expanding antibiotics industry, the large importation of antibiotics from the West, and past experience in civil defense and chemical warfare defense produce the capability to give some protection to essential industries and essential personnel against all forms of warfare including BW.

1. There are some indications that the USSR has BW defensive capabilities and to a lesser extent offensive capabilities, both resulting from known normal bacteriological research programs. There is no positive evidence of a Soviet biological warfare (BW) program either in research and development or in the production of BW agents for large scale overt or clandestine use.

2. Specific information concerning the importance of BW in Soviet strategy is lacking. Soviet recognition of the potentialities of BW was indicated during World War II by their interrogation of captured German and Japanese personnel, and following the war at the Khabarovsk trials of Japanese war criminals. The Soviet position on the utilization of BW has been indicated by their declaration that they will not be bound by the restrictions of the Geneva Convention, of which they are signatories, if another country wages BW against them. Together with the Communist propaganda accusing the United States of initiating BW in the Korean conflict, this could be interpreted as a political measure designed to prepare the Soviet people and the rest of the world for Soviet employment of BW.

3. Information on Soviet science points to considerable research and experience with pathogenic micro-organisms and their toxic products, which enhances the BW potential of the USSR. The following organisms have been discussed frequently in Soviet

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scientific literature; Pasteurella pestis (plague), various strains of Brucella (undulant fever), Pasteurella tularensis (tularemia), Bacillus anthracis (anthrax), Clostridium botulinum toxin (botulism), fungus toxins including that of Stachybotrys alternans and Aspergillus, viruses of psittacosis (parrot fever), hoof and mouth disease, rinderpest and hog cholera. Several of these organisms are candidate BW agents and the remainder have a potential use in this field. Soviet research in regard to these organisms appears to be good; it includes investigations on biochemical structure, purification, mutation (either naturally or artificially induced), cultivation and storage, and development of immunological methods of control. The results claimed for some of these investigations, if true, would be remarkable. However, Soviet statements as to scientific achievement in certain fields of biology cannot be accepted as factual without more detail regarding the procedures employed which would permit verification by other investigators. The presentations of Soviet research papers at recent international scientific congresses, and the discussions by attending Soviet scientists indicates, in general, that Soviet research achievements are not on a par with those of the United States and other Western countries. Nevertheless, Soviet research activity indicates a general scientific capability which could be applied to BW. IT MUST BE STRESSED, HOWEVER, THAT THE SCOPE AND DEGREE OF ACTIVITY OF THESE INVESTIGATIONS ARE CONSISTENT WITH THOSE REQUIRED FOR AN EXPANDING PUBLIC HEALTH, MEDICAL AND VETERINARY PROGRAM.

4. The USSR has an extensive network of research laboratories and institutes under the Ministry of Health, the Academy of Science, and the Academy of Medical Science, which include those



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devoted to military medical science. While firm evidence is lacking connecting these establishments to BW, information available on several of them, concerning their activities, equipment, and scientific personnel employed, indicates a BW research and development capability and permits the conclusion that they could be readily diverted to an active BW program at any time. The possibility, therefore, exists that one or several Soviet research establishments and test areas may, under strictest security, be involved in a BW program, without the nature of their activities being disclosed.

5. Although there is no evidence of such activity, the production of BW agents for either overt or clandestine use should not present any insurmountable obstacle to the USSR if they elect to use their scarce scientific personnel, highly skilled technicians, and critical equipment and supplies for this purpose. The following factors contribute to the Soviet capability to produce BW agents:

a. Large scale BW requires the mass production of BW agents including bacteria, viruses or fungi. That the Soviet fermentation industry has the ability to produce bacteria and their toxic products which may be used as BW agents can be inferred from the rapid growth of the Soviet antibiotics industry since World War II. This industry employs the same technical skills and basic equipment which are required for BW, although it is considered impracticable by U. S. standards to convert an antibiotic plant to the production of BW agents.

b. The mass production of viruses or rickettsia for BW purposes, while offering considerably greater problems, can be achieved by the USSR if they choose to expend

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c. The Soviets are capable of production of fungi pathogenic to plants, but more difficulties would be presented in producing fungi affecting animals. The USSR has manufactured selected chemical weed killers and recent trials on a field scale have been reported.

d. Soviet interest and research during the last several years in developing dried forms of bacteria and viruses, and the acquisition of freeze-drying equipment, ostensibly for blood plasma processing, contribute to the Soviet capability of producing and storing BW agents.

e. Production of BW agents for clandestine use offers no considerable problem.

