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Description of document: Defense Intelligence Agency report, **Chemical and Biological Warfare Capabilities - Asian Communist Countries**, March 1972

Requested date: 23-October-2008

Released date: 10-June-2013

Posted date: 13-August-2013

Source of document: Commander
US Army Intelligence & Security Command Freedom of Information/Privacy Office
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DEPARTMENT OF THE ARMY
UNITED STATES ARMY INTELLIGENCE AND SECURITY COMMAND
FREEDOM OF INFORMATION/PRIVACY OFFICE
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REPLY TO
ATTENTION OF:

Freedom of Information/
Privacy Office

10 JUN 2013

This is in further response to your Freedom of Information Act (FOIA) request of October 23, 2008, and supplements our electronic message of May 12, 2010.

Coordination has been completed with another element of our command and other government agencies and records returned to this office for our review and direct response to you. We have reviewed the records and determined the records are partially releaseable to you. A copy of the records are enclosed for your use.

We have completed a mandatory declassification review in accordance with Executive Order (EO) 13526. As a result of our review information has been sanitized and 4 pages have been withheld in their entirety as the information is currently and properly classified TOP SECRET, SECRET and CONFIDENTIAL according to Sections 1.2(a)(1), 1.2(a)(2), 1.2(a)(3) and 1.4(c) of EO 13526. This information is exempt from the public disclosure provisions of the FOIA pursuant to Title 5 U.S. Code 552 (b)(1). It is not possible to reasonably segregate meaningful portions of the withheld pages for release. The records are enclosed for your use. A brief explanation of the applicable sections follows:

Section 1.2(a)(1) of EO 13526, provides that information shall be classified TOP SECRET if its unauthorized disclosure reasonably could be expected to cause exceptionally grave damage to the national security.

Section 1.2(a)(2) of EO 13526, provides that information shall be classified SECRET if its unauthorized disclosure reasonably could be expected to cause serious damage to the national security.

Section 1.2(a)(3) of EO 13526, provides that information shall be classified CONFIDENTIAL if its unauthorized disclosure reasonably could be expected to cause serious damage to the national security.

Section 1.4(c) of EO 13526, provides that information pertaining to intelligence activities, intelligence sources or methods, and cryptologic information shall be considered for classification protection.

In addition, information has been sanitized from the records and 4 pages have been withheld in their entirety as the release of the information would reveal sensitive intelligence methods. This information is exempt from public disclosure pursuant to Title 5 U.S. Code 552 (b)(7)(E) of the FOIA. The significant and legitimate governmental purpose to be served by withholding is that a viable and effective intelligence investigative capability is dependent upon protection of sensitive investigative methodologies. It is not possible to reasonably segregate meaningful portions of the withheld pages for release.

The withholding of the information described above is a partial denial of your request. This denial is made on behalf of Major General Stephen G. Fogarty, the Commanding General, U.S. Army Intelligence and Security Command, who is the Initial Denial Authority for Army intelligence investigative and security records under the FOIA. You have the right to appeal this decision to the Secretary of the Army. Your appeal must be postmarked no later than 60 calendar days from the date of this letter. After the 60-day period, the case may be considered closed; however, such closure does not preclude you from filing litigation in the courts. You should state the basis of your disagreement with the response and provide justification for a reconsideration of the denial. An appeal may not serve as a request for additional or new information. An appeal may only address information denied in this response. Your appeal is to be made to this office, for forwarding, as appropriate to the Secretary of the Army, Office of the General Counsel.

Coordination has been completed and we have been informed by the Central Intelligence Agency (CIA) that information is exempt from public disclosure pursuant to Title 5 U.S. Code 552 (b)(1) and (b)(3) of the FOIA.

The withholding of the information by the CIA constitutes a denial of your request and you have the right to appeal this decision to the Agency Release Panel within 45 days from the date of this letter. If you decide to file an appeal, it should be forwarded to this office and we will coordinate with the CIA on your behalf. Please cite CIA #F-2010-01292/Army #57F-09 assigned to your request so that it may be easily identified.

Coordination has been completed and we have been informed by the Defense Intelligence Agency (DIA) that their information is exempt from public disclosure pursuant to Title 5 U.S. Code § 552 (b)(1), (b)(2) (b)(3) and (b)(4) of the Freedom of Information Act and Executive Order (EO) 13,526 § 1.4 (c) (d) and (h). The statute invoked under Title 5 U.S. Code 552 (b)(3) is 10 U.S.C. §424, which allows for the protection of organizational and personnel information for DIA.

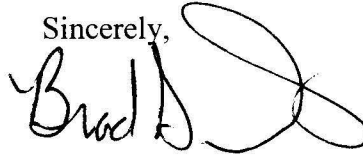
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You have received all Army intelligence investigative records pertaining to this request.

There are no assessable FOIA fees.

If you have any questions regarding this action, feel free to contact this office at 1-866-548-5651, or email the INSCOM FOIA office at: INSCOM_FOIA_ServiceCenter@mi.army.mil and refer to case #57F-09.

Sincerely,

A handwritten signature in black ink, appearing to read "Brad S. Dorris". The signature is stylized with a large, looping flourish at the end.

Brad S. Dorris
Director
Freedom of Information/Privacy Office
Investigative Records Repository

Enclosure

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October 1972

ST-CS-03-148A-72

Publication No.
ST-CS-03-148-72
Amendment A

US ARMY MATERIEL COMMAND
FOREIGN SCIENCE AND TECHNOLOGY CENTER
220 7th St., N.E., Charlottesville, Va. 22901

BIOLOGICAL WARFARE CAPABILITY--ASIAN COMMUNIST COUNTRIES (U)

Publication No. ST-CS-03-148-73, March 1972, is amended as follows:

1. The old pages listed below are to be removed and destroyed in accordance with existing security regulations and new pages are substituted therefor, or are added.

| Remove old pages | Insert new pages |
|--|---|
| <p>----- ✓ iii through xiv ✓ 21 and 22 ✓ 27 and 28 ----- ✓ 53 through 56 ✓ 63 and 64 ✓ 67 and 68 -----</p> | <p>• 0.1 and 0.11 ✓ iii through xviii ✓ 21 through 22.2 ✓ 27 through 28.2 ✓ 48.1 through 48.4 ✓ 53 through 56.2 ✓ 63 through 64.2 ✓ 67 through 68.2 • 114.1 and 114.2 ✓ 119 and 120</p> |

2. Make pen and ink changes as listed on the following pages.

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Exemption Category: 2
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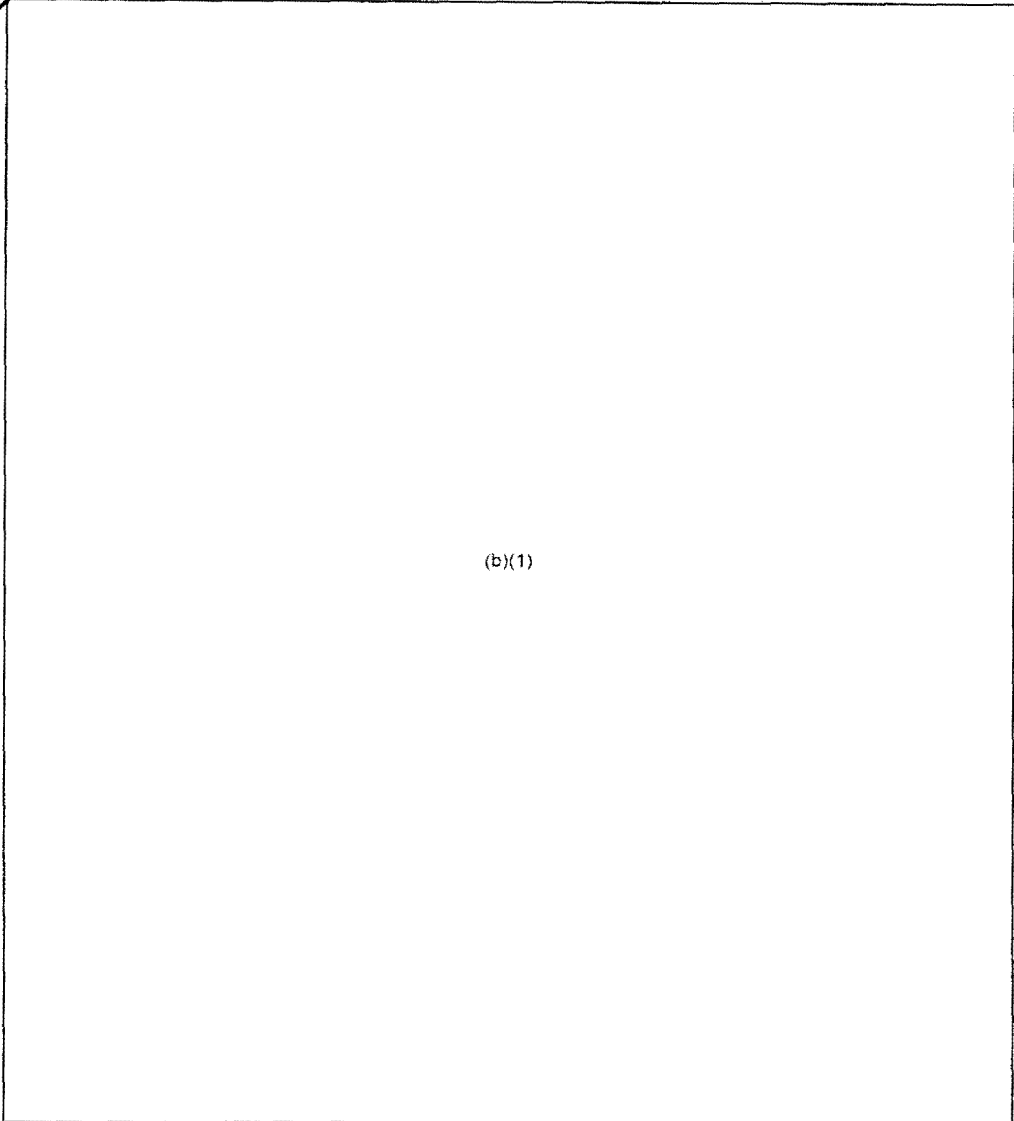
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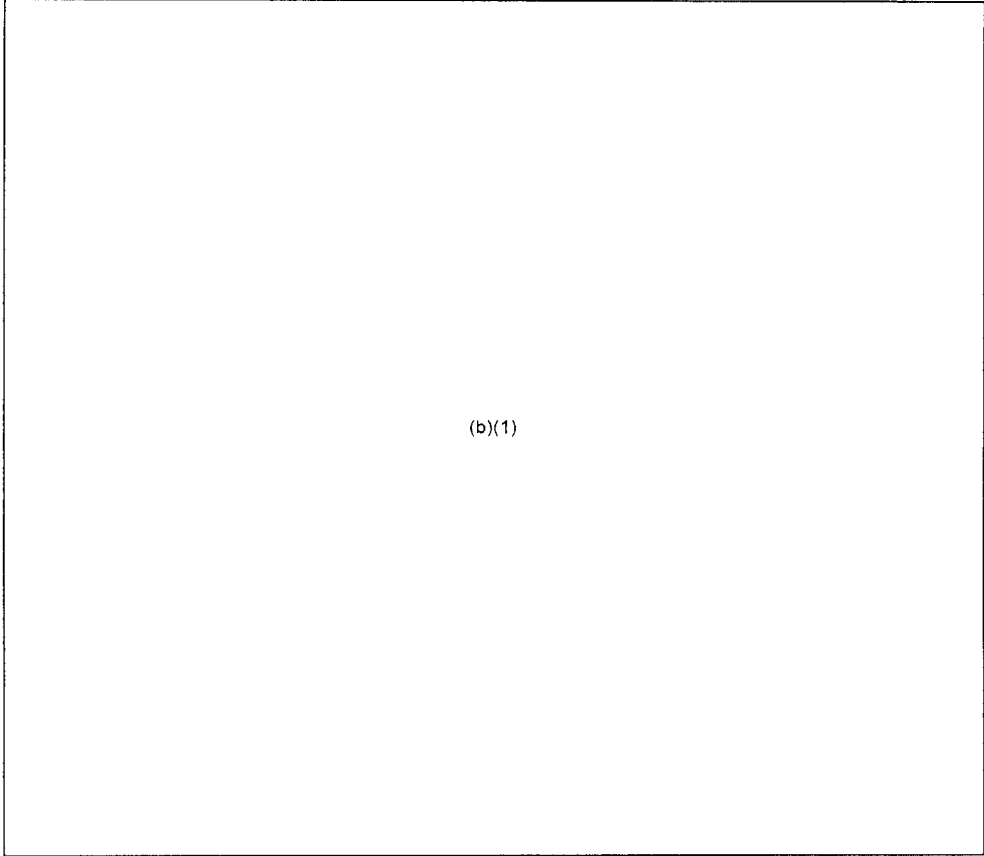
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Publication No.
ST-CS-03-148A-72

US ARMY MATERIEL COMMAND
FOREIGN SCIENCE AND TECHNOLOGY CENTER
Charlottesville, Va. 22901

BIOLOGICAL WARFARE CAPABILITY-
ASIAN COMMUNIST COUNTRIES (U)

- ✓1. Change paragraph 1, "Insert new pages," line 3 of the amendment instructions to read "21 thru 22.2" instead of "21 thru 22.4".
- ✓2. Instructions, page 3, line 17: Delete pen-and-ink change beginning "Page 54, para b...".
- ✓3. To front cover, title page, Amendment A instruction sheet, and back cover, add: RELEASABLE TO UK, CANADA, AUSTRALIA, AND NEW ZEALAND.
- ✓4. To front cover, add: (see first page).
- ✓5. To pages 113 and 114.1, add "-Rel to UKCanAusNZ" to Item 2a.

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BIOLOGICAL WARFARE CAPABILITIES
ASIAN COMMUNIST COUNTRIES (U)

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DIA Task No. T70-03-11

March 1972

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This is a Department of Defense Intelligence Product prepared by the Foreign Science and Technology Center of the US Army Materiel Command, with contributions from the Department of the Navy Scientific and Technical Intelligence Center, and the Defense Intelligence Agency.

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PREFACE

(U) The purpose of this publication is to assess all information concerning the biological warfare capabilities of the People's Republic of China, North Vietnam, North Korea, and Mongolia. For each of these countries information is included concerning: order of battle for biological warfare; identification and description of biological warfare materiel; production installations and capabilities; stockpiles and storage facilities; doctrine and procedures which would govern the use of biological warfare; defensive measures to be taken in the event biological warfare was initiated; and applicable research, development, and testing programs.

(b)(1)

(U) Constructive criticism, comments, and suggested changes are solicited and should be forwarded to the Defense Intelligence Agency, Washington, D. C. 20301, ATTN: DT-1A.

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| SUBJECT MATTER | PAGE NUMBERS | DATE |
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| Preface ----- | iii and iv | Original |
| List of Effective Pages ----- | v and vi | October 1972 |
| Record of Changes ----- | vii (Reverse Blank) | October 1972 |
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| List of Illustrations ----- | xiii (Reverse Blank) | October 1972 |
| List of Tables ----- | xiii (Reverse Blank) | October 1972 |
| Summary ----- | xv thru xviii | October 1972 |
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| | 1 thru 20 | Original |
| | 21 thru 22.2 | October 1972 |
| | 23 thru 26 | Original |
| | 27 thru 28.2 | October 1972 |
| | 29 thru 48 | Original |
| | 48.1 thru 48.4 | October 1972 |
| Section II.----- | 49 thru 56.2 | ----- |
| | 49 thru 52 | Original |
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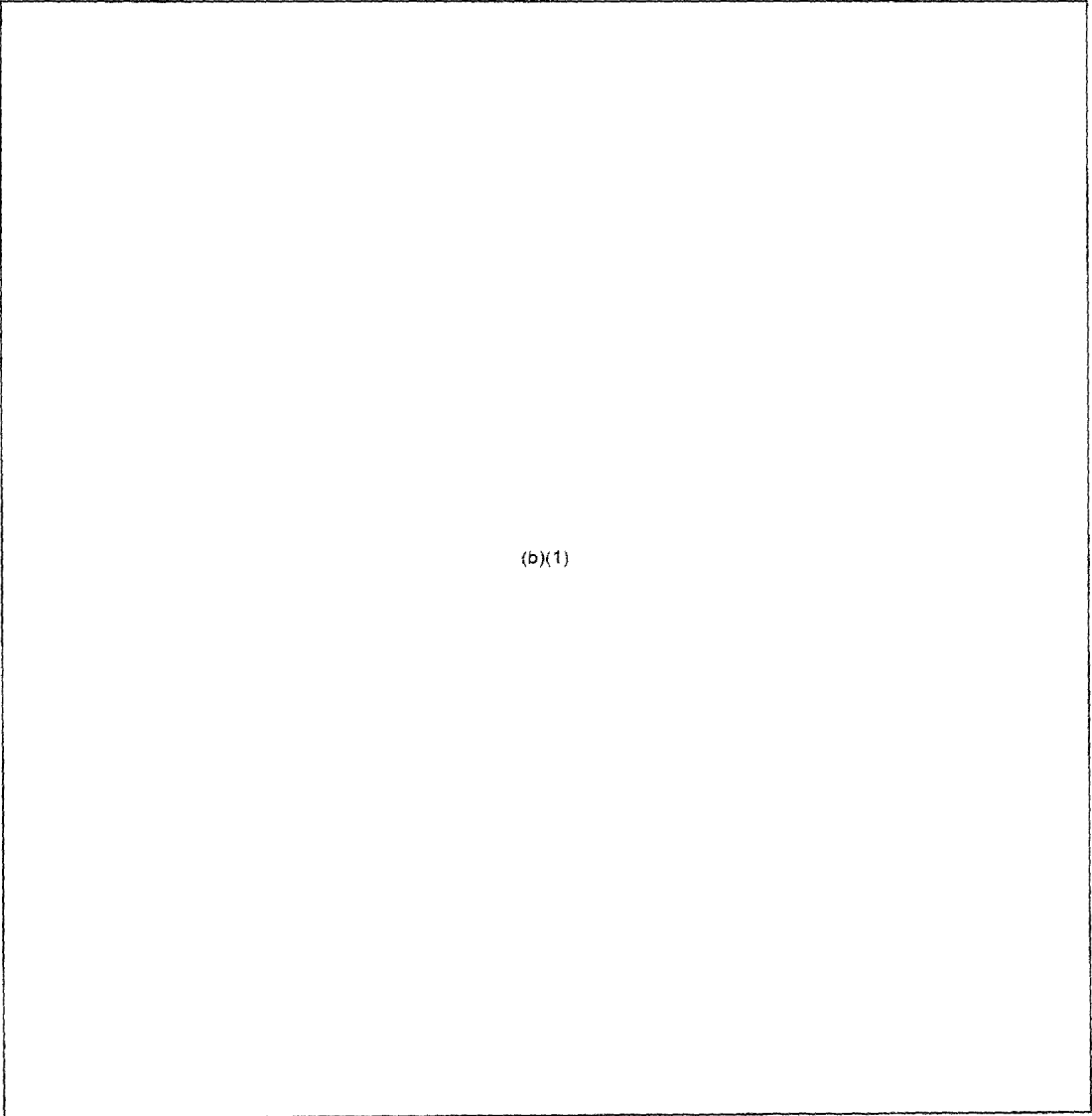
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SUMMARY



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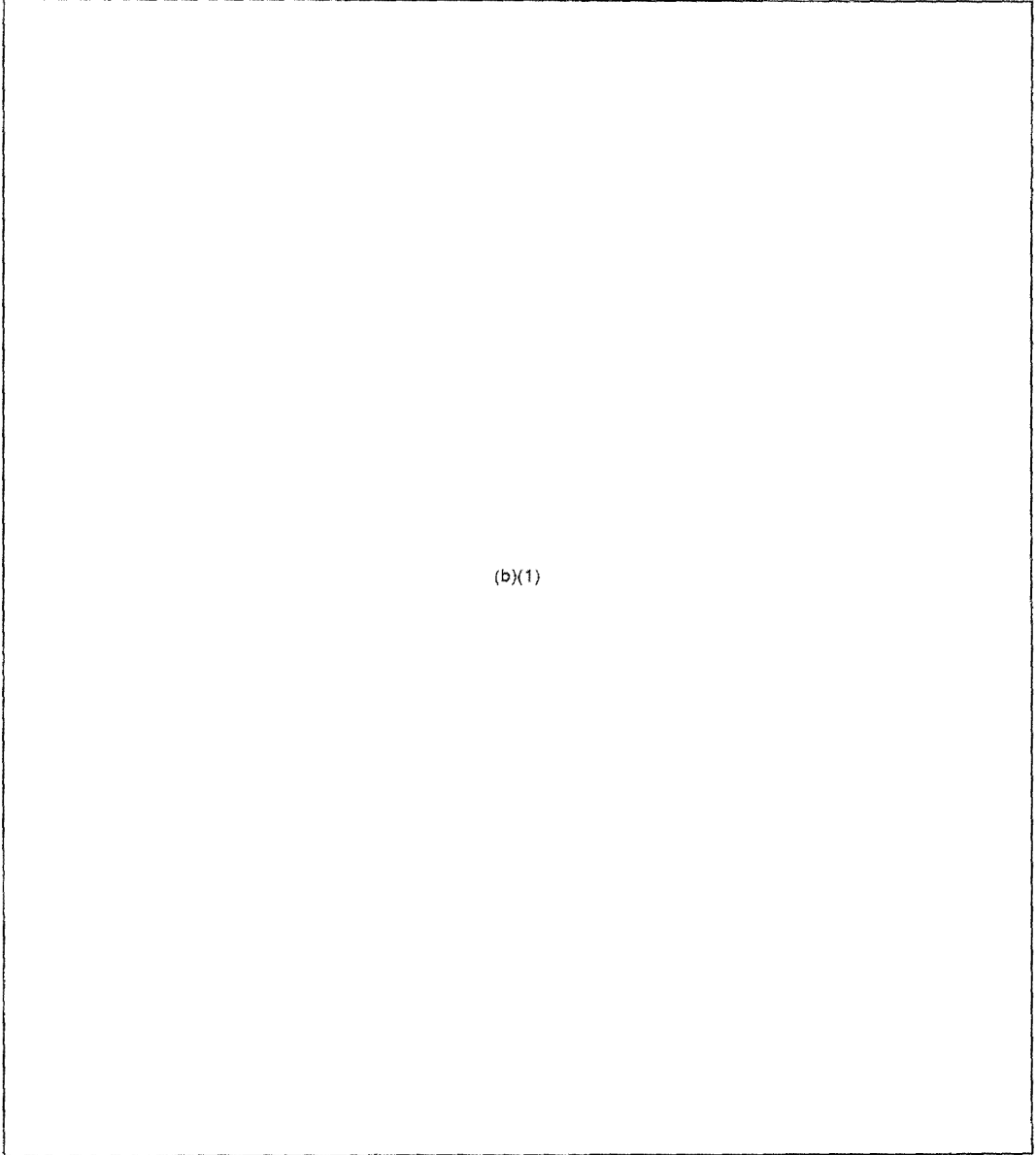
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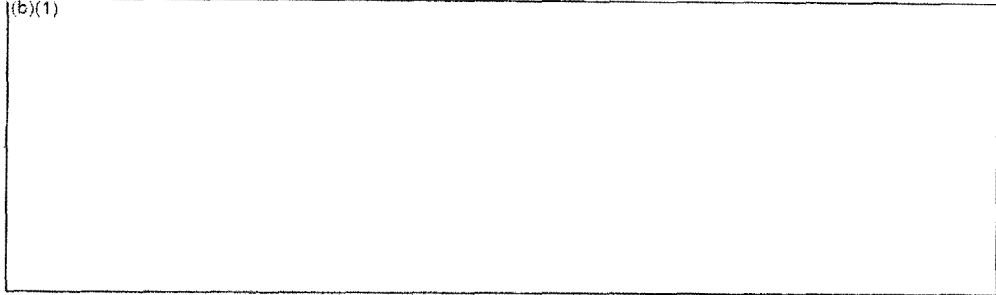
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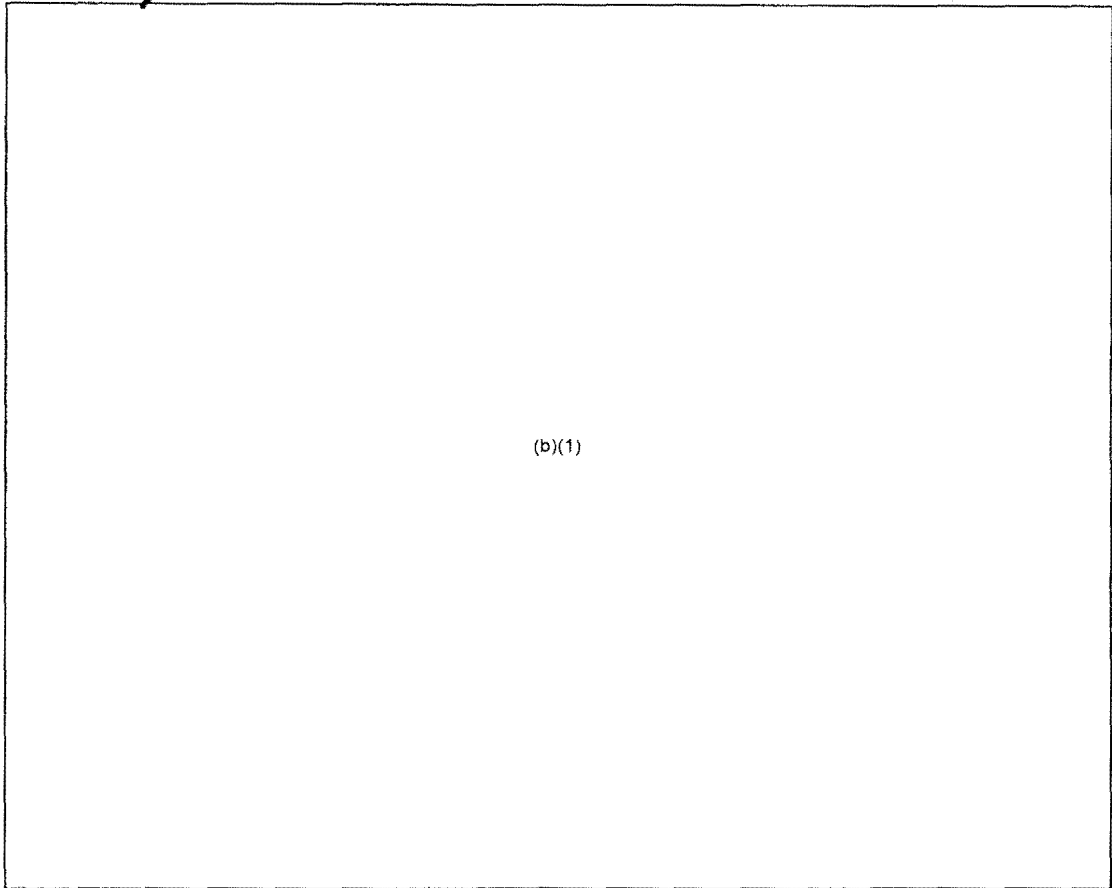
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Section I.
COMMUNIST CHINA

