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MILITARY INTELLIGENCE SERVICE

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GENERAL HEADQUARTERS
UNITED STATES ARMY FORCES, PACIFIC
Scientific and Technical Advisory Section

REPORT

ON

SCIENTIFIC INTELLIGENCE SURVEY IN JAPAN

September and October 1945

VOLUME V

BIOLOGICAL WARFARE

1 November 1945

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DISTRIBUTION

Report on Scientific Intelligence Survey

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BIOLOGICAL WARFARE (BW)

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Classification changed from Restricted to Secret as directed by War Dept. Telegram No: WX 80510.

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SUMMARY

BIOLOGICAL WARFARE (BW)

1. Responsible officers of both the Army and Navy have freely admitted to an interest in defensive BW.

2. Naval officers maintained that offensive BW had not been investigated.

3. Information has been obtained that from 1936 to 1945 the Japanese Army fostered offensive BW, probably on a large scale. This was apparently done without the knowledge (and possibly contrary to the wishes) of the Emperor. If this was the case, reluctance to give information relative to offensive BW is partially explained.

4. BW seems to have been largely a military activity, with civilian talent excluded in all but minor roles.

5. The initial stimulus for Japanese participation in BW seems to have been twofold:

a. The influence of Lt Gen Shiro Ishii.

b. The conviction that the Russians had practiced BW in Manchuria in 1935, and that they might use it again. (The Chinese were similarly accused)

6. The principal BW center was situated in Pingfan, near Harbin, Manchuria. This was a large, self-sufficient installation with a garrison of 3,000 in 1939-1940. (Reduced to 1,500 in 1945).

7. Intensive efforts were expended to develop BW into a practical weapon, at least eight types of special bombs being tested for large-scale dissemination of bacteria.

8. The most thoroughly investigated munition was the Uji type 50 bomb. More than 2,000 of these bombs were used in field trials.

9. Employing static explosion techniques and drop tests from planes, approximately 4,000 bombs were used in field trials at Pingfan.

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10. By 1939, definite progress had been made, but the Japanese at no time were in a position to use BW as a weapon. However, their advances in certain bomb types was such as to warrant the closest scrutiny of the Japanese work.

11. Japanese offensive BW was characterized by a curious mixture of foresight, energy, ingenuity, and at the same time, lack of imagination with surprisingly amateurish approaches to some aspects of the work.

12. Organisms which were considered as possible candidates for BW, and which were tested in the laboratory or in the field included:

All types of gastro intestinal bacterial pathogens, P. pestis (plague), B. anthracis (anthrax), and M. malleomycea (glanders).

13. Japanese defensive BW stressed:

a. Organization of fixed and mobile preventive medicine units (with emphasis on water purification)

b. An accelerated vaccine production program.

c. A system of BW education of medical officers in all echelons (BW Defensive Intelligence Institute)

14. The principal reasons for the Japanese failure were:

a. Limited or improper selection of BW agents.

b. Denial (even prohibition) of cooperated scientific effort.

c. Lack of cooperation of the various elements of the Army (e.g., ordnance)

d. Exclusion of civilian scientists, thus denying the project the best technical talent in the empire.

e. A policy of retrenchment at a crucial point in the development of the project.

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CONCLUSION

It is the opinion of the investigating officers that:

a. If a policy had been followed in 1939 which would have permitted the reasonably generous budget to be strengthened by an organization with some power in the Japanese military system, and which would have stressed integration of services and cooperation amongst the workers, the Japanese BW project might well have produced a practicable weapon.

b. However, since the Japanese dreaded the United States' capacity for retaliating in kind (i.e., BW) or with Chemical Warfare agents, it is most unlikely that they would have used a BW attack against American troops even if the weapon had been at hand.

c. The Japanese are fully aware of the reasons for their failure in the development of BW. It is extremely unlikely that they would repeat their mistakes.

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BIOLOGICAL WARFARE (BW)

1. INTRODUCTION. The purpose of this investigation has been twofold: a) to evaluate the intentions and capabilities of the Japanese military in regard to BW; b) to apply these findings in an attempt to estimate the potentialities of BW as a weapon at the present time or in the immediate future.

The basis of the statements in this report stem from numerous interviews and laboratory examinations carried out in Japan during the period immediately following the signing of peace in Tokyo Bay, 2 September 1945. In Appendix 29, an effort has been made to provide a documentary background by recording selected interviews.

It must be remembered that at the time of the investigation, certain unavoidable difficulties inherent to the military situation precluded a searching examination of laboratory records. For one thing, the massive destruction of such key areas as Tokyo, Nagasaki, and Kobe made it impossible to check the claims of those interviewed that records had been burned. Indeed, it was surprising that some records were still extant in such centers as the Tokyo Army Medical College, which was more than 90% destroyed.

It also became apparent early in the investigation that in dealing with the subject of BW, the investigators were faced with obtaining information which the highest authorities in the War Ministry were reluctant to give. This fact, coupled with the lack of recorded data, made it necessary to rely on verbal evidence. In order to reduce the error as much as possible, attempts were made to obtain information from presumably independent sources, using the data from each as confirmation. Although an occasional discrepancy was noted, they were of minor nature, and it is felt that the information obtained from the interviews is reasonably accurate within the limits of error of human memory. Certainly it seems logical to assume that information on offensive BW activities is significant, since the greatest reluctance was encountered in obtaining data relative to this phase. In view of the political situation, the shortcomings of offensive information would be omission rather than commission.

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2. INITIAL STIMULUS. There is some conflict in the statements concerning the motives which precipitated the Japanese commitment to BW. According to Naito (App 29-E-a), in 1932 Gen Shiro Ishii (then a Major) returned to Japan after a European tour and attempted to obtain funds for constructing facilities where BW could be developed as a weapon. His hypothesis was based upon the implication of the prohibition by the League of Nations, some years earlier, against the use of bacterial agents in warfare. He reasoned that BW might be effective; otherwise, it would not have been forbidden. Regardless of whether Ishii's efforts were responsible for the birth of the Japanese BW movement, all informants are agreed that this individual was the compelling force behind the ea[illegible] throughout the period of Japanese investigations in the field of biological warfare.

Emphasis has also been placed upon the role which Russian BW activities played in stimulating the organization of Japanese BW. According to one informant, Masuda, (App 29-E-d), it was learned in 1935 by the Kwantung Army, that many Russian spies carrying bottles filled with bacteria had crossed into Kwantung territory. It is the claim of this individual that he personally examined containers found on such spies and demonstrated the presence of B. anthracis. A similar contention was made by Dr Naito.

3. HISTORICAL. Regardless of the nature of the initial stimulus, it is apparent that by 1935 Japan was actively engaged in the development of munitions for offensive BW. This work was carried out in the laboratories attached to the Harbin Military Hospital. Nor were their investigations limited to bomb construction. Field trials and preliminary offensive evaluation of organisms, in addition to defensive investigations, were simultaneously in progress. Throughout this period, and indeed at all times during the BW picture, Gen Ishii moved prominently. Although his efforts to obtain support for a BW center were not formally accepted until 1937, he seems to have provided an impetus for the work even before it received quasi-official status.

By 1937, BW investigation apparently showed sufficient promise to warrant support from the Japanese War Ministry. It has been emphasized that the BW project was carried out from beginning to end without the approval or knowledge of the Emperor. This is an important factor in contributing to the weaknesses in the organizational structure, which later proved to be fatal to the success of the mission.

With the support of the highest military authorities assured (with the exception of the Emperor), the BW project progressed rapidly. A large institute was constructed in Pingfan, south of Harbin. Buildings were apparently completed with some rapidity, because by 1939 it was possible to house the garrison of 3,000 individuals who were directed by Ishii in all phases of BW investigations. By 1940, the Pingfan Institute reached its present physical strength, although it has been stated that this does not represent the completed plan.

4. ORGANIZATION OF THE BOEKI KYUSUIBU. There is no doubt that the responsibility of BW investigation in all its phases rested in the Boeki Kyusuibu or Water Purification Dept.* To understand the unique opportunity which this group had for pursuing an activity apparently prohibited by the Emperor, the bivalent responsibilities which were lodged in Gen Ishii's hands must be clarified. As head of the Boeki Kyusuibu, he controlled many installations, both within Japan proper and outside the homeland. (Supp 1, a & b). It should be emphasized that the Medical Dept exercised no control over the Boeki Kyusuibu, whatsoever, and functioned in a purely advisory capacity to the military commanders in the various echelons of command. The Water Purification units, on the other hand, were directly responsible to these same military commanders through an independent channel. Furthermore, the Kwantung Armies, perhaps the most powerful military unit in Japan, functioned independently of all authorities, and the commanding general was responsible only to the Emperor. Thus, since Ishii was not only the chief of the Boeki Kyusuibu in general, with headquarters in Harbin, but at the same time was specifically in charge of the Kwantung Boeki Kyusuibu, he was able to carry on in an unhampered fashion so long as he satisfied the commanding general of the Kwantung Armies. For clarification of the channels of command, for appreciation of the magnitude of the organizations involved, with emphasis on the Kwantung group, it is recommended that Supplement 1 be consulted. It is to be further emphasized that the Boeki Kyusuibu Dept, in all its ramifications, was originally organized as the defensive mechanism against BW, and was given the mission of developing this means of warfare as an offensive, retaliatory measure.

a. The Pingfan Institute was the great Japanese BW installation.

