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Biological Warfare Capabilities-Warsaw Pact (U)

A Defense S & T Intelligence Study

Defense Intelligence Agency

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DST-1810S-123-90
March 1990

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BIOLOGICAL WARFARE CAPABILITIES - WARSAW PACT (U)

A Defense S & T Intelligence Study

DST 1610S-123-90

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PREFACE

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(C) Detailed information on specific subjects covered in the present study can be found in DST-1810S-010-82, Immunoprophylaxis of Infectious Diseases of Potential Biological Warfare Significance—ECC (U), dated December 1982 (S/NF/WN/NC), DST-1810S-203-85, Toxin Research: Warsaw Pact Countries and Yugoslavia (U), dated July 1985 (S/NF/WN), and DST-1610E-121-86, Biological Warfare Capabilities, USSR, dated August 1986. Because many aspects of BW such as training, physical protection, weaponization, and doctrine are related to chemical warfare capabilities, the reader is encouraged to examine the following publications: DST-1600S-034-82, Chemical and Biological Warfare Capabilities—USSR (U), dated 28 February 1983 (S/NF/WN); DST-1620S-041-83, Chemical Warfare Agents and Weapon Systems—USSR (U), dated 31 January 1983 (S/NF/WN); and DST-1600S-272-85, Soviet Chemical Warfare Capability (U), dated 16 September 1985 (S/NF/WN).

(U) Each classified paragraph, caption, and title in this study has been properly marked; those unmarked are unclassified.

(U) Constructive criticisms, comments, or suggested changes are encouraged and should be forwarded to the Defense Intelligence Agency, (ATTN: DT-5A), Washington, DC 20340-6053 and to the Director, Armed Forces Medical Intelligence Center, Fort Detrick, Frederick, MD 21701-5004.

SECTION II

GENERAL CONSIDERATIONS

1. Warsaw Pact Biological Warfare: Historical Perspective

(U) Information from more than six decades highlights the origin of Soviet interest in and growth of capabilities to conduct offensive BW. Russia suffered a half million gas warfare casualties in World War I. As a result, Lenin ordered a chemical and biological warfare (CBW) program to be initiated, stating that "if the enemy has a weapon, the Soviet Union must have it as well." Mark Popovsky, a Soviet emigre and former science writer with good access to high-level decision makers, has stated that "work began in 1919 and never ceased and won't cease while they (the Communists) are in power." Lenin's concern about the effects of years of war and revolution on Russia's health and sanitation resulted in the establishment of a countrywide network of disease research institutes. These institutes, still referred to as Anti-Plague Institutes, were commissioned to (1) fend off the perennial dangers of epidemics from Asia; (2) study little-known diseases; and (3) devise an effective defense against these diseases.

(U) A wealth of historical information about Soviet CBW capabilities before and during World War II (WW II) can be found in the Hirsch Report, a compendium of WW II German intelligence on the subject. According to supposedly reliable and knowledgeable Soviets who were German prisoners of war (POW), Soviet BW research progressed significantly between 1933 and 1943. In 1933-34, the Scientific Medical Institute of the Red Army was instructed to redirect its studies of theoretical BW problems toward developing and field testing pathogenic infectious agents and delivery systems. The program rapidly progressed from agent characterization and animal studies to aerosol and environmental stability studies. Field tests were begun about 1936-37 at various remote sites, eventually including a 10,000 square kilometer tract on Vozrozhdeniya Island in the Aral Sea. In the ensuing years, a variety of delivery devices was developed and standardized. These devices included aircraft-mounted wet and dry sprayers; air-droppable bursting and non-bursting cylinders; metallic darts; rotating glass glide bombs; artillery munitions; and dispensers and devices for covert ground operations. Various causative agents of infectious diseases such as plague, anthrax, tularemia, cholera, typhus, glanders, typhoid fever, psittacosis, dysentery, and viral encephalitides were evaluated. Several agents of diseases including glanders, plague, and anthrax reportedly were tested on political prisoners and POWs during WW II. In addition, the Soviets began to develop offensive and defensive BW doctrine. Clearly there was early Soviet preference for agents that were deliverable by aircraft, were disseminated in aerosol form, and would affect humans directly, without the need for vectors and intermediate animal hosts.

(U) Throughout the 1940s, BW research received continuing emphasis in the Soviet Union. During the 1950s, however, most of the available funds and laboratory resources were devoted to nuclear weapons research. Throughout this decade, sources characterized CBW research as the poor stepchild in weapons development research. Even during this period, however, Soviet mili-

tary leaders considered BW a powerful weapon of mass destruction that was likely to be used in future wars. In a February 1956 speech to the 20th Communist Party Congress, the Soviet Minister of Defense, Marshall G. K. Zhukov, stated that "Future war, if they unleash it, will be characterized by the massive use of air forces, various rocket weapons, and various means of mass destruction such as atomic, thermonuclear, chemical, and bacteriological weapons." The same year, General Pokrovskii wrote in *Science and Technology in Contemporary War*: "In recent decades, bacteriological weapons . . . have begun to be developed. A scientific analysis of the potential employment of bacteriological weapons and of the means of defense against these weapons is of significance in strengthening the defense capability of the country."

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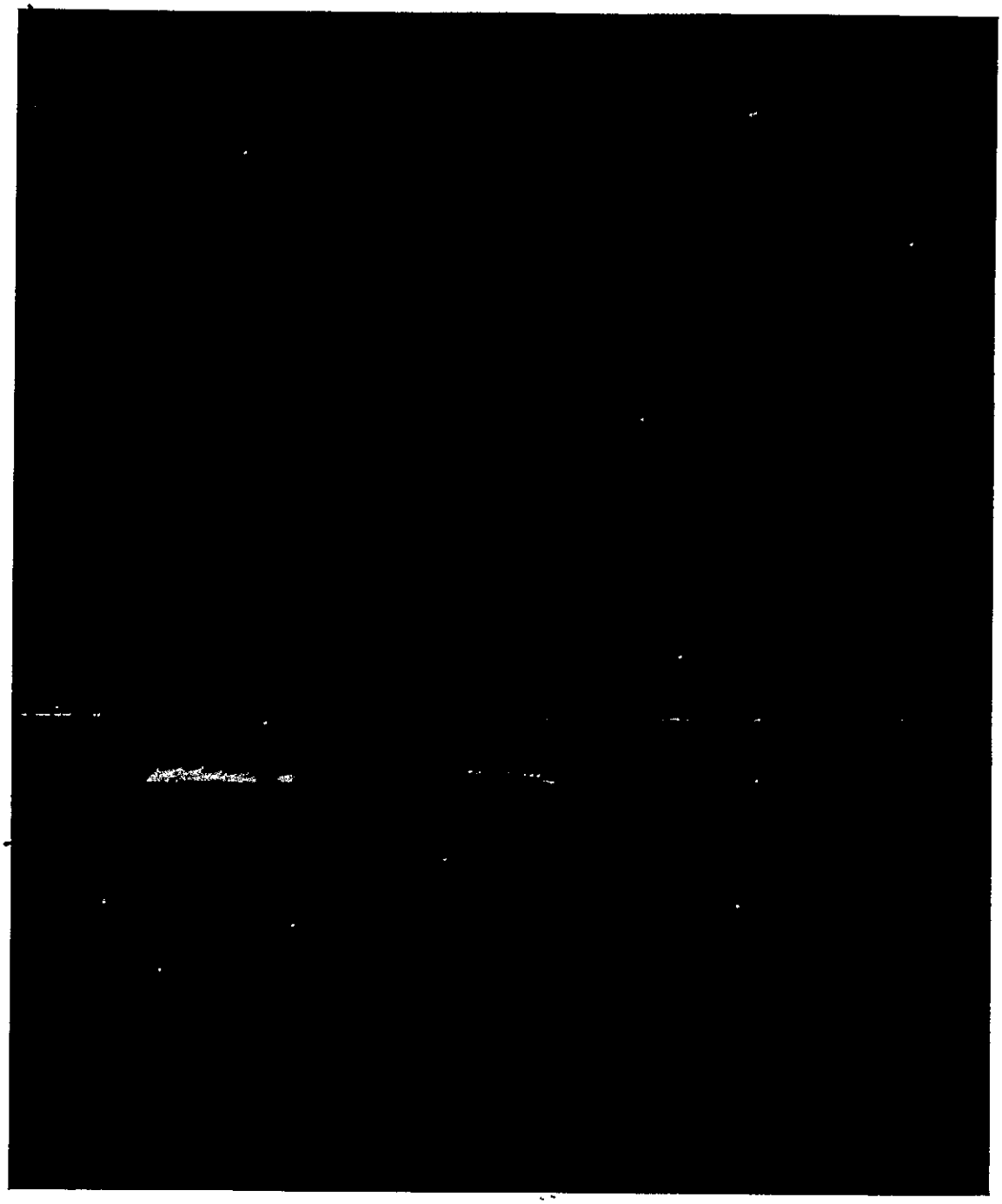
(U) In 1963, WP battle plans began to incorporate the assumption that chemical and biological weapons would be used in massive quantities. From this time forward, CBW was regarded as the best way to seize Europe without destroying it in the event of war. Everything related to offensive CBW intentions and capabilities was placed under the tightest security measures. Special code words for use in referring to CW and BW were developed and changed every 6 months. Defector Jan Sejna, former First Secretary of the Czechoslovakian MOD, stated that the Soviets believed they could cause the West to disarm unilaterally in the CW and BW areas. In order to do so, the WP must be perceived to be in compliance with arms control agreements. An image of WP backwardness and of a low priority accorded to CBW research and development was presented to the West by propaganda, disinformation, and false intelligence "leaks." Under the cover of secrecy, a long-term plan to research and develop CBW throughout the WP was coordinated and implemented. In 1965 a 20-year plan to develop new chemical and biological weapons was proposed. Phase One, 1965-1971, emphasized qualitative steps, research, and preparation for new weapons production as well as training and protection of the troops. Research for development of new weapons was heavily emphasized. During the second phase, from 1971 to 1977, production was to be emphasized. A major expansion in CBW training and manufacturing facilities was to take place during this period. The year 1986 was projected as a significant benchmark. The onset of Global Democratic Peace or an age of arms control breakthroughs was pro-

jected for this year. Immediately prior to 1986 the plan called for production of a new generation of both chemical and biological weapons.



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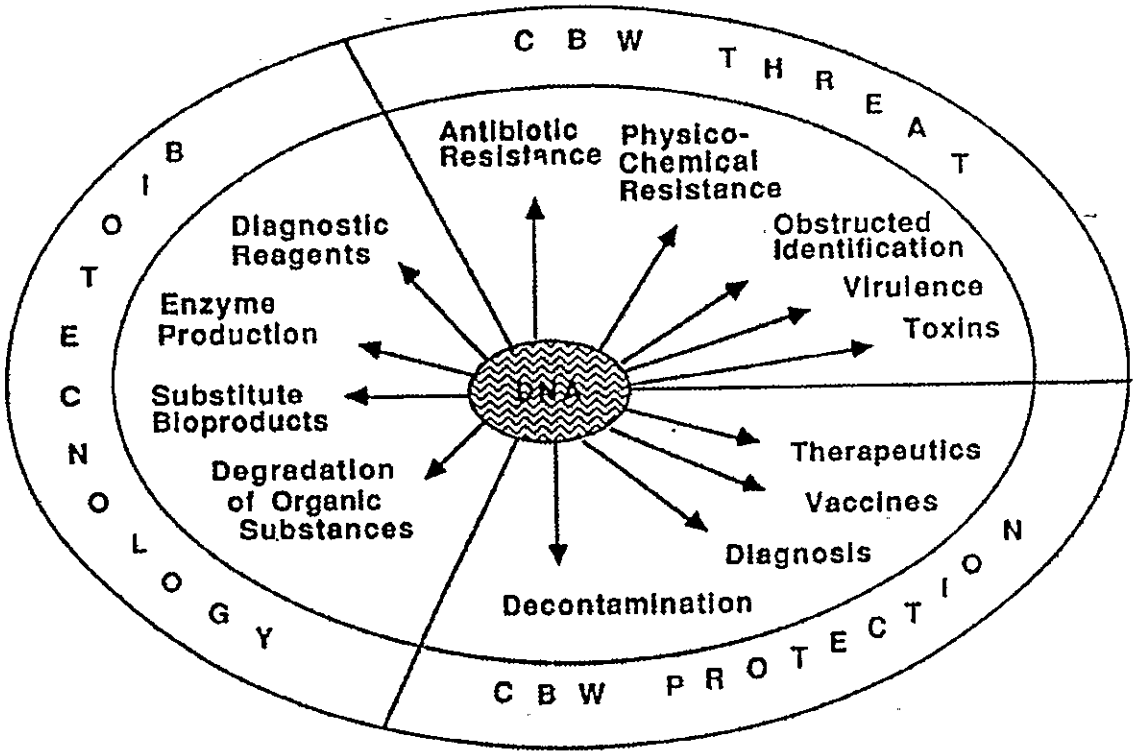
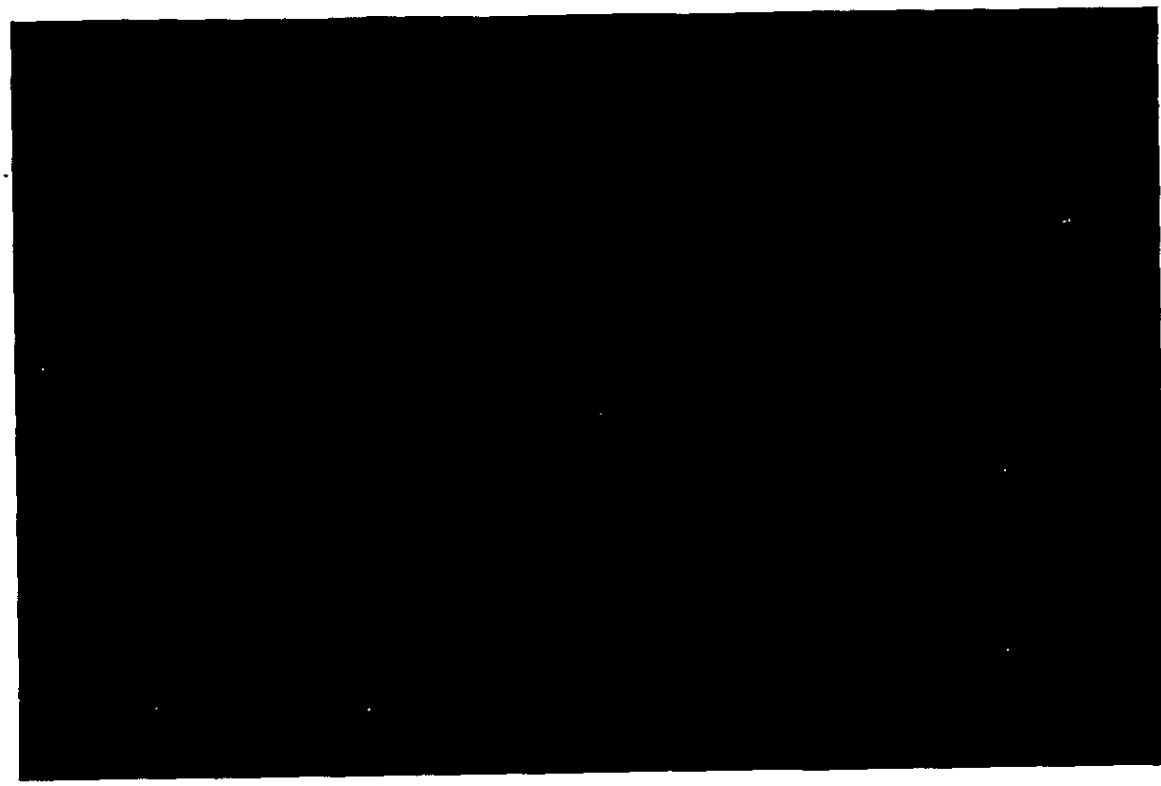