A. INTRODUCTION

1. ~~(S)~~ Historical Background



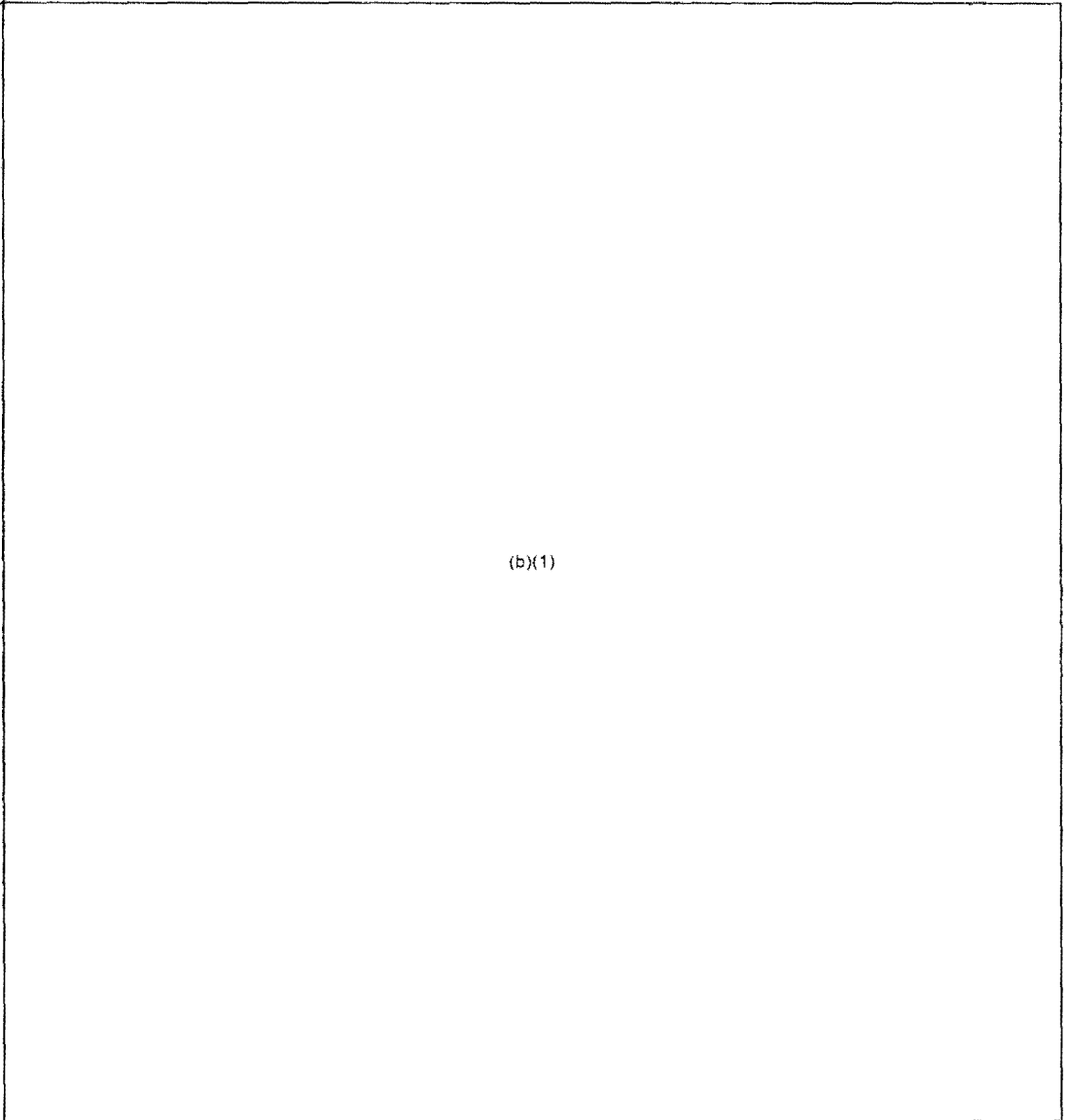
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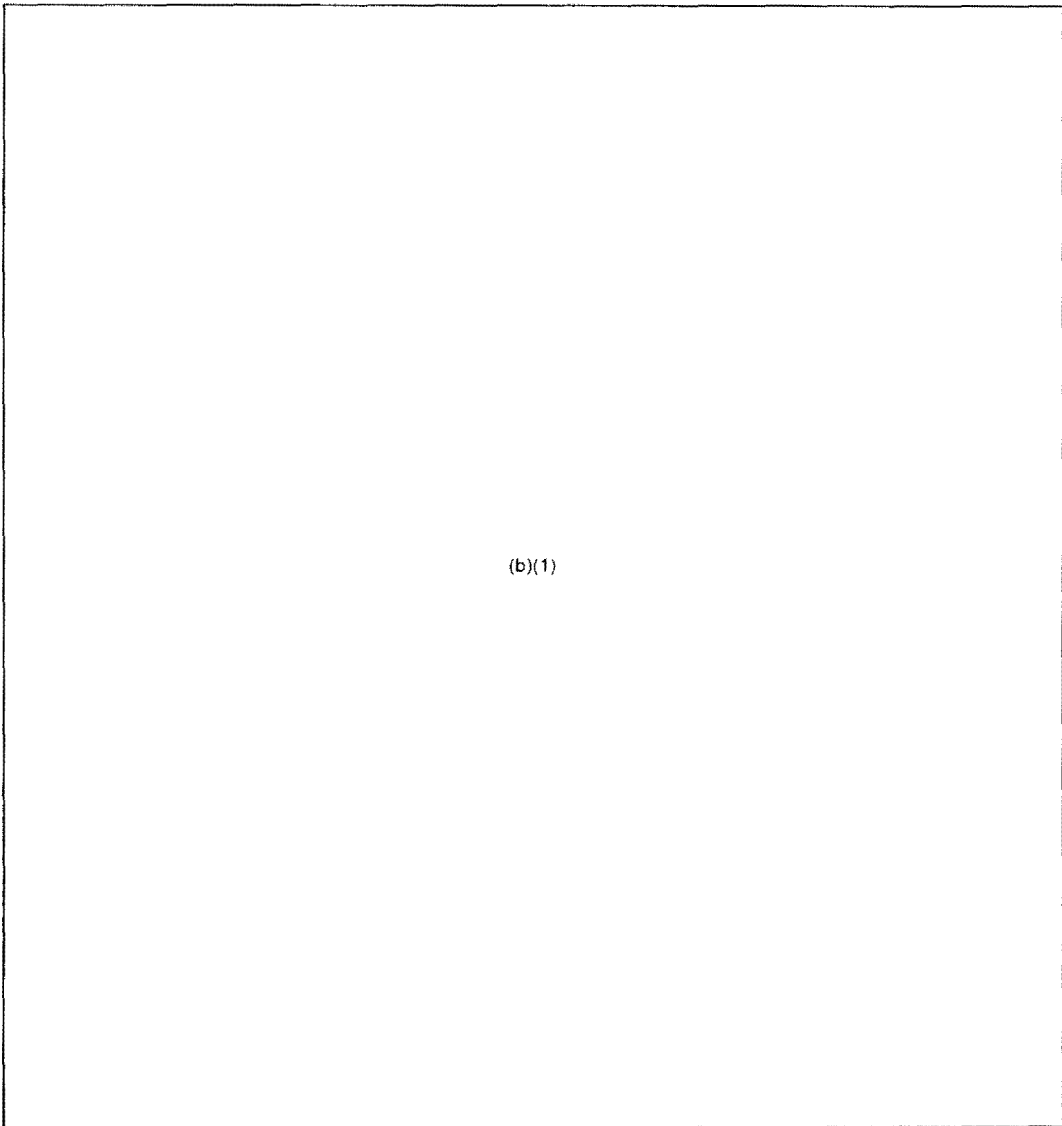
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3. ~~(C)~~ Geographical and Political Factors^u

a. (U) Communist China is the third largest country in the world, occupying about 3.7 million square miles, and the population comprises about one-fifth that of the world. To the North and West an extensive boundary is shared with the Soviet Union, a boundary which separates the two most powerful communist countries. To the South, China borders on several weak, unstable countries, one being North Vietnam. She has used North Vietnam as a base for Communist operations against neighboring countries. China also shares common borders with North Korea, Mongolia, Afghanistan, India, Nepal, Bhutan, Burma, and Laos. The mainland is within 2500 nautical miles of every major target in Asia as well as European USSR. Two-thirds of China's area is mountainous or desert-like, and ninety percent of the population live in one-sixth of the country, primarily in the fertile plains and deltas of the east.⁸

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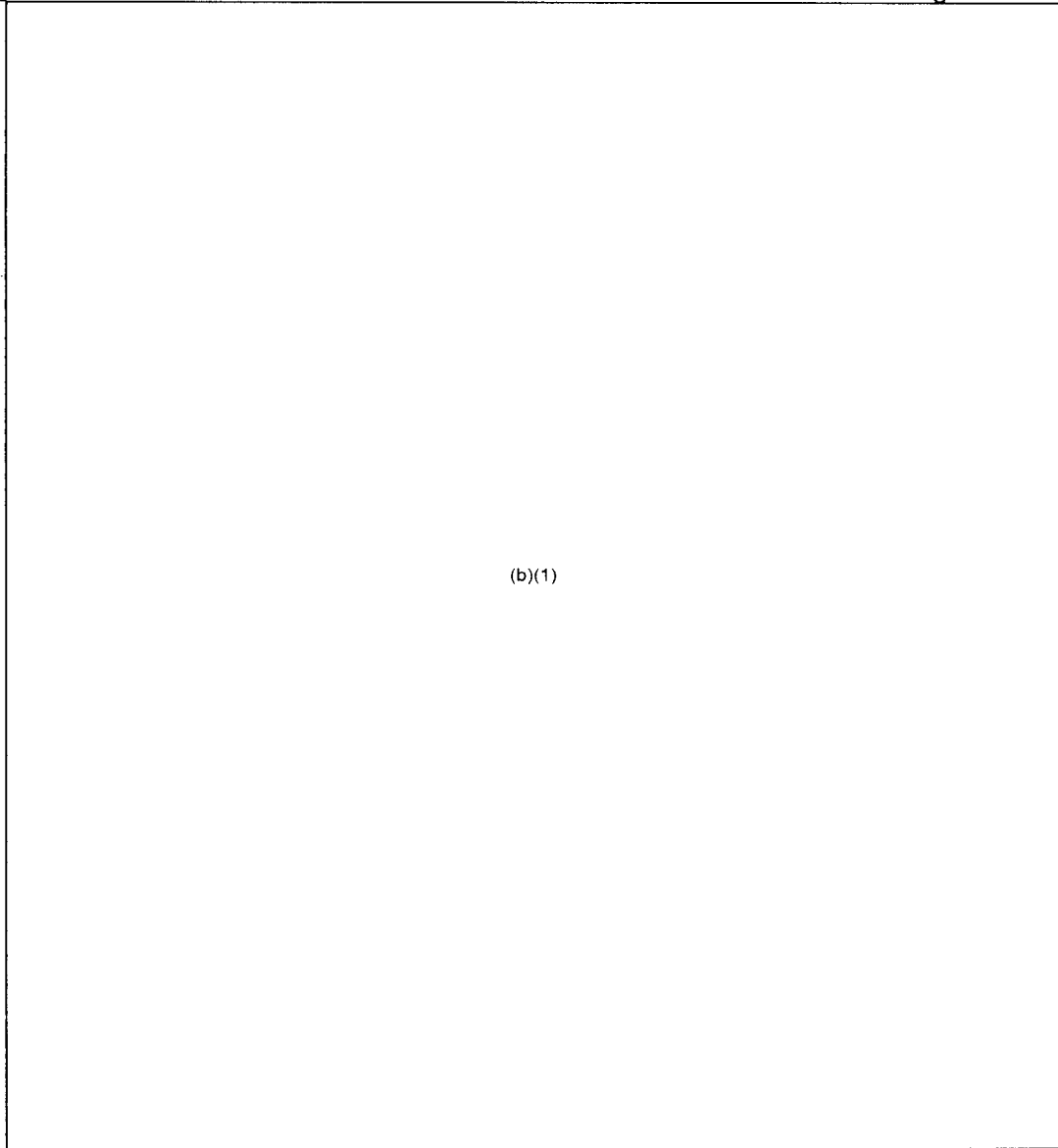
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4. ~~(S)~~ Military Organization

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5. ~~(C)~~ Military Equipment

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6. ~~(C)~~ Military Training

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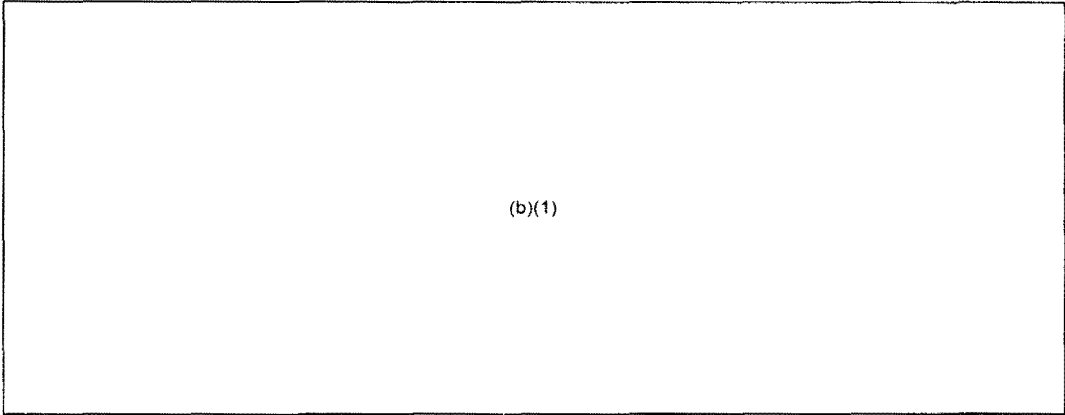
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~~Figure 1.~~ CBR reconnaissance troops in light protective clothing (U).

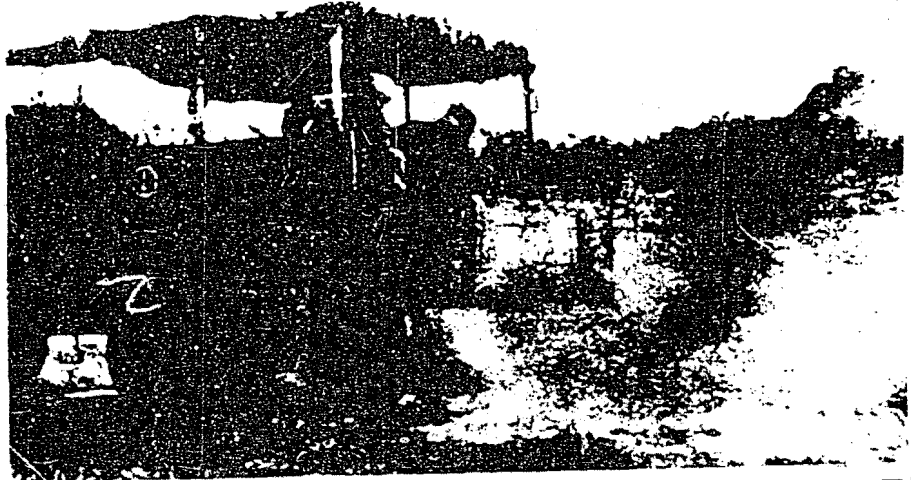


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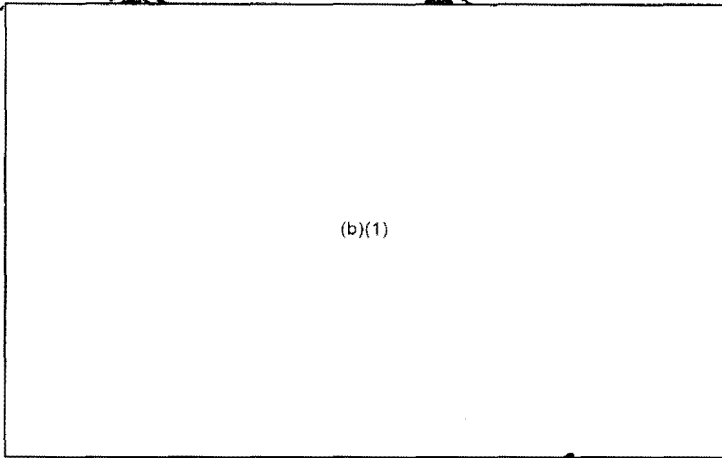
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Figure 2. Vehicle ground decontamination exercises (U).



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Figure 3. Troops preparing to ford stream in full protective clothing (U).

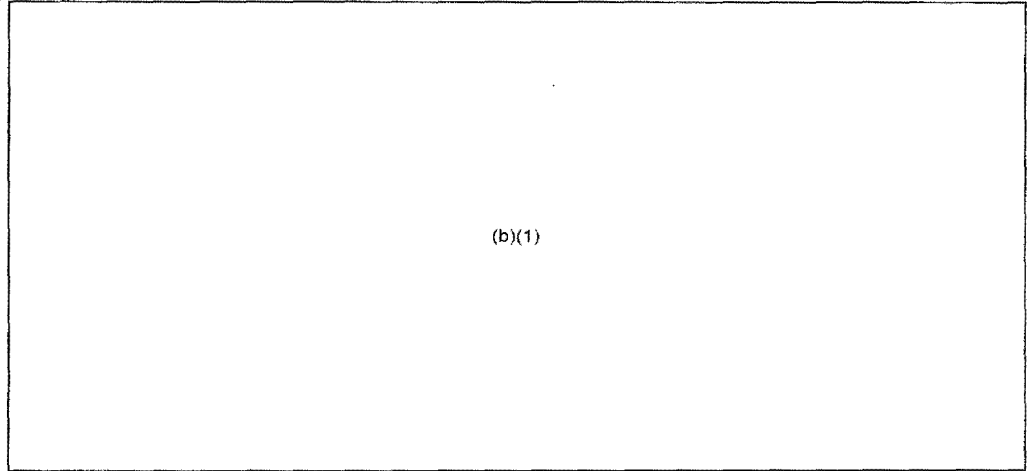
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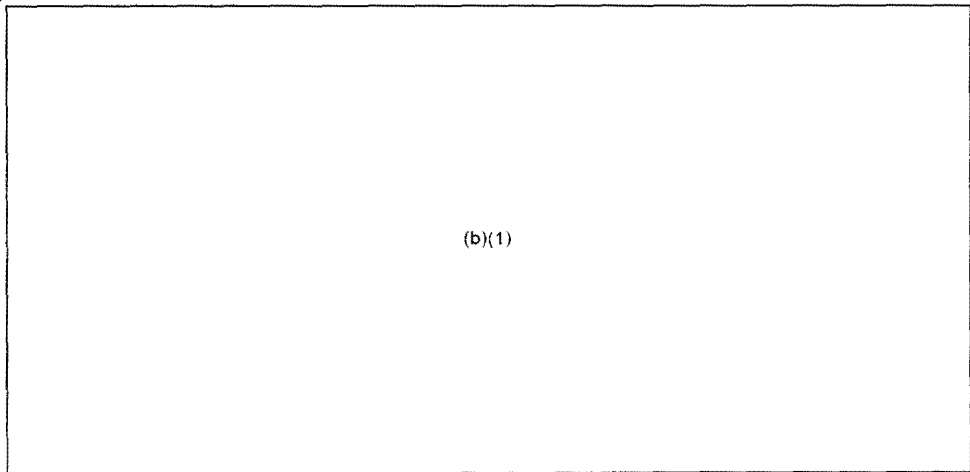
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~~Figure 4. CW school and research station at Ch'ang-p'ing (U).~~



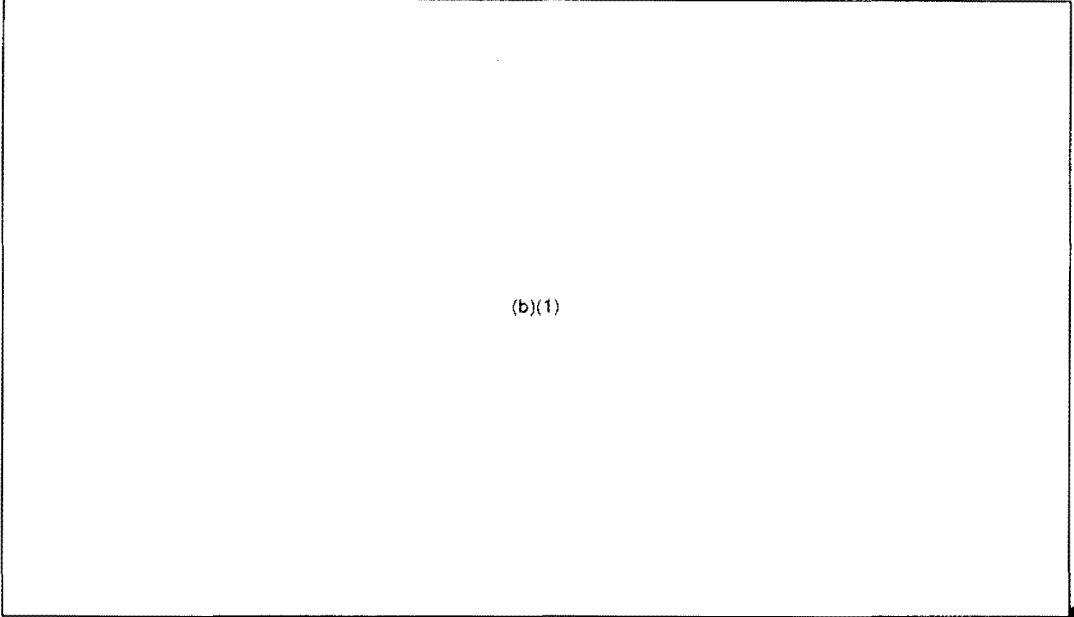
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Figure 5. Decontamination exercise at CW school
at Ch'ang-p'ing (U).

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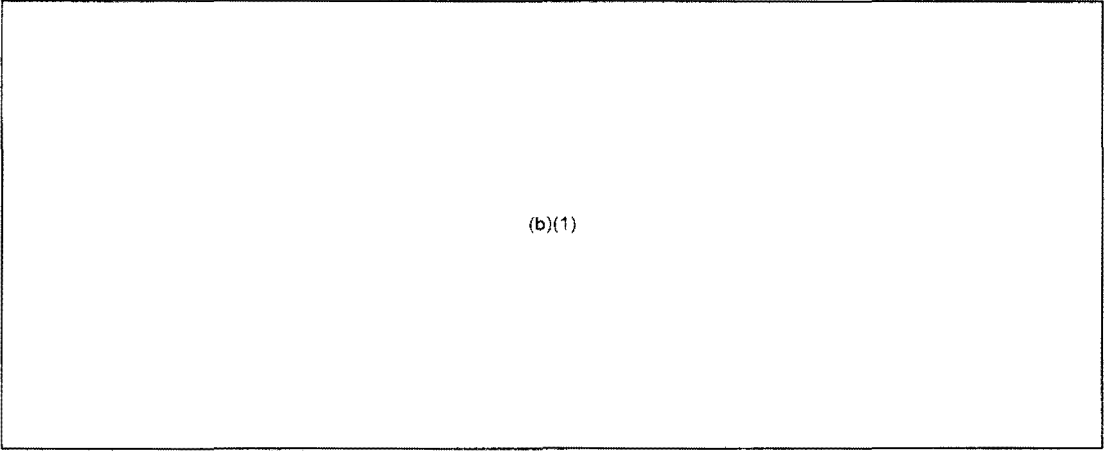
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Figure 6. Troops in full protective clothing training with detector kits at CW school. (U).



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c. (U) ChiCom pictorial magazines have shown naval personnel operating a one-man back pack decontamination apparatus. Another illustration shows sailors washing down the decks with hoses and scrub brushes. There are no recent reports to indicate what, if any, improvements have been made in equipment for decontamination onboard ships (figs 7, 8, 9).¹⁶

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Figure 7. Battle training at sea (U).

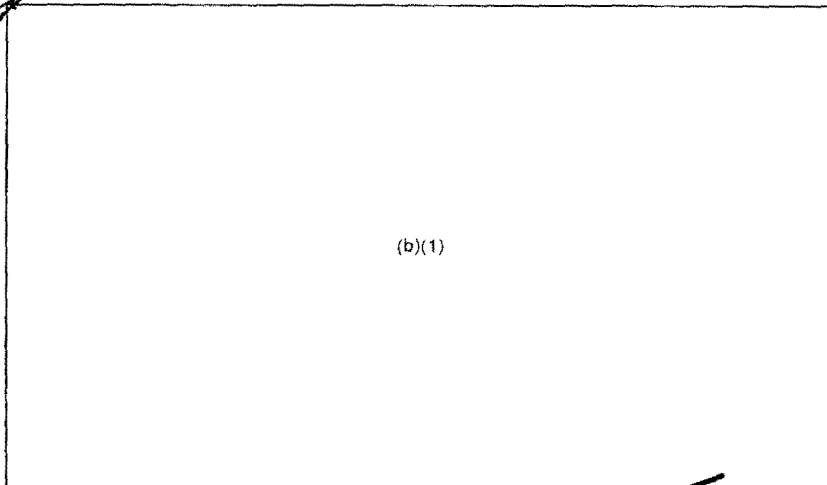
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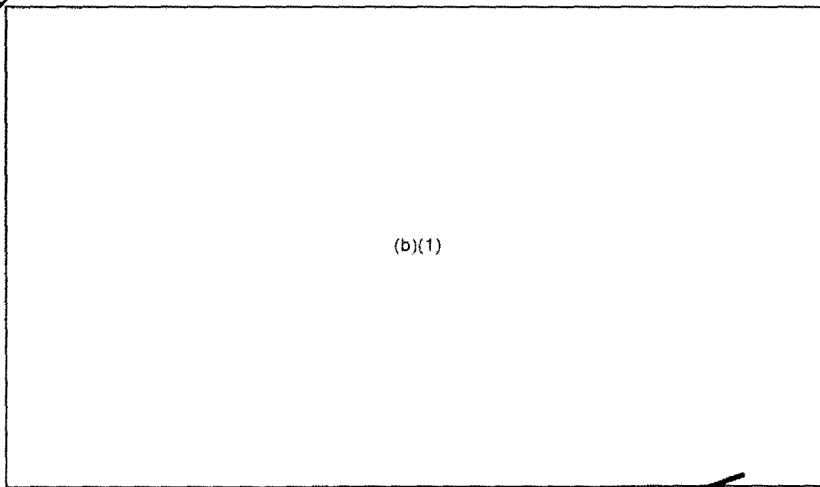
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Figure 8. Decontamination exercise aboard ship (U).



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Figure 9. CBR exercise aboard Chinese ship (U).