* The literal translation of Boeki Kyusuibu is "Anti-Epidemic Water Supply Unit."

It can be seen from a plan of the grounds and buildings at Pingfan (Supp 2a, b) that the institute was of considerable size and was self-supporting (even to the extent of raising its own vegetables and livestock).

Unfortunately, no original documents are available because of the stringent command that complete destruction of the installation be carried out at the approach of an enemy. With the entrance of the Russians into Manchuria, this command was supposedly obeyed to the letter. There is no reason to doubt this because the Japanese had ample time to burn records and demolish all buildings and their contents.

Perhaps no better indication of the magnitude of the Pingfan project can be gained than consideration of the fact that in addition to various offensive activities, the vaccine production capacity of the plant was of the order of twenty million doses annually. Furthermore, the spectrum of vaccines ranged from typhoid to typhus.

The Pingfan Institute epitomizes the paradoxical character of the Japanese BW project. On the one hand, modern methods and machinery were utilized in seemingly efficient manner and the experiments which were done revealed ingenuity and imagination. On the other hand, a curiously primitive and limited approach appeared throughout the pattern of the organization. For example, in order to meet typhus vaccine production, the institute maintained its own flock of 50,000 hens and roosters (for obtaining fertilized eggs). These chickens were distributed in lots of 100-200 to farmers. It was the duty of the farmers to tag these chickens and to supply the fertilized eggs to collectors from the institute.

5. JAPANESE OFFENSIVE ACTIVITIES IN BW

a. Organisms. Various sources of information have agreed that the following organisms were considered likely candidates for BW:

(1) B Typhi
(2) Paratyphoid A and B
(3) S dysenteriae
(4) V cholerae
(5) P pestis
(6) B anthracis
(7) M malleomyces (glanders)
(8) Anerobes

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(a) B welchii
(b) B novyii
(c) B hystolyticus
(d) B tetani

However, there is a difference of opinion as to the amount of experimentation carried out with each agent. According to Kaneko (App 29-T-b), organisms which were studied in the BW munitions included B prodigiosus, V cholerae, P pestis, various types of dysentery organisms, B typhosus, and B anthracis. Efforts were principally directed toward the study of pestis and anthracis organisms.

In contrast to this opinion is the statement of Col Masuda (App 29-E-d), that only B prodigiosus and B anthracis were tested in the bombs. Since all records have been presumably destroyed, it was not possible to clarify this point.

b. The Method of Evaluating. BW potentialities of organisms were crude and unsatisfactory. The bacteria under consideration were stored at room temperature and tested at daily intervals. Depending upon viability curves or percentage survival, the decision was made regarding further studies. Since the investigation of preservative materials for extending the life expectancy of the bacteria beyond natural limits was insufficiently studied, the selection of BW candidates constitutes one of the basic errors in the Japanese project.

General Ishii and his assistants also exhibited a curiously limited imagination insofar as the virus-rickettsial agents were concerned. Why this group of pathogens was not even considered in the selection of agents is not clear. This is especially puzzling since rickettsia in mass production were available at the typhus vaccine plant. It is, of course, quite possible that fear of retroactivity was the important brake in the policy of agent selection. (See App 29-T-a for details)

c. Methods of Dissemination. The Japanese offensive plans in BW included four general methods of bacterial dispersion: (1) Artillery shells; (2) Bombs; (3) Dispersion from planes (not in munitions); (4) Sabotage activity.

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(1) Artillery shells. Two types of shells were investigated and were quickly discarded (1937) because of their impracticality as BW vehicles. The "A" shell was supposedly an ordinary gas shell and the only information available refers to an unsatisfactory trajectory. The "B" shell is supposed to have been a 75 or 80 mm shell with bacterial suspensions replacing the powder charge.

(2) Bombs. The principal offensive effort was expended on attempting to develop a bomb of bombs which could effectively disseminate organisms. Whatever detailed data have been made available on this subject have been incorporated in the drawings and summary chart (Supp 3). For purposes of this report, a brief discussion is given of the two principal munitions, the Uji and Ha bombs, with additional reference to recent trends in bomb research.

The Uji bomb was probably studied at Pingfan since 1936. It represents an ingenious approach to the problem of bacterial dissemination since the friable porcelain casing required little charge for shattering, with subsequently little destruction of the organisms due to explosion heat. That the Japanese investigated this model with vigor may be seen from the fact that at least three types of Uji bombs were exhaustively studied from 1936 to 1943, or even later. Again, the work on this munition emphasized the shortcomings of the Japanese system of investigation: Having made excellent progress in the early phase of their work, the scientific investigators were limited by their inability to obtain adequate equipment to rectify the deficiencies of the munition. One of the sources of information (App 29-3-d) who participated in numerous experiments has emphatically claimed that he would have resolved the munition problem except for the fact that he was only able to procure obsolete fuses. Much effort was wasted because of this fact, since the principle upon which the munition functioned was an accurately timed explosion in the air. (While it is true that he might have improved this weapon, serious doubts may be cast upon the possible solution because of a more basic error; i.e., the poor choice of organisms. (MS and HY)

Another serious error in the Japanese activities was the apparent inability (or the disinclination) of responsible authorities to permit cooperation within their own organization or with other branches of the service. For example, the Uji bombs were produced in the Kukden Army Arsenal by individuals who remained in total ignorance of the purpose for which the bombs were intended. As a result,

the deficiencies were not considered by competent bomb experts. Also, workers at Pingfan carried on their work in isolated fashion without intra-departmental discussion.

The nearest approach to mass production was made in the Uji bomb. According to one source of information (App 29-E-b), more than 500 such bombs had been tested in field trials by 1941. According to another informant (App 29-E-d), more recently concerned with the project, over 2,000 Uji type 50's were tested experimentally. It was also stated that this figure did not represent the total production (figures not available). If one considers the fact that the payload of the Uji bomb varied from 10-100 liters, and that this munition was only one of eight tested in Pingfan, then it becomes apparent that the Japanese offensive BW study was one of no mean magnitude.

Whereas the Uji bomb was an all-purpose munition, the Ha bomb was constructed and produced with only one purpose in mind--the dispersion of anthrax spores. The immediate effect was gained by shrapnel bursts with secondary considerations given to ground contamination. The statement has been made that a scratch wound from a single piece of shrapnel was sufficient to produce illness and death in 50-90% of the horses, and in 90-100% of sheep exposed in experiments. More than 500 sheep were used in such field trials and estimates of horses similarly expended vary from 100 (App 29-E-a) to 200 (App 20-E-b).

Both static explosions and drop-tests were investigated with the Ha bomb. A final opinion of responsible authorities indicates that they considered this munition, or a modification thereof, satisfactory for contamination of pastures. The implication is made that field trials with the Ha bombs filled with anthrax organisms were of a fairly extensive nature, since it was stated that three types of planes were used in such field tests. These planes consisted of:

a. Scout planes, type 94, capacity four Ha bombs.
b. Light bombers, type 88, capacity six Ha bombs.
c. Heavy bombers, type 97, capacity twelve Ha bombs.

The search for a satisfactory BW munition continued until 1944 when a new type of weapon was tested, in an attempt to accurately control the height at which the explosion occurred. This was done by the use of "mother and daughter" radio bombs. The munition consisted of one large "mother" bomb and a cluster of small "daughter" bombs. The large missile contained radio-sending apparatus and was dropped from the plane just before the target was reached. The cluster of bombs, containing radio-receiving apparatus, was loosed within a given period after the "mother" bomb had left the plane. Cessation of the radio impulses, which occurred when the "mother" bomb exploded on contact with the terrain, caused the "daughter" bombs to explode. The only information available concerning this weapon is that the bombs used in clusters were thin-walled and that the trend of research was considered highly promising. Only one set of bombs was made and tested and the investigation ceased because of the high cost of the bombs.

Although details on various other bomb types are available in Supplement 3, it is of interest to summarize information available on types of bombs, the approximate production figures, and the year in which they were made and tested.

BOMB	APPROXIMATE PRODUCTION	YEAR MADE AND TESTED
I	300	1937
RO	300	1937
HA	500	1938
NI	300	1939
U	20	1938
UJI (old type)	300	1938
UJI (type 50)	2,000*	1939
UJI (type 100)	200	1939
GA	20	1938

* This number of bombs was used for field trials. The total production figures are not known, although it has been established that additional Uji type 50 bombs were made.

Because the Mark 7 bomb has been frequently mentioned as the Japanese bacillus bomb in Theater G-2 reports, attempts were made to obtain information relative to this munition. In brief, it was found that the Mark 7 was a Navy bomb but its existence had been limited to the drawing board. According to the source of information (App 29-D-b), the Mark 7 bomb was suggested about ten years ago when the Japanese General Staff was considering all possible types of bombs. It has been repeatedly emphasized by responsible officers in the Navy that their interest in BW was not only limited to defensive aspects, but that this interest never exceeded simple theoretical considerations with defensive responsibilities allocated to the Bureau of Medicine. The group at the Naval Medical College maintained that they had carried out no experimentation whatsoever involving BW, and had considered the subject in terms of preventive medicine only.