Figure 1. (U) Potential Applications of Genetic Technology

THE POTENTIAL OF BIOTECHNOLOGY

(U) Biotechnology is the study or application of any biological technique that uses living organisms or parts of these organisms to make or modify products, to improve plants, or to develop microorganisms for specific uses. Included are older technologies like fermentation biology to produce beer, wine, cheese, and antibiotics as well as modern developments like recombinant DNA (genetic engineering) technology, cell fusion technology, and protein purification/recovery technologies.



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3. International Agreements

(U) Two international agreements form the legal framework for prohibition of biological and toxin warfare:

> Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases and of Bacteriological Methods of Warfare
>
> Convention for the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction

The first is the Geneva Protocol of 1925. The parties to this treaty agree to prohibit the use of bacteriological methods of warfare. The phrase "bacteriological methods of warfare" has raised some concern because it may be interpreted to exclude other types of microorganisms. Even though the scientific meaning of "bacteriological" is narrower than that of "biological," the two words generally are accepted as synonyms in the legal context of the Protocol. In 1969, the UN Secretary-General declared that "various living organisms (e.g. rickettsiae, viruses, and

fungi) as well as bacteria can be used as weapons. . . in the context of warfare all these are generally recognized as bacteriological weapons." All members of the WP are signatories to the 1925 Geneva Protocol, but most of them have made certain reservations to the treaty. (See Section III, Warsaw Pact Biological Warfare Policy, Table I.)

(U) The second agreement is commonly referred to as the Biological Weapons Convention (BWC). Its key provisions are:

> Article I ". . . never in any circumstances to develop, produce, stockpile, or otherwise acquire or retain microbial or other biological agents or toxins, whatever their origin or method of production, of types and in quantities that have no justification for prophylactic protective or other peaceful purposes . . . " as well as ". . . weapons equipment or means of delivery to use such agents or toxins for hostile purposes or in armed conflict . . . ." Article II ". . . requires the destruction or diversion for peaceful purposes for all biological agents or toxins not justified under Article I no later than December 26, 1975 . . ."

SECTION III

WARSAW PACT BIOLOGICAL WARFARE POLICY

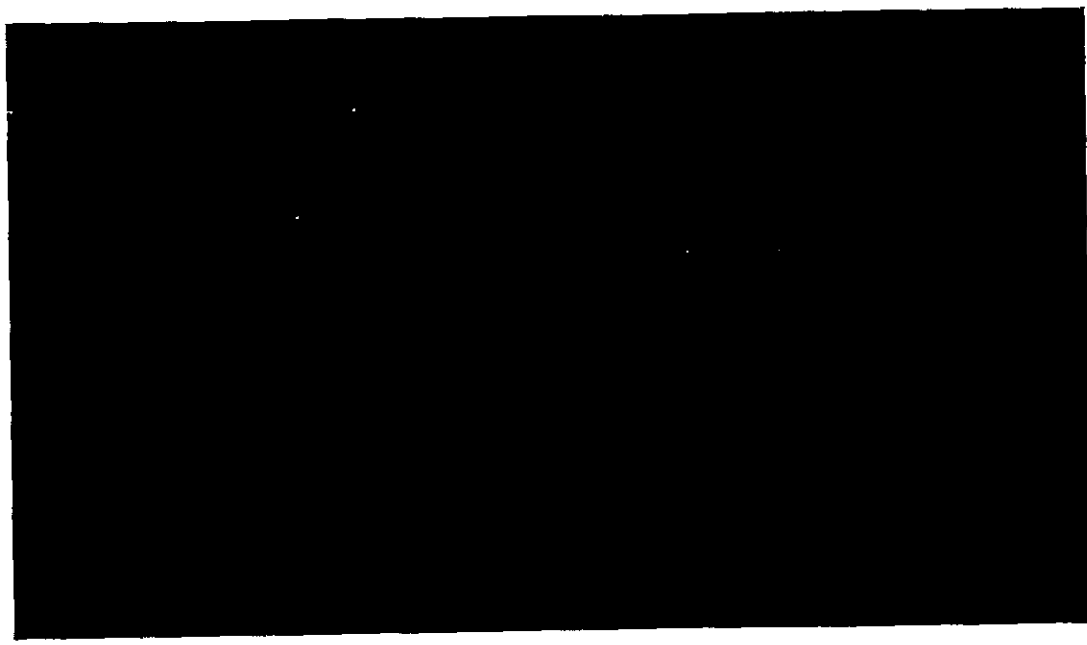

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Table I. (U) The Geneva Protocol and the Biological Weapons Convention: Positions of the Warsaw Pact Countries

Country	Geneva Protocol (1925)		Biological Weapons Convention (1972)	
	Accession	Reservations[a]	Signature	Deposition of Ratification
Bulgaria	May 1934	I, II, [redacted]	April 1972	August 1972
Czechoslovakia	August 1938	II and III	April 1972	April 1973
Germany, East	April 1929 (1959[b])	None	April 1972	November 1972
Hungary	October 1952	None	April 1972	December 1972
Poland	February 1929	None	April 1972	January 1973
Romania	August 1929	I, II, and III	April 1972	July 1979
USSR	April 1928	I, II, and III	April 1972	March 1975

[a] Reservations made by certain countries upon becoming party to the Protocol:
I. The country reserves the right to use CB weapons against non-parties.
II. The country reserves the right to use CB weapons against violators of the Protocol.
III. The country reserves the right to use CB weapons against allies of violators of the Protocol.

[b] In March 1959, the Czechoslovakian Embassy in Paris transmitted to the French Foreign Ministry a document stating the applicability of the Protocol to the GDR.

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SECTION IV

RESEARCH, DEVELOPMENT, AND ACQUISITION CYCLE (RD&A)

1. Introduction

(U) Maintenance of a modern fighting force is a national priority for the Soviets. Modernization can be achieved only through the discovery of new military-related technologies that subsequent-ly are developed into fielded hardware. This RD&A cycle is centrally managed and directed at the Politburo and ministerial levels. R&D policy is set by the Politburo while the management of R&D is performed by the State Committee for Science and Technology (GKNT) for ministerial level organizations and the Military Industrial Commission (VPK) for the Soviet military. BW programs require integration of both ministerial level control and management and VPK oversight.

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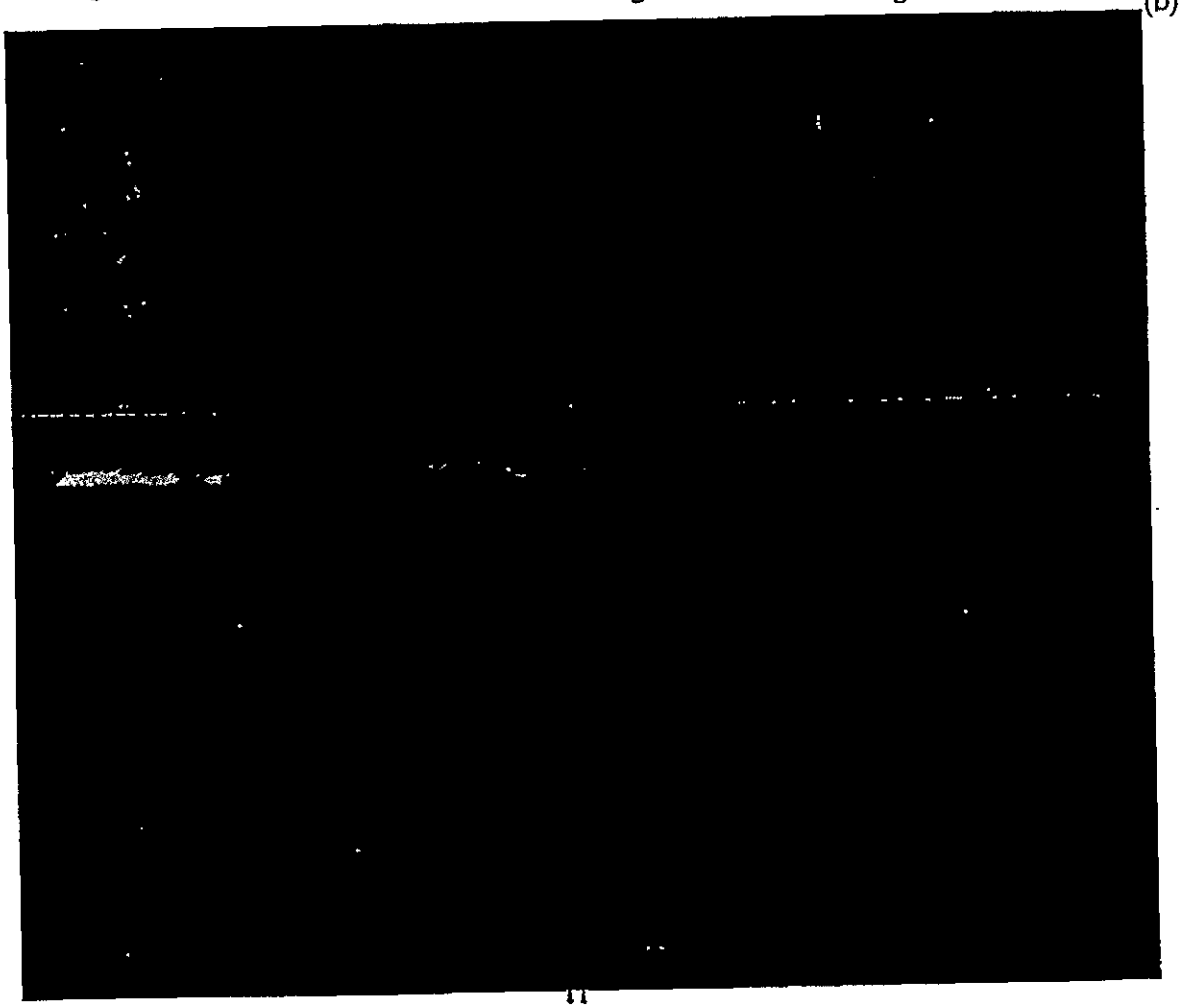