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[Redacted]

~~C.~~ POLICY, STRATEGY AND TACTICS REGARDING USE OF BW

8. ~~(C)~~ Policy

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[Redacted]

9. ~~(C)~~ Procedures

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D. POLICY, STRATEGY AND TACTICS REGARDING DEFENSE AGAINST BW

10. ~~(C)~~ Policy

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11. ~~(S)~~ Procedures

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12. ~~(S)~~ Agents

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13. ~~(C)~~ Delivery Systems

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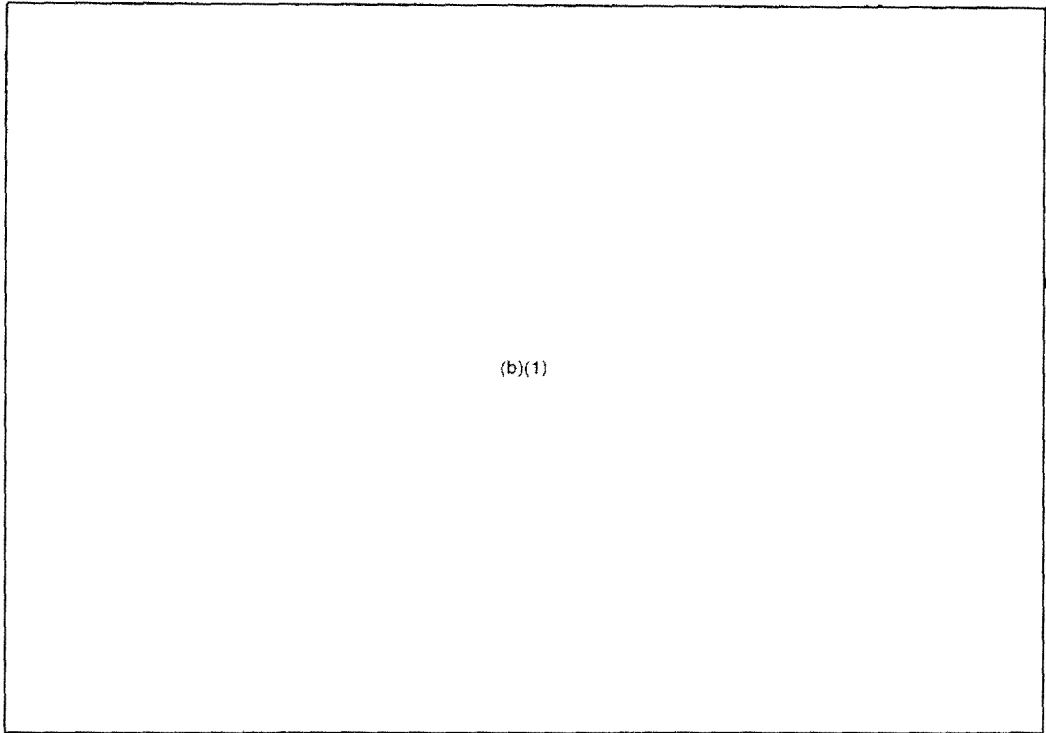
d. (U) The Chinese have studied the transovarian transmission of Rickettsia tsutsugamushi by two types of Trombicella deliensis which provides basic information for establishing vector colonies and their subsequent infection for possible use in a vector-agent system.⁴¹ In a 1966 publication Lu Pao-lin urged that extensive studies of insect culture be undertaken in order to remain abreast of foreign developments.⁴²

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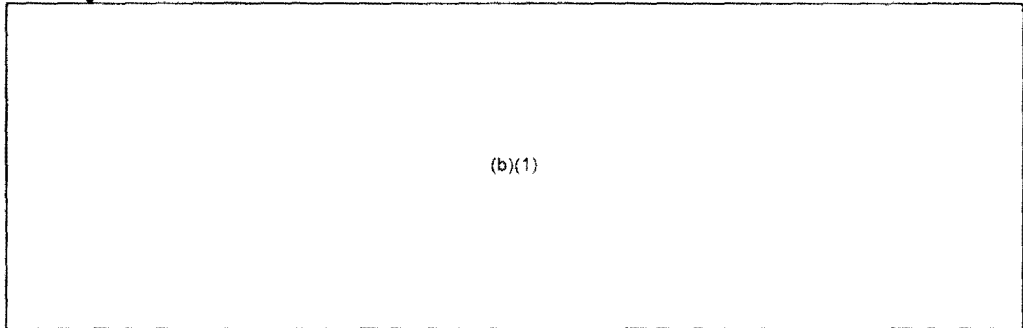
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F. BW MATERIEL (DEFENSIVE)

14. ~~(S)~~ Decontamination &



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15. ~~(C)~~ Detection and Identification

a. (U) There is little indication that the Chinese have conducted research to develop means of detecting and identifying biological agents. The results of some related research could be exploited for such a purpose. Tseng Fan-chi of the Wuhan Army General Hospital obtained rapid results in identifying 55 different species of bacteria by their biochemical reactions. The time required to identify bacteria by this technique was 20-24 hours as opposed to 4-5 days by conventional means.³³ An unknown author summarized a method in 1964 for determining the generation time of Bacillus anthracis.³⁴ The following year Li Liang-shan compared a broth method with the agar method to demonstrate the string-of-pearls reaction for B. anthracis. Details of the test were not given, however, the author claimed that results were identical. Possibly the modified reaction would have contributed to more rapid identification of B. anthracis.³⁵ Other studies suggestive of rapid identification were published by Chiang Shun-Ch'iu who experimented with incomplete antibodies for the diagnosis of brucellosis³⁶ and by Yun Chao-Chuan who compared various methods for identifying Brucella.³⁷

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16. (C) Medical Protection U

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b. (U) Chinese military cadre are inoculated with a combined cholera and typhoid vaccine once a year. Claims have been made that all people of the nation have received vaccination for smallpox, and that the disease has been eradicated. Vaccines or antisera for typhoid, paratyphoid, typhus, diphtheria, tetanus, rabies, plague, cholera, yellow fever, and Japanese B encephalitis have been developed, but the scale of use is not known. The use of live vaccines has been exploited in China. Live vaccines for brucellosis, plague, and anthrax are available.³ Vaccines for the more serious animal diseases, such as, swine plague, hog cholera, rinderpest, and foot-and-mouth disease have been developed. A method of aerosol immunization was introduced into veterinary practice in 1964. The vaccine materiel was sprayed or dusted in a room so that animals were exposed and immunized.⁵⁷ There are no known instances concerning immunization of humans by the aerosol route. Continued efforts in aerosol research could have provided means for the mass immunization of the population and of animals in the event biological agents are used.

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G. PRODUCTION FACILITIES

17. ~~(C)~~ Agents and Munitions

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18. ~~(C)~~ Defensive Equipment

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H. BW RESEARCH, DEVELOPMENT, AND TESTING

19. ~~(S)~~ General 6

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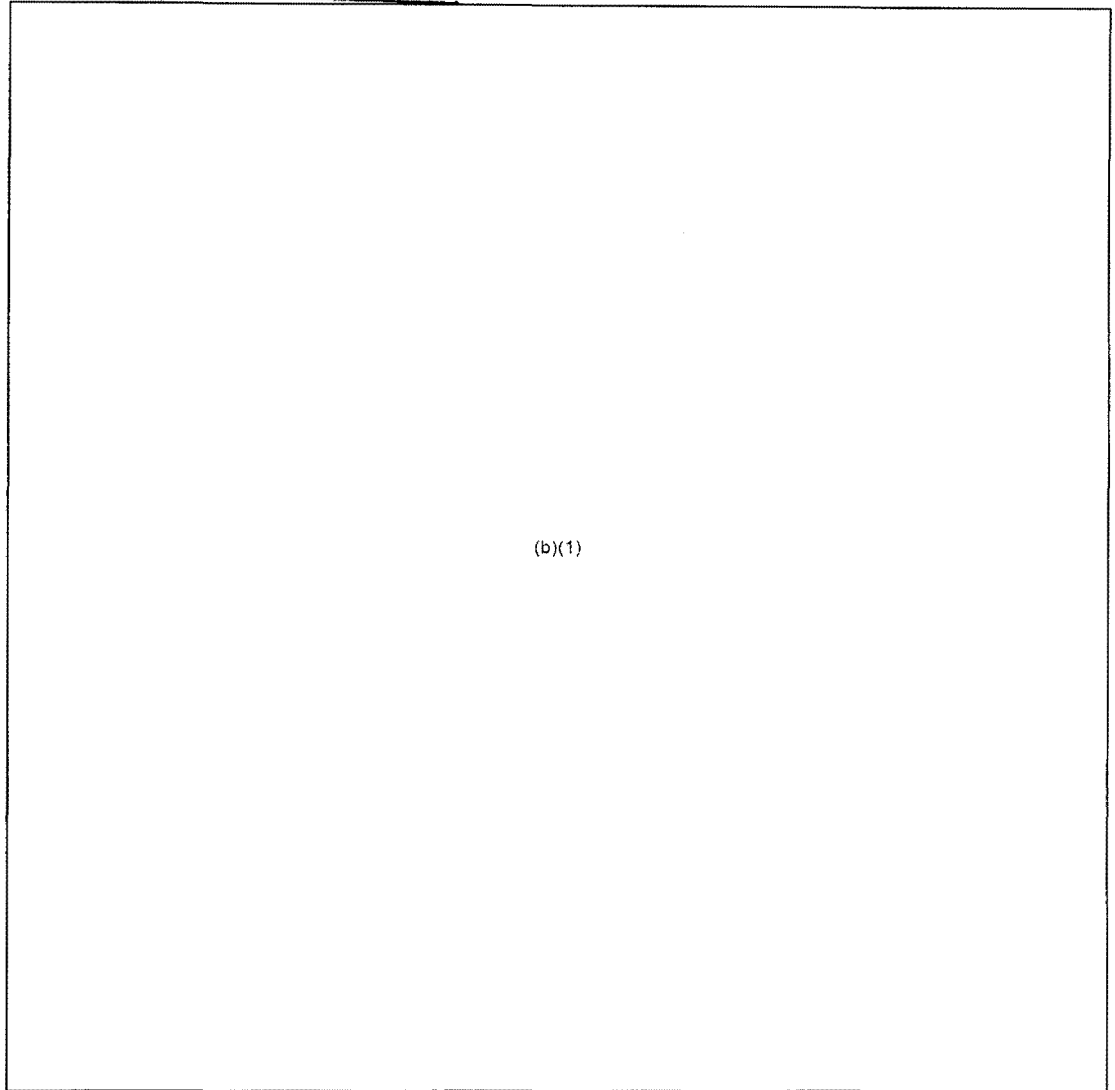
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20. ~~(S)~~ Military Facilities (u)



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c. (U) The CPLA Veterinary University of China. The location of this institute and its true military affiliation cannot be verified. It could be part of the China People's University in Peking, or it might be misnamed because of incorrect translation.⁷⁴ An investigator, Liu Ching-hua, reportedly associated with the University, has studied the various types of Pasteurella isolated from 11 species of animals and fowl.⁷⁵ His observations of morphological, physiological, and biochemical properties indicated that there were no consistent host/bacterial specificities which could be reliably used to classify the 62 types of Pasteurella isolated. In general, although one strain Pasteurella might attack many species of domestic animals and fowl, a single species of animal might be infected by several strains of the bacteria. All strains isolated in nature could give rise to variant types when grown in artificial media. Although this study was apparently conducted to advance veterinary immunology, the basic data concerning susceptibility of animals to this disease and the genetic selection of mutant strains could be applied to other infectious diseases.

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e. ~~(C)~~ The Institute of Zoology, Kun-ming.

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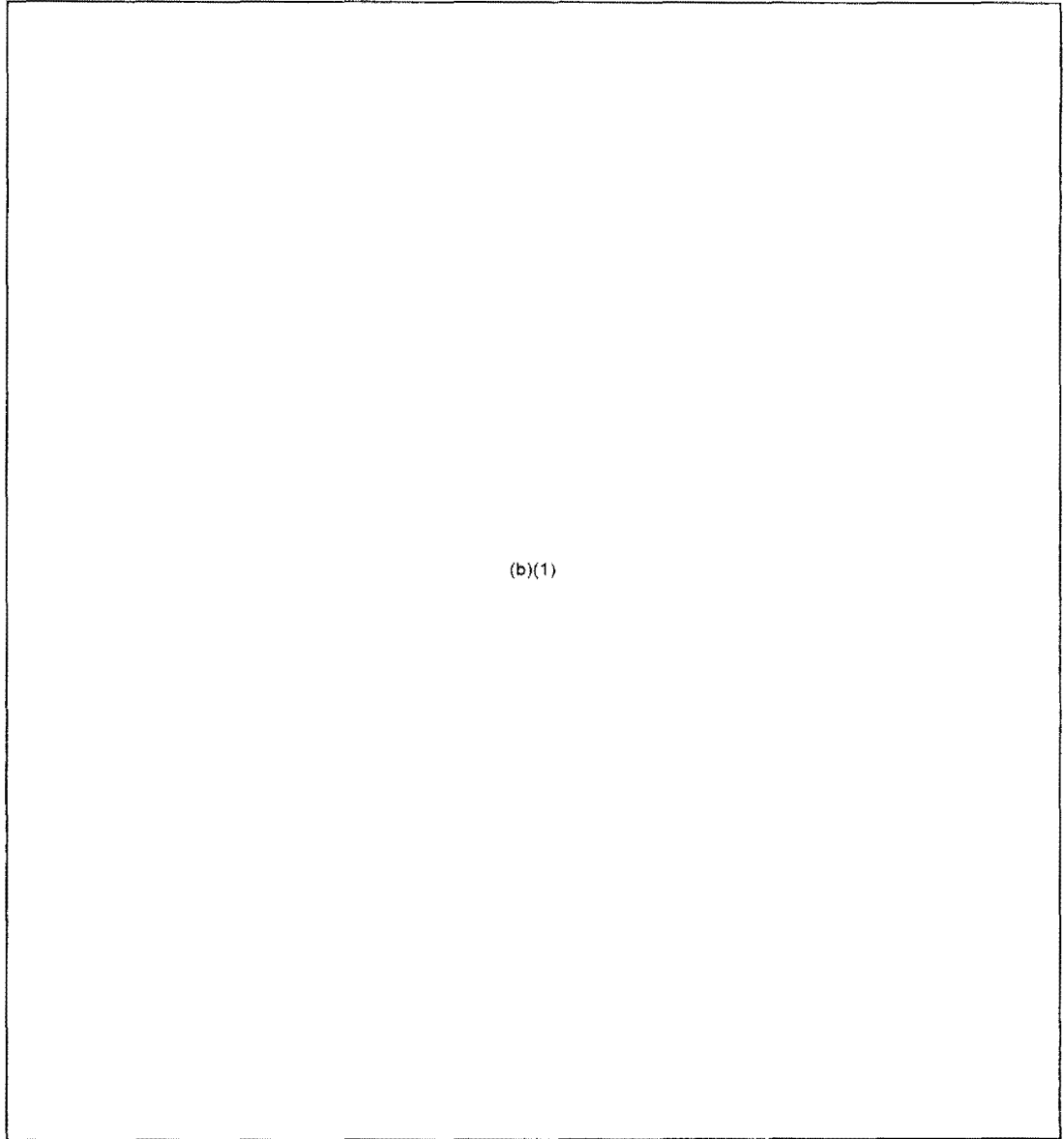
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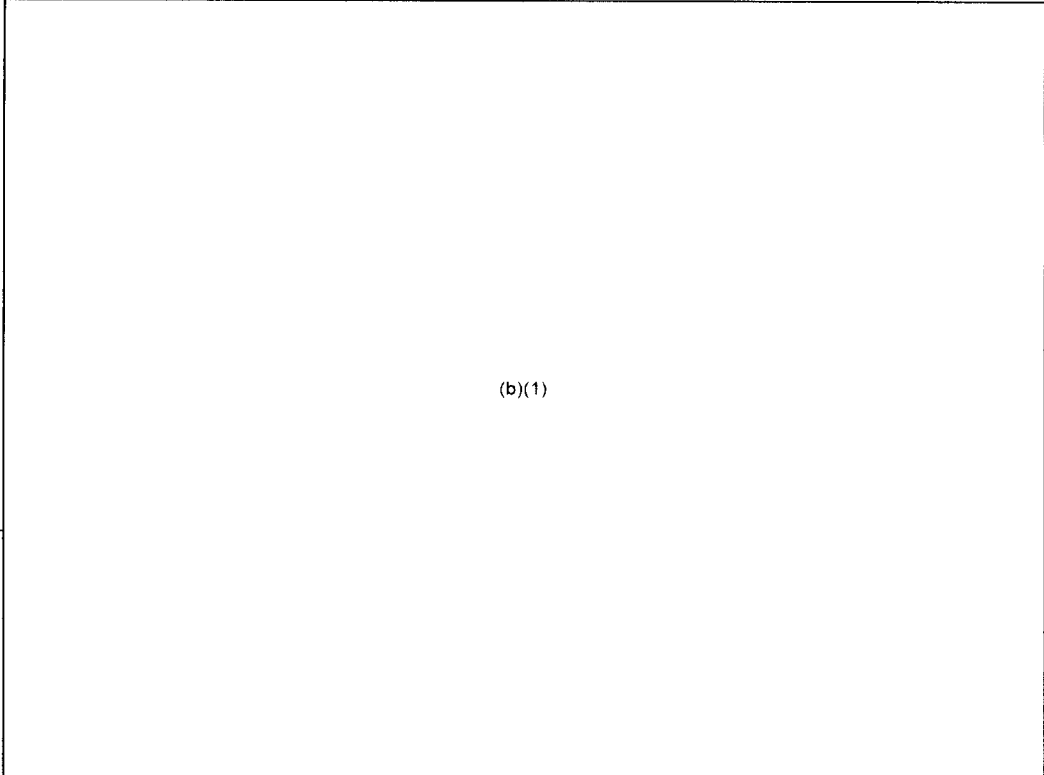
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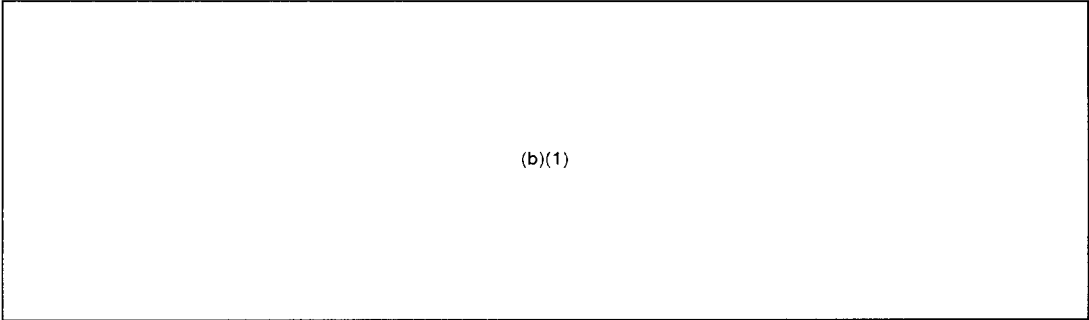
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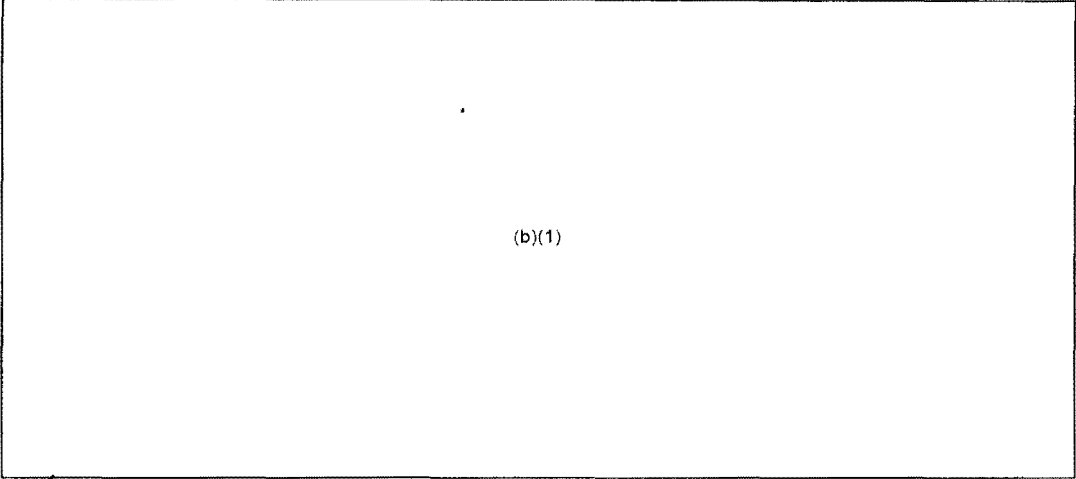
21. ~~(S)~~ Non-Military Facilities



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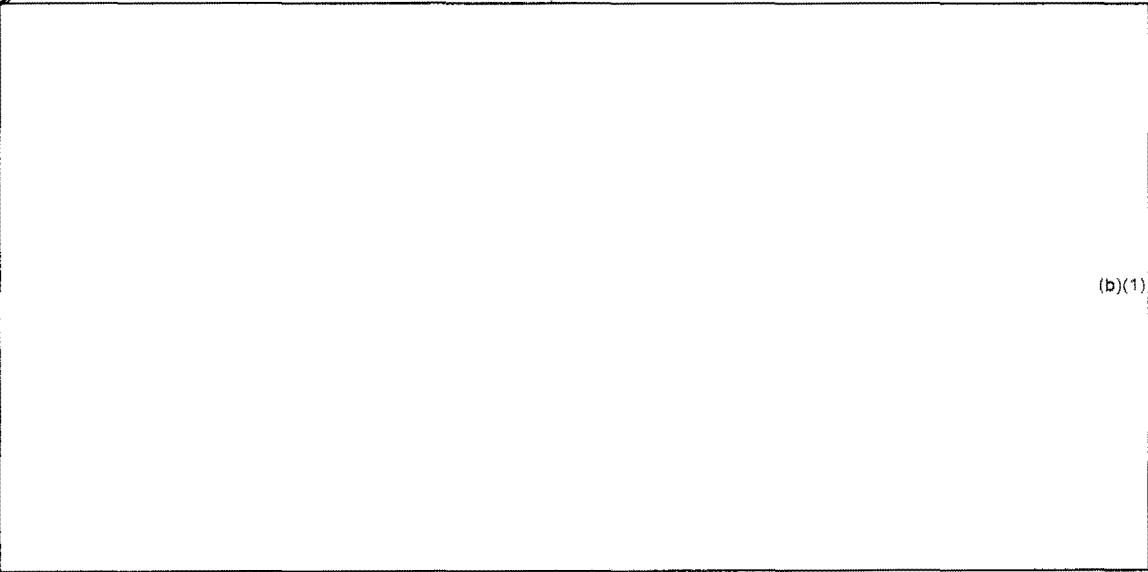
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b. ~~(S)~~ The Institute of Virology, Pekin



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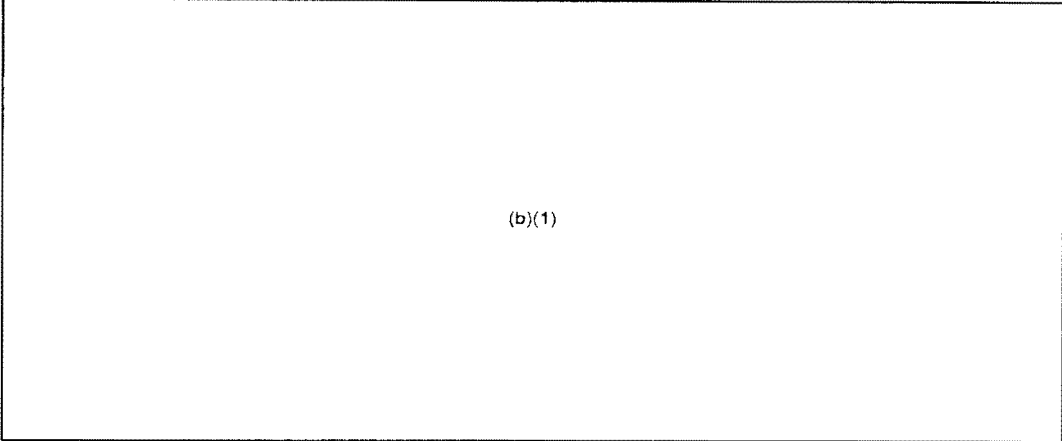
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(3) (U) Ch'en Po-ch'uan, Hsu Chao-hsiang, Liu Yuan-yuan, and Fan Jui-lien, studied the infectivity of JBE virus in 1963.⁹⁵ They concluded that a plaque assay could be used for the routine titration of viral infectivity. A similar study was conducted the following year when these same investigators studied the plaque-forming characteristics of several different strains of this pathogen.⁹⁶



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(6) (U) Mao Chiang-sen studied the effect of temperature and pH on the production of JBE virus and the effect of those parameters on interferon subsequently synthesized in chick embryo cell cultures.¹⁰⁴ The optimal temperature for virus growth was found to be 33.5° C, although interferon production increased as higher temperatures were reached. The optimal pH for interferon production ranged between 7.1 and 7.6, while the optimal pH for production of the infective virus was 7.8. These data suggest, therefore, that at pH7.8 and at 34.5° C, the Peking strain of JBE virus would propagate to maximum titers under conditions severely inhibiting the production of interferon. The Peking strain of JBE virus is the most virulent of those known.

(7) (U) Many other investigators at this institute have contributed also to general knowledge of the JBE virus. Included are P'ang Chi-fang who in 1964 reported observations made with an electron microscope while the virus of JBE was developing in chick embryo fibroblasts and in hamster kidney cells.¹⁰⁵ Wang Chin, 1960, studied

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comparatively the growth of JBE virus in the brain and in the extra central nervous tissues of white mice; coauthor of the finished report was Huang Chen-hsiang.¹⁰⁶⁻¹⁰⁷

(8) (U) Hsu performed studies involving the use of mice in determining the mechanism of immunization against JBE.¹⁰⁶ Lieu investigated the enzymatic activity and effects of ribonucleic acid of JBE on mouse brain tissue.¹⁰⁹ Much of the data obtained from these studies relative to the growth characteristics of the JBE virus would be essential to support any effort to mass produce this virus as a potential BW agent.

c. ~~(C)~~ Institute of Epidemiology and Microbiology, Peking

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(2) (U) Other work on brucella involving the agar diffusion reaction has been done by Yun Chao-ch'uan.¹¹¹ This spotty interest in brucellosis shown by Chinese investigators suggests that China is not free of the consequence of this chronic disease. Attempts to resolve problems affecting public health and the practice of veterinary medicine will generate a great deal of data, some of which would be applicable to the development of brucella pathogens for BW.

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(3) (U) In 1962, Wang Yung-chi, Lu Chin-han, Li Mei-jung, and Chang Yung-fu induced allergic encephalomyelitis in guinea pigs, albino rats, white mice, rabbits, and monkeys.¹¹³ It was found that the pathological changes observed were much more complex in monkeys; this might have been used as a parameter to determine similar results in man.

(4) (U) In a paper presented at the 1963 Symposium sponsored by the Microbiology Society of China¹¹⁴ Wang Yung-chi and coworkers described their findings of an interferon-like substance in chick embryo cultures infected with either type B epidemic encephalitis virus or yellow fever virus. Effective inhibitory concentrations were still present, even upon dilution of 1:160, a fact which indicated a need to make further adjustments in concentration to reduce the plaque count to 50%. In a follow-up study (1964), Wang investigated JBE virus culture, and elucidated the nutritional aspects of viral growth using monolayer tissue cultures.¹¹⁵

(5) (U) Other notable research conducted at the institute was that by Han Hung-lin and Pan Jen-chiang who studied the activation of botulinum type E toxin by trypsin.¹¹⁶ This study confirmed the

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previous observations of others. Available published research on the incidence of botulism in China is scarce, and the extent of research on the toxin is not apparent. Research on botulism would probably be in consonance with similar studies in other countries to combat its incidence, but might also aid any effort to develop this potential BW agent.

f. (U) Chengtu Institute of Biological Products (Chengtu Vaccine and Serum Institute), Chengtu.

(1) (U) Wei Wen-pin characterized an interferon-like substance found in the supernatant fluid of a suspension of mouse lung tissue infected with a virulent strain of Rickettsia prowazekii.¹¹⁷⁻¹¹⁸ The substance exhibited some properties quite distinct from other interferons. Wei and his coworkers were subsequently able to propagate R. prowazeki in monolayer cultures of embryonic mouse lung cells. Wei from 1946 to 1951 was engaged in research at the Pasteur Research Institute in France. In 1952 he was a member of the Chinese Committee to Investigate Alleged US Use of Bacterial Warfare in Korea.

(2) (U) Tung Tien-shun and K'ang Hsien-yuan are responsible for several original studies on Salmonella typhosa, causative agent of typhoid fever.¹¹⁹ Chou has also done original work in isolating new subtypes of Shigella flexneri, causative agent of dysentery.¹²⁰ Studies on the rickettsiae and on the enteric pathogens make up much of China's efforts in microbiology. Work in these areas probably enjoys an emphasis second only to that given to JBE. The endemicity and epidemicity of these diseases demand that such work be performed primarily to upgrade the public health standards in attempts to eradicate these diseases from the environment. The studies they perform and data gathered therefrom could be used to support applicable R&D efforts.

g. ~~(C)~~ Changchun Institute of Vaccines and Serum, Changchun.

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(2) (U) Yang Chung-ch'i has published a paper entitled "Changes in the Amino Acids Composition of Culture Fluid of Pasteurella *(Yersinia) pestis EV strain During Their Growth."¹²¹ The study revealed that various amino acids originally present in the growth medium were utilized by P. pestis according to a definite sequence--proline, serine, and theonine first, followed by glutamic acid only when the first three had been exhausted, and then aspartic acid. Glycine and alanine were utilized only after aspartic acid had been exhausted. Plague, carried chiefly by the tropical rat flea, has occurred in China for centuries and is likely to be present for some time to come. Data realized from studies of the pathogen are applicable to establishing growth parameters of this pathogen.