The naval authorities further maintained that the Mark 7 bomb never advanced beyond a preliminary informal drawing. The photograph of this munition (Supp 3f) is from a copy of the original "informal" drawing. Since the naval developmental group was located adjacent to an air arsenal where naval officers were instructed in ordnance, it is considered likely a reference to the Mark 7 was seen by one of the instructors who then entered the (theoretical?) bomb in his lecture notes. No evidence refuting these claims was obtained during the course of the investigation. Certainly the Mark 7 based on the drawing is a crude and unsatisfactory BW munition.

(3) Dispersion from Planes (not in munitions). Some consideration by the Japanese has been given regarding the dispersion of bacterial agents from planes, in the form of fluid or dried material. It was the opinion of one of the central figures in the project (Col Masuda), that desiccated material dispersed directly from a plane would undoubtedly be an effective means of waging BW. Because of the hazard to the workers and limited facilities for desiccating biological substances en masse, such considerations have remained hypothetical.

The direct dispersion of fluid material was limited to a few preliminary experiments. Tests with colored material, dispersed at a height of 4,000 meters, revealed that the particles descended to the surface of the earth in one hour. When B prodigiosus was used in such tests, the organisms could not be recovered in viable form. It was further established that the viscosity of the solution and rapidity of dispersion were important factors for successful dissemination of test materials. The best substances for producing the proper degree of viscosity were 50% glycerine and 10% gelatin. In one series of experiments, adequate dispersion was obtained when a dissemination rate of 920 liters per second was maintained over the test area. The number of experiments was small and additional information concerning other substances tested was not forthcoming. However, it was learned that similar tests had been carried out at altitudes of 2,000, 1,000, and 200 meters--with somewhat better results than at 4,000 meters.

Whether this was the complete story of direct dispersion could not be ascertained. However, it was certainly possible for the Japanese to indulge in such activities since the test field at Pingfan is a square, 10 x 10 km, and various planes were at the disposal of the project.

(4) Sabotage Activities. The Japanese have repeatedly emphasized this phase of BW activity, but have invariably placed the responsibility upon China or Russia. Indeed, the only technical reference to saboteurs, so far as the Japanese were concerned, was an explanation as to why the study of contaminated wells came under the defensive program.

Regardless of whether or not the Chinese or Russians indulged in this type of activity, it is suggested that the Japanese statement in respect to their own intentions be considered with some reservation. It is not intended to convey in this report that the Japanese used individuals to disseminate infectious materials, nor that they proposed to do so. However, there are several reasons for accepting, with some question, their purely defensive connotation to BW by sabotage methods. These reasons are as follows:

(a) In the selection of BW agents, the Japanese concentrated to a great extent on organisms spread via the gastro-intestinal tract. In such circumstances, water might be the vehicle of transmission, par excellence.

(b) It is difficult to understand how the Japanese offensive program intended, even theoretically, to disperse such organisms as S typhi, V cholerae, and dysentery by means of the munitions studied at Pingfan. Yet, these bacteria remained on the list of offensive agents.

(c) Not only do G-2 reports emphasize Japanese BW offensive thinking in terms of accentuation of endemic disease, but a similar line of reasoning has been noted in various discussions with Japanese officers. If this reasoning is indicative of Japanese thought on the subject of BW, then the selection of enteric organisms is further explained.

As previously mentioned, there is little concrete evidence, with one exception, of Japanese studies using saboteurs for spreading disease. A large number of experiments were carried out by units under the direction of Col Masuda, which tested the capacity of organisms to survive in water. More than a thousand wells in a given district were tested. Further details on this study can be found in App 29-F-a, and it may suffice to say here that Col Masuda came to the conclusion that contamination of wells in China was not practical.

d. Assessment of Field Trials. The methods used at Pingfan to accumulate and evaluate data from field trials, provide an interesting and significant insight into Japanese BW capabilities. While the methods were essentially of a qualitative character, they were, nevertheless, simple, direct, and undoubtedly provided significant data.

It is important to note that the authorities at Pingfan disregarded any possible need for accumulation of quantitative data in cloud chambers preliminary to setting up field trials. (Indeed, such chamber studies were never attempted). Showing little concern for finesse, they proceeded to test in the field bacterial dissemination from various types of munitions. This activity was initiated as early as 1935 and was energetically maintained for almost ten years.

Whatever details are available on such aspects of field trials as persistence of clouds, sampling methods, particle size determination, and pattern of dispersion, can be found in App 29-F-a.

Admittedly crude and possibly unsound as part of a permanent policy, Japanese methods of obtaining data from field trials served an important purpose in demonstrating BW potentialities. It would be a serious error to minimize them.

6. JAPANESE DEFENSIVE BW ACTIVITIES. In spite of the energy which the Japanese expended on offensive BW investigations, the importance which they attached to the BW problem is best appreciated from a consideration of the defensive phase. This is true in spite of two cardinal principles of the Boeki Kyusuibu that: (a) Offensive BW was the best defense; (b) If a large-scale BW attack were to be launched against Japanese forces or civilians (especially in the homeland), defensive measures would be of little avail. Japanese defensive measures may be divided into three phases: (See App 29-F-a) (a) An organization to meet the BW problem; (b) Preventive medicine; (c) The BW Defense Intelligence Institute.

a. Organization to Meet the BW Problem. This was considered the most important defense measure.

During the summer of 1939, Col Masuda recommended that the Boeki Kyusuibu be greatly expanded. His plan was accepted and by October of the same year, 18 water purification centers were established in Chinese territory controlled by Japan. Each of these installations served as a central bureau, assigning their allotment of 300 persons to satellite branches. The 18 larger installations were distributed as follows: 3 in north China, 13 in central China, and 2 in south China.

At the risk of appearing repetitious, it is considered sufficiently important to point out that fear of BW (presumably in China) was the basis of this expansion involving a minimum of 5,000 personnel with varying degrees of technical training. While it is true that the water purification centers of necessity contributed to a health program, it has, nevertheless, been emphasized that only later, when BW attacks did not materialize, was the emphasis permitted to shift.

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b. Preventive Medicine. This phase of the defense must certainly be considered part of a normal medical program of a nation at war. Nevertheless, the emphasis on BW was a definite and independent part.

To begin with, the vaccine production program was accelerated and expanded. Measures were taken to permit the large, fixed installations to produce all types of vaccines for those individuals in the areas for which the Boeki Kyusuibu was responsible. This, of course, required transfer of personnel and equipment. But the vigor of the program can be noted from the fact that at the Pingfan installation alone, more vaccine was produced annually than in the whole Japanese homeland during a comparable period.

Another, perhaps more specific phase of defensive BW included research in preventive medicine in various localities. Because this type of work was generally acceptable as a medical activity, it was not only carried on at Pingfan but also at the Army Medical College at Tokyo (and possibly at the corresponding institution at Niigata).

It has been difficult to isolate the experiments which were done for the purpose of contributing to BW defense. However, there is no question but that many investigations would have been omitted had it not been for the stimulus of BW

As has been noted in Appendix 29, the records at the Tokyo Medical College were destroyed. Just as the investigation was being concluded, a complete set of records was found at the Niigata branch of the Army Medical College covering all experimental work which was done in Tokyo during the past ten years. An analysis of these records, including detailed findings in defensive BW research, will be presented in a supplementary report.

c. The BW Defense Intelligence Institute. This phase of the defensive activity might well be considered as part of the general organization for combating BW. However, Ishii considered it [illegible] and used this system for teaching purposes. The term, system, has been used advisedly since the Defense Intelligence "Institute" seems to have referred to a function rather than to an organization. The Boeki Kyusuibu had the responsibility of briefing medical officers in all echelons down to battalions, on the subject of BW. It was the duty of these officers to organize epidemiological teams to trace all outbreaks of disease to the source to determine whether or not they were dealing with an artificially initiated epidemic (i.e., BW). While this may

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to be somewhat far-fetched, it may be pointed out that such an attitude was no more incredible than the field testing of some 2,000 Ujii type 50 bombs (practically a fait accompli by the time the BW Defense Intelligence Institute began to functio

Since no BW attacks were experienced, the contribution of the epidemiological teams was limited to control of disease outbreaks occurring in the natural course of events. However, the case may have been, it is the method of thought in the BW Defense Intelligence Institute that is pertinent to this report.

It may be further noted that it had been planned originally to assign specially-trained BW officers in various echelons of the Army, but a dearth of personnel made it necessary for the medical officers to take on the additional duty of BW technical intelligence.

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PREFACE TO APPENDIX 29

Statements in the interviews (Appendix 29) have been largely left in their original form and may therefore appear foreign or unwieldy.

IT IS REQUESTED, IN THE EVENT THAT ANY USE IS MADE OF MATERIAL IN THE INTERVIEWS, THAT JAPANESE NAMES AND SOURCES BE KEPT CONFIDENTIAL BECAUSE INFORMATION WAS OCCASIONALLY GIVEN CONTRARY TO THE WISHES OF SUPERIOR OFFICERS.

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ARMY MEDICAL COLLEGE

SUBJECT : Biological Warfare (BW)
DATE : 20 September 1945
INTERVIEWED : Col Saburo Idezuki, Chief, Division Preventive Medicine, Army Medical College, Col Takatomo Inoue, Director Department of Bacteriology, Army Medical College,
INTERVIEWERS: Lt Col M Sanders, Lt Col F Moore, Maj H F Skipper.

1. When these officers were questioned regarding their relationship to BW they answered that the department of Preventive Medicine had been given the responsibility of organizing defense measures in that field.