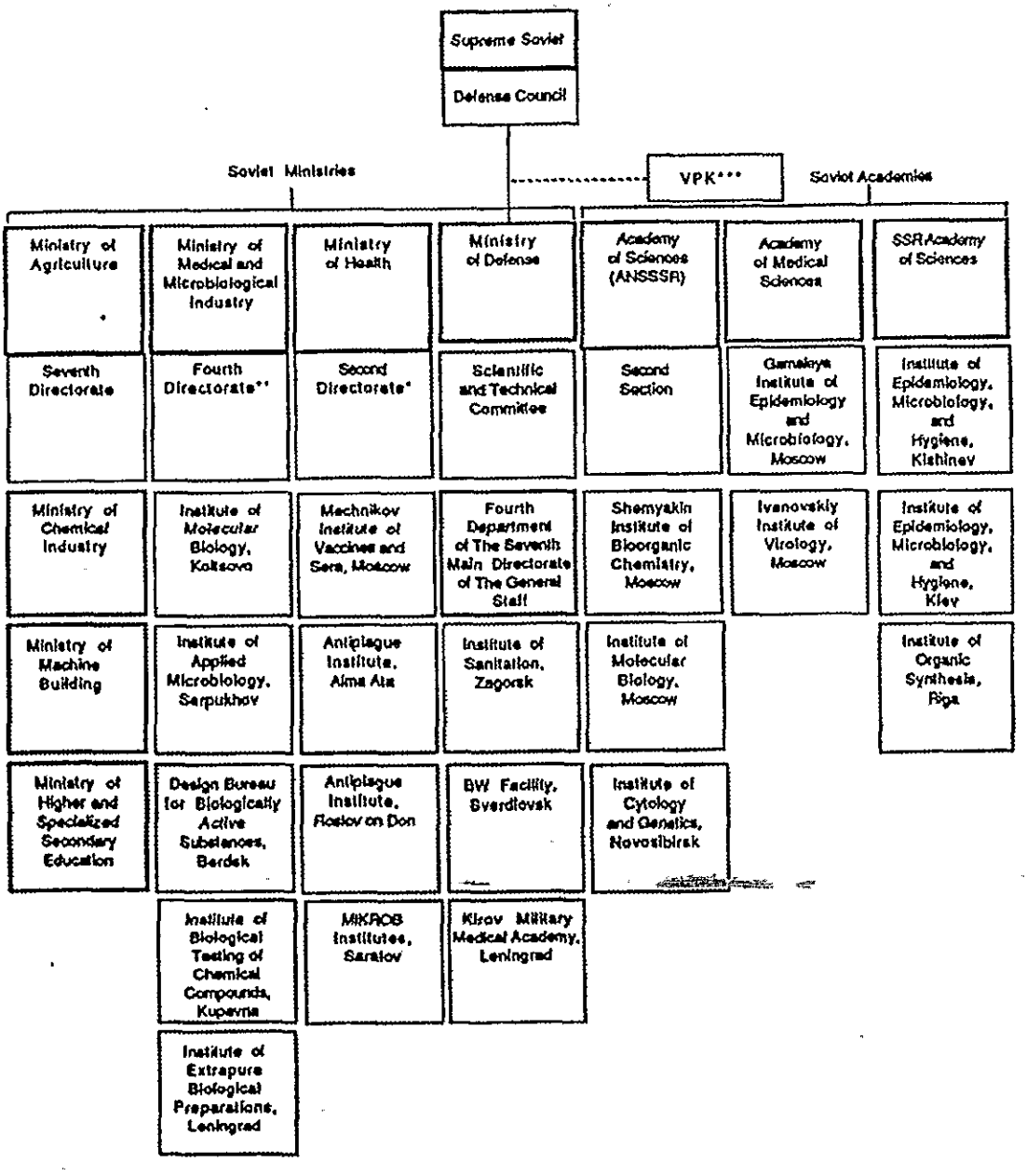

*Also referred to as Fourth Department/Administration
**Also referred to as Fourth Department
***Military Industrial Commission

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Figure 2. (U) Major Participants in the Soviet BW Program

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(U) Of critical importance in any Soviet R&D program is the Five Year Plan. The basic directions of R&D within these plans are established by the Party Congress prior to the beginning of each Five Year Plan. The 12th Five Year Plan, spanning 1986 to 1990, emphasizes molecular biology and gene engineering, and triples funding for production in the microbiological industry.

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2. Offensive Biological Warfare Program

a. Offensive Biological Warfare Agents

(1) Infectious Agents

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Table II. (U) Potential Antipersonnel BW Agents

ILLNESS	CAUSATIVE AGENT	INCUBATION PERIOD (DAYS)[a]	DURATION OF ILLNESS[a]	MORTALITY (%)[a,b]	ANTIBIOTIC THERAPY
VIRAL					
Chikungunya fever	Chikungunya virus	3-12	2 weeks to several months	<1.0	None
Dengue fever	Dengue virus	5-7	2 weeks to several weeks	<5	None
Venezuelan equine encephalitis (VEE)	VEE virus	2-5	3-10 days	<1.0	None
Tickborne encephalitis (TBE)	TBE virus	7-14	1 week to several months	Variable up to 30	None
Yellow fever	Yellow fever virus	3-6	1-2 weeks	~40	None
Smallpox	Smallpox virus	7-16	12-24 days	~30	None
BACTERIAL					
Anthrax (pulmonary)	*Bacillus anthracis*	1-5	3-5 days	~100	Effective
Brucellosis	*Brucella* species	7-21	Several weeks to several months	<25	Effective
Cholera	*Vibrio cholerae*	1-5	1-3 weeks	Up to 80	Effective
Glanders	*Pseudomonas pseudomallei*	2-14	4-6 weeks	~100	Effective
Plague (pneumonic)	*Yersinia pestis*	2-5	1-2 days	~100	Effective
Tularemia	*Francisella tularensis*	1-10	2 weeks to several weeks	Usually low	Effective
Dysentery	*Shigella* species	1-3	Few days to several weeks	<10	Effective
RICKETTSIAL					
Q-fever	*Coxiella burnetii*	10-21	1-3 weeks	<1.0	Effective
Rocky Mountain spotted fever	*Rickettsia rickettsii*	3-10	2 weeks to several months	~80	Effective
Epidemic typhus	*Rickettsia prowazekii*	6-15	Few weeks to months	~70	Effective
FUNGAL					
Coccidioido-mycosis	*Coccidioides immitis*	7-21	Few weeks to months	<10	Of limited value
TOXIN					
Botulinum	Toxin of *Clostridium*	0.5-4	3-7 days	>30	None

[a] Figures given for incubation period, duration of illness, and mortality are based on data for the naturally occurring diseases. Inhalation of massive concentrations, as might occur in a BW attack, probably would result in a shorter incubation time and more severe symptoms.

[b] Mortality data are for untreated cases.

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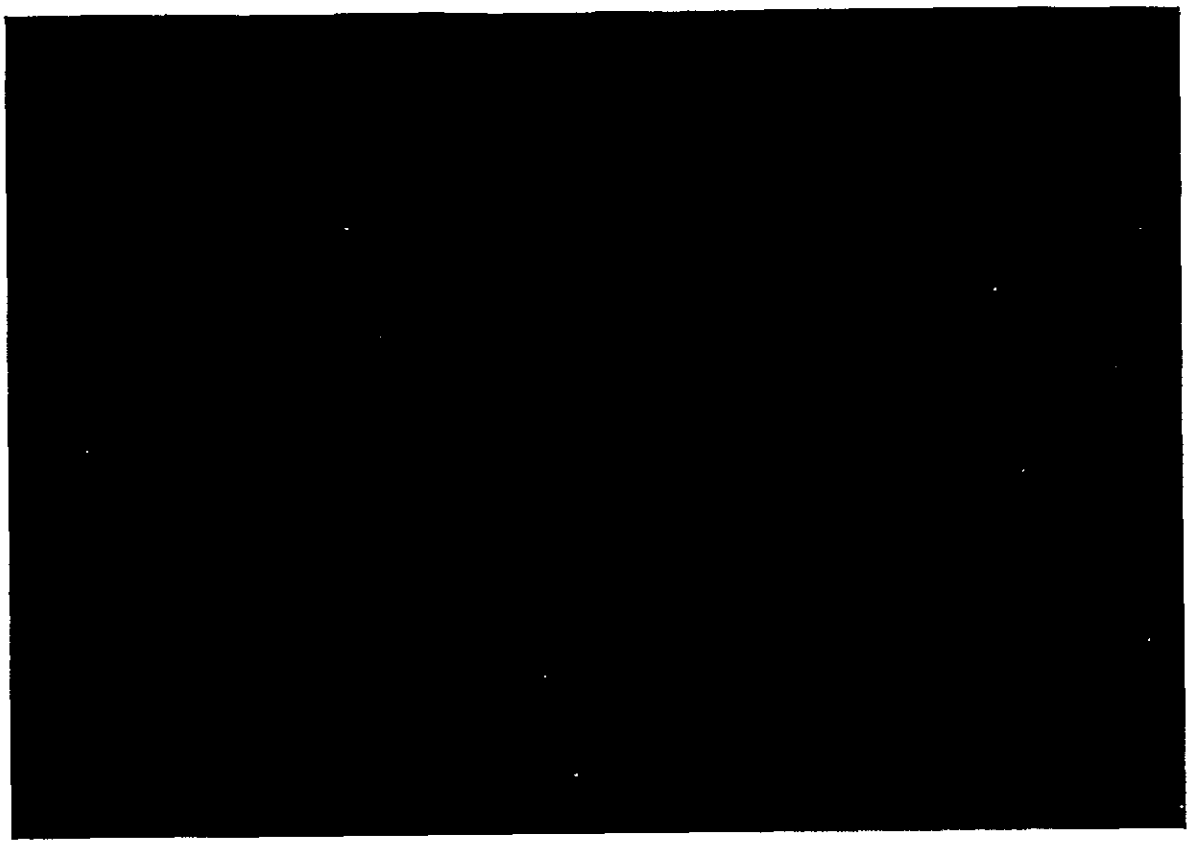

THE 1979 ANTHRAX ACCIDENT IN SVERDLOVSK

~~(S/NF/WN)~~ In early April 1979 anthrax spores were accidentally released from a highly secure, secret BW facility of the Seventh Main Directorate of the Soviet MOD Sverdlovsk. This facility is known as the Microbiology and Virology Institute or Cantonment 19. On or about 4 April 1979, the population near the facility was awakened by a loud explosion. Soon several military and civilian employees of the military installation were brought to the local Hospital Number 20. The civilians were primarily young men conscripted for training in the installation for two-year periods. Many other patients were brought to the hospital from a ceramics factory close to the military installation. Initial symptoms of affected individuals suggested a diagnosis of typical pneumonia. However, they soon developed a high fever followed by serious breathing difficulties and choking attacks. The patients died within a day. The autopsies, revealing advanced pulmonary edema with signs of toxication, clearly indicated that the cause of death was pulmonary anthrax. All evidence indicates loss of biological containment at the facility with a consequent generation of an aerosol after the explosion. As much as ten kilograms of dry anthrax spores are estimated to have been released outside the institute and to have drifted downwind. Six days after the appearance of the first illness, more than 40 people had died. At this time the chief health authority of the Chkalovsky District informed the physicians that an anthrax epidemic had occurred in their area. He stated that the epidemic was caused by an infected cow whose meat was illegally sold in the area of the military installation. The physi-

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cians could not comprehend this explanation, as many of the victims had died of pulmonary anthrax and not gastrointestinal anthrax as the result of eating infected meat. Within two weeks after the explosion, patients were sent to a larger hospital, identified as Hospital Number 40, which was converted into an epidemic center. Shortly after this conversion the civilian staff was replaced with military personnel and security procedures were initiated. All individuals at Hospital 40 were then vaccinated against anthrax. Two weeks later all staff members and family received prophylactic dosages of tetracycline. Although all of the hospital's 1,200 beds reportedly were utilized, the number of casualties has not been determined. Estimates have placed this number as high as 1,600, including 300 dead. In addition, affected livestock and all stray dogs in the district were collected and destroyed.

~~(S/NF/WN)~~ Shortly after the first deaths were reported, Deputy Minister of Health Burgasov, staff members, and a portable laboratory arrived in Sverdlovsk. While this group remained for the entire length of the epidemic, Health Minister Petrovsky and Defense Minister Ustinov made a brief, unpublicized visit to assess the situation.

~~(S/NF/WN)~~ Attempts to medically treat the surrounding population and disinfect the surrounding area were extensive. The surrounding population was ordered to drink only boiled water. In addition, several reports have indicated that the entire population of the district was vaccinated and/or treated with antibiotics. The dead reportedly were disinfected and buried in sealed caskets. Special aircraft sprayed the area with disinfectants, and large areas were burned or leveled and covered with asphalt. After three months no new anthrax cases were reported, and by early September 1979 the military installation was operating normally.

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~~(S/NF/WN)~~ The events in and around Sverdlovsk clearly reveal that a major accident involving the aerosol release of a large quantity of the biological agent, *Bacillus anthracis*, occurred in April 1979 in the Soviet Union. The agent released reportedly was a genetically altered strain.