6. There is no firm evidence of Soviet development of overt methods for the dissemination of BW agents. However, certain capabilities are indicated by Soviet interests in single and cluster type bombs, artillery shells, aerial spray tanks and aerosol dissemination with emphasis on propulsion of aerosols.

7. Clandestine dissemination of BW agents does not present any problem. It is assumed that the Soviets, either in peace or war, are capable of covertly introducing into another country certain epizootic diseases of animals--such as hoof and mouth disease, rinderpest or hog cholera--which could cause serious damage to the food supply of that nation. There is a possibility that plant diseases could be introduced similarly. However, effective employment would depend on a favorable combination of climatic, seasonal, and other natural factors. Against humans it appears doubtful that through clandestine measures the Soviets could produce serious epidemics, although it appears feasible that BW agents could be employed against selected

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8. Soviet BW defense capabilities are seriously handicapped by deficiencies in public health, sanitation, livestock management, and plant protection. There is evidence that some of these deficiencies gradually are being overcome. Soviet medical and veterinary scientific literature reveals intensive research on infectious diseases, on methods of immunization, and on other measures to control diseases in man and animals, although the effectiveness of these activities is not known. Progress in the antibiotic and other pharmaceutical industries contribute to Soviet BW defense capabilities. It is estimated that with the help of certain satellites, notably East Germany, the USSR is approaching self-sufficiency in the production of penicillin and that other antibiotics will be produced in increasing amounts within the next several years. In the meantime, extensive continued importation of antibiotics from the West has given the USSR a stockpile of penicillin estimated to be sufficient for the requirements of the military forces for the first three years of a major war. Stockpiles of other antibiotics cannot be estimated but indigenous production and importation are undoubtedly rapidly augmenting existing stocks which will contribute to BW defense capabilities.

9. Soviet experience in civil defense and chemical warfare defense should add to their BW defensive capabilities. Some of the equipment used in CW defense, including such items as decontaminating equipment, protective clothing, gas masks, and collective protectors, can also be used in BW defense. There is no evidence of a current implementation of a comprehensive civil defense program in the USSR and the people are clearly apathetic toward civil defense. However, there is a framework which could be rapidly expanded after the outbreak of war to

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APPENDIX "B"

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ESTIMATE OF SOVIET CAPABILITY FOR WAGING CHEMICAL WARFARE

SUMMARY

In estimating that the Soviets have a capability of waging chemical warfare (CW) on a large scale for a prolonged period of time, the following conclusions are made:

a. Soviet research is of sufficient caliber so that research is probably directed toward the production and effects of known nerve gases and toward the development of new nerve gases and other types of new chemical agents.

b. It is estimated that the Soviet Bloc can produce annually 120,000 to 140,000 metric tons of filled ground and aerial CW munitions of which about a fourth would be the nerve gas GA (tabun). It is anticipated that within several years the Soviets will be producing in quantity either GB (sarin) or a more effective nerve gas.

c. It is estimated that the existing Soviet stockpile of toxic chemical agents is approximately 200,000 metric tons, of which approximately 30,000 tons is GA (tabun). The bulk of the remainder is probably mustard.

d. Air weapons, bulk dissemination equipment and ground weapons are indicated as the three major methods employed by the Soviets for the dissemination of CW agents. It can be expected that the Soviets will stress the development of CW munitions suitable for use by high-speed jet aircraft.

e. Training in defense against chemical attack forms an integral part of the training of the Soviet armed forces. This training coupled with the availability of adequate

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1. It is estimated that the USSR has the capability to engage in chemical warfare (CW) on a large scale for a prolonged period. Soviet CW preparations during World War II demonstrated their ability to manufacture toxic agents, to design simple but adequate weapons and munitions, and to provide protection for their troops. Since World War II there are indications that large stockpiles of CW agents and munitions have been maintained. Furthermore, while the Soviet chemical industry still has large limitations, considerable progress over the last ten years has increased their estimated productive capacity of toxic chemicals. The capture of German stocks of nerve gases, and certain German scientists who had been engaged in the research and production of these agents, has given the USSR an estimated capability of using GA (tabun) on a large scale and it is anticipated that, within the next several years, either GB (sarin) or a more effective nerve gas will be produced in quantity. There are reports of continuing emphasis on CW discipline within the Soviet armed forces.