2. The question was raised regarding the unit of defense and the answer given referred to it as the Water Purification Unit. (WPU)

3. When asked to reproduce a chart showing the organization and details of BW groups in the field the following was given:

Commander of Division

Bacteriological Group (225 men)

(Lt Col or Maj)

4. The duties of the divisional WPU were listed as follows:

a. Prevention of Infectious Disease
b. Water Purification
c. Investigation of Epidemics

5. Fixed units, larger in organization, also prepared vaccines. Futhermore, emphasis was placed upon the fact that the units had no offensive duties but only those considered as preventive medical activities.

6. Equipment for divisional WPU included: 4 water purification units (motorized filters plus trucks); some units contained only 2 filters with 28 trucks for water and material transportation.

7. Army Water Purification Units were twice the size of divisional units and were commanded by colonels.

8. The organization of the permanent fixed stations was somewhat different than that of the army divisional WPU. The permanent fixed stations were situated at:

a. Harbin (Manchuria)
b. Peking (China)
c. Nanking (China)
d. Canton (China)
e. Singapore (Malay States)

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9. The following questions and answers were recorded:

Q. Where is there water purification equipment which may be examined?
A. In the Army Medical College. Part of the equipment has been moved to Niigata to avoid bombing.

Q. Did you have defensive measures against BW other than GP?
A. Just cloth masks.

Q. Did you investigate the possibility of the gas masks as a means of defense?
A. No.

Q. Did you produce any protective clothing especially designed for BW defense?
A. Only for people who studied Plague.

Q. Did you expect a BW attack?
A. Yes. (Col Idozuki stated that after the last war they had heard that all countries were studying offensive BW.)

Q. What work has been carried out here on offensive BW?
A. None, The offensive phase of BW was never studied.

Q. Which BW agents did you think would be the most likely candidates in the event of an attack?
A. Typhoid and intestinal type germs.

Q. Did you think ordinary precautions were adequate?
A. We felt that the weakest point of the Japanese soldier was his inadequate knowledge in regard to his hygiene. Because of this weakness, boiling water and proper preparation of foods were stressed.

Q. What vaccines were produced in Japan?
A. a. Typhoid.
b. Para typhoid A, para typhoid B.
c. Plague
d. Meningitis
e. Typhus
f. Weil's Disease
g. Small pox

Q. Am I to understand that you have carried on absolutely no offensive studies on BW?
A. No studies concerned with offensive BW. Only studies to avoid attack of enemy. These studies were carried out at the Army Medical College.

Q. What type of defensive studies have been carried out?
A. Studies of diseases endemic in a given area. For example, in Manchuria --typhus studies; in South China--malaria.

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Q. What do you know of a BW bomb?
A. We know nothing.

Q. We have reports from independent sources that you possess a BW munition. All reports agree on the description of this munition.
A. This is a strategic (?) fact. It is not within our responsibility and we would naturally be ignorant of it.

Q. Who would know of this?
A. General Staff.

Q. Who in General Staff?
A. We do not know.

Q. How could you carry on intelligent defensive studies without offensive knowledge?
A. We believed we could take general measures.

Q. We wish to see your records on the defensive work.
A. Most of the buildings have been burned and with them the medical studies in which BW is described.

10. The interview was terminated and the Japanese officers voluntarily promised to try to find out the individuals on the General Staff who were responsible for policy and who might have had the responsibility for offensive studies.

ESTIMATE: This, the first conference on BW was manifestly unsatisfactory. If the statements of the Japanese officers were to be credited then the defensive aspects of the subject were indeed amateurish and crude. Cols Idezuki and Inoue had been summoned because of the policy current at GHQ of frankly requesting that officers engaged in specific activities be called for interview. Thus, they had come in response to a request for officers concerned with BW.

It is to be noted that the claims made for BW activities were limited to enteric organisms and emphasized the accentuation of endemic disease. Although the paucity of information cannot be denied, it is interesting that these statements were made which were in agreement with our intelligence reports. Also in agreement with such reports was the association of TPU with BW.

Because of the unsatisfactory nature of this interview it was decided that the Surgeon General of the Army be summoned.

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ARMY MEDICAL COLLEGE

SUBJECT : Japanese Defensive Activities in Biological Warfare (BW).
DATE : 1 October 1945.
INTERVIEWED : Col Takatomo INOUE, Lt Col Ryoichi NAITO.
INTERVIEWER : Lt Col Murray Sanders.

1. This conference held at the Army Medical College emphasized the reluctance with which Japanese officials discussed BW. Col Inoue who is chief of the Bacteriological Section in the Army Medical College was given the responsibility of defensive BW. He stated that BW was part of the research program in preventive medicine. When asked for the records of this research he said that none were available since all the files had been burned as a result of bombing. This was certainly likely since more than 90% of the Army Medical College has been completely destroyed by air attack.

2. In response to a question concerning the extent of the BW activities in the Army Medical College Col Inoue stated that no type of artificial infection experiment had been carried out and that the approach to the problem of BW was based on general medical concept. Furthermore, 90% of their efforts had been expended toward the improvement of vaccines.

3. In response to orders from Gen Kombayashi, Col Inoue prepared a resume (?) of his departments activities during the war years. Since no detailed records were available the summary was prepared from memory. A translation of this statement is appended. It is apparent that his material deals only with generalities and provides absolutely no information on BW. Col Inoue provided a list of personnel within his department. They are:

Maj Ikeda, Kichitaro	Differentiation of Vibrio cholerae from non-pathogenic
Army expert Miyauchi, Mashiro	Water analysis
Col Inoue, Takatomo	Director 1942-1945
Lt Col Naito, Ryoichi	Water supply, Drying of Sera
Maj Yamada, Masatsugu	Education, Lecturer
" Idei, Katsushige	" "
" Nakano, Minoru	Plague prophylactic vaccine
" Hirooka, Tadashi	Cultivation of Bac tuberculosis
" Miyasaki, Tadaomi	Prophylactic of tetanus and gas gangrene
" Hayashi, Masao	BCG vaccine
" Kondo, Masabumi	Spirochetae icterohaemorrh
" Kaseno, Toshio	B. tuberculosis
" Tsuyama, Yoshibumi	Water supply & Disinfection
Lt. Usiba, Daizoo	Penicillin
Maj Komori	Classification of salmonella

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Studies for the Prevention of Epidemics in the Army

I Studies on Malaria

A. On investigations of the mosquitoes which carry malaria.

B. The study for destroying mosquitoes.

1. On insecticides.
2. On a certain insecticide invented by the Chemical Department.

C. Studies with bird-malaria.

1. Precipitin tests between the organs of (liver, spleen) malaria-infected birds and human serum. This was reported to be of no diagnostic value.
2. Sulfachinin (Sulfanilamide + chinine) was found to have no effect on bird malaria.

D. The cultivation of the plasmodium.

1. It was reported that they were able to preserve the bird malaria plasodium in an ice chamber longer than in former times (5 days).
2. Tissue-culture was given up owing to the death of the investigator.
3. The object for cultivation was to discover a good Plasmodium-antigene for diagnosis and prophylaxis.

E. Summary of Japanese references on malaria.

F. On the prophylaxis of malaria.

1. Against the plasmodium in the human blood.
2. The destroying of mosquitoes and larvae.
3. The prevention against mosquito bites.

G. On investigations of the malaria in the occupied areas.

II Studies on immunizing. This was regarded as one of the most important studies.

A. Typhoid Fever
B. Paratyphoid A
C. Paratyphoid B
D. Cholera
E. Plague

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F. Epidemic cerebro-spinal meningitis
G. Typhus
H. Dysentery
I. Tuberculosis
J. Small-pox
K. Tetanua
L. Infectious jaundice

III Studies on tuberculosis.

A. Culture media for the tubercle bacilli. Oka-Kata-kura's media was reported to be the best.

B. On culture medias using eggs.

C. On the resistance of the tubercle bacilli.

D. On the non-pathogenic acid fast bacilli in the sputum.

E. The studies on immunixing solutions, B. C. G.

F. On the manufacturing of "tuberkulin" for diagnostic use.

G. On a simpler method for collecting the sputum.

H. On the effect of the Spirochaeta morsus-muris. The inosoculation of the Spirochaeta to the tuberculosis-infected guinea-pig was reported to show a tendency to the healing of tuberculous ulcers.

IV Studies on Penicillin, especially on the conditions for culture.

V Studies on some pathogenic bacilli.

A. Studies on the Salmonella group.

1. Morphological, biological and serological studies on the bacilli collected from various parts of the continent of Asia.
2. On a simpler way for increasing the bacilli 1% glucose solution, and even sterile water served the purpose.

B. Studies on the dysentery bacilli.

C. Studies on the cholera vibrio.

D. Studies on the Plague bacilli.

VI Studies on substitutional culture medias.
Studies on serums for diagnostic use.
Studies on improvement of culture medias for the front.

VII A. On destroying insects which are carriers of infectious diseases: on D.D.T.

B. On the habits of mosquitoes. The colours mosquitoes like are red and yellow.

VIII Studies on the filtering apparatus. The Berkefeld type was adopted by the Army owing to the following reasons:

KIND OF FILTER	METHOD TO DISPOSE OF FILTER CAKE
A soft filter using asbestos.	It needs to be renewed every time.
A hard filter consisting of porcelain.	To be delt with chemicals or flames (fire).
A hard filter made from Diatomaceous earth.	Brushing the surface is sufficient for the purpose.