~~(S/NF/WN)~~ Although hundreds of victims died, the Soviets never have provided a satisfactory explanation. Between March and August 1980 the Soviets gave at least six different explanations of this incident. These and all subsequent explanations, until the most recent one, stated that the outbreak was extremely small and localized. One version reported as few as two cases with no deaths and another only that some deaths had occurred with no numbers provided. Recently the Soviets presented their most detailed explanation. In August 1986 the Soviets provided an extensive verbal explanation to a US citizen invited to Moscow. The same report was given orally at the second Biological Weapons Convention (BWC) Review Conference one month later. In October 1986 select members of the US National Academy of Sciences met with their counterparts in Moscow, in part to discuss the epidemic. Although they received additional information from physicians who allegedly treated some of the victims, the explanation was identical to that provided to the BWC review committee. Finally, in April 1988, a team of Soviet scientists, including Burgasov, presented this explanation to academic scientists in Boston, Baltimore, and Washington, D.C. This information is believed to have been presented as a response to repeated efforts by the US to obtain a reasonable explanation for the epidemic. In this new account, the Soviets claim that the epidemic was the result of distributing 29 tons of inadequately sterilized livestock feed contaminated with anthrax spores. Sickness in

humans and animals allegedly was produced by eating meat from contaminated cattle. The Soviets have claimed a total of 79 cases (64 fatal) of gastrointestinal anthrax. They also have acknowledged that this was the most extensive incidence of anthrax in Soviet history. Further, they have stated that there were no cases of inhalation anthrax, no military were affected, and the military absolutely was not involved.

~~(S/NF/WN/NC)~~ Although this explanation does incorporate some accurate information about certain events, like previous explanations it is marginally plausible. The preponderance of intelligence-derived information clearly indicates that the epidemic was caused by the accidental release and subsequent aerosolization of large amounts of "weapons grade" anthrax at a military BW production facility.

~~(S/NF)~~ There is no direct evidence that the Seventh Main Directorate controls the MOD's Military Medical Academy imeni Kirov (VMA) in Leningrad. However, it may control the associated Central Research Laboratory, also known as NII-35, located in Leningrad. The NII-35 is divided into bacteriology and toxicology research sections. The toxicology section is known to conduct CW antidote R&D. The bacteriology section's function, although less well understood, is thought to be BW medical defense oriented. This section may also provide agent cultures for testing of medical material. The VMA, which conducts medical R&D and professional medical training, has served as a conduit for publications co-authored by NIIS Zagorsk researchers and other scientists, both military and civilian, involved in the BW program. The VMA has served also as a rotational base between the NIIS Zagorsk, the Institute of Vaccine and Sera imeni Mechnikov, and the Institute of Epidemiology and Microbiology imeni Gamaleya in Moscow. This arrangement has facilitated free exchanges between military BW researchers and managers. Relationships are reported between VMA and/or NII-35 and the Microbiology and Virology Institute in Sverdlovsk. Another MOD institute suspected of involvement in BW cooperative projects is the Central Scientific Research Institute of Testing of Military Medicines in Leningrad.

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~~(S/NF)~~ For decades intelligence sources have implicated the Institute of Epidemiology and Microbiology imeni Gamaleya as being involved in offensive and defensive BW programs. Another Soviet Academy of Medical Sciences research institute suspected of contributing in the areas of basic and applied viral research is the Institute of Virology imeni Ivanovskiy. These facilities are adjacent to one another in Moscow. Both have BL4 containment facilities. The central and foremost epidemiology and microbiology institute in the USSR, the Gamaleya Institute, appears to exert considerable influence over microbiological research programs throughout the country. O. V. Baroyan, former KGB colonel and director at Gamaleya, is the Chief of the General Microbiology Laboratory. The Gamaleya Institute's research focus is claimed to be on national problems (PROBLEMA). The PROBLEMA 5 has a scientific committee with military members and is thought to be dedicated to military-funded offensive and defensive BW programs. Laboratories responding to its military research requirements are closed. The Gamaleya Institute laboratories provide research expertise on enteric infections, some viral diseases, rickettsial diseases, brucellosis, and microbial toxins, particularly clostridial toxins such as botulinum and gangrene. Numerous sources have claimed that some of this research is related to military BW projects. One source stated that a brucellosis accident in Moscow which killed numerous people was related to BW research at this institute. US intelligence has not

been able to substantiate this claim. Other sources state that research on dangerous organisms for BW-related projects is carried on at undisclosed locations by the Gamaleya Institute. We suspect that this facility's long-term contribution to the Soviet BW program has been in the areas of basic research on candidate agents, immunology, and development of diagnostic serologic techniques.

~~(S/NF)~~ The Soviet MOH is responsible for the health of the civilian population. Planning for emergencies brings the MOH into close contact with military medical and civil defense organizations. The ministry also has closed laboratories that are known to collaborate with the MOD's Seventh Main Directorate researchers and institutes. The military link is through a second department (also referred to as the Fourth Department or Administration) within the MOH. This department is headed by Deputy Minister P. N. Burgasov, whose probable role is coordinating BW-related activities within the MOH institutes. He probably channels requirements, funds, and equipment to the various participants. Burgasov formerly was associated with the Seventh Main Directorate of MOD and served as a special consultant to the KGB. The MOH exerts considerable influence over the Ministries of Health of the Federated Republics (SSRs).

~~(C/NF)~~ The MOH Institute of Vaccine and Sera imeni Mechnikov in Moscow has one or more closed laboratories that support Seventh Main Directorate BW requirements. Researchers at this institute work closely with those at the Gamaleya Institute, NIIS Zagorsk, and the VMA. The closed Mechnikov Institute laboratories conduct basic research in antisera, toxoid, and vaccine development. The Mechnikov Institute has an in-house production capability and supports the Soviet BW program by producing special vaccines for the military.

(Ø) Other MOH institutes that are thought directly to support the Seventh Main Directorate's offensive BW mission include several of the Soviet Antiplague institutes. Research collaboration on infectious agents has been identified at the Central Asia Scientific Research Institute of Antiplague in Alma Ata, the Scientific Research Institute of Antiplague in Rostov-on-Don, and the State Scientific Research Institute of Microbiology and Epidemiology of Southeastern USSR (MIKROB) in Saratov. These institutes historically have had a role in studying dangerous bacterial infections. Researchers at these institutes represent considerable, if not principal, Soviet expertise on enteric agents such as cholera and typhoid, and bacterial zoonotic diseases such as plague, anthrax, tularemia, and brucellosis.

(U) These institutes probably contribute to the BW program by conducting labor-intensive screening of natural bacterial pathogens and toxin-producing agents to identify prime BW agent candidates. Other basic research probably includes agent characterization, effects in animals, stability, and culturing techniques. They may conduct induced mutagenesis studies of microorganisms to facilitate selection for several factors including virulence, antibiotic resistance, and culture yield.

~~(C/NF)~~ The Extremely Dangerous Infections Institute (OOI) of the Scientific Research Institute of Antiplague at Rostov-on-Don offers advanced training courses for physicians concerning treatment of infectious diseases related to BW. The OOI produces antisera and vaccines used by epidemiological stations in BW-related civil defense exercises.

Non-Soviet Warsaw Pact Countries (NSWP)

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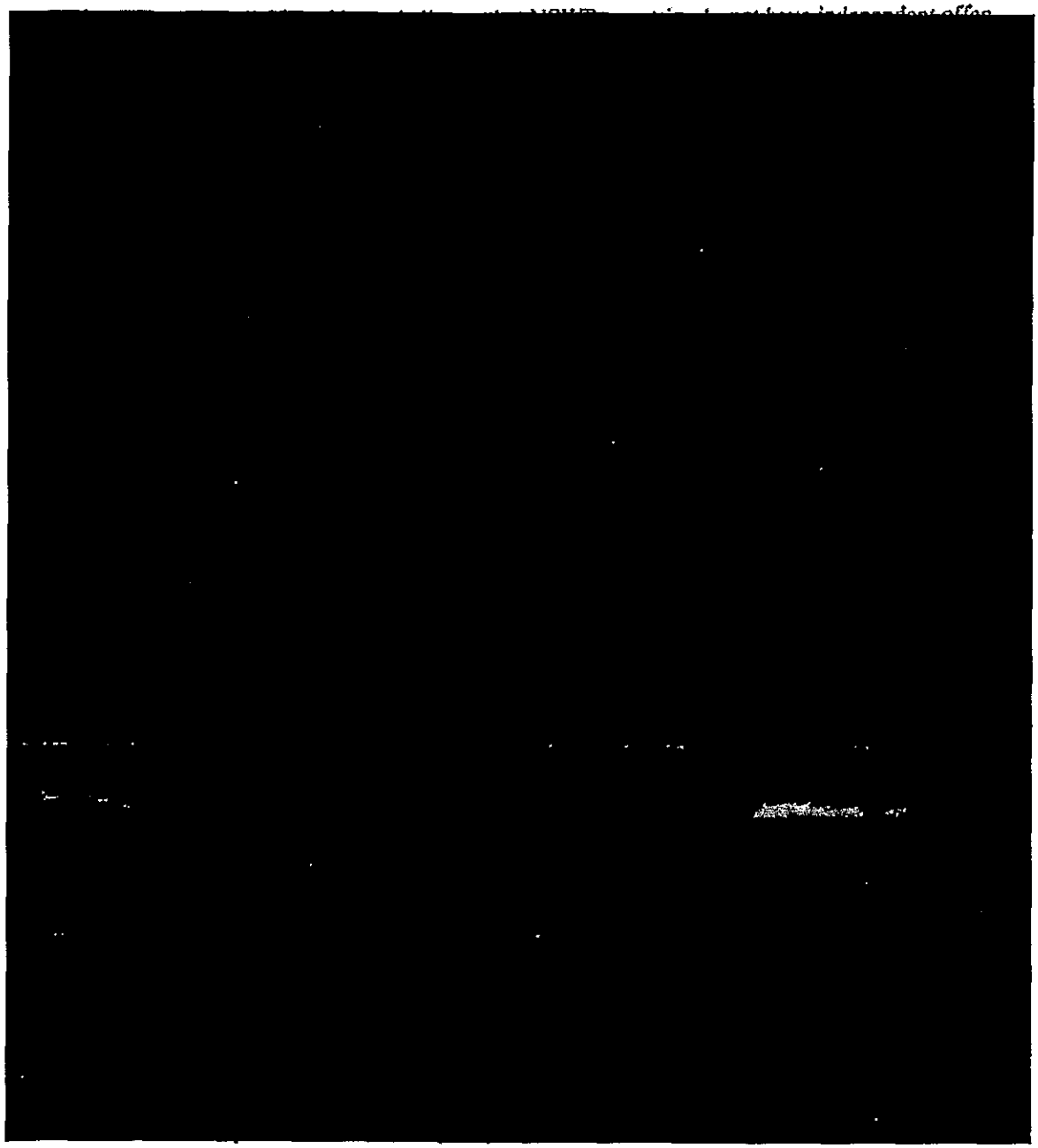

*(U) Detailed analyses of WP R&D capabilities in bacterial, fungal, marine, animal, and plant toxins have been published in two *Defense Intelligence Agency studies*: DST-1810S-203-85, Toxin Research: Warsaw Pact Countries and Yugoslavia, and DST-1812S-175-88, Low Molecular Weight Toxin Research - Worldwide. Tables of key WP personalities and scientific institutes engaged in toxin research are available in these studies.

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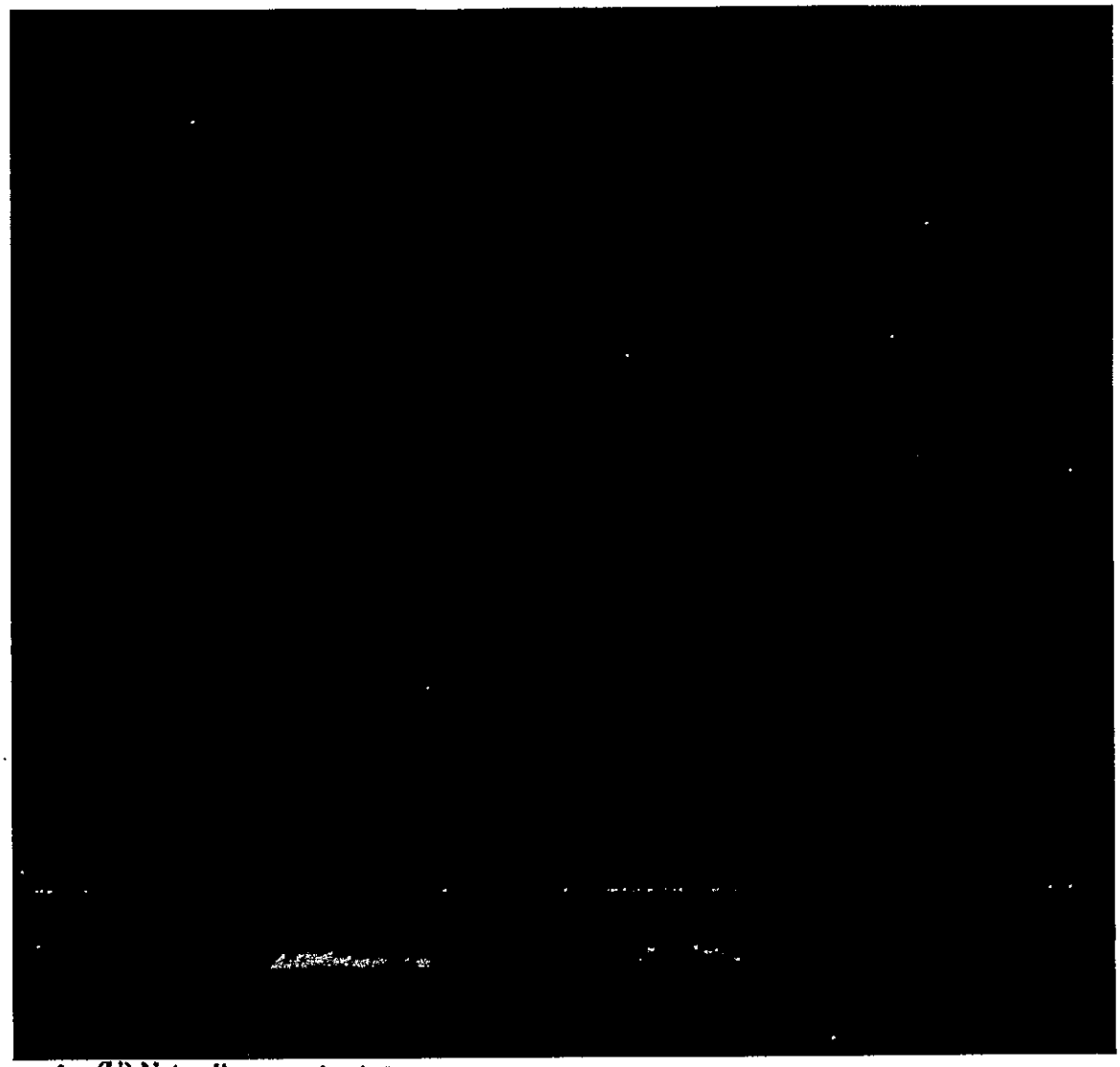