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(1) (U) Investigators at the Fukien Institute of Epidemiology, Foochow have studied the vectors of Rickettsia tsutsugamushi,¹²⁸⁻¹²⁹ the detection of Leptospira,¹³⁰⁻¹³³ and immunological methods for identifying Coxiella burnetii. An Infectious Diseases Hospital at Foochow and the Fukien Provincial Hospital have also been mentioned. Studies on antibiotic resistant dysentery bacilli¹³⁴ and the serological variability of Shigella flexneri¹³⁵⁻¹³⁶ were conducted there.

*The use of the genus name Yersinia is consistent with current taxonomic practice, however because of past common usage and the greater familiarity of investigators with the genus name Pasteurella, the latter term will be used throughout this report.

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(2) (U) Ch'en, China Medical College, studied the antibiotic resistance of a large number of strains of *Shigella*.¹³⁷ The Inner Mongolia Medical College, Huhekot published results of efforts to isolate drug resistant variants of *Shigella flexneri*.¹³⁸ The Institute of Antibiotics, Peking has evaluated various nitrogen sources for growth of *Shigella* species,¹³⁹ and the effect of additives on growth has been determined.¹⁴⁰ These studies might have some application in a BW program, although the enteric diseases are prevalent public health problems.

22. (S) Potential Agent Development ~~4~~

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~~A~~ Agent Research and Development

Molecular Biology as Related to BW

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Table I. Potential BW Agents (U).

| Causative Agent | Disease Produced |
|-----------------|------------------|
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Table II. Suspected Chinese Biological Warfare Agent
Production Facilities (U).

| Organization | Location | Activity |
|--------------|----------|----------|
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Table II. Suspected Chinese Biological Warfare Agent
Production Facilities (U). (Continued)

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24. ~~(S)~~ Biofermentation/Bioengineering as Related to BW Agent Developments

a. (U) If a successful BW program is ever to be established, fundamental data derived from R&D efforts must first be scaled-up, through process research, so that large volumes of precisely defined biological materiel ultimately can be produced at will. Unfortunately for those who are working very hard to identify this effort, equipment and facilities used for these purposes are simply not unique. For instance: processes by which biological agent fills are produced need differ but slightly from those schedules which are used to manufacture bulk volumes of vaccine materiel; and fermentors already in use to cultivate yeasts and actinomycetes for established commercial purposes could be adapted easily to produce pathogenic organisms with but appropriate modifications for safety purposes. The facilities used for this research in China appear to be under civilian control but nevertheless these could be used to support military needs for the development of BW agents.

b. (U) Chiao Jui-shen, an investigator at the Institute of Plant Physiology, CAS, spoke at the 1963 Symposium on Progress in Microbiology held in Wuhan University and pointed out that although current emphasis

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h. (U) Another significant accomplishment has been the development of an automatic defoaming method for use in the fermentation industry.¹⁴⁹ Shen Yung-hsing described details of this development which compared in quality to the work of the Czechoslovaks, who have recently acquired equipment which controls automatically pH, foam, etc.

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25. (U) ~~(C)~~ Preservation of Microorganisms as Related to BW Agent Development

a. (U) Another prerequisite for the militarization of biological materiel is an appreciation of the technology needed to stockpile agents in a viable state, so as to assure their availability for offensive use when required. The Chinese have conducted various studies which increased their knowledge of the applicable technology, mainly laboratory techniques associated with lyophilization (freeze-drying).

b. (U) In 1959, an improved method of lyophilization was described by Hsieh Chen-yang of the Second Military Medical College, Shanghai, CPLA Academy of Medical Science.¹⁵¹ Many strains of fungi and influenza viruses, together with strains of bacteria which cause anthrax, cholera, brucellosis, and plague, were maintained in a lyophilized state without loss of cultural or physiological properties. These studies demonstrated the competence of Chinese investigators to control the stability, viability, and virulence of potential agents for BW purposes.

c. (U) Hsing Tsu-p'ei of the Hungshan Sanitation and Antiepidemic Experimental Institute, Wuchang, studied the survival of lyophilized Rickettsia tsutsugamushi (orientalis).¹⁵² The results indicated that the rickettsiae retained their viability up to 9 years when stored at -10 to -20° C in sucrose solutions.

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d. (U) Li Tut'ang and Hsu Hung-li of the Institute for Biological Products Research (Ministry of Public Health), Peking, studied survival rates of Vibrio cholerae after lyophilization.¹⁵³ V. cholerae was chosen as a model because of its marked sensitivity to physical and chemical factors associated with biological decay. The investigators found that after 10 years in the lyophilized state, cholera organisms survived without undergoing significant changes in morphological, biochemical, or serological properties.

e. (U) In 1965, investigators in the laboratory of the Wuhan Municipal Contagious Disease Hospital reported on a "simple and practical way of preserving bacteria," which allowed them to keep their cultures either in a refrigerator or at room temperature.¹⁵⁴ This method was used for 3 years and proved effective.

f. (U) Chu Cheng-ch'ing and Tung Ts'un of the Shanghai Institute of Medical Industry, Ministry of Chemical Industry, Shanghai have also conducted a study of microbial preservation by refrigeration and desiccation.¹⁵⁵

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I. ANTICROP RESEARCH

27. (U) General

a. Communist China, the world's third largest country, with an area of 3.7 million square miles, is the world's second largest agricultural producing country after the United States. Communist China, with only 7.8% of the world's cultivated area, supports almost one-fourth of the world's population.

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b. This unfavorable population-land balance, which provides less than 0.4 acre of cultivated land per person, has been a major deterrent to the country's economic progress. Between 80% and 85% of the population are engaged in farming, and agriculture currently supplies one-third to one-half of the national income. Agriculture also supplies the bulk of the raw material base. Farm products and the finished agricultural products constitute 60% to 70% of total exports.

c. During the first decade of Communist rule, gains in agricultural production were registered almost every year. Then 4 years of devastating reverses in agriculture, because of the reckless adventure of the Great Leap Forward (1958-60) and unfavorable weather during 1959-61, dropped farm output to a dangerously low level and resulted in a near collapse of the economy.

d. Under the guise of central planning during the Great Leap Forward, officials had ignored traditional farming culture--thereby badly upsetting one of the most intricate farming systems in history. Because of the successive crop reverses, the regime beat a hasty retreat and announced a new policy of giving priority to agriculture. Since that time, gains have occurred in numerous industries designated to support agriculture.

e. Although sufficient justification exists for official claims that the current level of food consumption exceeds that of the 1959-61 period, agricultural production in the socialist sector has failed to make a net per capita gain since 1964, and remains substantially below levels of production achieved before the Great Leap Forward. Large imports of grain and substantial production increases on private plots of land account for most of the increased consumption since 1961. On socialist farms, the production of food crops in 1966 failed to meet consumer needs for the eighth consecutive year.

f. Although exports of agricultural commodities have increased significantly since 1962, they apparently have not regained the 1959 level. Thus, almost a decade after the Great Leap Forward that was to solve China's economic problems within a few years, the country's agriculture is still in a state of stagnation. As one authority observed, "It may turn out that the Great Leap Forward will have cost the Chinese economy roughly a decade of growth."

28. (U) Major Crops

Rice is by far the most important crop in Communist China. The production of rice is more than three times that of all the other major crops

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combined; wheat is next in acreage and production. Other principal crops are soybeans, peanuts, rapeseed, and cotton. Acreage and production figures of the major crops grown in Communist China are listed in table III.

Table III. Acreage and Production of Major Crops
in Communist China (U).

| Crops | Acres | Production (tons) |
|----------------|------------|-------------------|
| Rice ----- | --- | 91,800,000 |
| Wheat ----- | 62,114,000 | 22,927,000 |
| Soybeans ----- | 20,433,000 | 8,100,000 |
| Peanuts ----- | 4,339,000 | 2,209,000 |
| Rapeseed ----- | 2,830,000 | 965,000 |
| Cotton ----- | 10,950,000 | 1,241,000 |

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29. ~~(C)~~ R&D Against Naturally Occurring Crop Pests and Anticrop Warfare Agents

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b. (U) Research on Rice Diseases and Insects. Since rice is the most important source of food in Communist China, its diseases would be expected to receive the greatest attention of ChiCom scientists. This opinion seems to have no basis in fact, however, since the rust diseases of wheat apparently are the object of much more research.

(1) (U) Investigations on rice diseases. Rice blast is a serious disease in Communist China, especially in the northeast, but only one article since the beginning of 1965--concerning the application of kasugamycin, a Japanese antibiotic, for the control of rice blast--has been noted in a Chinese Communist publication.¹⁵⁶ The study on which the article was based was conducted by a Japanese scientist. During the same time period, three papers on other rice diseases appeared:

(a) (U) The Mycelial Activities of the Rice Sheath Blight Fungus in Relation to the Disease Development;¹⁵⁷

(b) (U) Studies on the Spore Dispersal of Helminthosporium oryzae;¹⁵⁸

(c) (U) Field Control of Bacterial Leaf Streak (Xanthomonas oryzaicola) of Rice in Kwangtung.¹⁵⁹

(2) (U) Rice insects. The following two papers on rice insects have been noted; both concern research on the control of the paddy borer:

(a) (U) Outbreak, Rhythm, and Control Techniques of Paddy Borer (Tryporyza incertellus Walker) in Huang, Hsin, Hsi, and Demonstration Regions in Hopeh Province;¹⁶⁰

(b) (U) Forecasting the Third Generation Paddy Borer (Tryporyza incertellus Walker) and Chemical Control Techniques.¹⁶¹

c. (U) Research on wheat Disease and Insects.

(1) (U) Races of wheat stem rust. The physiological races of the fungus causing stem rust of wheat were analyzed in 1964. Stem rust was epiphytotic in all areas of China in 1964, being generally more serious in the north than in the south. In 1964 a total of 2835 samples of stem rust spores was collected from 229 cities and districts within 26 provinces; 2006 of them have been identified. The identifications were conducted from November 1964 to March 1965 according to the usual international procedure and rules. The races and types found were: 17, 19, 21, 21C1, 21C2, 21C3, 34, 34C1, 34C2, 40, and 194. The predominance of race 21 has

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been gradually decreasing, whereas race 34 has been increasing in occurrence, as seen from the analyses of the physiological races found from 1962 to 1964. This survey was conducted by personnel from the Mukden Agricultural College, Heilungkiang Agricultural Research Institute, and the Kirin Agricultural Research Institute, all in Northeast China.¹⁶²

(2) (U) Control of wheat diseases. Four effective means of stripe rust control have been developed in China: (a) breeding of rust-resistant varieties, (b) postponing the sowing time from 100 days to 80 days before the winter solstice, (c) destroying disease-infested plants, and (d) applying fungicides like sodium fluorosilicate and sulfanilamide.¹⁶³ According to available statistics, 6 million acres were sown with about 100 varieties of good rust resistant strains of wheat in Shansi, Hopeh, Shantung, Honan, Shensi, Kansu, and Northern Kiangsu in the autumn of 1964.¹⁶⁴ The variety Nei-hsiang 36 was reported to be immune to stripe rust but susceptible to leaf and stem rusts. A second variety, Hopeh Agriculture University 3, is almost immune to stripe rust and is resistant to stem rust, while a third variety, Hsu-chou 4, is almost immune to all three types of rust.¹⁶⁵

(3) (U) Development of chemical rust fungicides. Sulfonic acid, a systemic fungicide against wheat rust, has been tested in the field. The optimum concentration found was 6.5 to 13 pounds of 65% acid per acre. Methods for producing the acid have been developed.^{166,167}

(4) (U) Development of antibiotic fungicides. During 1965, seven papers were published on antibiotic fungicides. All but one concerned the fungicide "Nung-K'ang-101," and isocycloheximide isolated from Streptomyces aureus, by the Pharmacology Institute, Chinese Academy of Sciences, Shanghai. Nung-K'ang-101 was tested and found to be effective against wheat rust and Gibberella disease of wheat.¹⁶⁸⁻¹⁷⁴

(5) (U) Research on control of wheat insect pests. The oriental army worm, Leucania separata Walker, is the pest most destructive of cereal crops in Kirin Province, Northeast China. Studies have been conducted on its life history and the effects of microclimate on its population density. The wheat stem fly, Meromyza saltatrix Linn, is a serious pest of wheat in Shensi. Differences in varietal susceptibility have been noted; plants growing in fertile soils sustain less injury. Benzene hexachloride (BHC) or parathion provide very effective control of the adult fly. One paper describes the development of the aphid Macrosiphum granarium--the chief wheat pest in the province of Hsi-Nan.¹⁷⁵⁻¹⁷⁹

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d. (U) Research on Soybean Diseases and Pests. Although the soybean is a major crop in Communist China, research on its diseases and pests is sketchy. Only three papers have been noted: one on the analysis of the soybean mosaic virus, and two on the soybean pod borer. The latter is a serious pest of soybeans in Northeast China. Recommended control methods are the use of resistant varieties of soybean, proper cultural practices, and insecticides like BHC together with DDT.¹⁸⁰⁻¹⁸²

e. (U) Research on Rape Disease and Pests. The Institute of Microbiology has conducted an intensive study of the rape mosaic viruses. The Chinese Communists have identified and characterized 40 strains of the virus. A partial purification of the virus has been accomplished, and its properties have been described. Another institute has studied the epidemic relations between the vector aphid, Myzus persicae Salz, and the virus.¹⁸³⁻¹⁸⁵

f. (U) Research on Cotton Disease and Pests. Analysis of the published research papers indicates that the principal diseases and insects of cotton are: fusarium wilt, verticillium wilt, and pink bollworm. Stopping the spread of fusarium wilt and verticillium wilt appears to be the principal difficulty. Use of BHC and DDT is recommended to control the bollworm.¹⁸⁶⁻¹⁸⁸

g. (U) Insect Pest Control Research.

(1) (U) Chemosterilants. Two forestry institutes have been investigating the use of the chemosterilants to control Dendrolimus punctatus Walker, Bombyx mori, and other insects. Chemosterilants selected experimentally included Thio-TEPA, 5-fluorouracil, 5-fluorourotic acid, colchicine, nitrogen mustards, and thiocarbamide. The effects of the various chemosterilants on the different insects were described.¹⁸⁹⁻¹⁹²

(2) (U) Organic insecticides. Research on chemical insecticides in Communist China appears to concern chiefly the testing of Western-developed organophosphorus and organochloro insecticides on Chinese crops. The development of synthetic processes for producing the desired insecticides for Chinese crops also is of concern.

(3) (U) Biological control. Spores of the bacteria B. bassiana and B. thuringiensis are used to control such insects as D. punctatus Walker, the pine caterpillar Grapholithe glycinivosella, and Cylas formicarius. Applications of the insect fungus, Spicaria fumoso-rosea, have been considered for the control of a wide range of insects, including L. separata Walker and Pyrausta nubilalis Hübner. The use of Chinese bees and the insect Trichogramma australicum to control the sugar cane borer has been investigated and has produced satisfactory results.¹⁹³⁻¹⁹⁶

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30. ~~(S)~~ Assessment of Communist China's Anticrop BW Capabilities u

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J. CONCLUSIONS

31. ~~(S)~~ Offensive Posture u

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32. ~~(S)~~ Defensive Posture u

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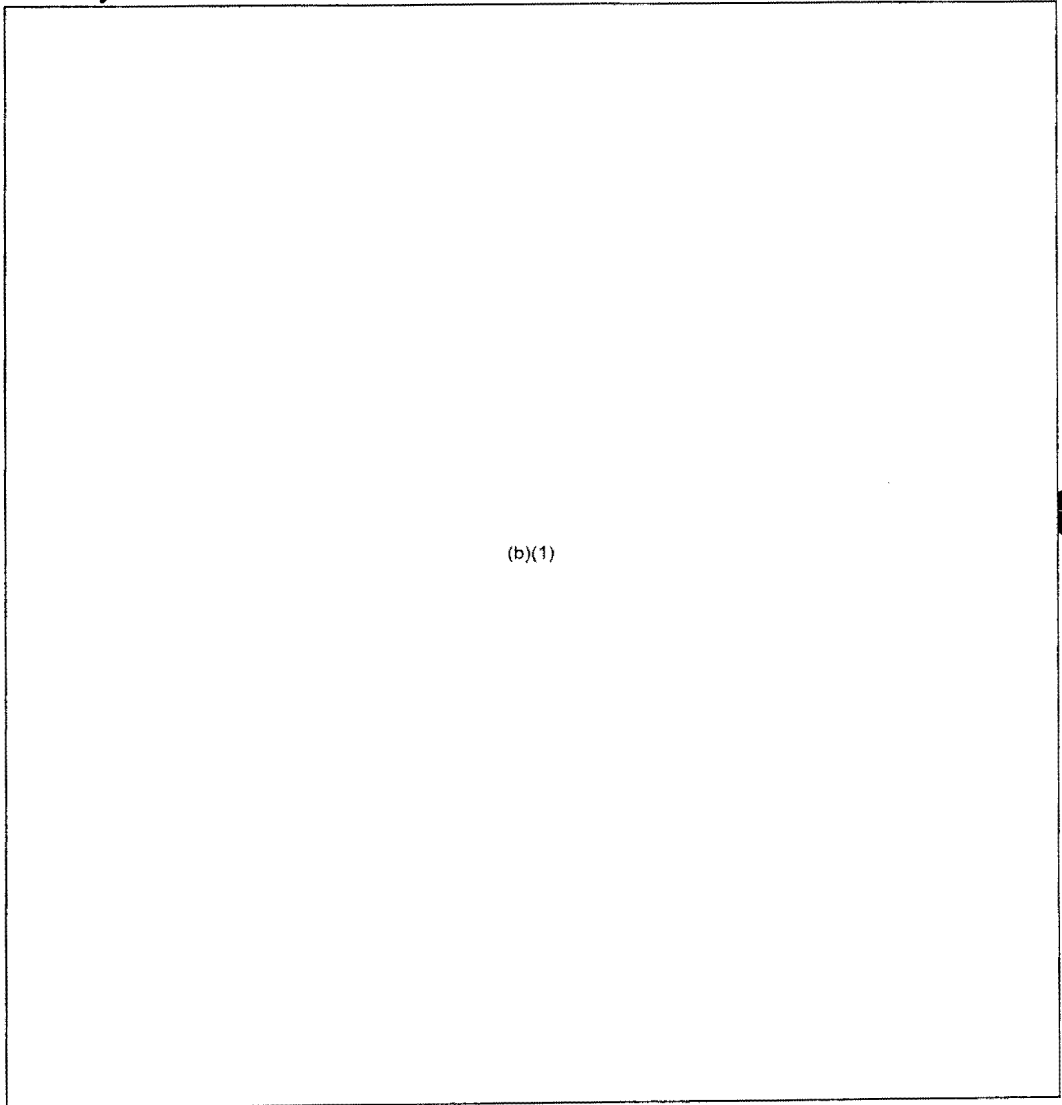
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K. TRENDS AND FORECASTS

33. ~~(C)~~ Trends



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34. ~~(c)~~ Forecasts *u*

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e b. Mid-Range (5-10 Year Projection).

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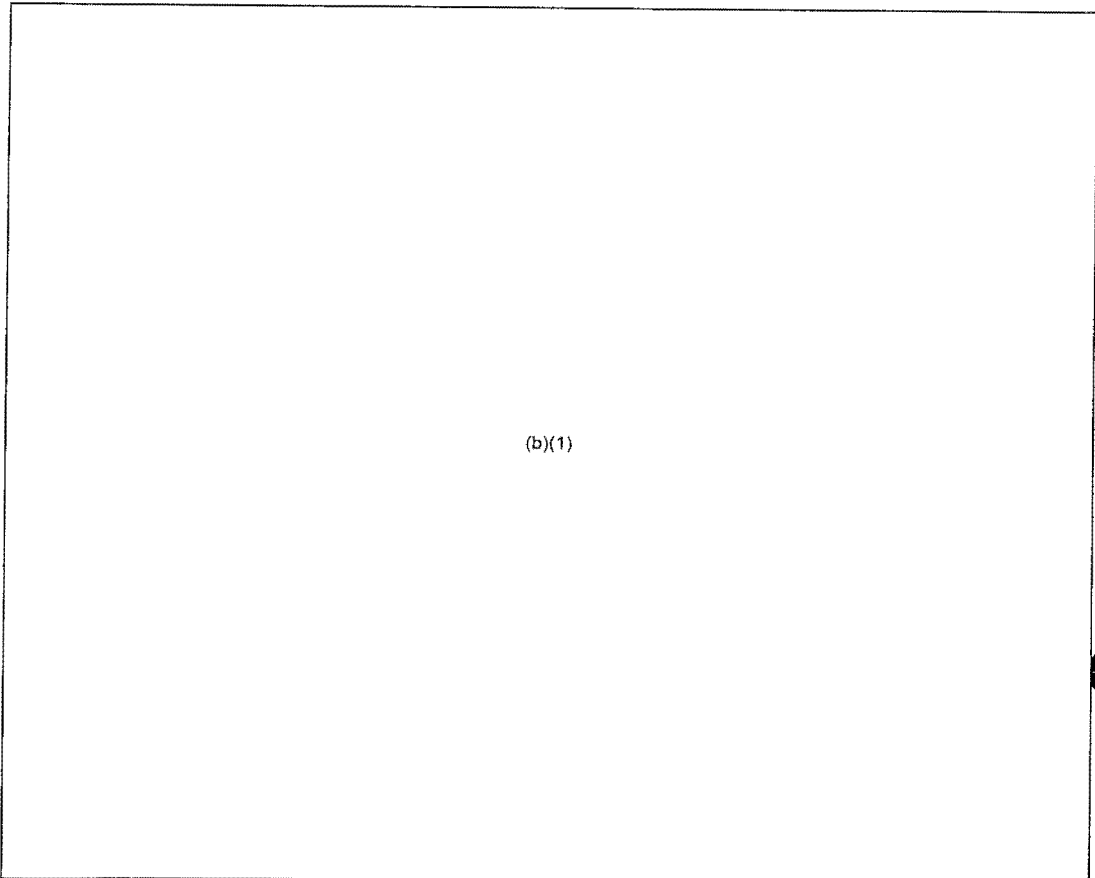
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Section II.

NORTH VIETNAM

A. INTRODUCTION

1. ~~(S)~~ Historical Background and Competence in Microbiology ^u

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b. (U) When the Communists assumed control of North Vietnam in 1954, there was no central public health group capable of effectively instructing the people and instituting disease control procedures. Modern sanitation and public health facilities were essentially nonexistent. A Ministry of Public Health on the pattern of Communist China was established in Hanoi that year. The health organization extends down to interzonal and provincial levels, each having its own hospital or health center, along with its own medical and provincial administrators.²⁰³ Little attempt was made to control scientific activities until 1958 when the State Science Committee was formed to aid the government in the organization and direction of scientific activities.²⁰⁴ In 1960, the first attempt was made to draft a comprehensive scientific and technical program which evidenced the attempt to plan for the orderly development of scientific effort by the State Science Committee.²⁰⁵ The government

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has claimed improvement in public health and sanitation but the number of medical personnel is inadequate and most of them are poorly trained. After 1960, the Bacteriological Institute was made responsible for the production of vaccines against diseases of an epidemic nature. Vaccines against smallpox, tetanus, polio, and cholera have been produced, but the institute and other production facilities could not manufacture sufficient quantities to immunize all the population.²⁰⁶ Since 1965, eastern European countries have significantly increased assistance to North Vietnam in the medical field, including construction of new hospitals and medical facilities, most of which probably serve military needs.

2. (U) Geographical and Political Factors

a. North Vietnam lies in the northeastern part of the Indochina Peninsula, bordering the Gulf of Tonkin. This relatively small and irregular shaped country narrows from a maximum width of 375 miles in the north to about 30 miles in the south. The maximum north-south axis is about 450 miles. Its size approximates that of the State of Washington. The population of about 18.5 million is chiefly concentrated in the Red River Delta and along the coastal plains. Of the 1850 miles of land boundaries, about 800 miles borders on Communist China and about 1000 miles on Laos. There are two ^{land} routes into North Vietnam from Communist China, and a number of highway connections. Two selected routes from Laos contain a road suitable for vehicular movement, but are poor access routes because of the mountainous terrain and inferior roads. The best air approaches are from the east, over the South China Sea.

b. The DRV Government is a highly centralized structure paralleled by the Lao Dong (Communist Party) organization, composed of more than half a million members. Civil obedience is maintained by an elaborate police and security service backed up by the military service. The economy is tightly controlled and the people are held to an austere level of living. North Vietnam's position in the Communist World was greatly enhanced by the personal stature of Ho Chi Minh. The Soviet Union and Communist China have each actively sought the support of the DRV in their contention for leadership in the Communist world. This has been done partly by making competitive grants of both military and economic assistance. North Vietnam, although heavily dependent on the larger and more advanced Communist countries for military and economic aid, has remained largely independent in the formulation of its domestic and foreign policies. The DRV controls its own territory through the usual Communist machinery and methods.¹⁹⁸

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c. The government structure was substantially reorganized in 1960. A new constitution was promulgated for further centralization and for an elected National Assembly. The constitution was modeled extensively on the Chinese constitution and serves as an organic law for the government as well as a propaganda document for the Lao Dong. Like all Communist constitutions, it ascribes considerably more responsibility and authority to the governmental organization than exists in actual practice. The most important centers of power within the government are the executive agencies--the President of the Republic; the Premier; the Council of Ministers; and the administrative committees of the local governments. The Council of Ministers is the organization closest to the policy making process, and the most important ministries of the Council are the Ministries of National Defense, Foreign Affairs and Public Security. Each of these Ministries is headed by Politburo members. The Communist regime has continued to reshuffle local government organizations and generally has developed a unified, nationwide system of local administration, dominated by Lao Dong Party members.¹⁹⁸

B. ASSESSMENT

3. (c) Order of Battle u

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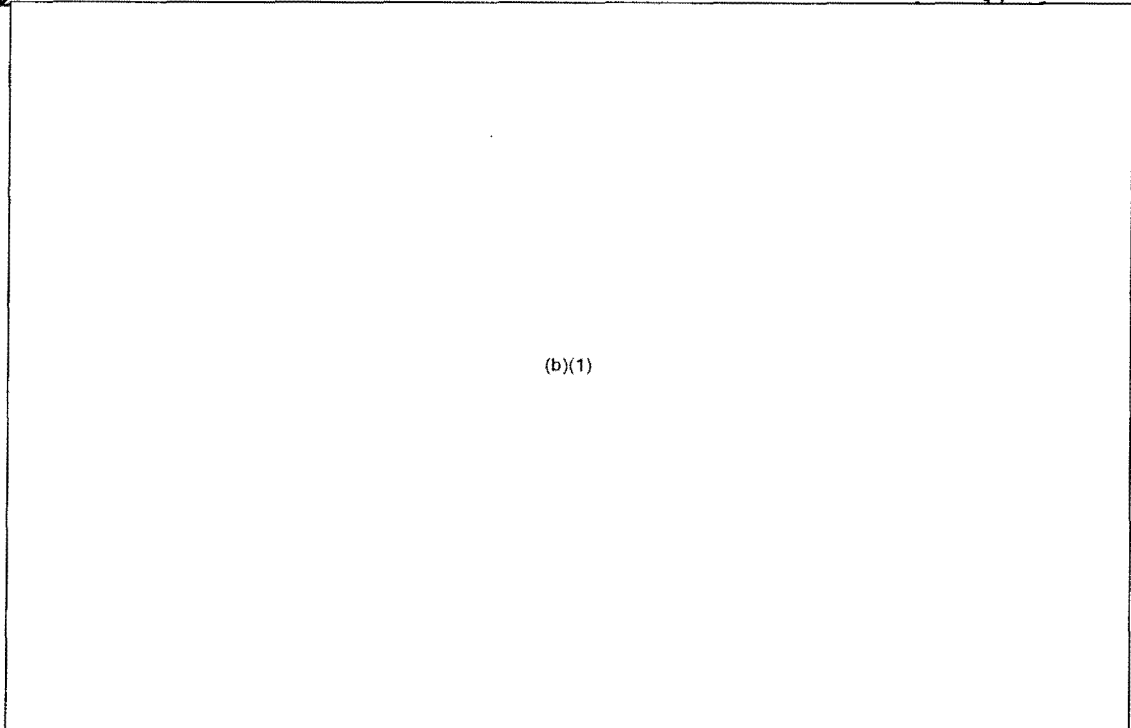
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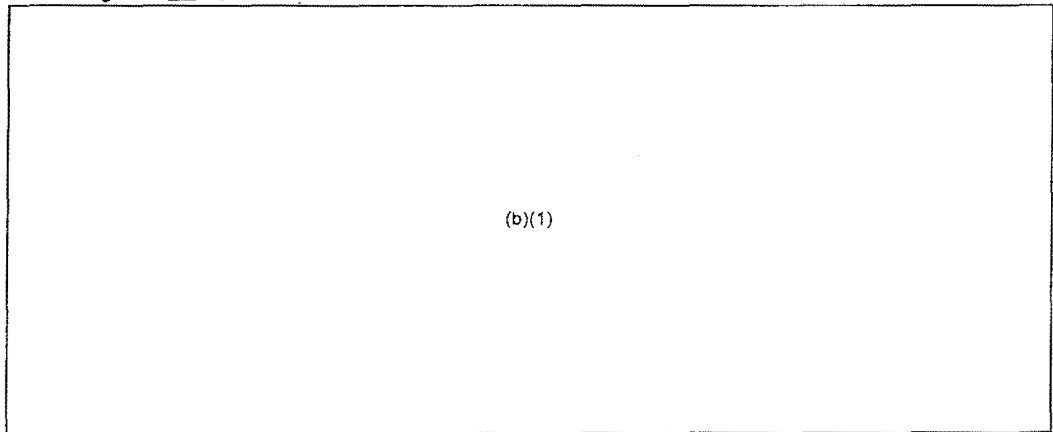
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4. ~~4.1~~ Doctrine and Procedures