The types adopted by the Army are:

TYPES	STRUCTURE OF APPARATUS	WATER FILTERED PER HOUR	WEIGHT	ARRANGEMENT
A	Transported by motor truck	36 kl	5 tons	4 to each div.
B	Transported by a cart	1000 l.	100 kg.	1 to each bn.
C	Transported by horse	700 l.	70 kg.	1 to a company
D	Transported by men	100 l.	20 kg.	1 to a section
D	Transported by one man	20 l.	5 kg.	1 to each squad

A. Studies on the raw materials for the filter.

B. Studies on the manufacturing of the filter.

C. On testing the filter.

1. Mean pore diameter.
2. Maximal pore-diameter.
3. The amount of water filtered per hour.
4. The power of checking bacterias.
5. The absorption power.

D. On the filtering power and methods for using the apparatus.

E. On the structure of the filter.

F. On the preservation of the filter. For preserving the filter from mold it was soaked in a solution of Ca Cl_2 and Phenol.

IX Studies on disinfecting trucks. (Trucks for disinfecting) Two motor trucks were used for this purpose.

A. Consisting of:

1. Water tank (containing 1 L. of water).
2. Boiler.
3. Turbine pump for spraying.
4. A shower.

B. Consisting of:

1. A bag to disinfect clothes in.
2. An apparatus for causing hot air.

The trucks A and B combined, the following disinfections are performed:

1. Soldiers - chemical baths.
2. Clothes - steam, then dried with hot air.
3. Horses and carriages - sprayed with disinfectants.

100 (in summer 200) soldiers per hour could be disinfected in this manner.

X Studies on preserving serum.

XI Studies on the typhus vaccine. For producing the vaccine the lungs of rats, or the chicken embryo were used and not the louse nor tissue culture.

A. Vaccine produced from the lung of rats (Rickettsia Mooseri used - R. M. Vaccine)

1. Liquid vaccine.
2. Dry vaccine.

B. Vaccine produced from the chicken embryo using the Rickettsia Provaseki as the virus strain. (R. P. Vaccine).

1. Liquid vaccine.
2. Dry vaccine.

C. The comparison of the two vaccines as antigens by animal experiments.

Guinea pigs were used for the purpose. The guinea pig was immunized with each vaccine, and after 3 weeks of the injection, 1 cc of brain emulsion from an infected guinea pig was injected. A rise of temperature, decrease of weight, and if considered necessary, monocytosis, Fraenkel's nodules were examined.

1. With the R. M. Vaccine in using 1 cc in the first injection, and 2 cc in the second injection 20% of the guinea pigs were infected, but by using 2 cc in the first, and 4 cc in the second injection, the infection was completely prevented. The only fault was that a large dose was necessary for acquiring complete immunity. The liquid and dry vaccines are almost the same in their antigene powers.

2. With the R. P. Vaccine 0.5 cc in the first, and 1.0 cc in the second injection were enough to prevent the outbreak of the desease. The liquid vaccine, if preserved in a dark cool place, retained its power for about one year, while the dry vaccine can preserve its power for several years even in room temperature.

D. The immunizing of human beings.

In both vaccines the following method was adopted; The liquid vaccine, after preserving for two weeks in an ice chamber, the dry vaccine after dissolving the powder.

1. Local reactions.

Considerable pain is felt in both vaccines when injected, owing to the formalin as a preservative. This, however, disappears in less than a minute.

With the liquid vaccine swelling and reddening of the skin may be seen for a few days, but not with the dry vaccine.

2. The minimal dose:

a. R. M. Vaccine - 1 cc in the first, and 2 cc in the second injection.
b. R. P. Vaccine - 0.5 cc in the first, and 1.0 cc in the second injection.

As there has been no great epidemic, the dose for injection should be further studied. R. M. Vaccine for 6 persons can be gotten from 1 rat. R. P. Vaccine for 30-40 persons can be gotten from 1 egg.

E. Summary.

The R. P. Vaccine is superior to the R. M. Vaccine because of the following three reasons.

1. The immunizing power being greater.
2. The manufacturing process being simpler.
3. The amount of vaccine available being greater.

XII Studies on the examination of water.

A. An emergency test.

In cases of battle, and marching, examination boxes are used chiefly to remove poisonous substances.

To find poisonous substances in water quickly, and with simplicity, a testing paper for cyanide, sublimate, arsenic were invented.

B. Examinations in camp.

Not only examinations for poisonous substances, but also physico-chemical examinations to prove the contamination of the water by pathogenic bacterias indirectly are adopted. The examinations are made for:

1. Atmospheric temperature.
2. Temperature of the water.
3. Colour.
4. Chlorides.
5. Ammonia.
6. Subnitrates.
7. Nitrates.
8. Hardness.
9. Free chlorine.

C. Thorough examinations for permanent water supplies.

XIII On the water supply in Io Jima (Io Island).

Though the source of water in Io Jima is very scarce, well water is available on the coast, but as it contains much mineral salts, it does not serve as drinking water.

By using it for drinking use many soldiers suffered from diarrhea, the chief cause of which was considered to be the presence of magnesium sulfuricum, and so the following methods were adopted to remove $MgSO_4$:

A. The quantative measuring of $MgSO_4$.

B. The removing of $MgSO_4$.
1. The $Ca(OH)_2$ method; $Ca(OH)_2 + MgSO_4 = CaSO_4 + Mg(OH)_2$
2. The $Ba(OH)_2$ method; $Ca(OH)_2 + MgSO_4 = BaSO_4 + Mg(OH)_2$
3. The $Ca(OH)_2$ - $Ba(OH)_2$ method. The two methods above combined.

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Appendix 29-B-a-1

JAPANESE GENERAL STAFF

SUBJECT : Biological Warfare (BW).
DATE : 1 October 1945.
INTERVIEWED : Lt Col Saiichi Niizuma and Lt Col Ryoichi Naito.

INTERVIEWERS: Lt Col Sanders.

1. Col Niizuma's position was given as "My appointment controls all technical research work for the Japanese Army." Questioning revealed that his position carried extensive responsibilities including: Ordnance (bombs, weapons), Radar, Medicine, Communications, Foods, Clothing (including protective), Fuel, Buildings, Veterinary Medicine.

2. Col Niizuma was frankly questioned on Japanese BW offensive activities and on the official lists which referred to a bomb as the "Mark 7 bacillary bomb".

3. The Japanese officer stated that he had no information concerning Japanese BW since the subject as a whole had been handled in the Medical Bureau.

4. In reference to the Mark 7 bomb Col Niizuma gave the following explanation. It is not the custom of the Japanese Army to place numbers on bombs. The army classification of bombs is based on letters and symbols and so far as he knew the Japanese had never experimented with a bacillus bomb. He suggested that the Mark 7 may have been confused with a 1 kg "Ta" bomb since the symbol for this missile resembles a 7 ([タ] ="Ta").

5. The statement was made that numbers were placed by the army on rocket bombs and arrangements were made for inspection of the NO. 7 rocket bomb.

6. In answer to the question as to which army bomb was colored green or purple or grey purple Col Niizuma stated that there were no bombs with such colorings.

7. Information was requested concerning protective clothing for BW. Col Niizuma stated that the Japanese Army had no BW protective clothing. Col Naito proferred information that in the Medical Bureau protective clothing was used for special post mortem work (plague) and for plague studies.

8. The following questions and answers were recorded: (NOTE: Since adequate information is available concerning plague protective clothing, this subject was not pursued.)

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Q. Am I to understand that BW was handled entirely by the Medical Bureau?
A. Yes. General responsibility was lodged in the Chief of the Bureau, (Surgeon General) but specific tactical responsibility may have been placed elsewhere.

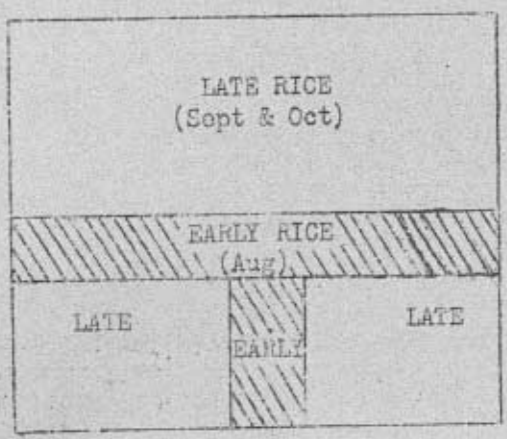
Q. Who would have specific tactical responsibility?
A. I do not know.

Q. What was the opinion of the Japanese General Staff in regard to BW?
A. Reports were received based on literature studies that such attacks could be made and would spread misery.

Q. Did the Japanese General Staff expect a BW attack by the U.S.?
A. In view of the Air Force spreading glass and gasoline on rice fields the Japanese General Staff expected BW attacks.

Q. In what form did you expect such an attack?
A. We had no detailed concept. We attempted no protection because it was felt that protective measures were hopeless in view of the number of aircraft available to the U.S. We even felt helpless in view of the threat of rice crop destruction by burning.

Q. Did you take any measures to preserve the rice crop?
A. Only simple ones. (NOTE: Col Niizuma states that the Japanese General Staff planned to vary rice field patterns in order to preserve part of the crop. This was to be done in 1946 in the following manner:



The harvesting of early rice (August) would leave spaces or alleys between sections of late rice (Sept & Oct) so that part of the crop might be protected if incendiaries or gasoline fell on sections of late rice.