2. There is no information on the utilization of CW in Soviet strategical planning. However, as in the case of BW, it is assumed that the USSR would not consider itself bound by the Geneva Convention if another country waged CW against her.

3. It can be assumed that Soviet scientists of good caliber are engaged in CW research. This research is probably directed not only toward the production of the known nerve gases and ~~determining their effects, but also toward the development of new~~ nerve gases or other types of new chemical agents. The selection of new chemical agents will probably be directed toward those with the following characteristics:

a. Those which are easy to produce from raw materials

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c. Those which destroy the protective contents of the gas mask cannister and make it ineffective against other chemical agents.

From this direction of research it is possible that they may develop either a new chemical agent or an agent that has been given relatively little consideration previously.

4. On the basis of available installed plant capacity, the annual chlorine production of the USSR is estimated to be approximately 300,000 metric tons a year as of January 1954. On the assumption that 10 percent of the annual chlorine production can be devoted to the manufacture of toxic chemical agents, it is estimated that the Soviet Bloc can produce annually, 40,000 to 47,000 metric tons of agent, which is equivalent to 120,000 to 140,000 metric tons of filled ground and aerial CW munitions, of which about a fourth would be nerve gas. The nerve gas agent believed to be under production by the Soviets is GA (tabun). The Soviets undoubtedly realize that GB (sarin) is a more effective agent, but are believed to have decided on the initial production of GA because of its greater ease of manufacture and because of the availability of German equipment and personnel for its production.

5. It is estimated that the existing Soviet stockpile of toxic chemical agents is approximately 200,000 metric tons of which approximately 30,000 metric tons is GA (tabun). It is believed that 60 percent of the total stockpile is mustard, the mainstay of the Soviet chemical arsenal. From a consideration of logistic and munition production factors it is believed that unless and until full-scale chemical warfare is initiated only sufficient new agent will be made annually to maintain this stock. Stockpile and production estimates cannot be made of the other known World War II-type CW agents. However, it is known that the Soviets have had an

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6. Information is notably lacking on new developments of CW weapons and munitions in the USSR since 1945, and available information clearly indicates that there has been no major change in the methods of disseminating CW agents. The three major methods continue to be:

a. Air Weapons

- (1) Aerial bombs
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- (4) Ampule release gear

b. Bulk Dissemination Equipment

- (1) Contamination vehicles
- (2) Stationary contamination apparatus
- (3) Portable contamination apparatus

c. Ground Weapons

- (1) Mortars
- (2) Artillery
- (3) Rockets
- (4) Land mines
- (5) Grenades

Apparently the Soviets do not believe that explosives are necessary to disseminate chemical agents. Their methods are direct and are designed to place the contamination in large amounts by the most simple means. The Soviets can be expected to stress the development of CW munitions suitable for use by high-speed jet aircraft. This effort should result in the development and standardization of a number of new munitions, including spray tanks and cluster type bombs. Attention is expected to be given to improving techniques for low-level spray operations and to developing methods and devices for high altitude bombing; the development of aerosol-type generators for aerial

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7. Several detection kits are indicated as being standard in the Soviet Army. These kits are capable of detecting the following CW agents: mustard, nitrogen mustard, lewisite, phosgene, diphosgene, hydrogen cyanide, cyanogen chloride, and arsine. There is no information to indicate that the Soviets have an adequate field kit with which to detect the nerve gases.

8. Chemical warfare instruction forms an integral part of the training of the military forces of the USSR and the other Soviet Bloc countries. The training emphasizes the use of the gas mask, including:

- a. Donning of the mask in a limited time;
- b. Wearing of the mask for a specific period of time; and,
- c. Wearing the mask during marches and chemical reconnaissance.

Specialized CW units receive intensive training in both the offensive and defensive aspects of gas warfare. Chemical troops and gas defense personnel of other combat and service elements receive training in specialized CW schools within the armed forces organization.

9. The standard issue military gas mask is the Shlem-Maska with the MO-2 cannister. This gas mask affords adequate protection against the nerve gases and all CW agents except cyanogen chloride. There are several reports that a new cannister, the MO-3, is replacing the MO-2. A special cannister for the ~~removal of carbon monoxide is issued~~ to troops enclosed in tanks and bunkers. The troops are issued protective covers of varying composition, the most common type being single and double layers of impregnated paper. Mustard and GB penetration tests show that the Soviet single layer type is inferior to the U. S. protective