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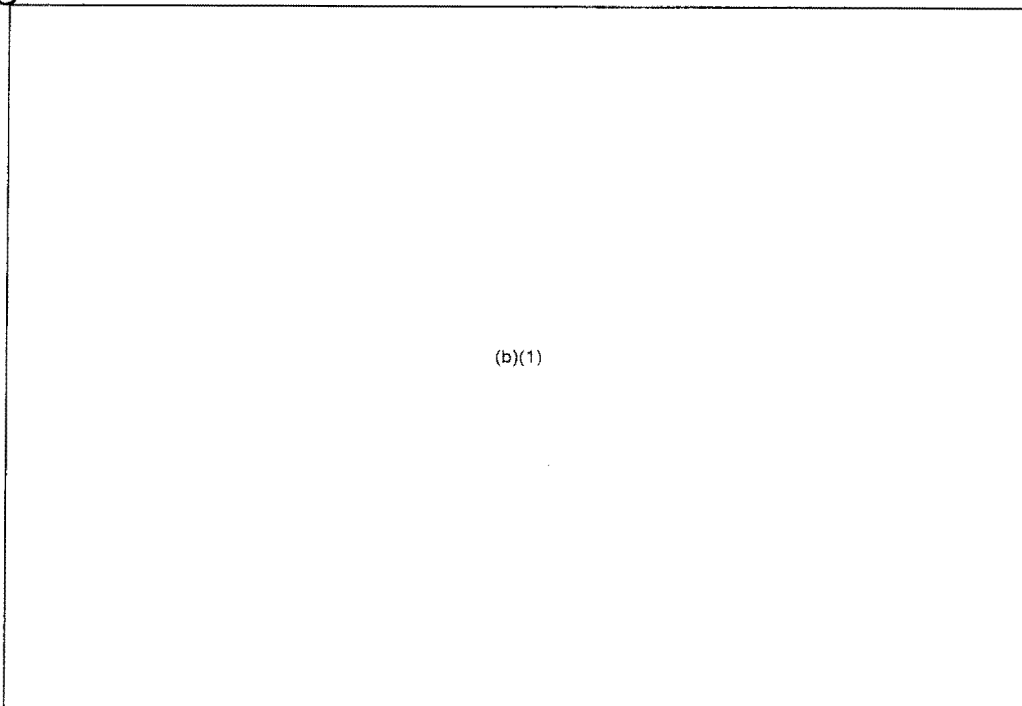
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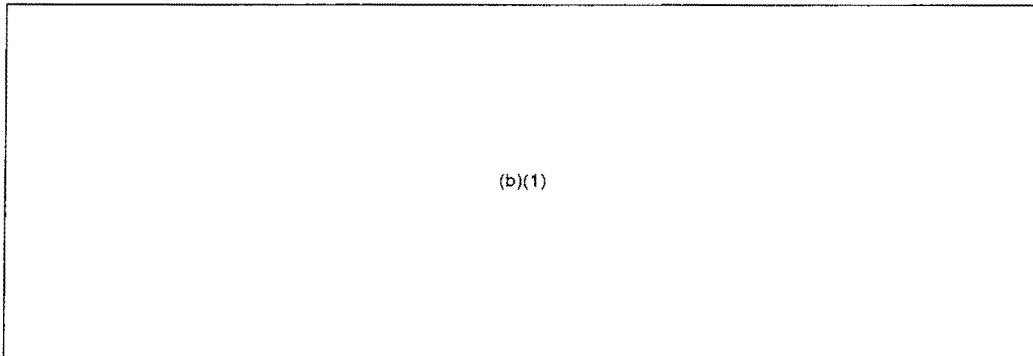
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~~4~~ b. Defense.



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5. ~~5~~ BW Equipment



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6. ~~(C)~~ Production and Stockpiling

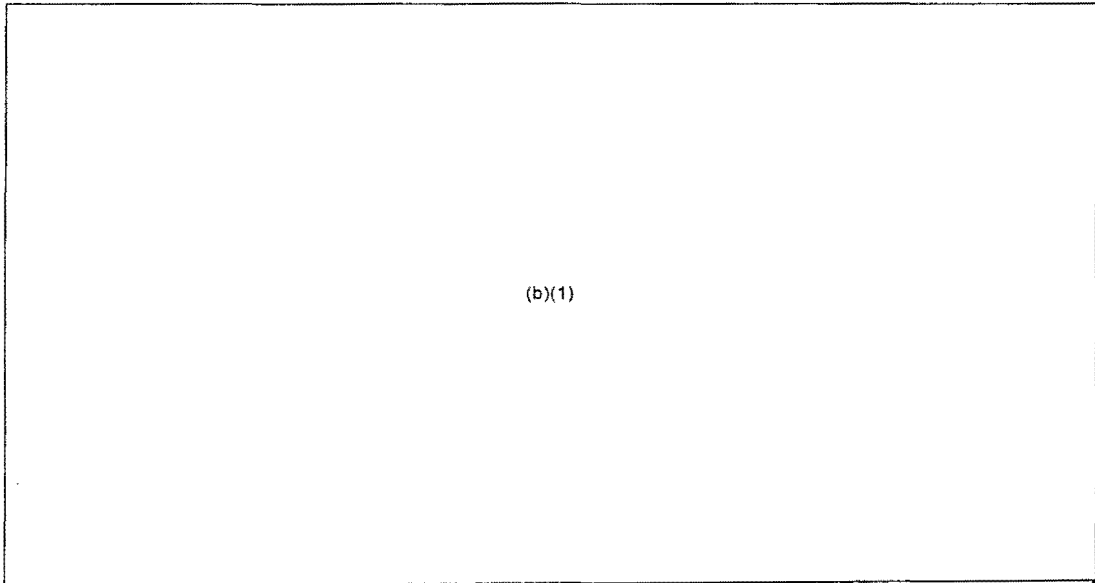
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7 ~~(C)~~ Research, Development, and Testing u



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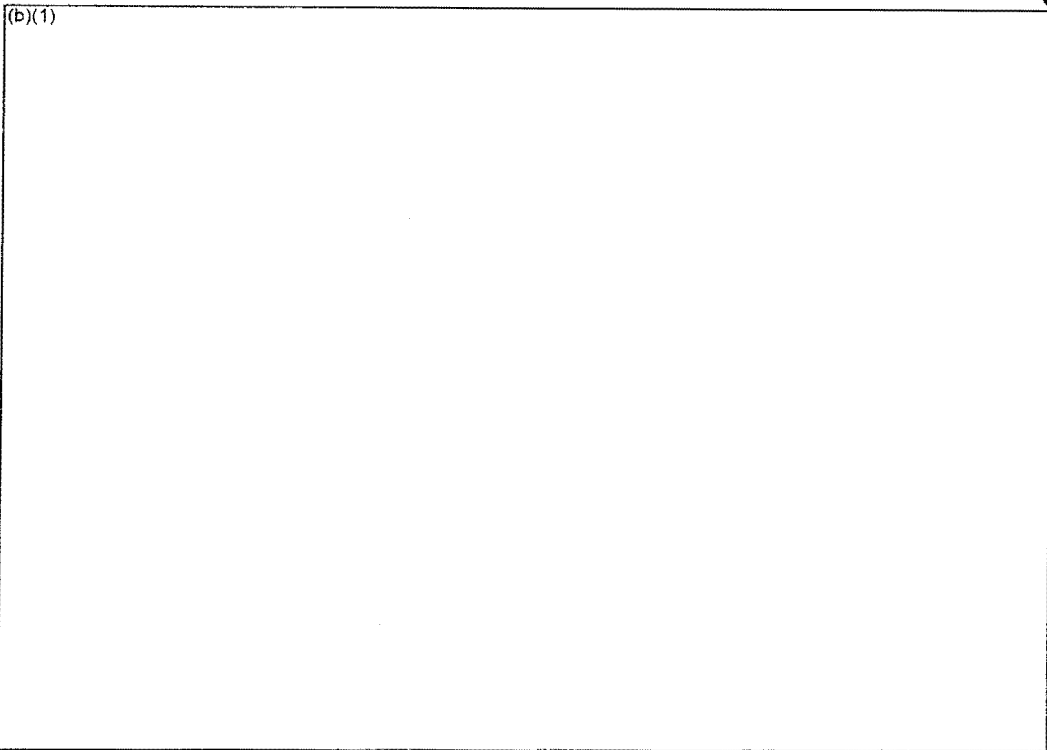
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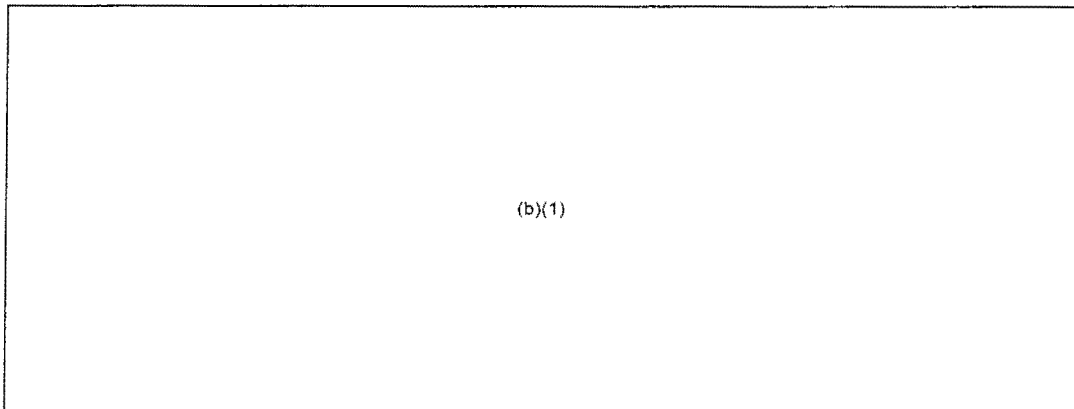
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8. ~~(S)~~ Conclusions



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9. ~~(c)~~ Trends and Forecasts

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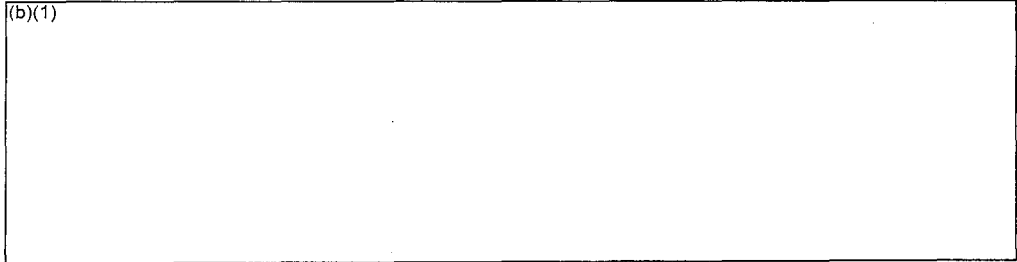
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Section III.

NORTH KOREA

A. INTRODUCTION

1. ~~(S)~~ Historical Background and Competence in Microbiology u

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2. (U) Geographical and Political Factors

a. North Korea is a rugged land which occupies the northern part of the Korean peninsula between the Yellow Sea on the west and the Sea of Japan on the east. It adjoins Communist China and the USSR on the north and South Korea on the south. North Korea has an area of about 47,000 square miles, or approximately the size of Pennsylvania. Because

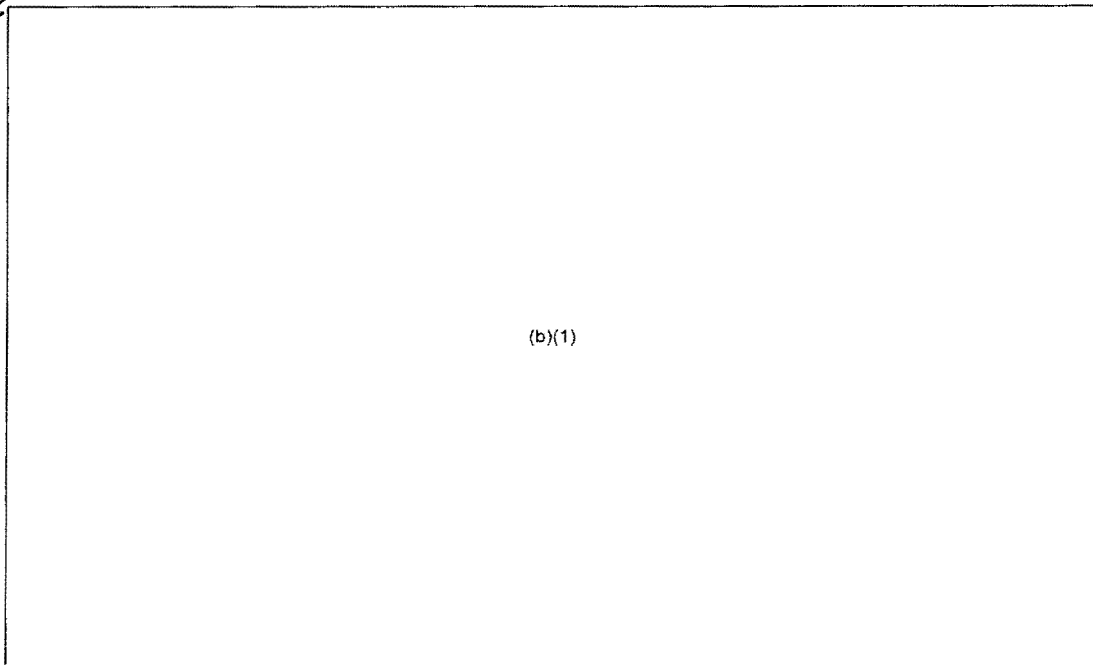
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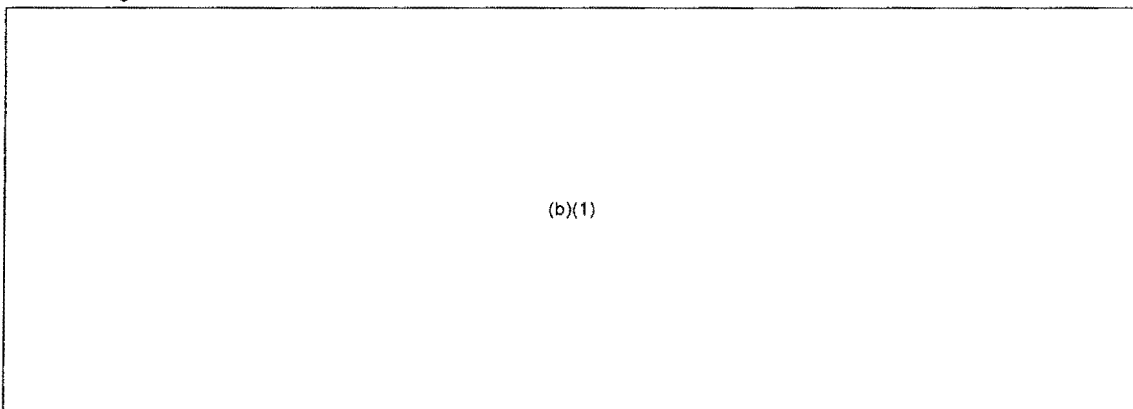
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3. ASSESSMENT

3. ~~(S)~~ Order of Battle



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4. ~~(S)~~ Doctrine and Procedures *u*

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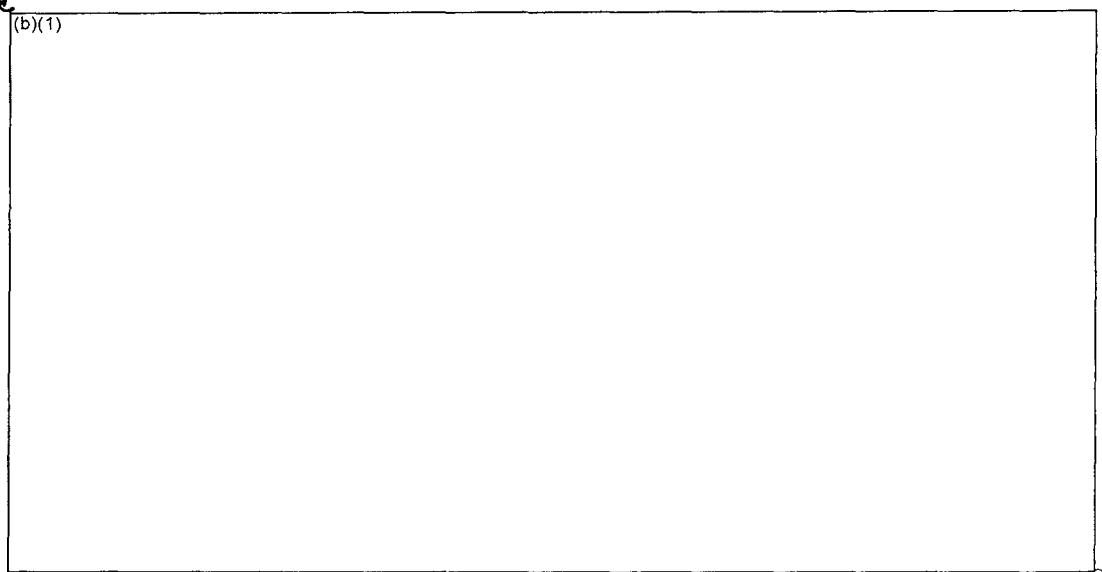
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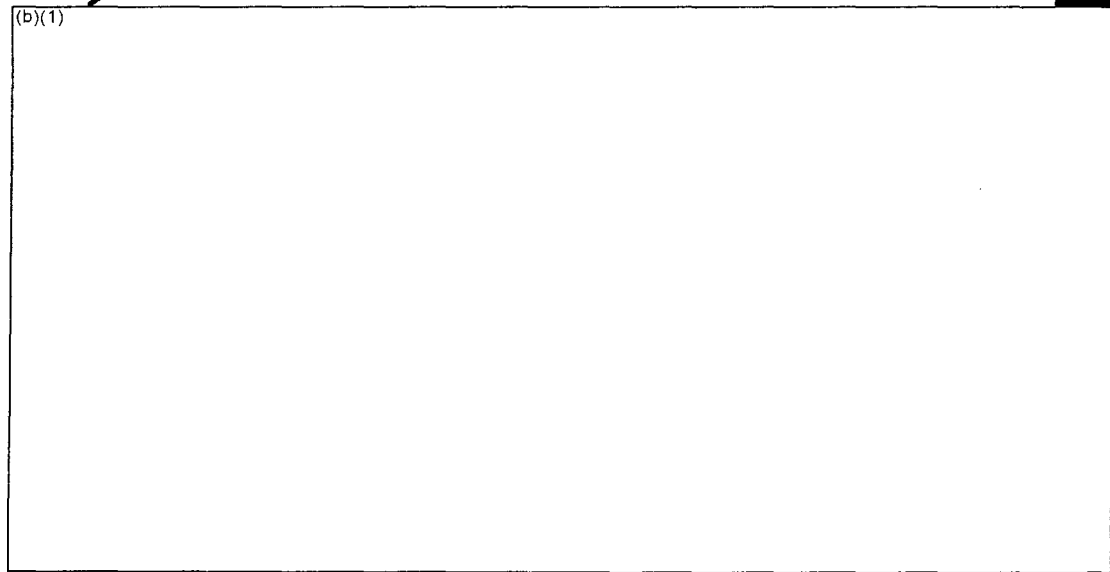
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5. ~~(S)~~ BW Equipment u

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6. ~~(S)~~ Production and Stockpiling *u*

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7. ~~(c)~~ Research, Development, and Testing

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8. ~~(C)~~ Conclusions

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9. ~~(C)~~ Trends and Forecasts ✓

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h. Forecasts.

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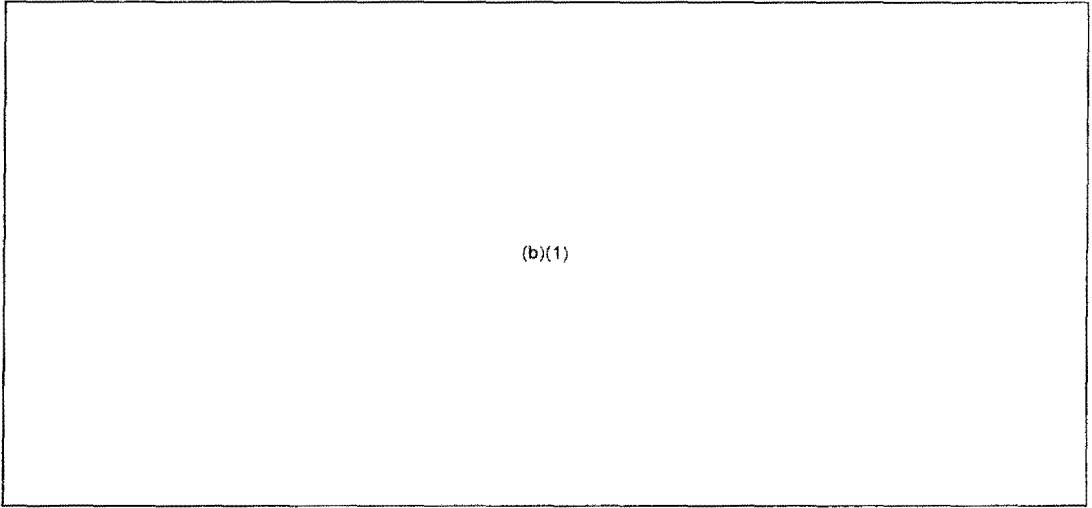
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Section IV.

THE MONGOLIAN PEOPLE'S REPUBLIC

A. INTRODUCTION

1. ~~(S)~~ Historical Background and Competence in Microbiology

(b)(1)

2. (U) Geographical and Political Factors

a. Mongolia's proximity to the Trans-Siberian railroad in the Soviet Union, and its position between the USSR and Communist China

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lends it a unique strategic significance. It provides road and rail routes from the USSR to the coast of Communist China. The main strategic area is Ulan Bator, the capitol city. A single track railroad links Ulan Bator with the Trans-Siberian Railroad in Russia and extends south-east to connect with the Communist Chinese system at Erk-lien. Of Mongolia's boundaries, 2600 miles border Communist China and 1850 miles border the Soviet Union. Since tensions arose between the USSR and Communist China, Mongolia has been used as an advanced position for the Soviet Army. Soviet units reportedly are stationed in Mongolia, and the Chinese border is constantly under observation.²⁵² Geographically, Mongolia includes vast desert plains in the south and east, long mountain ranges in the west, and hills mountains with broad valleys in the north. The climate is continental with great daily and seasonal extremes of temperature.

b. The Mongolian People's Republic is governed by a Communist dictatorship which maintains control through a centralized system modeled on that of the USSR. The Politburo is the center of power and the source of all executive, legislative, and judicial authority in the country. Soviet influence dominates public health planning and activities in Mongolia. The USSR has provided technical assistance since 1925 in establishing a public health program, epidemiological systems, and laboratory facilities for investigating diseases. In 1931 the Soviet Union established at Ulan Bator the first antiplague laboratory which became the Central Antiplague Station in 1936. Prophylaxis is the basic philosophy in Mongolia, and all health care and medical research units are owned and maintained by the state. The Ministry of Public Health is responsible for all health and medical services. The political reliability and loyalty to the Communist party often outweigh qualities, professional skill, and ability in the selection of scientific administrators. For this reason the effectiveness of the public health services and the advancement of scientific programs are often hampered.²⁷¹

B. ASSESSMENT

3. ~~(c)~~ Order of Battle

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4. (U) Doctrine and Procedures

The Mongolians are not known to have policies or procedures for conducting biological warfare.

5. ~~(S)~~ BW Equipment

a. (U) The Mongolians do not have biological warfare agents or munitions. Some vaccines, antibiotics, and sera are available for defense.

(b)(1)

b. (U) A Bacteriological Research Office was formed in 1932 by combining several small laboratories in Ulan Bator. This was the first facility under the Ministry of Health to conduct microbiological research. Diseases for which vaccines have been prepared at this facility include typhus, rabies, smallpox, dysentery, typhoid fever, and brucellosis.²⁷⁴ A Soviet specialist, L. S. Rezininkova, assisted in directing research programs for the development of vaccines and medicines during the late 1950's.

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c. (U) The Office for Studying and Combating Especially Dangerous Infectious Diseases which was an outgrowth of the Anti-Epidemic Office now has five substations under its jurisdiction. It is probably the largest Mongolian organization which supports studies of measures for preventing diseases, such as anthrax, glanders, plague, poliomyelitis, and tularemia. During 1966, the organization prepared and administered vaccines to an estimated 150,000 persons.²⁷⁴

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8. ~~(S)~~ Conclusions

a. Offensive Posture. Mongolia does not have the scientific and technical capability to conduct biological warfare research and development. A doctrine governing the offensive use of biological agents is not known to exist, nor has interest been expressed for their development. A capability to stockpile agent materiel would be negligible. The organization most likely to be made responsible for agent research would probably be the Office for Studying and Combatting Especially Dangerous Infectious Diseases.

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9. ~~(C)~~ Trends and Forecasts

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~~(C)~~ b. Forecasts

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APPENDIX I.
SELECTED MEDICAL MATERIEL MANUFACTURERS AND
MEDICAL LABORATORIES, COMMUNIST CHINA (1971)

| <u>Annexes</u> | <u>Page</u> |
|--|-------------|
| A. Manufacturers of Medical Materiel ----- | 71 |
| B. Medical Laboratories ----- | 83 |

GROUP-1
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downgrading and declassification.