Q. What does the Japanese General Staff think of BW as a weapon?
A. We had no idea of its potentialities because we did so little work in that field.

Q. Could it be possible for independent BW research to be carried out by individual army units e.g. Kwantung authorities?
A. We are responsible for the general directions of research and I made budget estimates for all divisions. BW was not included.

Q. I would like to see these directions and estimates.
A. They were burned previous to the entrance of American forces into Japan. This was reported to General MacArthur.

Q. Did you feel that any BW defensive measures should be directed toward domestic animals?
A. Protective measures did not extend to domestic animals in view of our inability to cope with the larger problem.

Q. Who was in charge of the veterinary research?
A. There is no veterinary bureau and I do not know who was responsible for research in this field.

ESTIMATE: It was evident that Col Niizuma either had little or no tactical information on the subject of BW or was under orders to conceal such information. This officer however voluntarily expressed a great desire to assist in the compilation of BW material. Three days later he returned with an explanation for the Mark 7 bomb. (See interview with Cmdr Ishiwata, Oct 3, 1945).

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JAPANESE SURGEON GENERALS

SUBJECT: Biological Warfare (BW)
DATE: 25 September 1945
INTERVIEWED: It Gen Hiroshi KAMBAYASHI
INTERVIEWERS: It Col M Sanders

1. When Gen KUMBAYASHI was asked concerning the Japanese activities in BW, he requested permission to first state his personal opinion on the subject. A free translation of his statement follows: "Should the Japanese Army use BW, I think it would have the same effect on our people as CW. Not only would the Japanese people suffer, but also the Emperor. I am personally opposed to BW, not only on a humane basis but also on a practical basis." The reasons are as follows:

a. New organisms are not easily found. Note: Gen KAMBAYASHI apparently felt that in the absence of new types of organisms unknown to the enemy, BW could not be waged.

b. Many types of organisms are everywhere and disinfection can be practised if they are further disseminated. Organisms cannot be disseminated with much general effect.

c. This work cannot be done with complete secrecy and world opinion would be entirely against such work.

d. If such work is attempted, perfect protection cannot be obtained. Note: The General apparently referred to his fear of retroactivity of organisms.

2. Gen KUMBAYASHI then continued in answer to the question of Japanese activities in BW. He stated that he did not expect any country to wage BW but that "under the press of circumstances" some attempt might be made to carry out BW. As protection against such an attack, methods were perfected in Japan for purification of water. Since this officer had little technical knowledge in the field of bacteriology, he assumed from what he had heard that a BW attack consists largely of gastrointestinal pathogens.

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3. The question was asked concerning Japanese efforts to provide protective clothing against BW. The answer stated that no special protective clothing had been devised and that countermeasures were limited to the action of sun and to disinfectants (lysol and mercuric chloride were apparently the favorite disinfectants).

4. The question was asked whether measures had been taken to protect against respiratory assault. The answer was definitely in the negative.

5. When asked what the Japanese offensive activities had been, the Surgeon General stated that no offensive studies had been carried out to his knowledge. However, he said that certain offensive activities might have been carried out in relation to defensive evaluation and that he would attempt to obtain this information. Such work was the responsibility of Col INOUE, Superior Inspector of the Army Medical School. Col INOUE investigated disinfection (boeki-kyoshitsu).

6. He also stated in response to questioning that Lt Gen SHIRO ISHII was chief of the water purification system in Manchuria (Kwantung Army). Gen ISHII was a specialist in disinfection and the inventor of the filters used by the Japanese for the purification of water. It was apparent from information obtained in the interview that Gen ISHII is disliked by medical authorities in the homeland. He is considered an ambitious boaster who has built an organization in Manchuria during the last ten years. Because of the independent organization of the Kwantung Army, Gen ISHII was in a position to organize research along any lines which he desired.

ESTIMATE. In spite of the lack of concrete information received in this interview, a strong impression was gained that Gen KITABAYASHI desired to cooperate fully, that his inability to provide information was probably based on lack of technical knowledge as an administrator of a large bureau and possibly also because of general staff restrictions. The Surgeon General promised to look into the matter of BW and to obtain specific information concerning:

a. Defense activities in BW.

b. The organization of the Japanese Surgeon General's office.

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c. Detailed organization of water purification units in general and also of the Kwantung water purification system under General ISHII.

On the following day, 26 September, another conference was held with Gen KUMBAYASHI and his staff. (See BW report supplement 1-a,b,c,d,e)

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JAPANESE SURGEON GENERALS

SUBJECT: Biological Warfare (BW)
DATE: 2 October 1945
INTERVIEWED: Lt Gen Hiroshi KAMBAYASHI, Surgeon Gen, Vice-Admiral Nobuaki HORI, Surgeon Gen,
INTERVIEWERS: Lt Col Murray Sanders

1. This interview was held as a means of summarizing information to date on the subject of BW. On the basis of the material previously provided by officers responsible to the Surgeon Generals of Army and Navy, a tentative conclusion had been drawn that Japanese BW activities in the military program constituted an unimportant minor activity. As a matter of fact, beyond broad generalities limited to defensive experimentation and organizational details, no specific data had been received.

2. Summarizing the information to date and emphasizing its vagueness, it was pointed out by the investigating officer that:

a. There was no reason to doubt the allegations concerning BW as set forth by Japanese officers.

b. Because of a desire to deal frankly with the Surgeon Generals, it was felt that certain information should be given them before a final report on the subject of BW was written. Intelligence reports from the theater based on prisoner of war statements and captured documents had accurately revealed the interest of the Japanese military in defensive BW. The information had also included the role played by the Boeki Kyusuibu (Water Purification Dept); inasmuch as information received from Gen KAMBAYASHI completely confirmed the intelligence reports on the defensive aspect, it was considered desirable that the Surgeon Generals should also become familiar with some of the evidence available on the offensive aspects of BW.

NOTE: At this point several statements were read from an intelligence document* which pointed to Japanese interests in offensive tactics and in bacterial bombs.

* Intelligence Research Project, Project No. 2263, 26 Jul 45, "Japanese Biological Warfare", copy No. 23, pg 23

3. It was further pointed out to the Surgeon Generals that the investigating officer was perfectly willing to accept the Japanese version on BW, but that in view of the complete absence of offensive data, it would be difficult to convince others that the whole story had been told. (This was particularly true because of defensive intelligence confirmation).

4. Thus, the purpose of the interview was emphasized to impress upon the Surgeon Generals that in the event any information relative to offensive BW would be forthcoming in the future, they would have to accept the responsibility for contributing to a poor impression on the General Headquarters in regard to Japanese integrity.

5. General KAMBAYASHI and Admiral Hori gave strong assurance of their desire to cooperate. They promised to look into the matter further and requested that the final report be delayed for two or three days.

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MARK 7 BOMB

SUBJECT : Mark 7 Bomb.
DATE : 3 October 1945.
INTERVIEWED : Commander Hiroshi Ishiwata
INTERVIEWERS: Lt Col Murray Sanders.

1. Commander Ishiwata explained the markings on Navy bombs. Each munition was originally labeled with a mark and number in the order of construction. Later, as the variety of special bombs increased this was discarded. Five or six years ago all markings were officially rearranged. Marks 1 to 20 were allotted for special bombs as well as those used in attacks on vessels. Marks 21 to 30 were for antiaircraft or airfield munitions. Marks over 31 were for land targets.

At the time that designations were considered, marks were given to all conceivable types. This is apparent in table #2 where reference is made to the #7 bacillary bomb.

2. The question was raised in regard to the period of construction of of the #7 bomb. Commander Ishiwata was emphatic in stating that the Mark 7 bomb was never constructed or used. The designation was simply an hypothetical one at a time when all conceivable types were being considered.

3. It was pointed out that frequent reference had been made to Mark 7 bombs in the field. Futhermore specific quotations were read to the commander. He explained that the list was used for education pamphlets for officers and that the bacillary mention was made in air force headquarters and air bureaus.

4. When asked what the Navy had done in BW Commander Ishiwata was of the definite opinion that the Navy had never experimented with BW if only because of tactical and social disadvantages associated from such a weapon. The Navy General Staff had absolutely no interest in BW. And indeed what little defense work was carried out was limited to water purification studies and production of vaccines.

5. Commander Ishiwata volunteered the information that in 1943 when the Japanese Imperial Navy was in difficulties he had personally investigated the possibility of BW to the extent of discussing the subject with responsible Navy officers in the Navy Medical College. He was flatly told that BW was impractical due to the nature of the organisms.

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MARK 7 BOMB

NOTE: The interview with Commander Ishiwata was not satisfactory. Emphasis had been placed upon intelligence reports in order that the Japanese officer might realize why the reference to the Mark 7 bomb could not be lightly discarded. Without any warning Commander Ishiwata requested an interview on October 5 and brought with him Commander K. Hayashi. Present also at this conference was Lt Col Murray Sanders. The evidence presented at this time is herewith given. Commander Ishiwata introduced Commander Hayashi as the individual who had made the plans for the original Mark 7 bomb. Both officers re-emphasized the fact that the simple drawing which they presented was the sum total of official Navy action and no formal plans had been drafted.