- (U) Naturally-occurring infectious agents genetically modified to improve their weaponization characteristics

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- (U) Bioregulators

- (U) Toxins, venoms, and their biologically active fractions produced through genetic engineering/biotechnical means.

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Genetically-Altered Naturally Occurring Infectious Agents

[redacted]

b. (U) Researchers at the Scientific Research Institute of Epidemiology and Microbiology imeni Gamaleya have reported the transfer of a *Vibrio cholerae* toxin gene to an *E. coli* plasmid.

2. (U) Genetic material of infectious agents that can be modified in the laboratory to produce more virulent and/or drug-resistant strains:

a. (U) Scientists at the Gamaleya facility have produced a tularemia strain resistant to the antibiotic spectinomycin.

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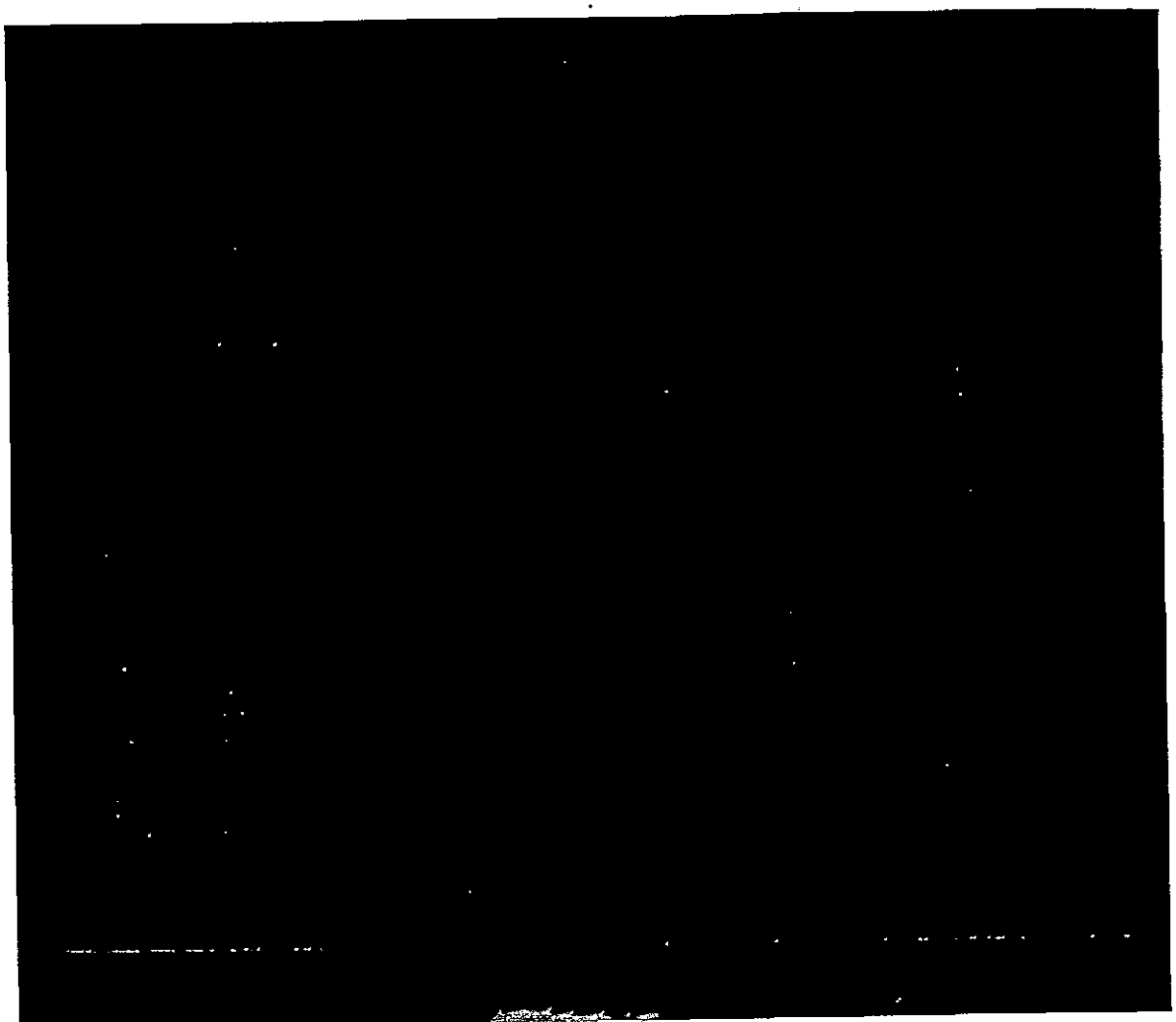

(U) In an open symposium in 1971, Karl Heinz Lohs, former director of the East German CW program, commented that "The synthetic peptides with their toxic character must be regarded as one of the malefic developments in the field of military toxicology." He further stated that "Synthetic toxins made up of 8 to 10 amino acids could already be produced," and that "due to rapid developments in biological engineering, the production of large-scale synthetic toxins would be possible in just a few years. For this reason, a close watch should be kept on all research centers working on peptides or toxins—even though at the moment they appear to be engaged in purely civilian research work."

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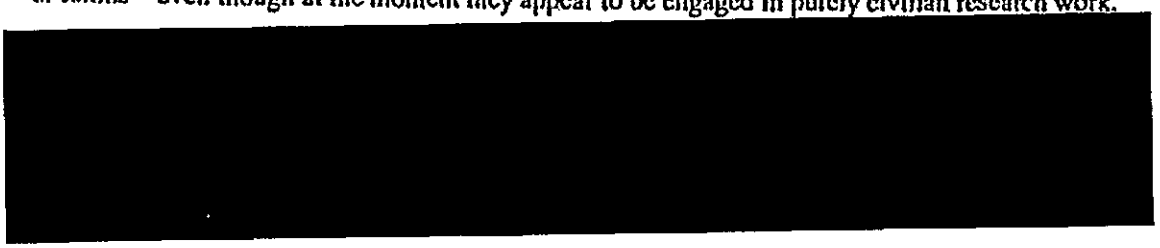

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(U) Bioregulators other than peptides that have received increased Soviet scrutiny are the prostaglandins. These are naturally occurring cell mediators affecting the arachidonic acid pathways. Prostaglandins and their chemical variants are substances responsible in part for mediation of pain, inflammation, and body temperature. They are present in virtually every tissue and body fluid, and in minute amounts produce a remarkably broad spectrum of effects that embraces practically every biological function. The full extent of prostaglandin activity is as yet unknown. Prostaglandins are divided into two major series. Those of the "2" series act as calcium channel ionophores.

(U) The All Union Scientific Research Institute of Biotechnology, tasked to exploit the biological resources of the oceans, was reported to have developed methods for producing prostaglandin from marine organisms that are tens of times less costly than standard production methods. This Moscow-based institute, formerly attached to the Ministry of Fishing Industry, recently was subsumed under MINMEDBIOPROM. The organizational change may reflect the growing importance of prostaglandin bioregulator research in the Soviet Union.

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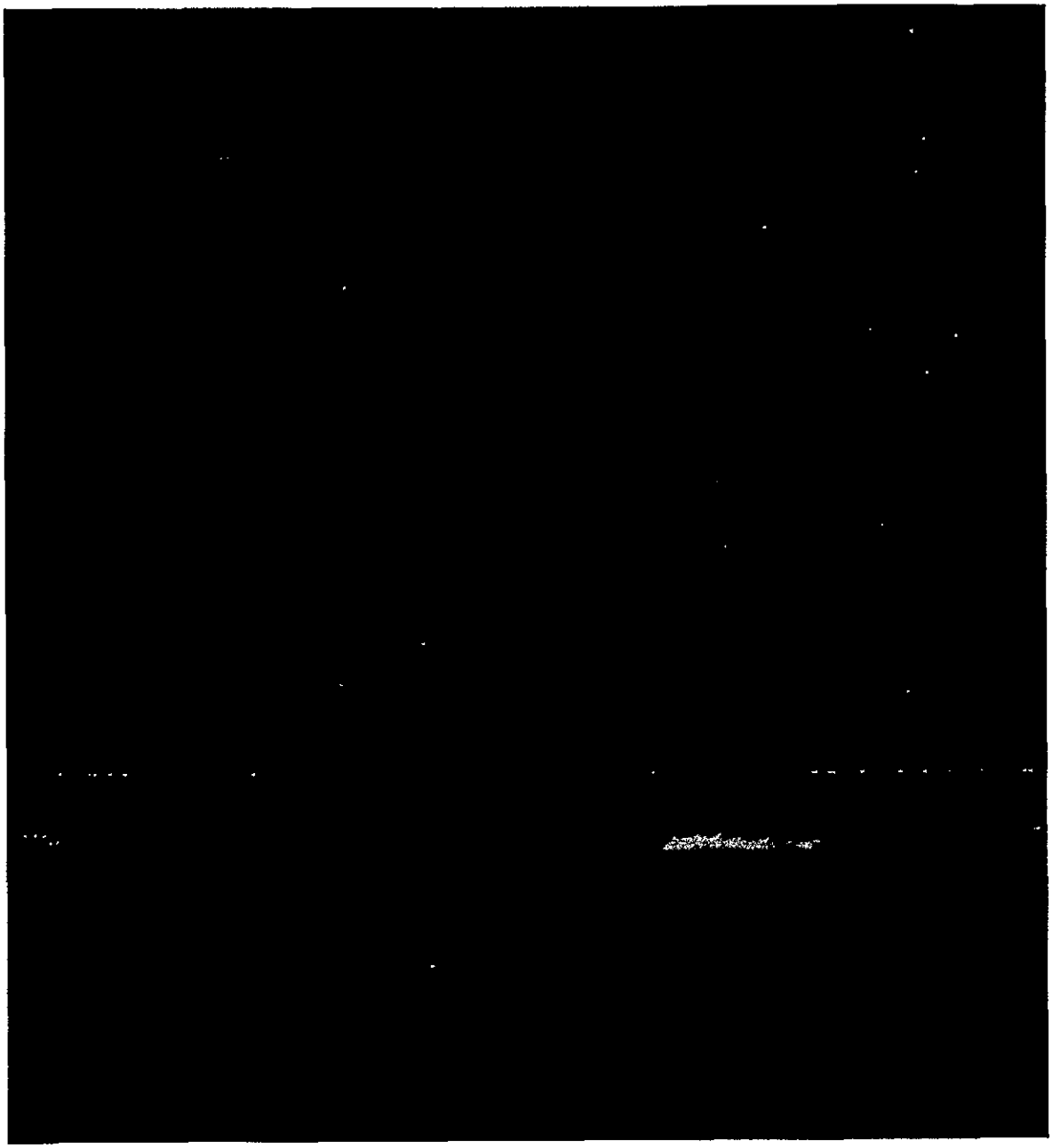
Subfractions of Toxins, Venoms, and Ionophores



(U) Specific toxins and venoms studied by the Soviets:

(U) **Scorpion toxin.** Ovchinnikov's group has extensively studied the toxic components (including insectotoxins) of the venom of the Caucasian subspecies of the mottled scorpion, *Buthus eupeus.*