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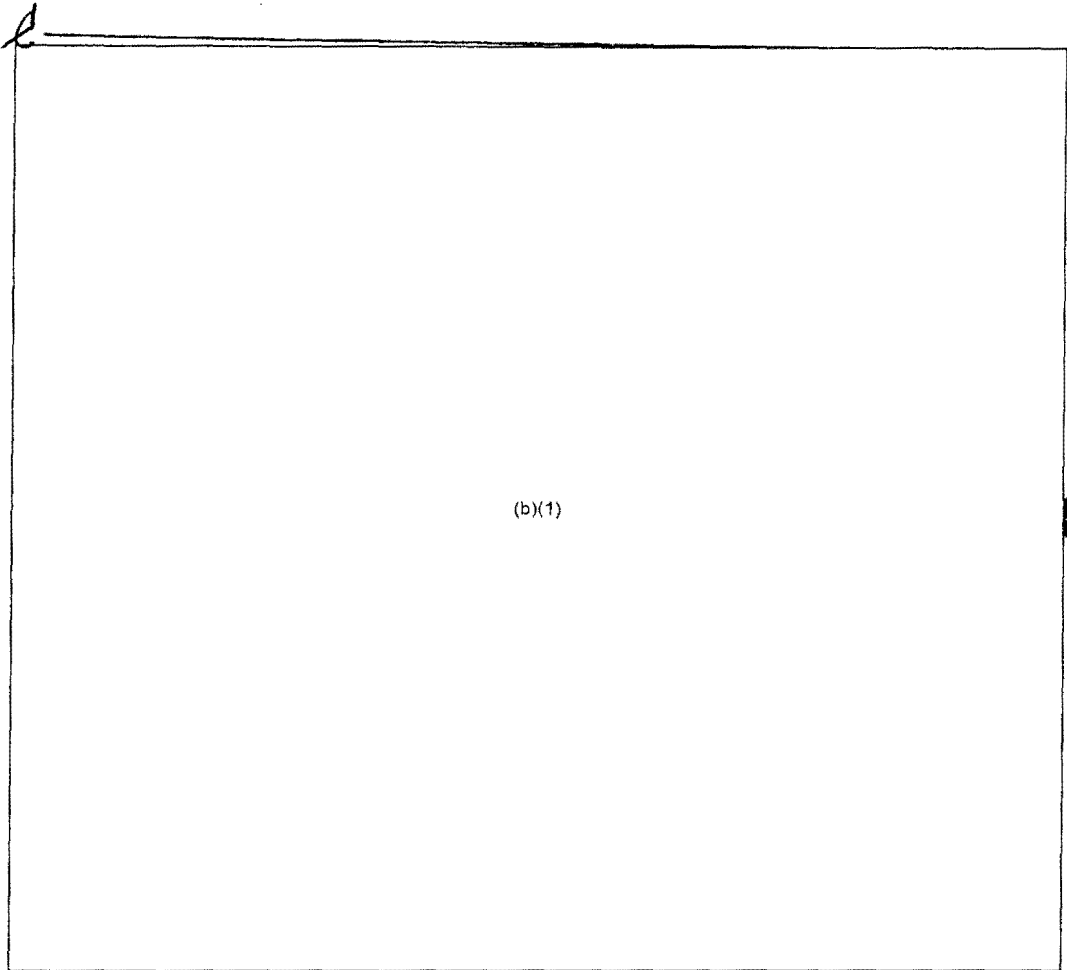
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ANNEX A.

MANUFACTURERS OF MEDICAL MATERIEL



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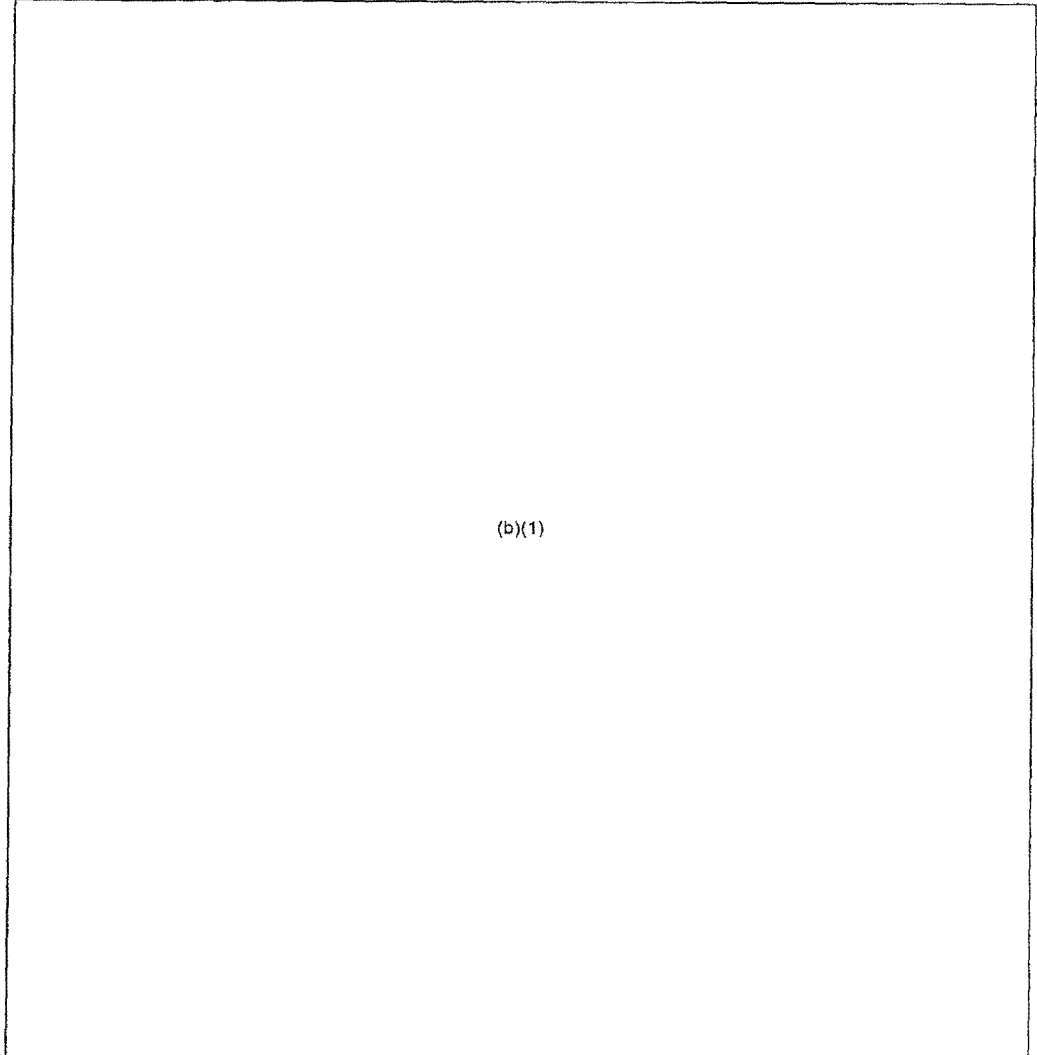
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e MANUFACTURERS OF MEDICAL MATERIEL (Continued)



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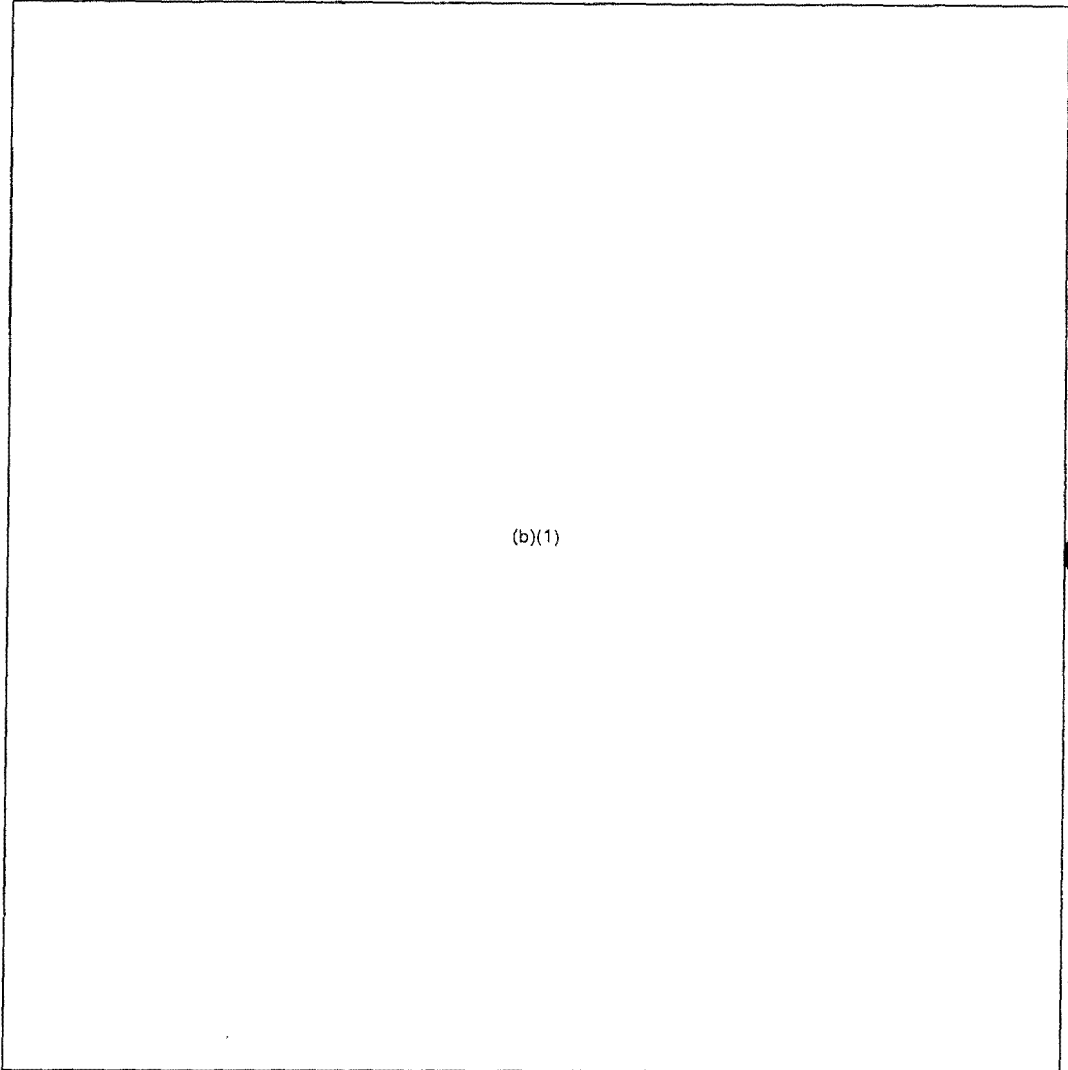
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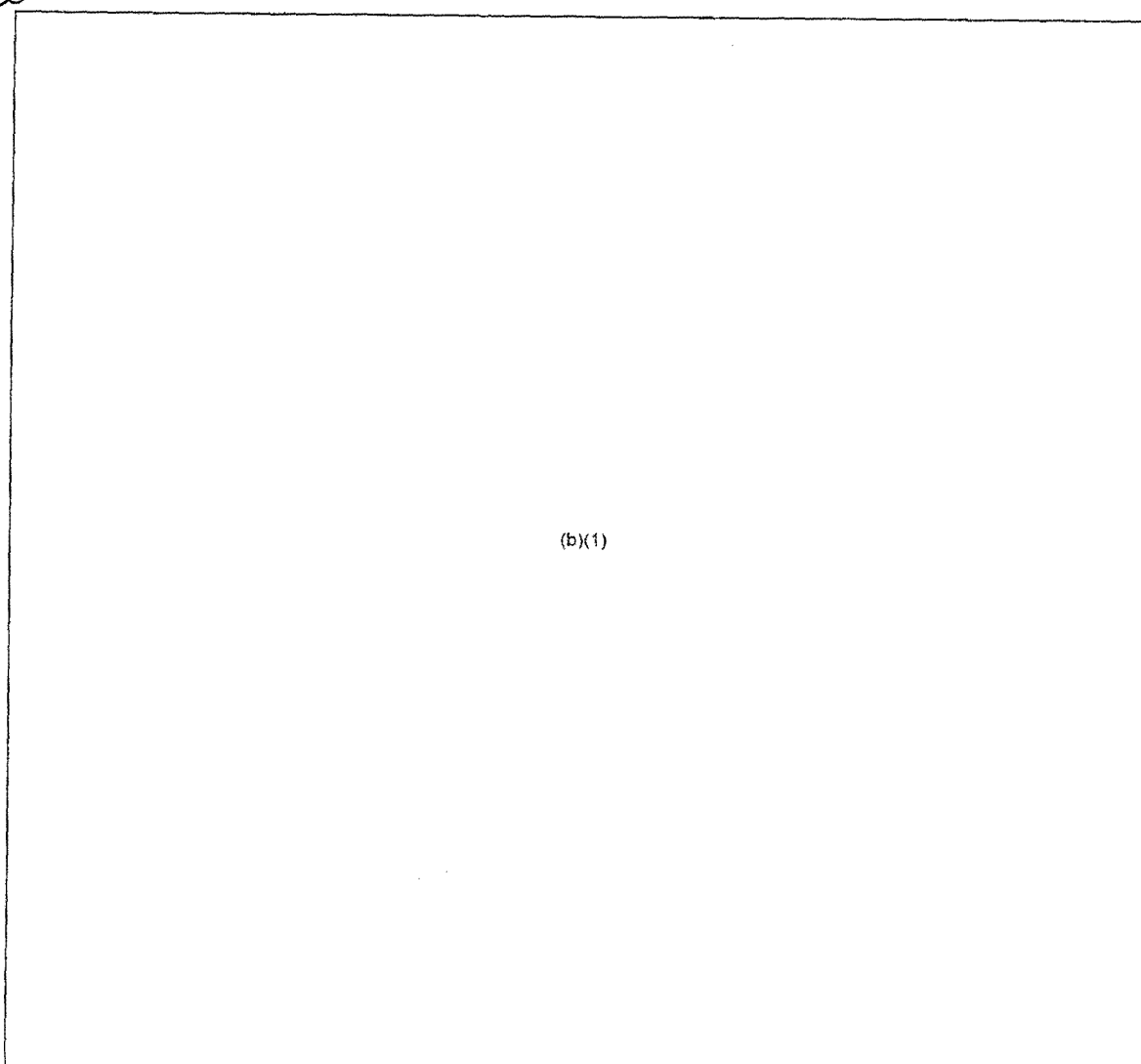
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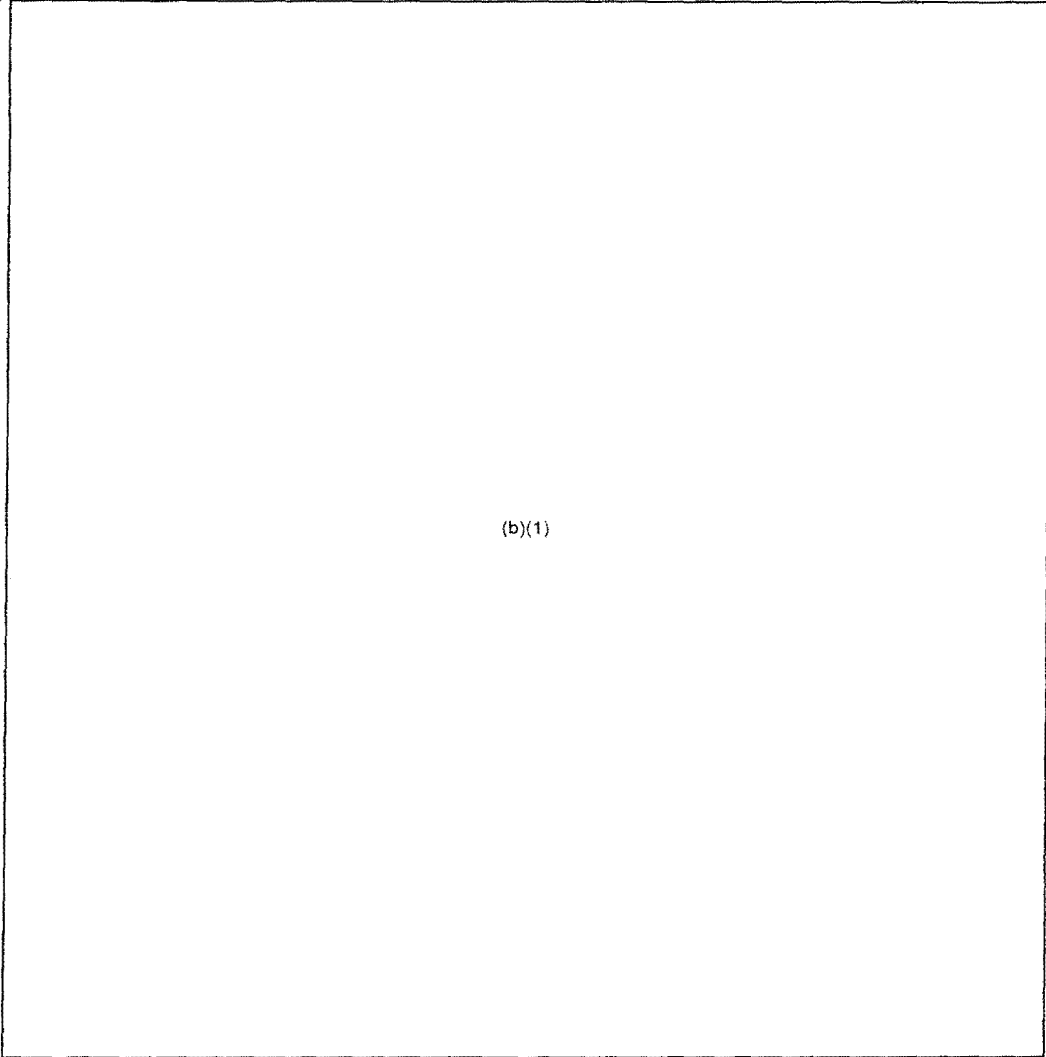
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MANUFACTURERS OF MEDICAL MATERIEL (Continued)

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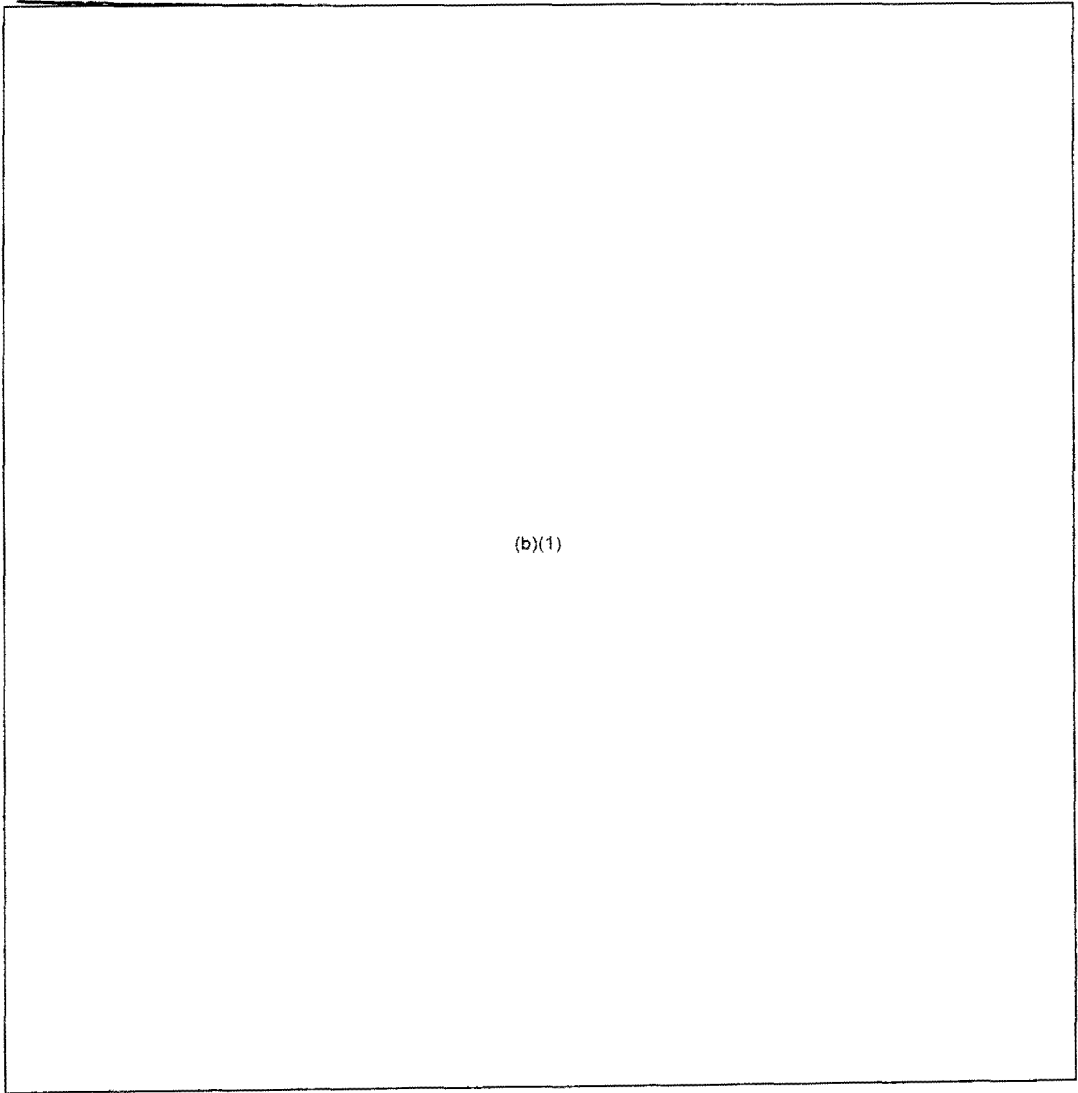
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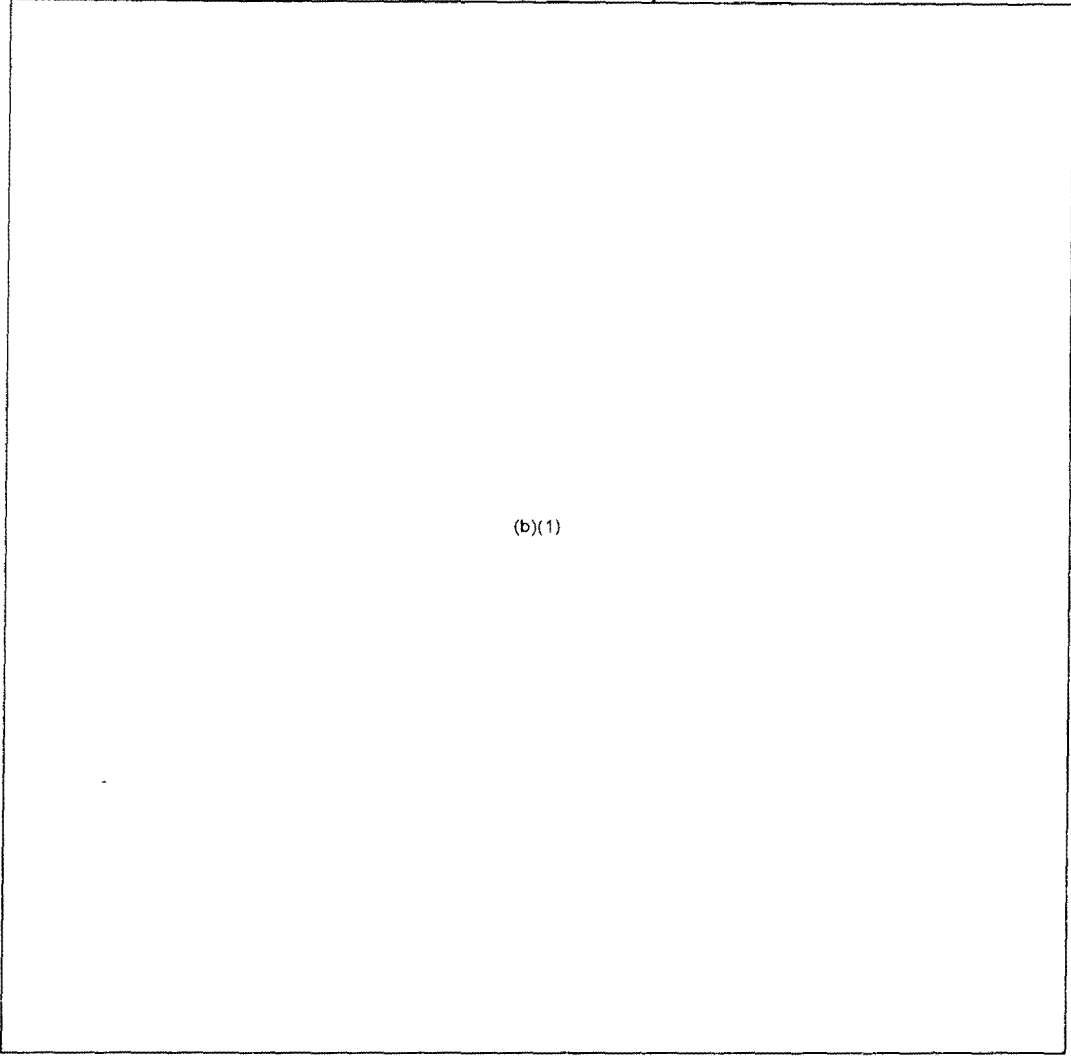
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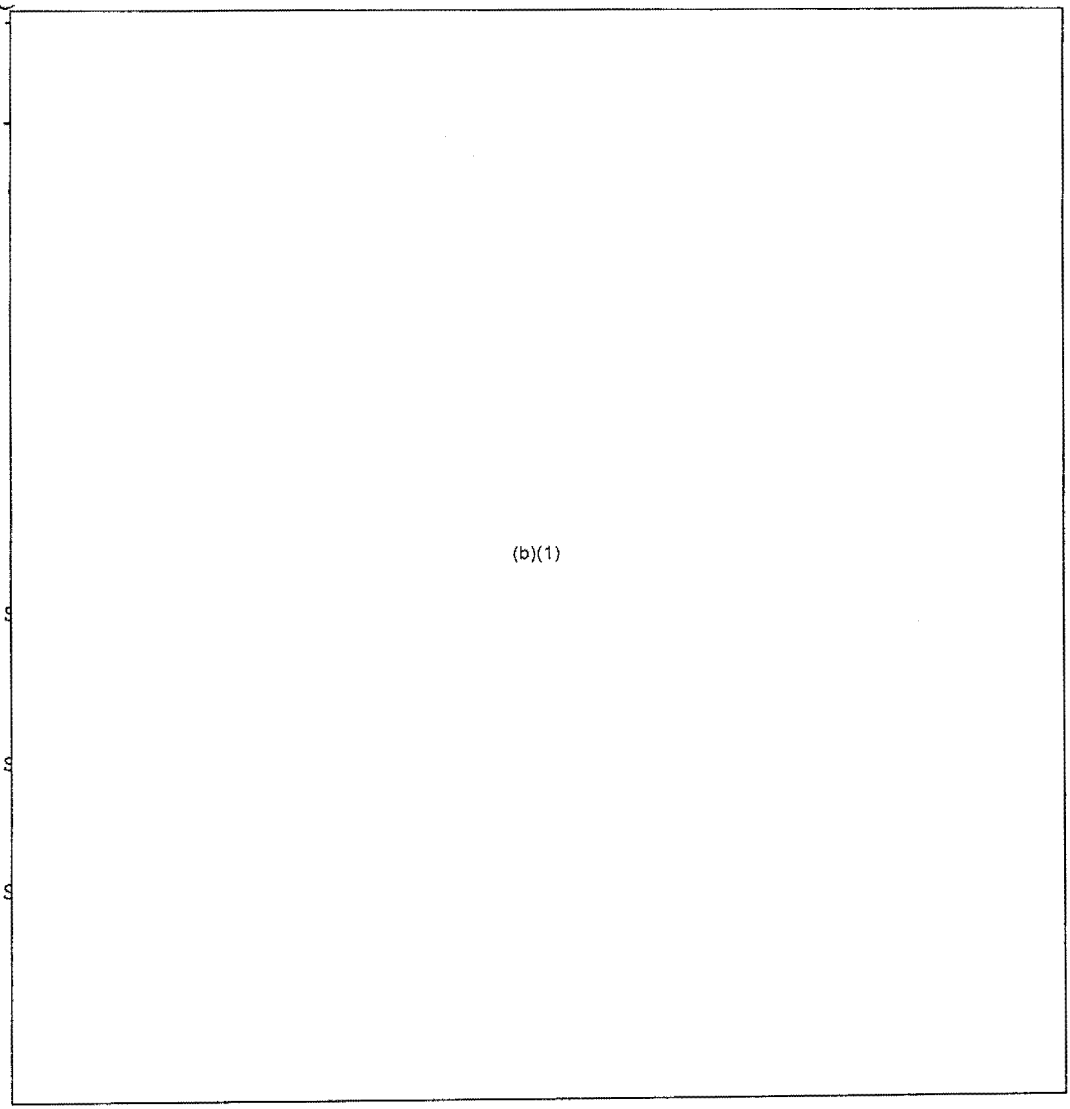
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d MANUFACTURERS OF MEDICAL MATERIEL (Continued)