6. As can be seen from the diagram (See B' Report; Supplement 3-f) the Mark 7 bomb was intended to be a bacterial bomb containing little or no charge and depending on payload distribution by simple scattering after contact.

7. The Mark 7 bomb as presented here is a crude impractical weapon that would certainly be useless for dispersion of bacteria.

8. The drawing was made about 10 years ago unofficially and voluntarily by Commander Hayashi. Its basis was the modification of the 1 kg training bomb.

9. The few officers who saw the plans for the Mark 7 did not approach the Navy Medical Bureau on this subject. However Commander Hayashi worked at the Air Arsenal which is adjacent to the Yokosuka Navy Air Unit specializing in the teaching of Air Armament. It is considered likely that an instructor at Yokosuka saw the rough drawing made some notes and mentioned this munition in his lectures. Subsequent instructors may have followed suit.

10. In regard to coloring no explanation was given for the several references in intelligence reports which stated the Mark 7 bomb was colored "green purple, grey purple" (Intelligence Research Project No. 2263, Date 26 July 1945).

It was stated that all explosive bombs in the Navy had green marks and that purple was placed on depth charges.

ESTIMATE: It was felt that the explanation presented by Commander Ishiwata clarified the references to the Mark 7 bomb. It seems quite possible that the Japanese Imperial Navy was too busy with numerous problems to indulge in activity which at best constituted a direct departure from Navy policy. This was confirmed by a letter from another informant. The informant's letter follows:

"About 10 years ago, Imperial Navy planned to adapt new type of bombs and altogether to systematize various categories of bombs.

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It is acceded that the 7th category should be of bacteriological bombs and Navy has so arranged the colors, so far as I personally am informed. At that time and even thence, no remarkable progress has been attained. But officers cadets, and crews are informed of the enterprise in several Naval instructional institutions the contents given in these lectures have been of imaginary nature. The information concerning the facts might have caused suspicions and caused you to be commissioned on your present investigations. This in return to your confidence placed on me I proceed to tell you. This information gathered by me through reliable and ardently desire that you never disclose the fact that you got this information through me. Otherwise it would become impossible that I be of any assistance in execution of your investigation."

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Table No. 1

Table of Special Bombs used by I.J.N.

Mark	Name	Use	Year of formal adoption as army
Mark 1	6th No. 1 Land-Bomb	To oppress land area with gas	1936
Mark 6	Style 98, 7th, No. 6 Bomb, Type 1	As land incendiary	1938
Mark 6	Style 98, 7th, No. 6 Bomb, Type 2	As land incendiary	1938
Mark 2	Style 99, 6th, No. 2 Bomb improved type 1	To attack submerged submarines	1940
Mark 3	Style 99, 3d, No. 3 Bomb	An incendiary to attack larger type planes	1939
Mark 2	Style 1, 25th, No. 2 Bomb, Type 1, improved type 1	To attack submerged submarines	1941
Mark 5	Style 99, 80th, No. 5 Bomb	To attack battleships	1941
Mark 5	Style 2, 80th, No. 5 Bomb, Type 1	To attack battleships	1942
Mark 6	Style 1, 7th, No. 6 Bomb, Type 3 improved type 1	Incendiary	1942
Mark 3	Style 2, 25th, No. 3 Bomb, Type 1 improved type 1	An incendiary to attack airfield	1943
Mark 23	Style 3, 6th, No. 23 Bomb, Type 1	Non-penetrating bomb to oppress airfield	1943
Mark 4	Style 3, 25th, No. 4 Bomb, Type 1	Rocket-bomb to attack battleship or heavy cruiser	1944
Mark 3	Style 2, 25th, No. 3 Bomb, Type 2	Incendiary to attack air-field or formation of larger planes	1944
Mark 8	Style 3, 25th, No. 8 Bomb	To attack surface ships by skipping	1944
Mark 8	Style 3, 80th, No. 8 Bomb	"	1944
Mark 31	Style 3, 25th, No. 31 Bomb, Type 1	To attack air-field or landing space (light-electric bulb)	1944
Mark 31	Style 3, 80th, No. 31 Bomb, Type 1	"	1944
Mark 21	Style 2, 6th, No. 21 Bomb, Type 2	To attack airfield (case-shot)	1944
Mark 9	Style 5, 1st, No. 9 Bomb	To attack landing craft (ordinary rocket)	1944
Mark 28	Style 3, 1st, No. 28 Bomb Type 1	To attack larger plane (rocket)	1944
Mark 27	Style 3, 6th, No. 27	To attack larger plane (rocket case-shot)	1944
Mark 1	(Temporary name) Style 4, 6th, No. 1 Land-bomb, Type 1	To oppress land (gas)	Under experiments
Mark 1	" Type 2	"	"
Mark 9	(Temporary name) Style 5, 6th, No. 9 Bomb, Type 1	To attack landing craft	"

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Mark	Name	Use	Year of formal adoption as arms
Mark 29	(Temporary name) Style 5, 25th, No. 29 Bomb	To attack formation of larger planes	Under experiments
Mark 32	(Temporary name) Style 3, 6th, No. 32 Bomb, Type 1	To attack airfield (spiral bomb)	"
Mark 33	(Temporary name) Style 5, 25th, No. 33 Bomb	To attack airfield, landing space (with plumb)	"

Table No. 2

Marks and Characteristics of the Special Bombs used in I.J.N.

Mark	Characteristics
Mark 1	Gas
Mark 2	Underwater explosion (anti-submarine bomb)
Mark 3	Anti-aircraft incendiary bomb
Mark 4	Rocket armour-piercing bomb
Mark 5	Armour piercing bomb
Mark 6	Land attack incendiary bomb
Mark 7	Sacillary bomb
Mark 8	Ship bomb
Mark 9	Vessel attack rocket bomb
Mark 21	Anti-aircraft case shot
Mark 23	Aerodrome attack non-penetrating bomb
Mark 27	Anti-aircraft rocket case shot
Mark 28	Anti-aircraft rocket bomb
Mark 29	Case shot to attack formation of planes
Mark 31	Aerial explosive bomb with light electric bulb
Mark 32	Spiral bomb
Mark 33	Aerial explosive bomb with plumb

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Appendix 29-E-a-1

JAPANESE BW ACTIVITIES
(OFFENSIVE AND DEFENSIVE)

SUBJECT: Japanese Offensive Activities in Biological Warfare
DATE: 6 October 1945
INTERVIEWED: Dr Ryoichi Naito
INTERVIEWERS: Lt Col Murray Sandera

Information was given concerning the history, personnel, and offensive activities in BW by the Japanese Army.

1. HISTORY. The origin of the Japanese movement in this field dates to 1932 when Lt Gen Shiro ISHII, then Maj ISHII, returned to Japan after a tour of Europe. The 1922* Geneva Document outlawing BW apparently constituted the initial stimulus. Maj ISHII felt that the formal prohibition against BW implied its potentiality as a weapon. For several years he attempted, without success, to obtain funds and permission which would allow him to test his hypothesis concerning the practicality of BW. His efforts were of no avail until the year 1937 when the War Ministry agreed to provide the means for establishing an institute where BW activities would be carried out. In that year construction of the Pingfan Institute was initiated with additional personnel, equipment, and construction added each year.

NOTE: It would perhaps be best at this point to clarify the location of the Institute. Commonly designated as the Harbin Institute, the BW installation is actually located one hour by motor, due south of Harbin, in the vicinity of the small village of Pingfan, a few miles east of the South-Manchuria Railroad between Harbin and Hsinkiang.

By 1940, the BW installation reached its present physical extent. However, it is likely that the garrison has been greatly increased in recent years. It is estimated that in 1942 the personnel numbered approximately 1,000 officers, engineers, and skilled technical workers.

* Reference is made by informant to a League of Nations Document of 1922. This is confusing since a League of Nations Disarmament Conference barring ".....and bacterial warfare agents" was held in 1925.

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The mission of the Pingfan Institute, from its beginning, has been the development of BW as a practical weapon. Extensive defensive activities permitted medical research and at the same time large-scale production of serums and vaccines. The actual vaccine production for one year has been estimated as approximately 21,000,000 doses of various types of vaccines. The offensive activities were apparently on an equal scale, and investigations involving hundreds of bombs (probably thousands) filled with simulants and pathogens were carried out.

At the same time, ISHII developed a BW organization that at its height extended from Harbin to the Dutch East Indies and from the island of Hokkaido to the Celibes. For specific reference to the numerous installations and the functions allotted to each, the data provided by Gen KAWASHIMA may be consulted. (See report on BW, Supplement 1a, b, c, d, e). It has been emphasized that offensive activities were limited to the Pingfan Institute, even the four satellite branches in Manchuria being concerned only with defensive aspects of BW.

Analysis of the studies which were investigated in the central BW installation during the past three years can only be estimated since the highly secret nature of the research (and other factors) did not permit filtration of information to any great extent to the home office.

2. OFFENSIVE ACTIVITIES. Although it has been stated that the Japanese concept of offensive BW included the use of airplanes (bombs and direct dispersion) artillery and saboteur, information at present is limited to the various types of bombs.

a. Uji bomb (ウジ): This all-purpose bomb was first tested in 1941 with simulants. Colored fluid (eosin or methylene blue) mixed with whole egg emulsion to provide viscosity comparable to payloads made up the simulant. Various technical characteristics of the dispersed load remain to be learned (method of particle size measurement, type of cloud, persistence, etc).