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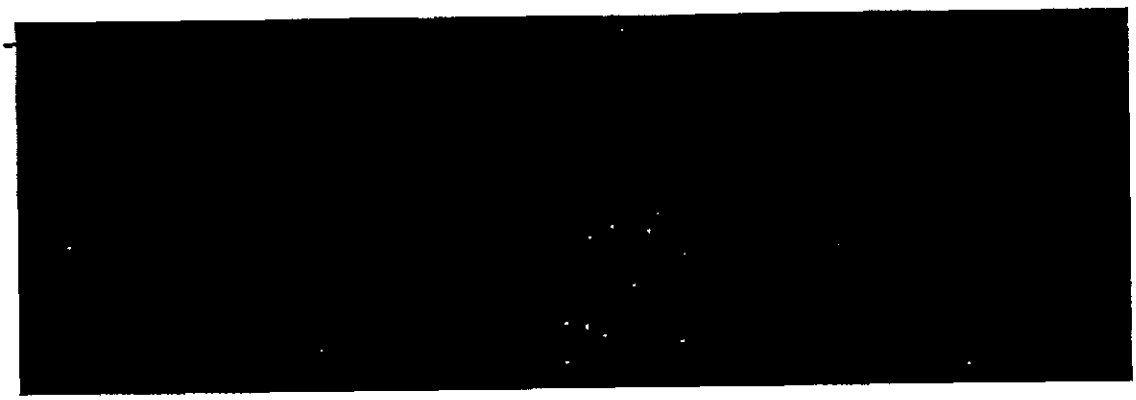

(U) Used as anticoccidials in poultry and as growth stimulants in ruminants, members of this class of compounds almost without exception are too toxic for human use. Published toxicity data reveal LD_{50} toxicities in mice ranging from 1.2 mg/kg (compound X 206) to 2,000 mg/kg (i.p.). Some for which no toxicity data are available may be much more toxic. In the West, research on more highly toxic varieties is minimal since the goal is to produce the least toxic compound possible. Because of a high degree of lipophilicity, some depsipeptides are readily absorbed through intact skin and therefore require unusual physical protective measures for handling. The primary action of the ionophores lies in their ability to form lipophilic complexes with alkalai metal ions and to facilitate movement of these ions across biological membranes. Ion movement is accomplished by one of two mechanisms: (1) the formation of channels in the membrane through which ions can "flow" or (2) the transport of ions across the membrane as ionophore/ion complexes. Many of the more toxic depsipeptide ionophores are cyclic. This feature would be expected to retard or prevent metabolism and increase half-life. Alternate forms of the basic structure of these compounds can be created by adding or deleting different chemical groups. In this way, toxicity can be enhanced or reduced. The depsipeptide ionophores are structurally very similar to the mushroom toxins amanitin and phalloidin, and to the blue green algal toxin, microcystin.

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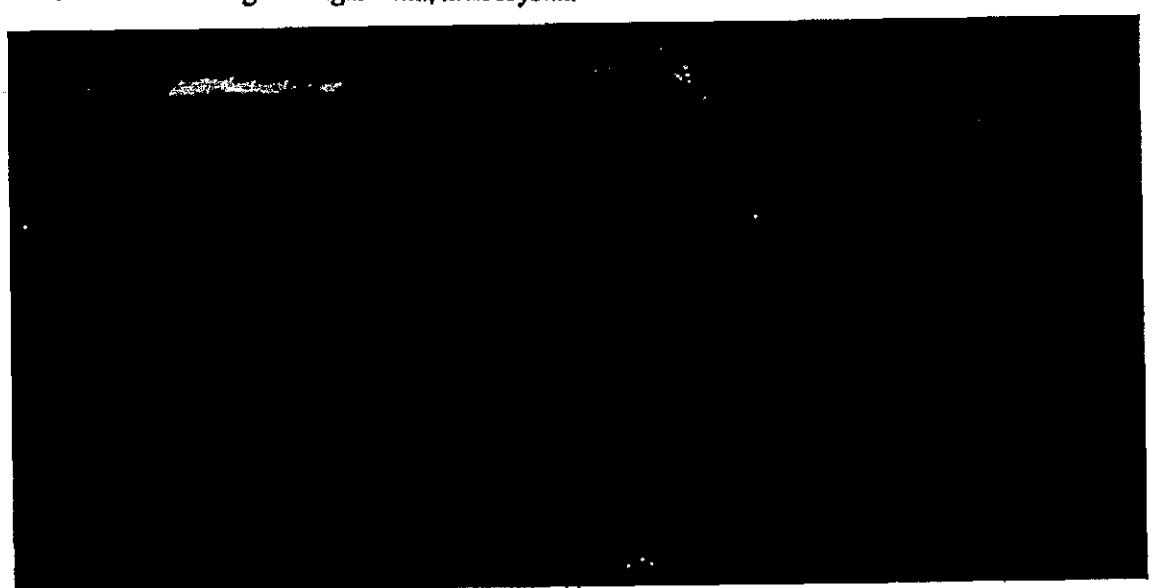

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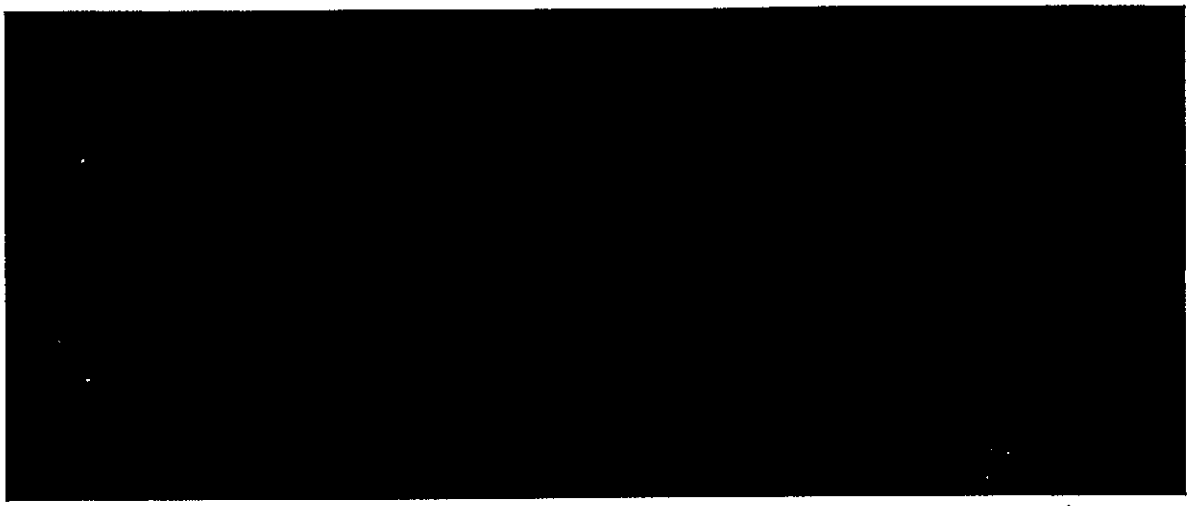
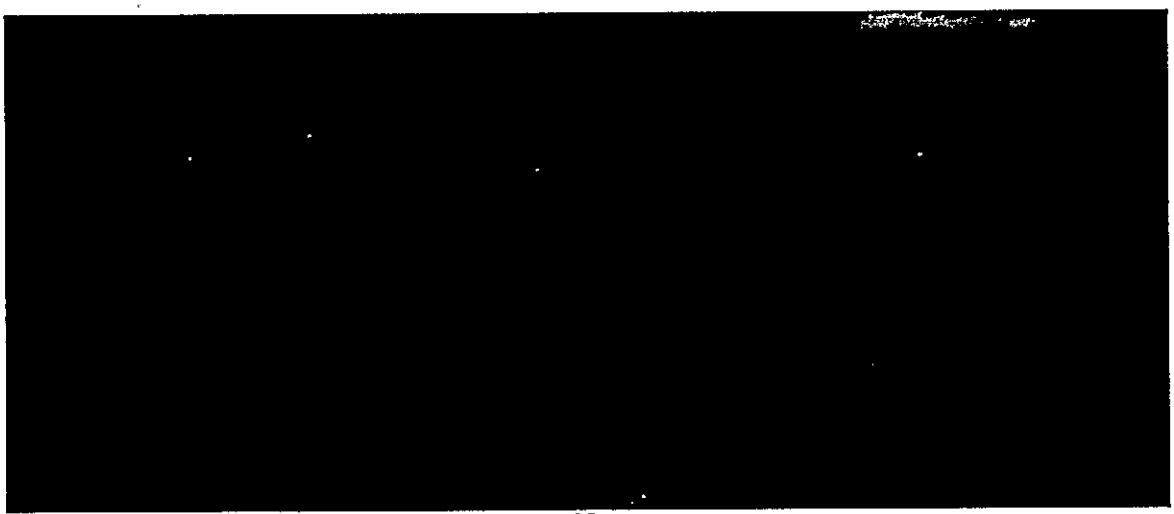


b. Production, Storage, and Stockpiling

General Comments - Non-Soviet Warsaw Pact (NSWP) Countries (b)(1)

Individual Country BW Production Potential - NSWP (b)(1)



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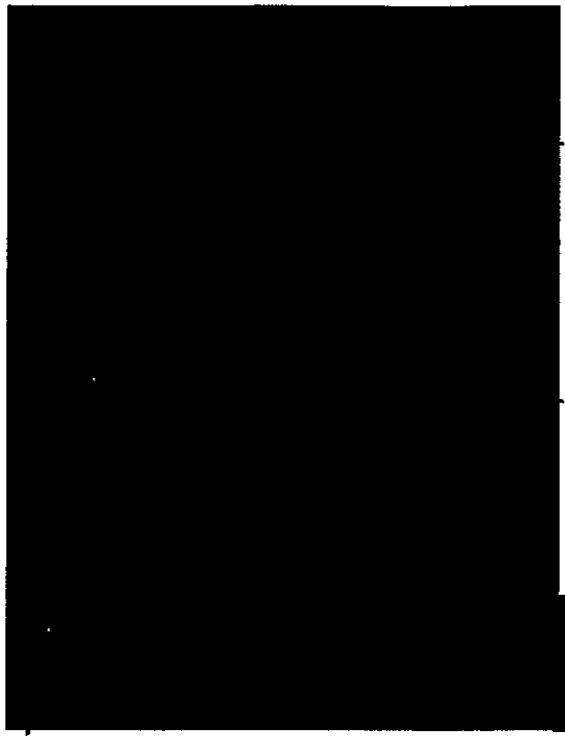

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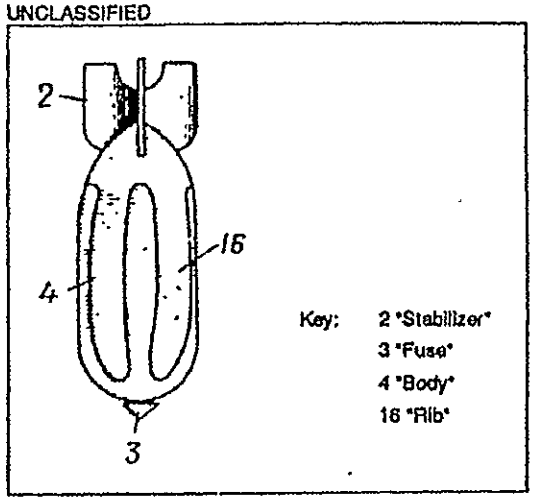

Figure 12. (U) Soviet Bacteriological Bomb

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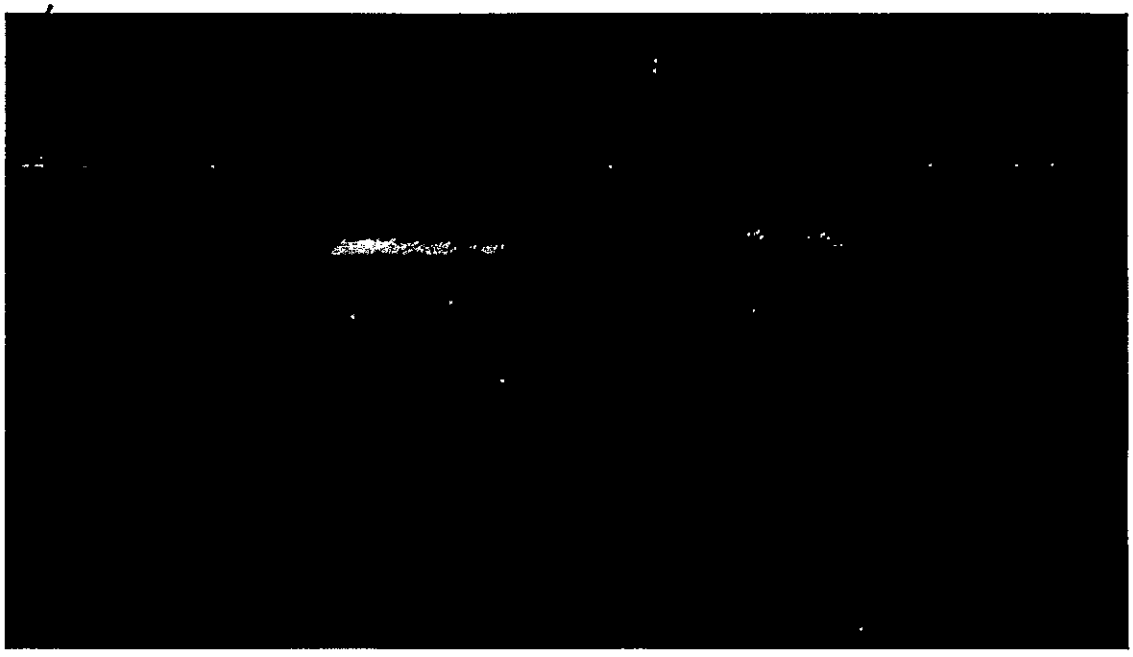