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MANUFACTURERS OF MEDICAL MATERIEL (Continued)

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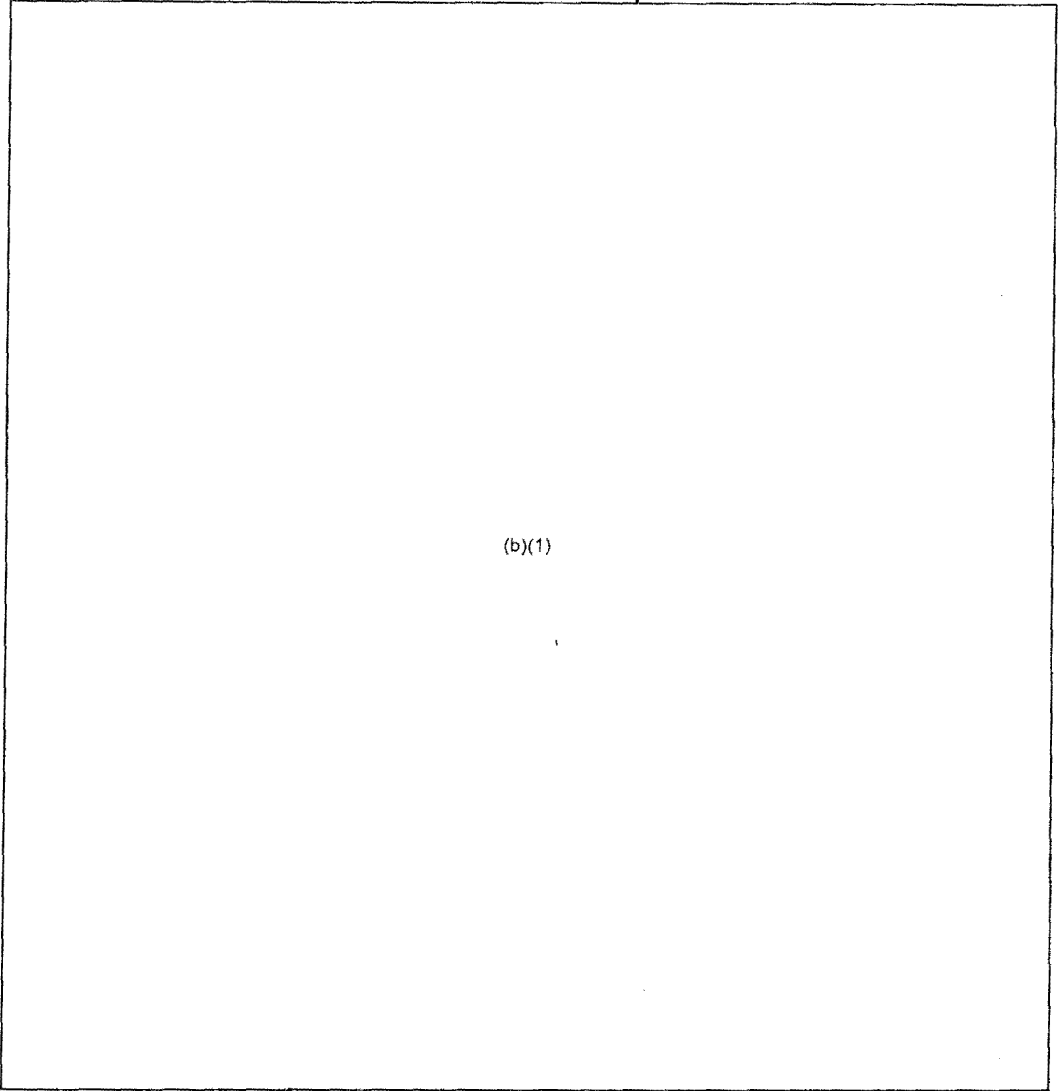
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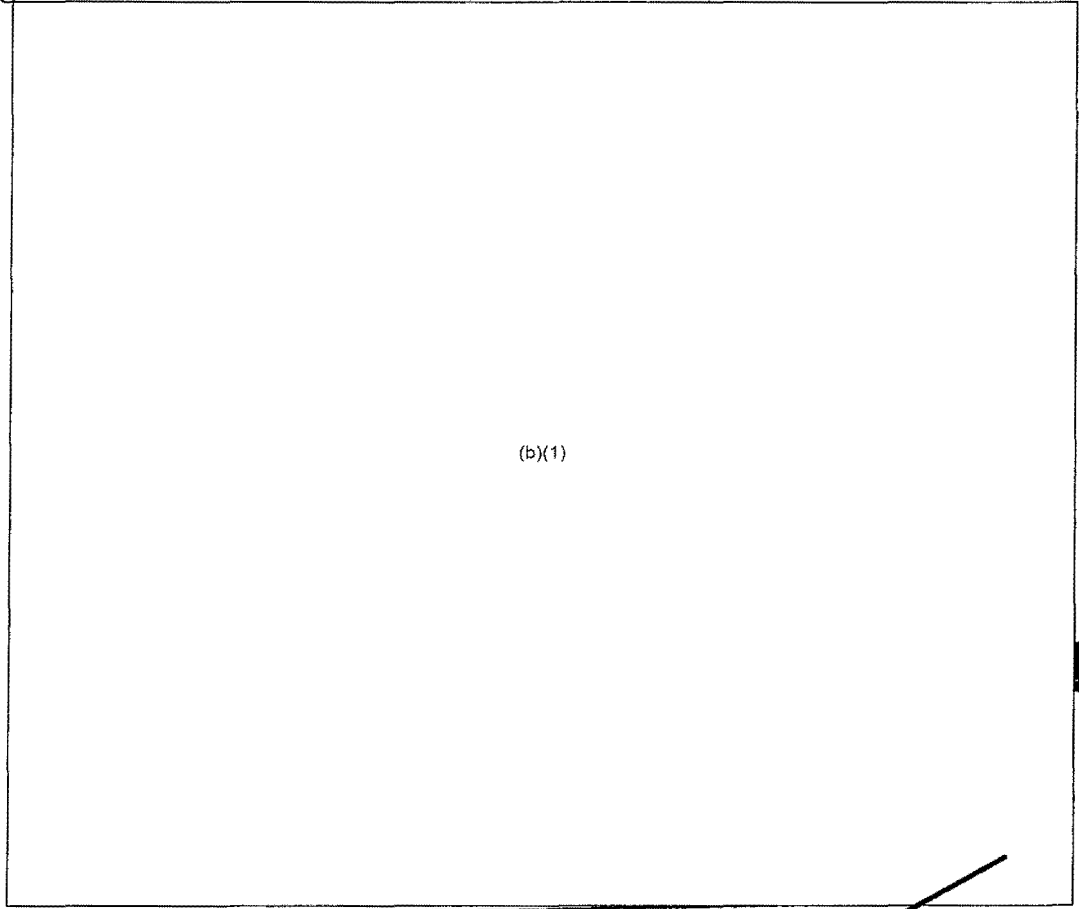
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MANUFACTURERS OF MEDICAL MATERIEL (Continued)



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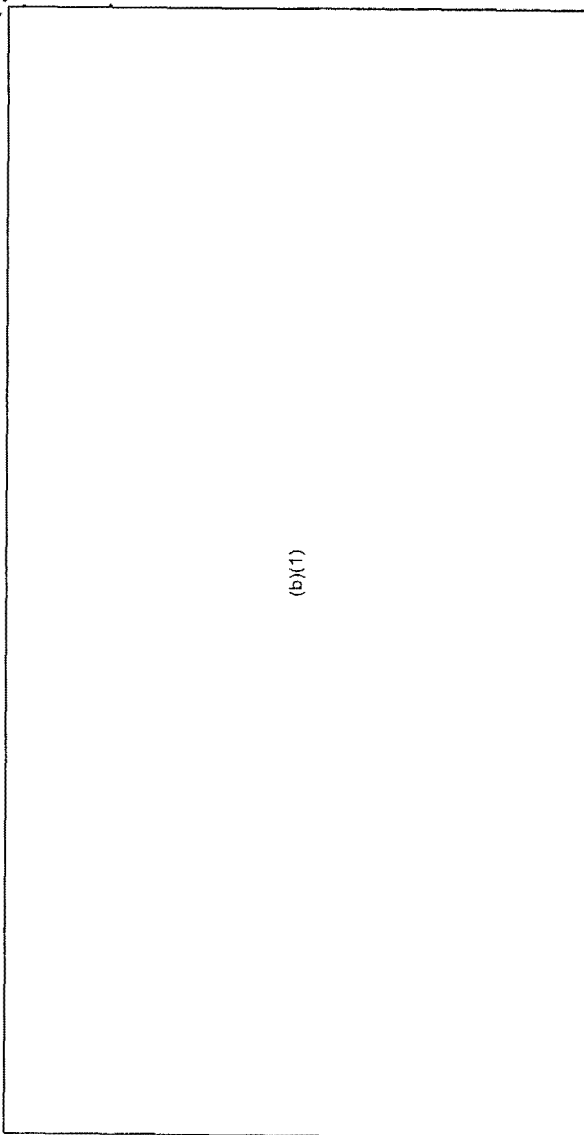
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ANNEX B.
MEDICAL LABORATORIES



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MEDICAL LABORATORIES (Continued)

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MEDICAL LABORATORIES (Continued)

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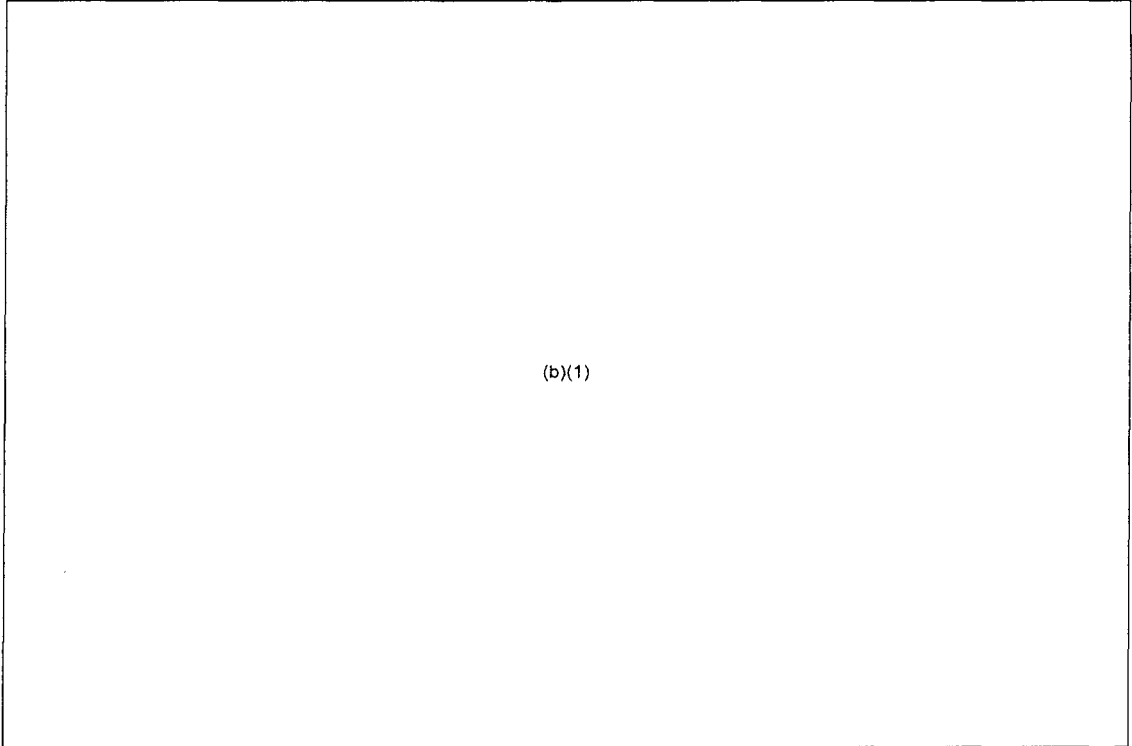
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MEDICAL LABORATORIES (Continued)

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MEDICAL LABORATORIES (Continued)

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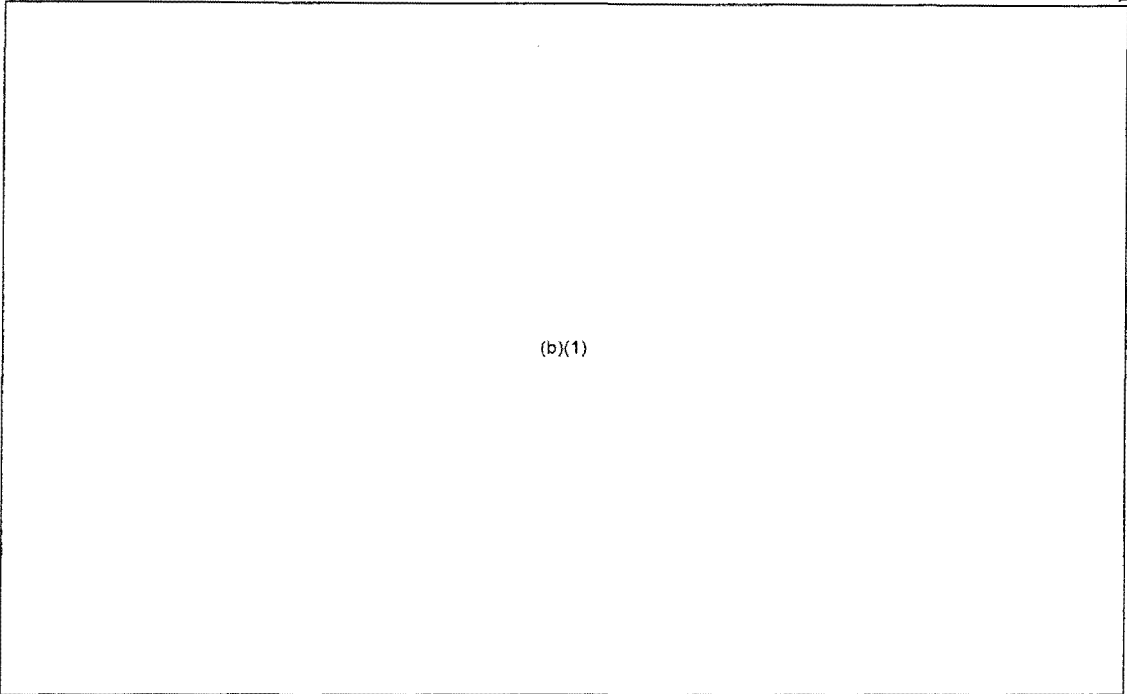
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MEDICAL LABORATORIES (Continued)

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MEDICAL LABORATORIES (Continued)

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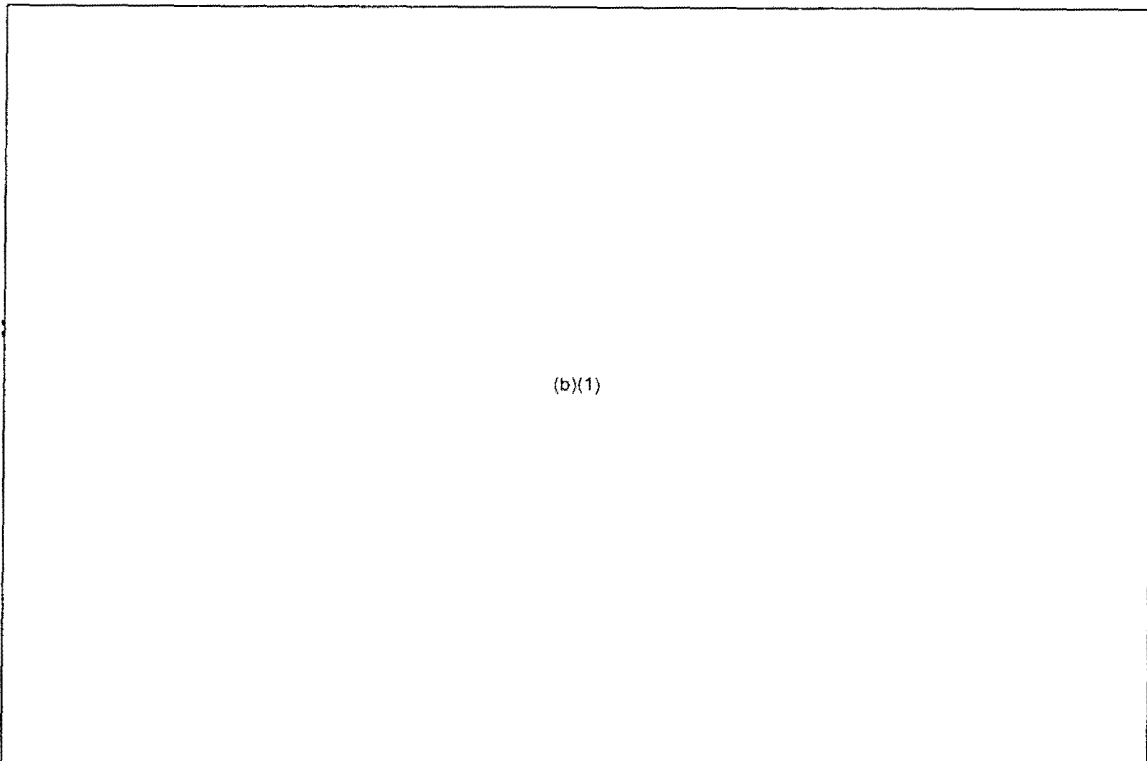
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MEDICAL LABORATORIES (Continued)

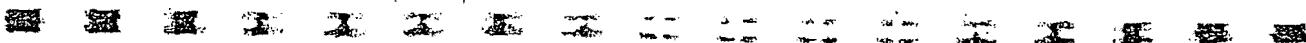
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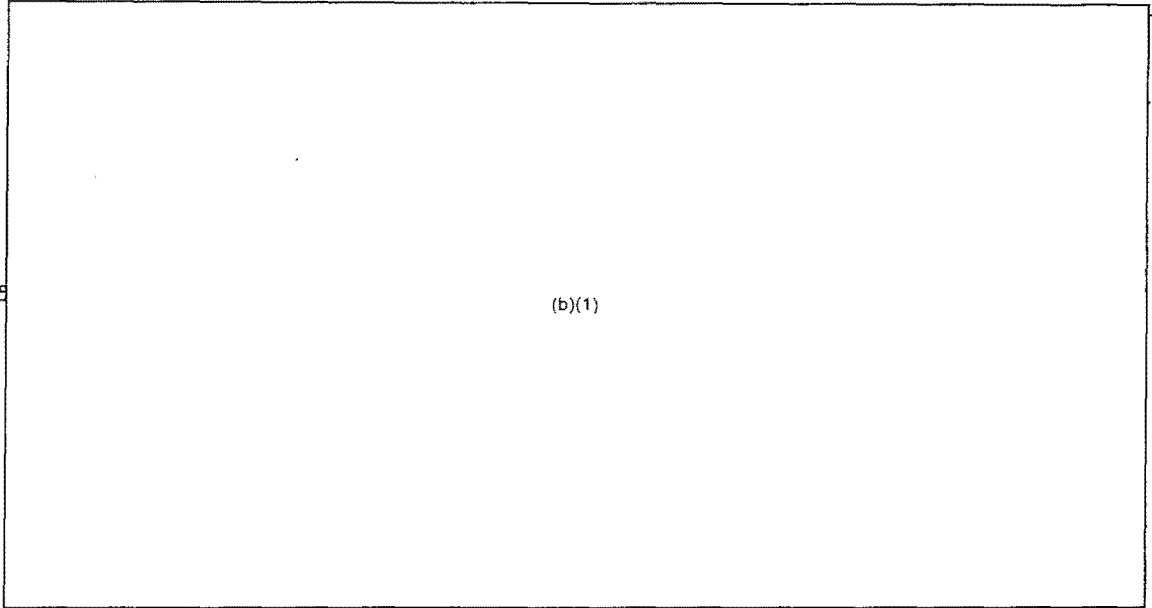
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MEDICAL LABORATORIES (Continued)



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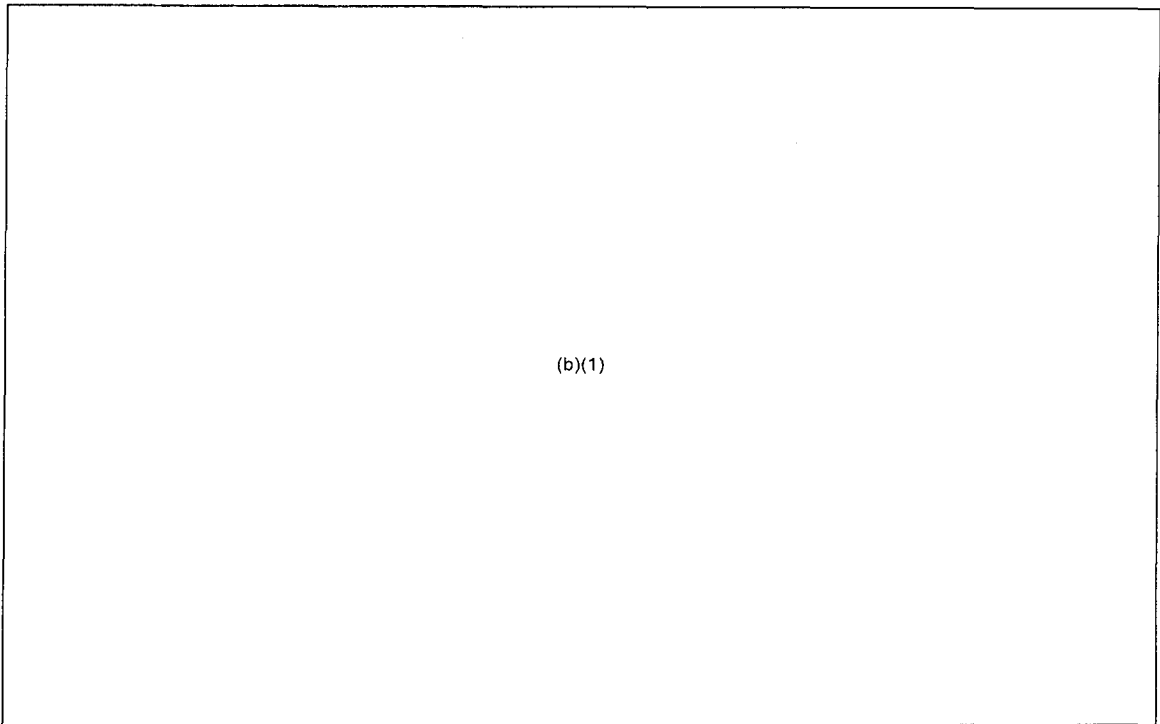
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MEDICAL LABORATORIES (Continued)

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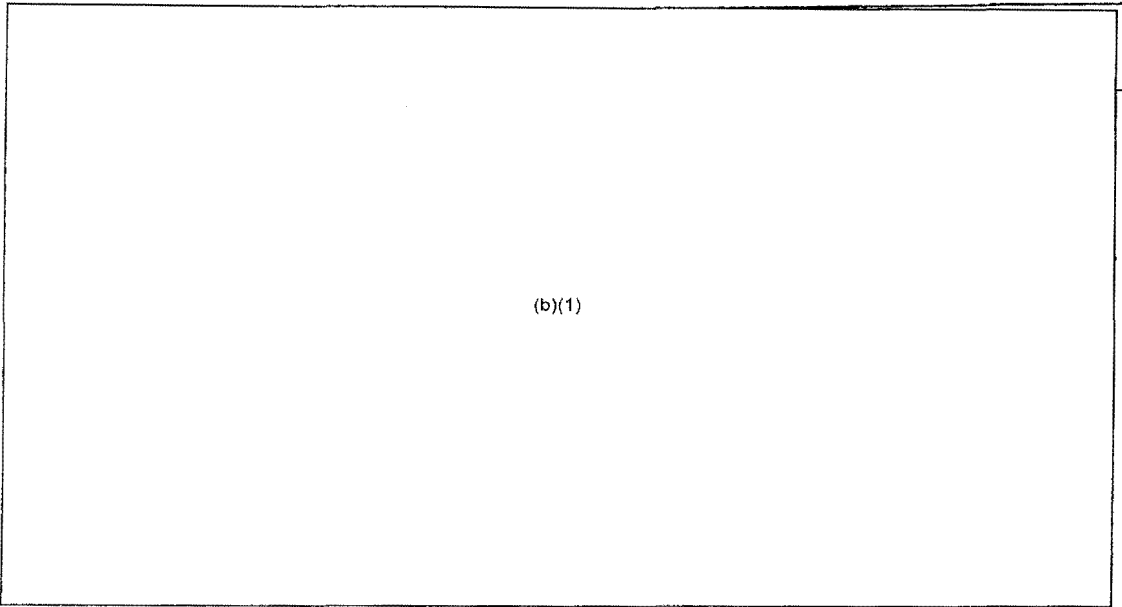
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MEDICAL LABORATORIES (Continued)



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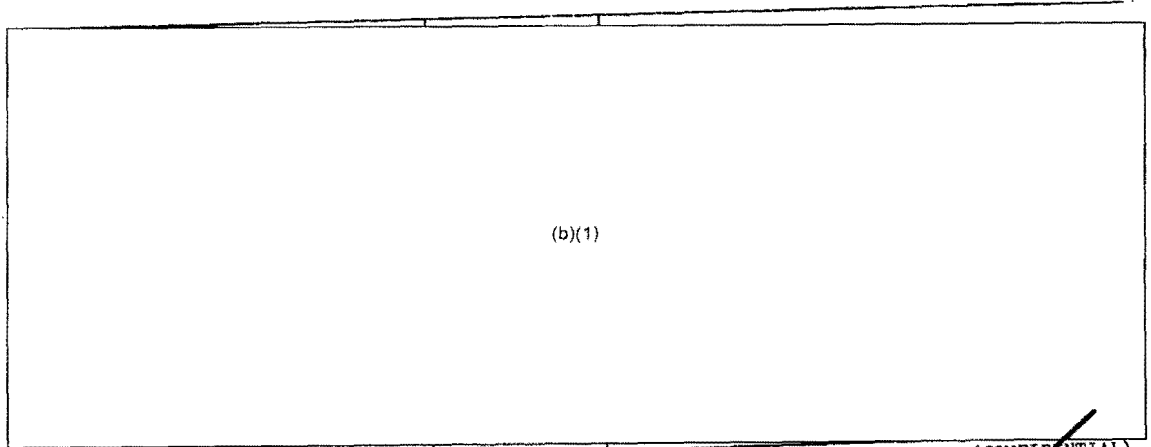
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MEDICAL LABORATORIES (Continued)

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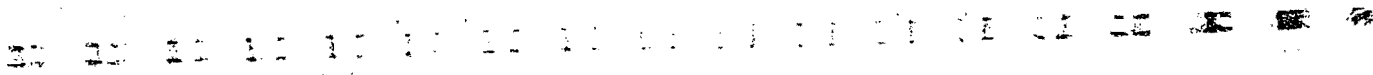
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APPENDIX II.