Table IV. (U) Toxic Agent Use

DELIVERY SYSTEM	LAOS (1975-83)	KAMPUCHEA (1978-83)	AFGHANISTAN (1979-84)
Fixed Wing Aircraft			
Spray	x	x	x
Bombs	x	x	x
Rockets	x	x	x
Helicopter			
Spray	x	x	x
Canisters	x	x	x
Artillery	x	x	x
Mines		x	x
Pumped from Vehicles	x		x
Agent Coated Flechettes			x
Toxic Grenades	x	x	x

x = Reported attacks

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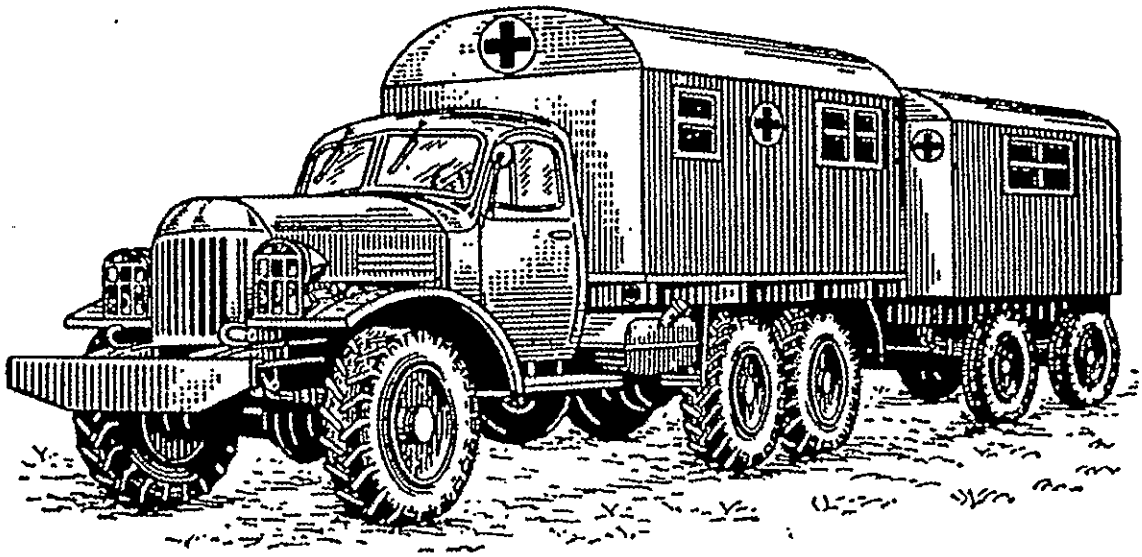

Figure 13. (U) PSEL-B Mobile Microbiological Laboratory

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Table V. (U) Potential BW Agents and Immunopreparations

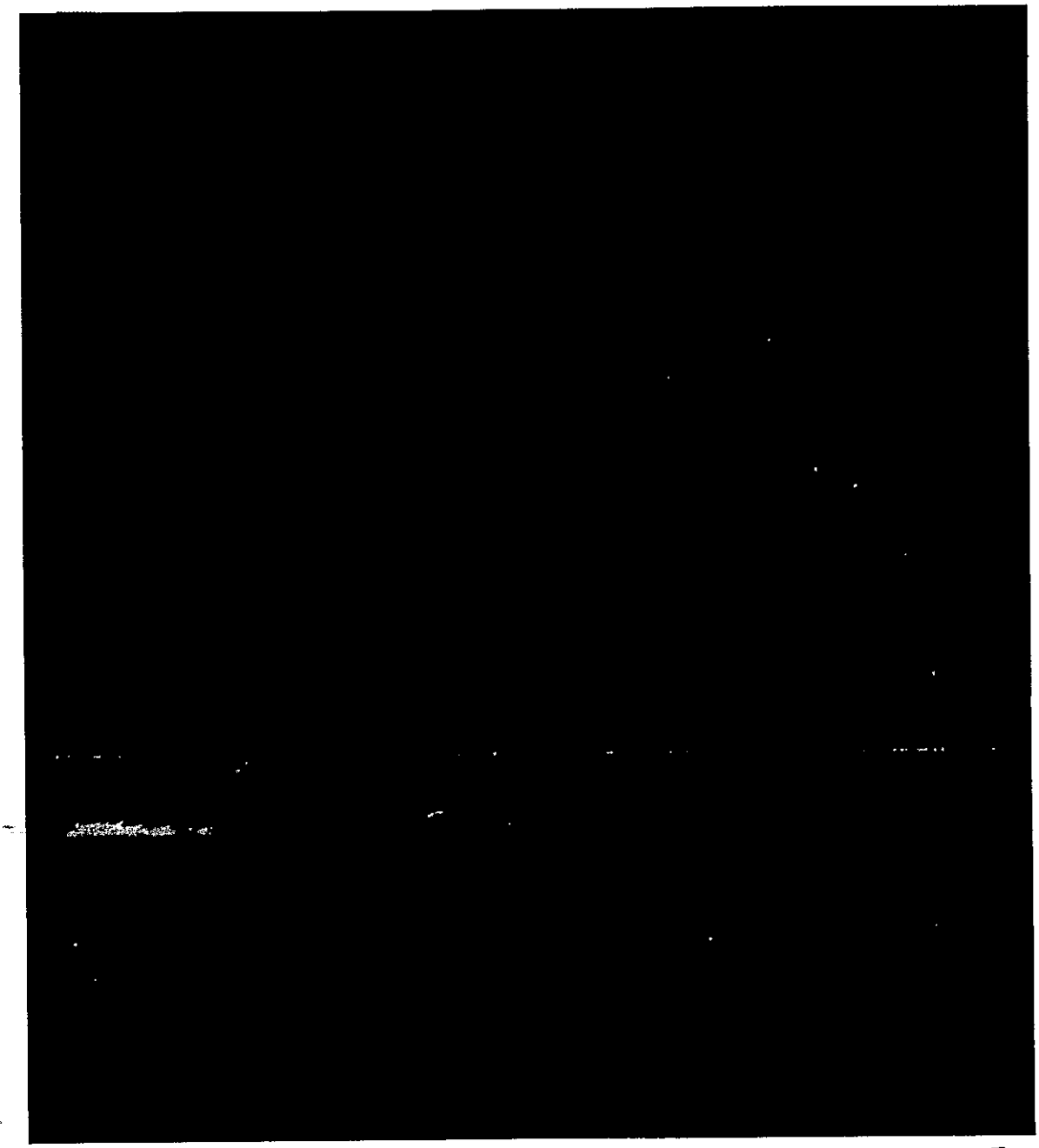

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Figure 14. (U) Soviet OP-1 Combined Arms Multipurpose Suit

[redacted]

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(U) Decontamination of uniforms, underwear, felt boots, shoes and tents is accomplished via the field decontamination station, AGV-3, AGV-3M or AGV-3U. The AGV-3 and the AGV-3M differ in number of vehicles used. The AGV-3 is composed of five vehicles and the AGV-3M is composed of four, a truck to transport the steam and hot air generator, two trucks to transport two steam chambers and a two-ton cargo truck to transport water, fuel, supplies and the accessory equipment (shower tent for the operating crew and a drying tent for the decontaminated clothing). (See Figure 15.) The AGV-3U has a four-chamber steam truck while the AGV-3M has only three chambers for decontamination. The contaminated clothing is subjected to either hot steam or a steam-ammonia mixture, dried, and reissued.

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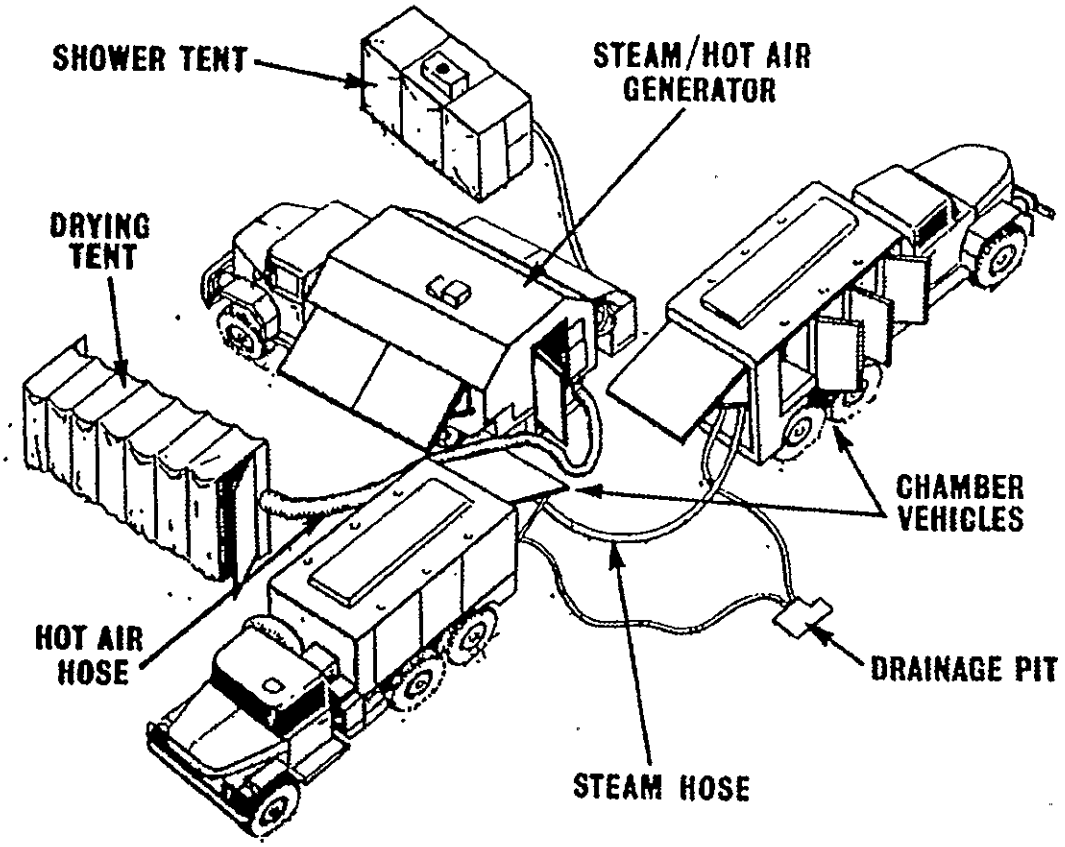

Figure 15. (U) Soviet Clothing Decontamination Station, AGV-3M

(b)(1)

[redacted]

f. Civil Defense

(U) The primary responsibilities of the civil defense (CD) systems in the WP countries are to protect the people and the national economy during wartime, and to provide emergency procedures following a natural disaster during peacetime. In the WP countries CD is the responsibility of the MOD, also called the Minister of National Defense (MND). During the mid-1970s, the NSWP countries modified their laws, making CD an integral part of national defense. In most cases, heads of industrial enterprises or governmental units are responsible for organizing CD units at the local level. The CD positions at the regional and national level usually are manned by military personnel, whose primary jobs are advising and training civilian CD leaders. Periodically, representatives of the NSWP

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Figure 16. (U) Soviet Truck-Mounted Jet Engine Decontamination Vehicle, TMS-65

countries hold conferences to discuss the status of the CD organizations so that any apparent weaknesses may be corrected. In addition, mutual agreements and joint CD exercises provide for co-operation and information exchange between NSWP countries.

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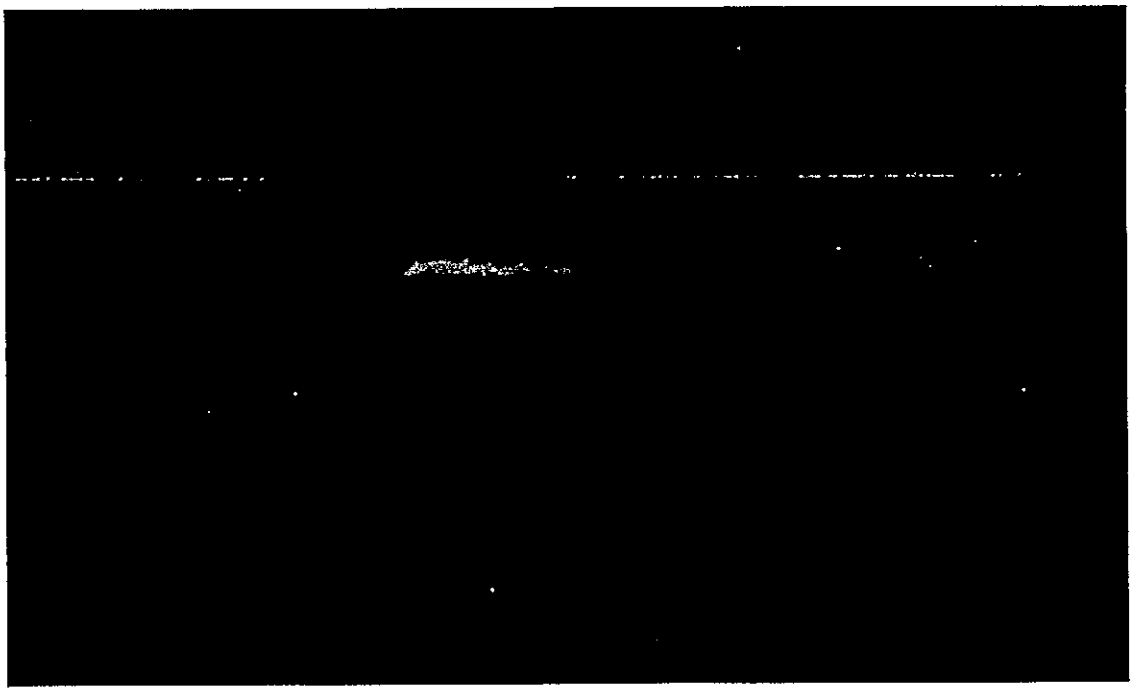

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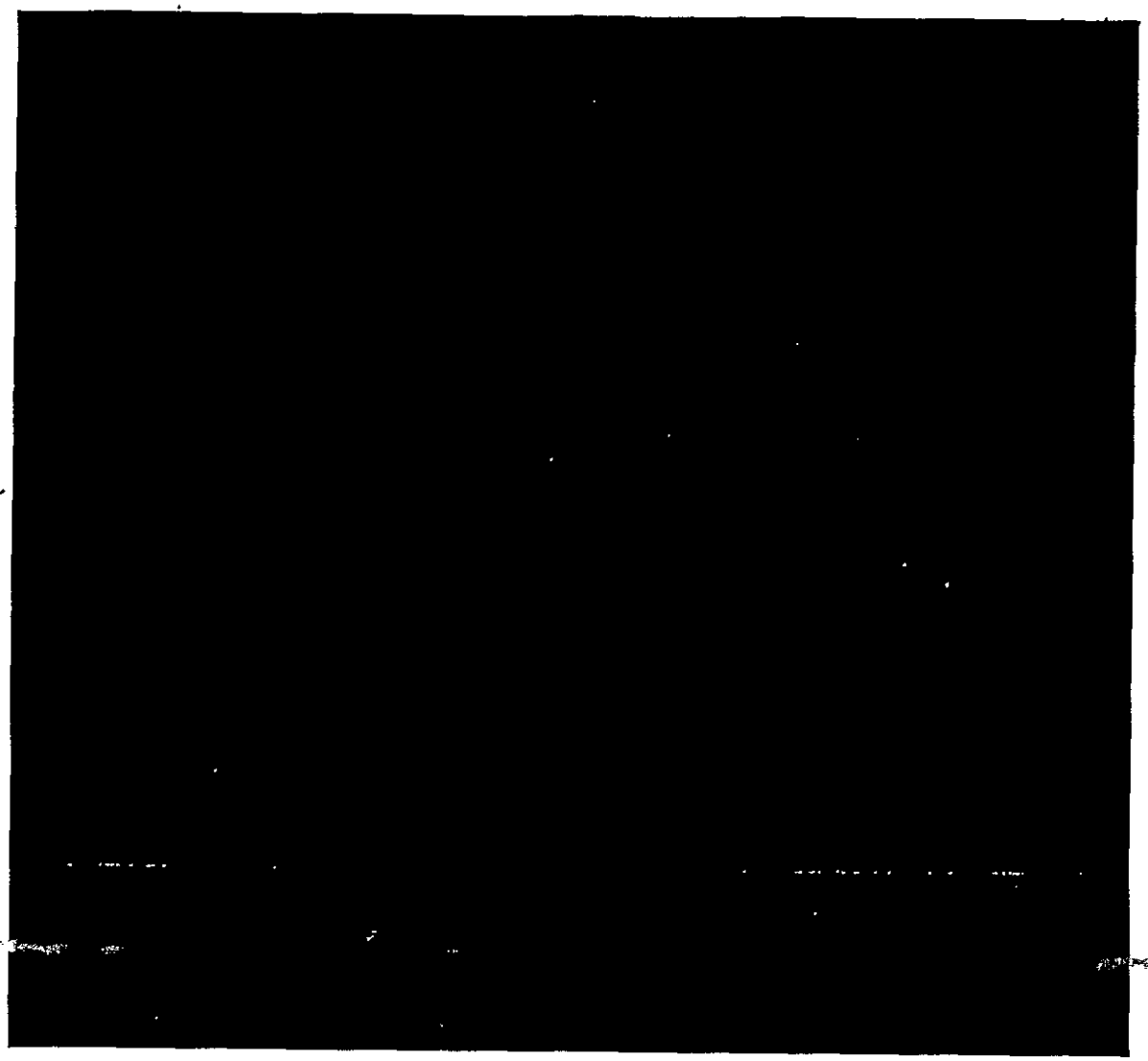
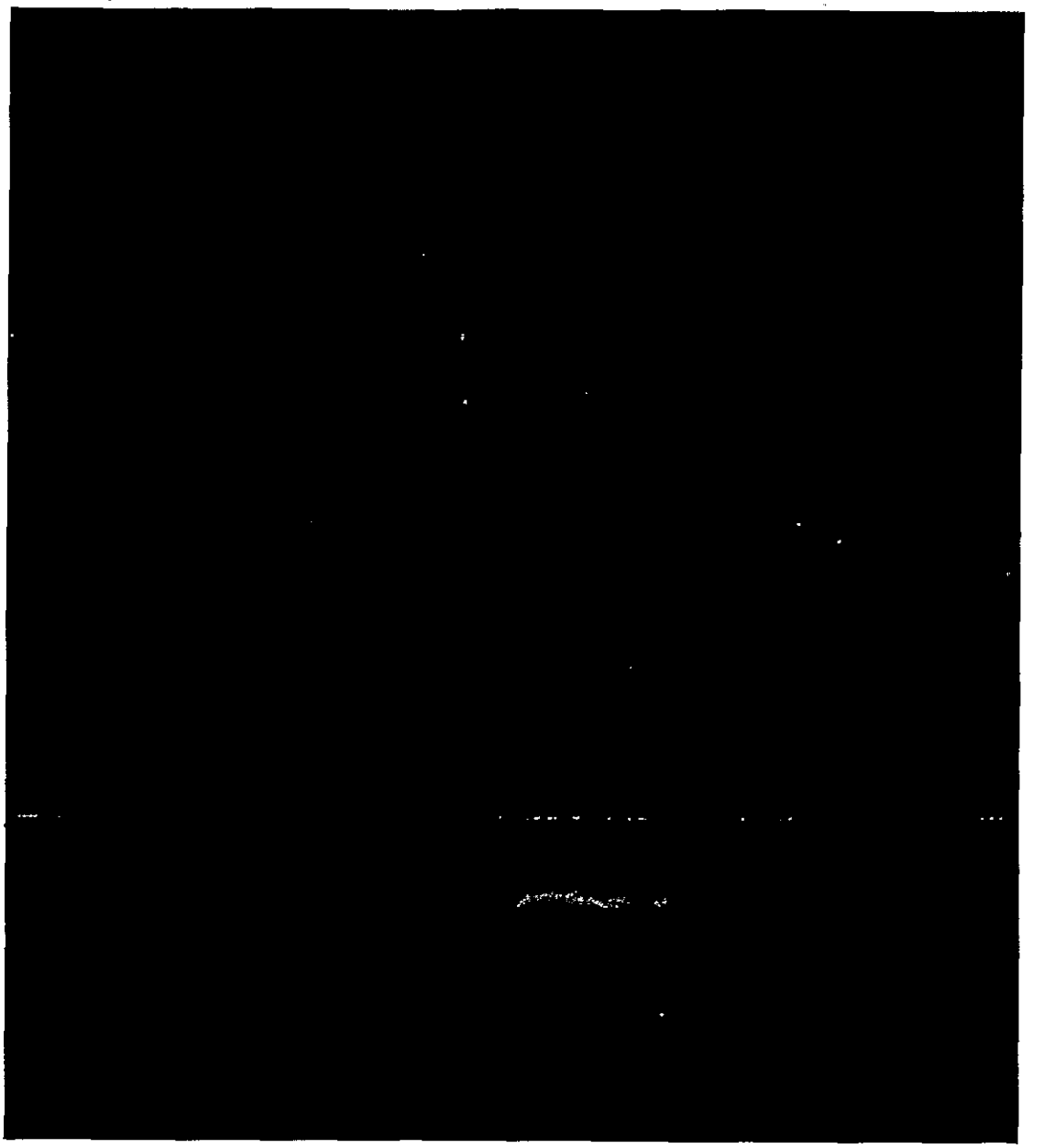


(U) Soviet CD preparedness is at a level capable of providing some protection to designated members of the population. Field Manual 100-2-2, *The Soviet Army, Specialized Warfare and Rear Area Supports,* concludes that "Despite widespread cynicism and apathy, the program is large and growing. It is probably the most highly developed CD effort in the world."



(U) Toxin agents, on the other hand, were described as being useful in combat as well as in the form of sabotage toxins. They would be used in combat according to the same principles and with the same methods used for chemical warfare agents. The toxin warfare agents can be aerosolized. They can be used primarily in microbombs which are launched from the air or in war heads of tactical rockets. The known toxin warfare agents are satisfactorily resistant to detonation and stable enough to remain effective in the atmosphere and on surfaces for some time.

When the toxin agents are used in combat, the atmosphere can be contaminated over relatively large areas. The necessary combat concentration for botulinum toxin is only one half that of warfare agent VX and one sixth that of Sarin to achieve the same effect. We can expect expansion depths of up to 6 km before the toxin concentration drops below the LC 50. [LC 50 - concentration necessary in the air to kill 50% of a population.] With the development of the areas of science mentioned earlier (genetic engineering/biotechnology) the boundaries between biological and chemical weapons are erased.

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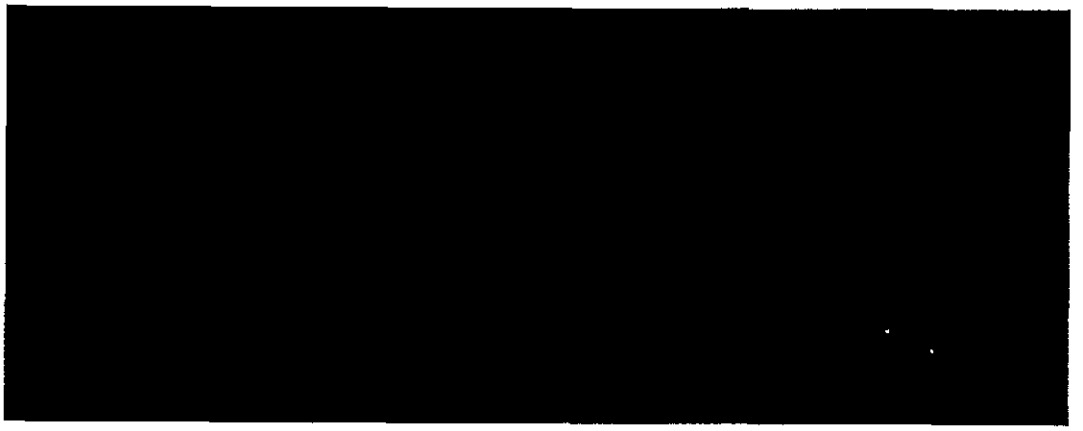

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SECTION VI

TECHNOLOGY TRANSFER: SOVIET UNION AND NON-SOVIET WARSAW PACT

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(U) The Military Industrial Commission (VPK) of the Presidium of the Council of Ministers, USSR, is the most powerful organization in the defense-research establishment. The VPK tasks both the Soviet Committee for State Security (KGB) and the Chief Intelligence Directorate of the Soviet General Staff (GRU) to obtain free world technology. These two intelligence groups in turn often levy requirements upon their counterparts in Eastern Europe. Since the mid-to-late 1970s, the intelligence organizations of the NSWP countries have played a major role in the VPK collection efforts. East Germany, Hungary, and Poland have been the most successful in obtaining Western classified information and COCOM (Coordinating Committee for Multilateral Control of Exports) restricted items. In general, the East European countries operate under less severe travel restrictions. Also, they may not be perceived as operating in a surrogate role to the Soviet Union. A reduced awareness of the potential for technology loss through these countries to the Soviet Union therefore may contribute significantly to their successful collection efforts.

[redacted] (b)(1)

(U) In addition to individual exchanges, regional and international conferences afford excellent opportunities for transfer of technical information and materiel.

[redacted] (b)(1)

(U) Academic and commercial stock culture sources provide pure cultures of numerous viruses, bacteria, fungi, yeast, and tissue culture cells. In many cases eligibility to procure these stock cultures is not restricted.

(b)(1)