SELECTED MEDICAL MATERIEL MANUFACTURERS AND
MEDICAL LABORATORIES, NORTH VIETNAM (1971)

| <u>Annexes</u> | <u>Page</u> |
|--|-------------|
| A. Manufacturers of Medical Materiel ----- | 97 |
| B. Medical Laboratories ----- | 101 |

GROUP-1
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downgrading and declassification.

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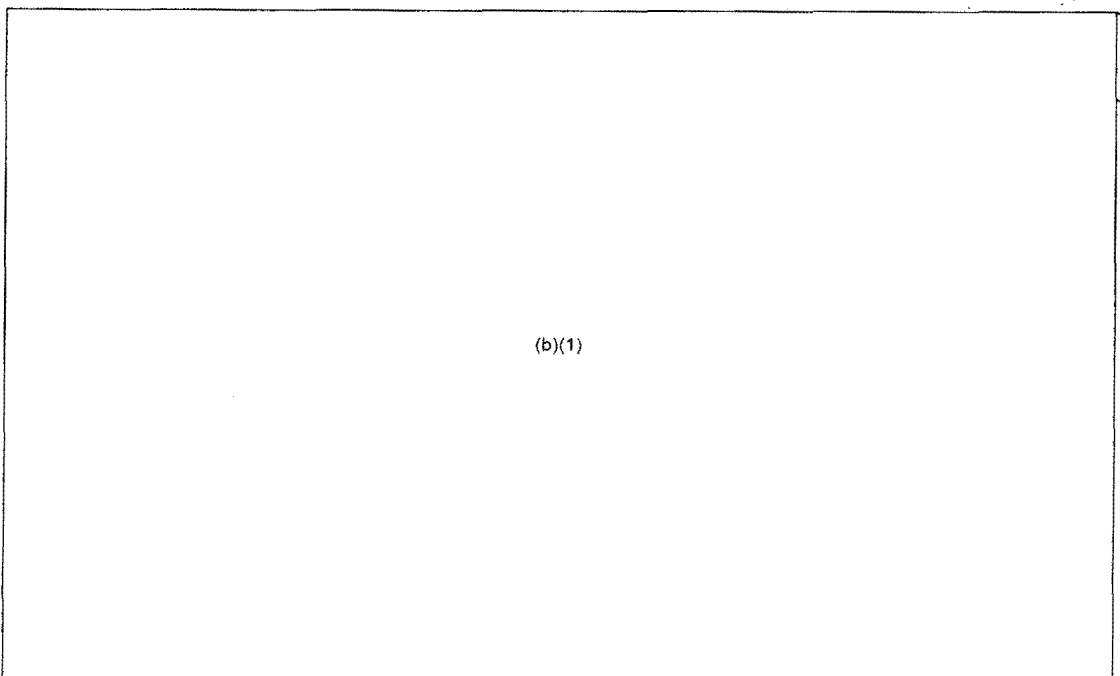
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ANNEX A.

MANUFACTURERS OF MEDICAL MATERIEL



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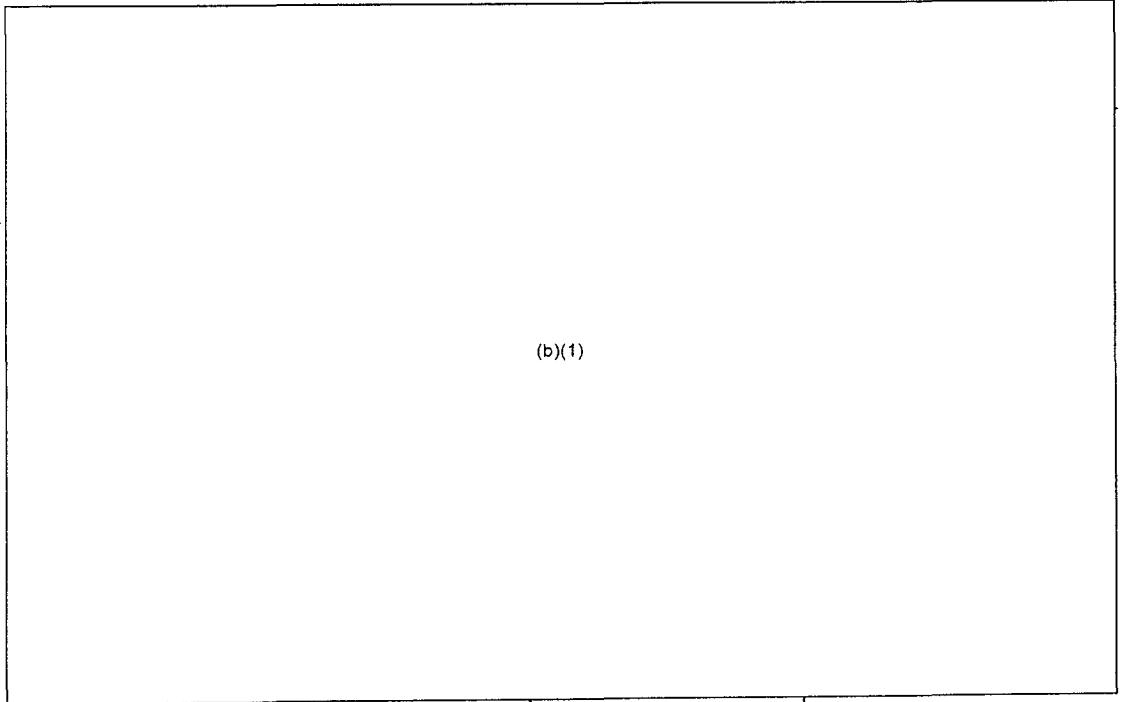


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MANUFACTURERS OF MEDICAL MATERIEL (Continued)

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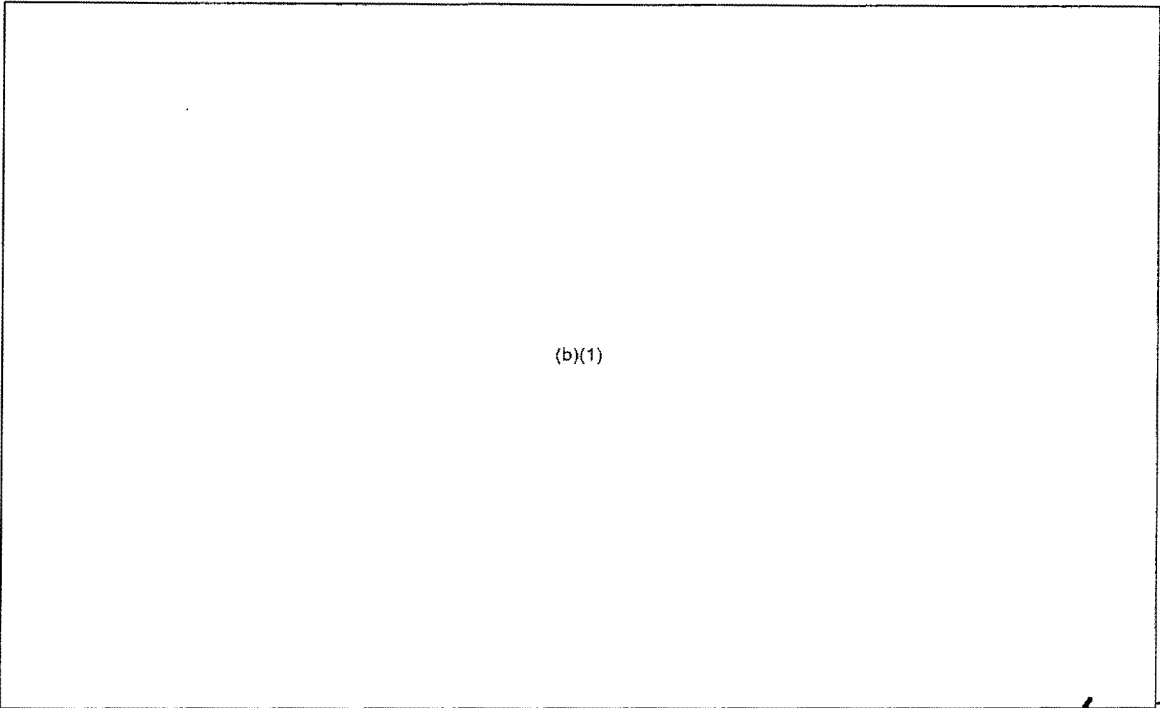
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MANUFACTURERS OF MEDICAL MATERIEL. (Continued)



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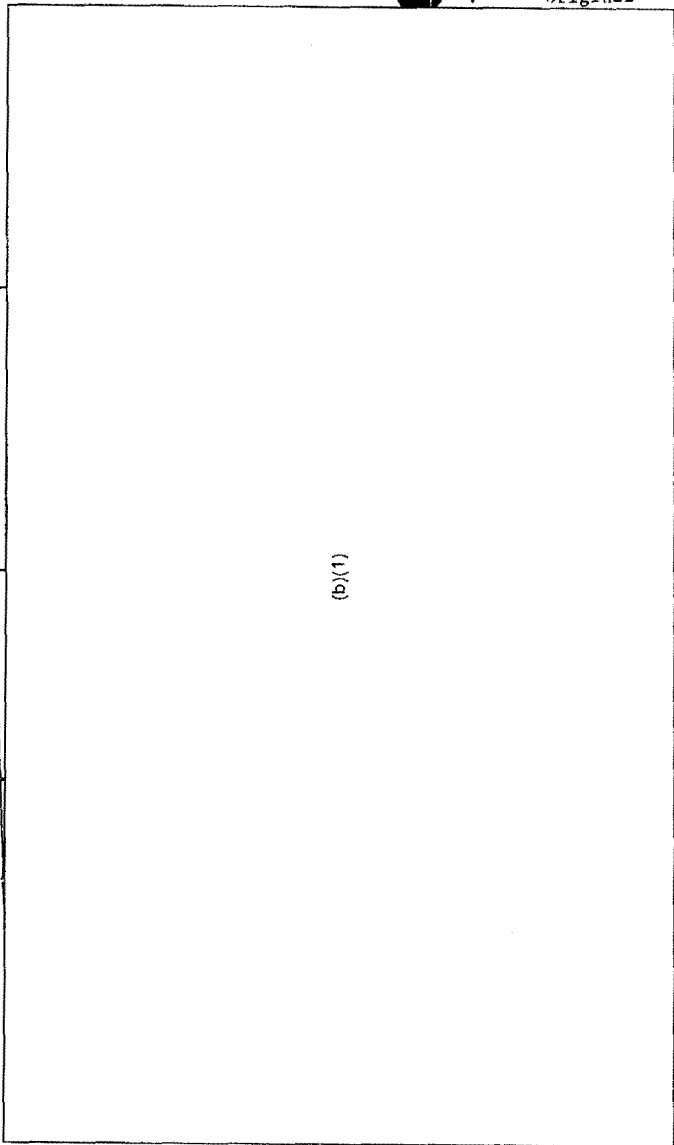
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ANNEX B.
MEDICAL LABORATORIES



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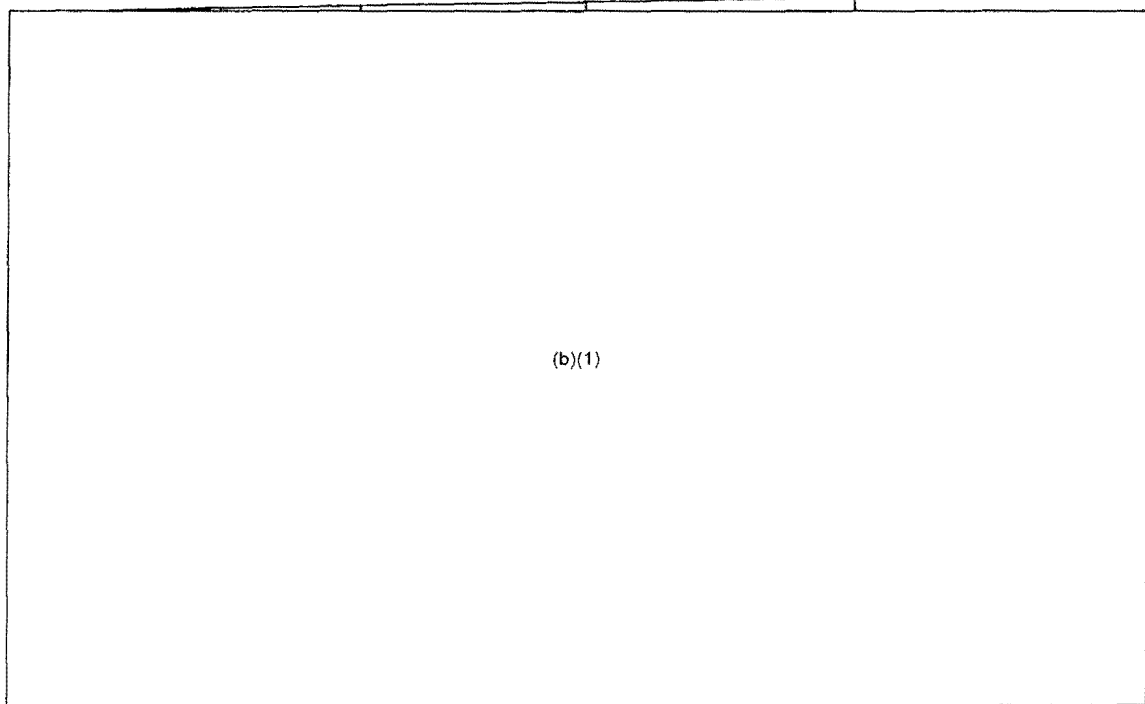
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MEDICAL LABORATORIES (Continued)

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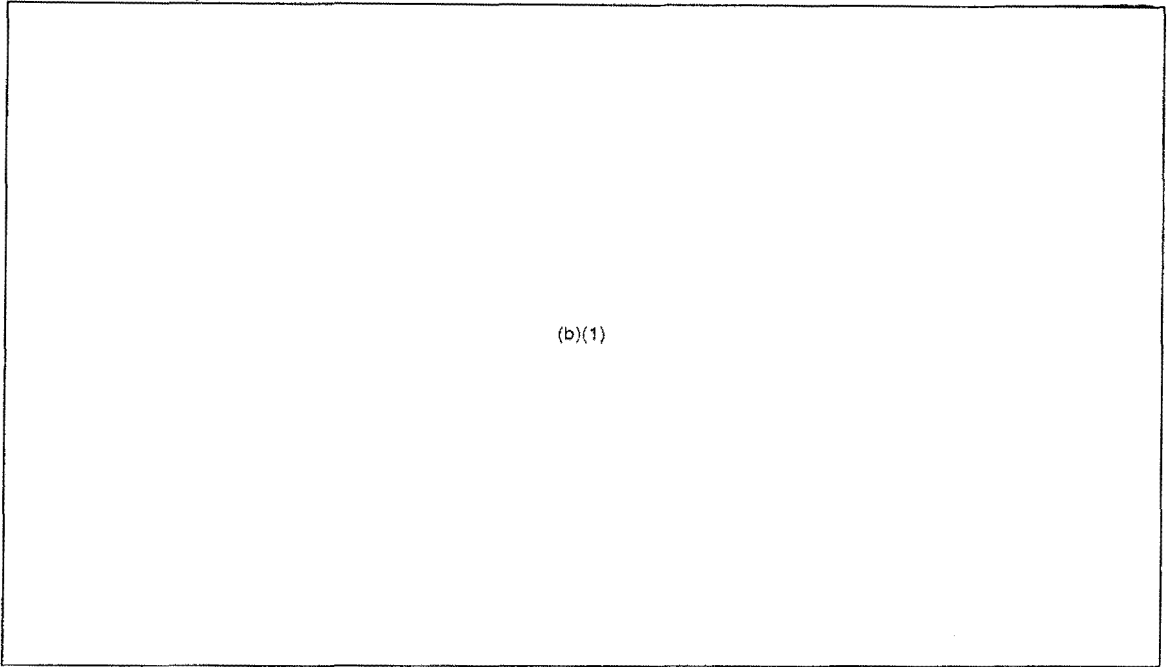
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MEDICAL LABORATORIES (Continued)

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APPENDIX III.
SELECTED MEDICAL MATERIEL MANUFACTURERS AND
MEDICAL LABORATORIES, NORTH KOREA (1971)

| <u>Annexes</u> | <u>Page</u> |
|--|-------------|
| A. Manufacturers of Medical Materiel ----- | 107 |
| B. Medical Laboratories ----- | 109 |

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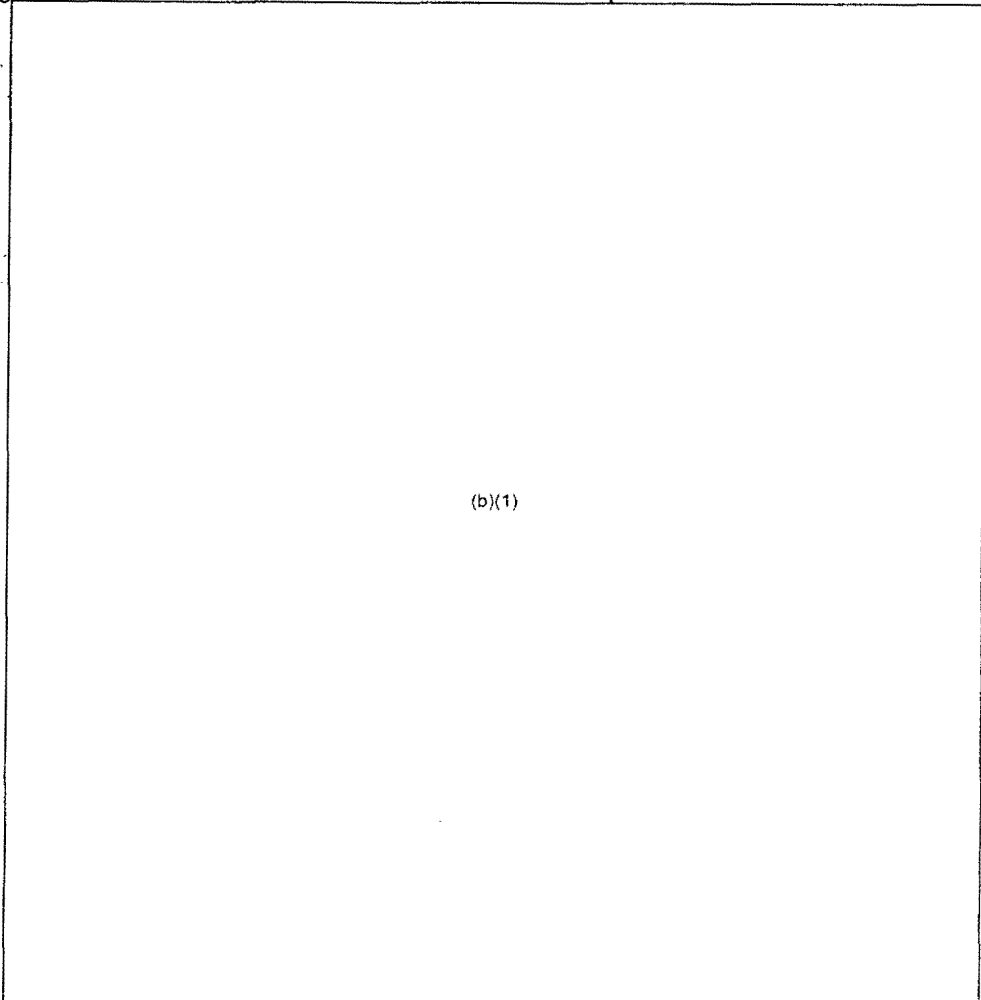
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ANNEX. A.

MANUFACTURERS OF MEDICAL MATERIEL



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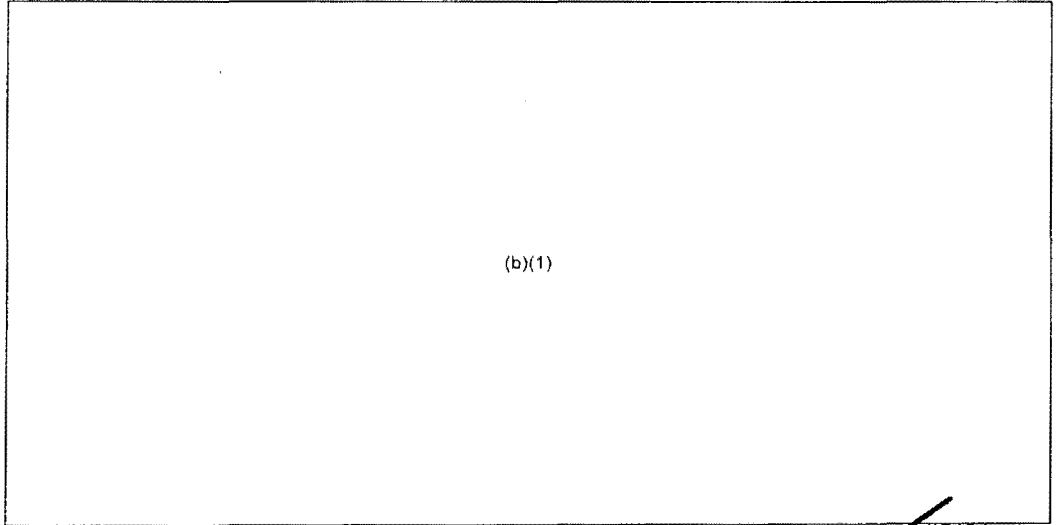
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MANUFACTURERS OF MEDICAL MATERIEL (Continued)



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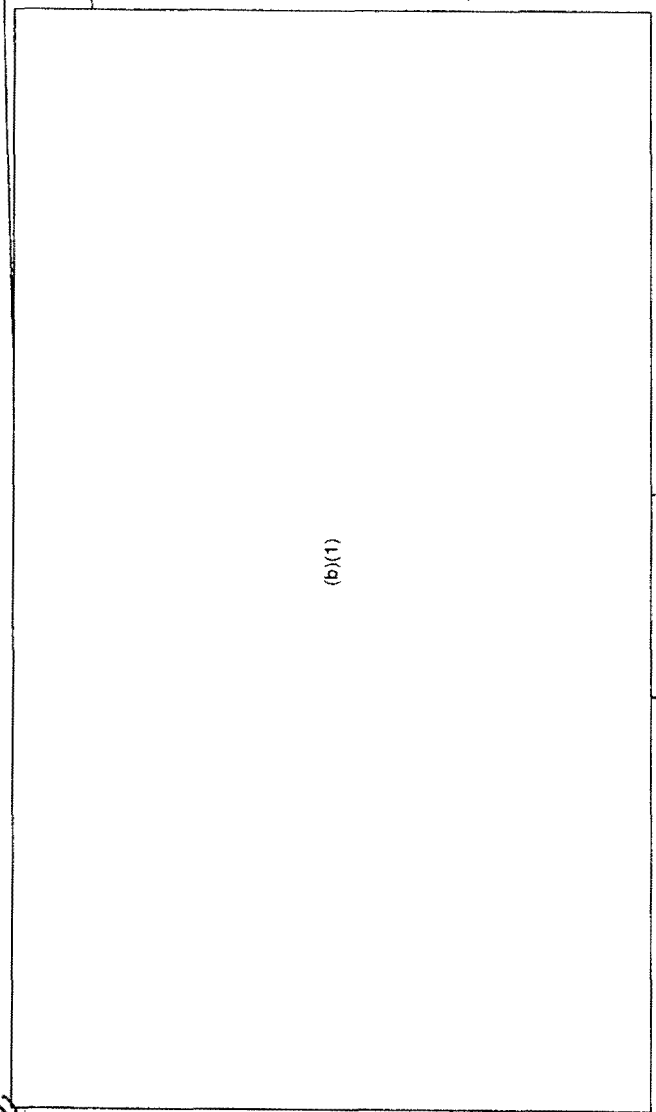
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ANNEX B.
MEDICAL LABORATORIES



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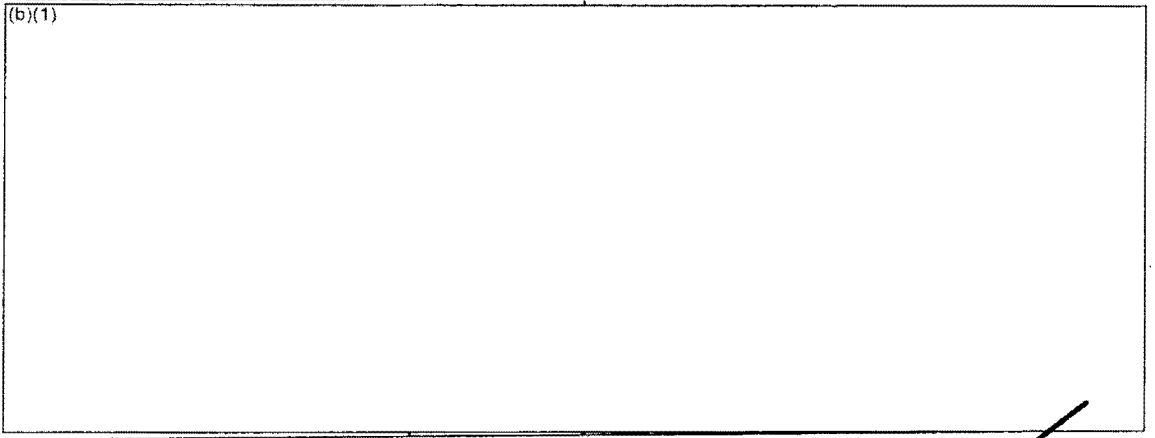
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MEDICAL LABORATORIES (Continued)

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APPENDIX IV.

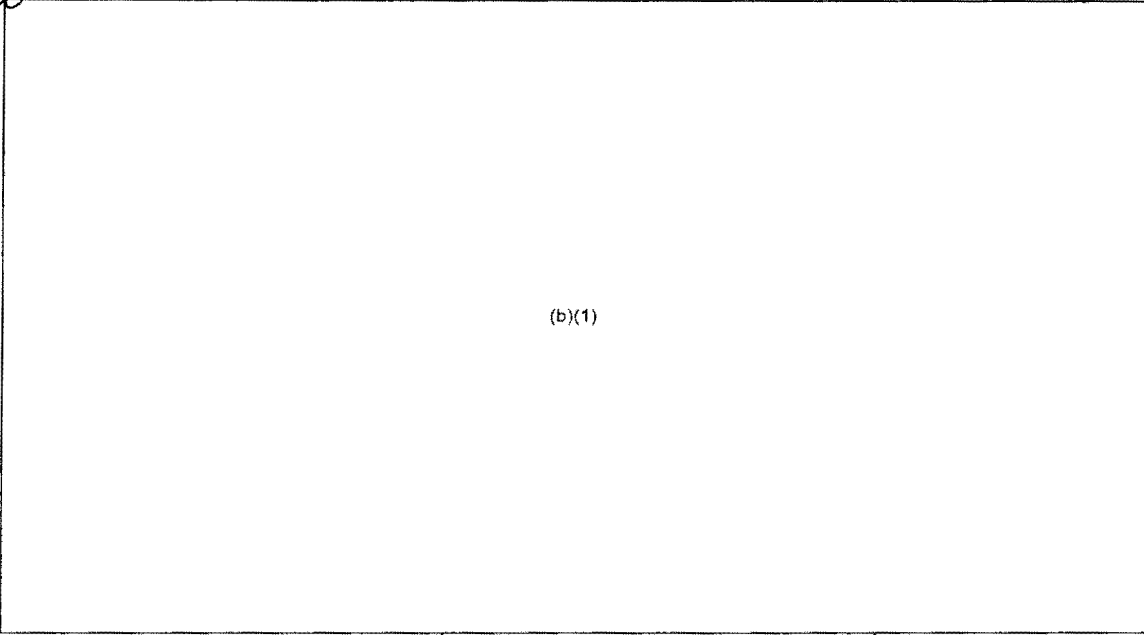
SELECTED MEDICAL MATERIEL MANUFACTURERS, MONGOLIAN PEOPLE'S REPUBLIC (1971)

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SELECTED MEDICAL MATERIEL MANUFACTURERS, MONGOLIAN PEOPLE'S REPUBLIC (1971) (Continued)

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