It has been stated that the ballistic quality of the Uji bomb was fairly good but not entirely satisfactory. One of the difficulties was due to the timing of the explosion which was not dependable because of terrain variations, and lack of reliable altimeters gave non-reproducible results. This led to the development of the so-called "mother and daughter" bomb. (See "d").

This bomb, which was produced in fairly large quantity (by the hundreds"), can be seen to have the following characteristics (See BW report, Supplement 3-a)

(1) Porcelain casing 8 mms* thick.

(2) Celluloid fin.

(3) Four meters of primer cord ("explosive string") attached to porcelain in grooves and kept in place with cement.

(4) A type-1 timer fuse in the nose and a type-5 timer posteriorly at the base of the fin.

(5) Powder charge in nose consisting of the common type of "brown" powder. This charge was fairly satisfactory and no comparable data are available since no other types of powder were tested. The size of the powder charge is to be determined. The dimensions of the Uji bomb are:

(a) Length of shell ca 700 mms.
(b) Total length from nose to end of fin ca 1100 mms.
(c) Porcelain wall thickness 8 mms.
(d) Diameter of shell 180 mms.

(6) The payload consisted of 10 liters of fluid. The bomb was filled with fluid and the charge was then screwed in.

(7) Weight empty was 25 kg, and when filled was 35 kg.

b. Ha bomb (/\): (See BW report; supplement 3-b) This single purpose munition was developed in 1941 for dispersion of anthrax spores and was produced in relatively large numbers ("by the hundreds"). Explosive mechanism

* All measurements are stated as approximations. However, these measurements are probably accurate since they were provided as were the drawings of the bombs by the individual who originally designed them for Gen Ishii. His name will be learned if possible.

functioned by a contact fuse in the nose and a shock fuse posteriorly at the base of the fin. The munition was made of steel, the two external and internal surfaces being painted with shellac to prevent corrosion. The Ha bomb was designed for ground contamination and as a shrapnel weapon. In contrast to the Uji bomb the powder charge was large and the payload small. Here, too, the common type of "brown" powder was used for the large central bursting charge. It has been stated that this munition was used on horses in field experiments (possibly sheep), infection and death resulting from superficial wounds caused by single contaminated steel unit.

(1) Steel casing ca 10 mms with serrated wall of ca 10 mms.

(2) Central burster chamber ca 110 mms.

(3) Steel fins.

(4) Payload chamber filled with 1,500 units of steel shrapnel weighing 5 kg. The dimensions are:

(a) Length of chamber ca 600 mms.
(b) Length of payload chamber ca 400 mms.
(c) Total diameter ca 150 mms.
(d) Payload chamber diameter ca 20 mms.

(5) The payload consisted of 500 cc of fluid.

(6) Weight empty was ca 40 kg and when filled was ca 41 kg.

c. Ro bomb (57) (See BW report, supplement 3-b). This steel all-purpose munition was developed in 1941 and because of unsuccessful trials never progressed past the experimental stage. The principal feature of the Ro bomb is the loose connection between the large nose and the remainder of the casing. The nose, which is approximately 1/5 of the bomb, explodes on contact and thus blasts the larger posterior portion containing the payload into the air. Due to a small charge, probably urotropin or picric acid the posterior chamber explodes within 1/10 to 1/5 seconds after the primary explosion. In addition to the "small transmission" charge between the nose and posterior chamber, there is a small amount of powder in the forward section of the posterior chamber. A "black" powder of unknown type is used as the explosive charge. This bomb, unlike the previous types, is filled from the rear, closure being effected by a screw type stopper. The dimensions of the Ro bomb are:

(1) Total length of bomb ca 500 mms.
(2) Loose nose ca 100 mms.
(3) Total diameter ca 100 mms.
(4) The payload volume is 2 liters.
(5) Weight empty is 20 kg and when filled is 22 kg.

d. In 1944, a so-called "mother and daughter" type bomb was devised to overcome difficulties in timing of the explosion encountered in the Uji bomb. Only one set of bombs was constructed and this type was discarded because of the high cost. While no details are known, the general mechanism was as follows: a large bomb with radio-sending apparatus was released from a plane. This was a high explosive type and did not contain bacteria. It was followed within a given period of time by a cluster of small bombs which had radio-receiving apparatus. When the first bomb exploded on contact and radio contact was broken, the small "daughter" bomb exploded in the air. This type of munition was designed by Lt Gondo (first name unknown), an aviation engineer interested in radio. He attempted to stabilize BW offensive tactics over irregular terrain.

3. ADDITIONAL INFORMATION. Two facts should be noted. In 1943, Gen Ishii recommended the study of large-scale drying of bacterial suspensions to be used in BW munitions. He apparently wished to concentrate the organisms and to obtain more stabilized payloads since the fluid material was active for relatively short periods of time. This plan did not materialize due to the pressure of work at the lyophilization centers which were working full time on plasma and vaccines.

Furthermore, plans were in progress to establish a large BW school but the termination of the war brought this to a premature end.

ESTIMATE. The extent of the Japanese BW program is apparent for the first time. Much thought and effort were expended in this field with results that suggest that the forging of a weapon might have been realized in the not too distant future. It must, of course, be emphasized that this statement is based on generalities and that a final analysis can only be made after careful perusal of experimental data. It remains to be seen whether these data will be available.

From a general consideration of diagrammatic construction, the Uji bomb offers some interesting possibilities if the point of explosion over variable terrain can be controlled. The casing is easily disintegrated, the charge is small, and consequently, there is little destruction of the payload. It is apparent also that the designer of this bomb wished to destroy all evidence of BW activity since the fins were made of inflammable material and it would be difficult to obtain the scattered fragments of the porcelain casing.

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JAPANESE BW ACTIVITIES (OFFENSIVE AND DEFENSIVE)

SUBJECT : Biological Warfare (BW)
DATE : 7 October 1945
INTERVIEWED : Major Jun-Ichi-KANEKO
INTERVIEWER : Lt Col M. Sanders

1. Major Kaneko had been a medical officer in the Japanese Army and had been assigned to the Pingfan Institute, in Harbin, for 3½ years. In 1941 his duty at Pingfan was brought to a close by his transfer to the Army Medical College, Tokyo. This move was in the nature of a routine rotation procedure for medical officers. The question was raised concerning the apparent inability of General Ishii to retain his services. The answer emphasized that medical officers were transferred after certain periods, and since the BW activities in the Harbin area were not only secret but were being carried on without the permission of the highest authorities (i.e., the Emperor), no effort could be made to obtain special dispensation for personnel.

2. Although Major Kaneko is a medical officer, his interests were primarily in engineering, and he was given the responsibility of assisting a civilian, Yamaguchi, civil engineer, in the construction of BW bombs.

3. At the time that Major Kaneko began his assignment at Pingfan, sometime in 1937, an old model Uji bomb was being tested. (See previous interview)

4. BOMB DESIGN AND PRODUCTION. On the basis of information received from Major Kaneko, the following facts may be stated:

a. Yamaguchi designed both the Uji and the Ha bombs, the most important models being constructed in 1940. (In 1941 Yamaguchi suffered a stroke. He is paralyzed and ill and is not available for questioning.)

b. The bombs were produced in Mukden, in the Army arsenal. The individuals who manufactured these bombs were not told their purpose; consequently, there were technical difficulities frequently encountered and the production activity was fairly inefficient.

c. By the middle of 1941, at least 500 each of the Ha and Uji bombs had been made and tested.

d. There were certain deficiencies in each type which stimulated the search for more satisfactory bombs.

NOTE: It is to be emphasized that Major Kaneko's information extends only to 1941. He does not know what happened at Pingfan after that year.

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e. DEFICIENCIES OF THE UJI BOMB.

(1) The porcelain casing varied in the different production lots and only one-third were completely satisfactory from the point of view of size and shape.

(2) The friable porcelain cracked frequently.

(3) This bomb was made to explode in the air and the height of explosion could not be satisfactorily determined when it was released over irregular terrain.

f. DEFICIENCIES OF THE B BOMB.

(1) The desired shrapnel effect was not obtained when the bomb fell in holes or into depressions.

(2) The pay load was small and relatively unsatisfactory in covering the iron particles, which were supposed to produce the effect by contact injury.

(3) Too much powder was required. The bomb carried a charge of approximately 3 kg.

NOTE: Major Kaneko stated that no experiments were done on heat generated by the explosion; that originally the iron particles were spheres and later cylinders.

g. The bombs were tested in the field attached to the institute (10x10 km). (Kaneko did not know the method of ground decontamination).

h. There were thirty responsible investigators in the second section (bomb research). The personnel included scientists, engineers, and aviators.

i. Three types of planes were used in the field tests:

(1) Scout type 94, capacity 4 Ha-bombs.

(2) Light bomber, type 88, capacity 6 Ha bombs.

(3) Heavy bomber, type 97, capacity 12 Ha bombs.

Newer types of planes were not available.

j. PAY LOAD.

(1) Organizms in the Uji bomb included B. Prodigiosus, V. cholerae, P. pestis, various types of dysentery organisms,

B. typhosi, B. anthracis. Efforts were principally directed toward the study of P. pestis and B. anthracis, so far as the Uji bomb was concerned.

(2) Organisms studied in the Ha bomb were limited to B. prodigiosus and (principally) B. anthracis.

K. EXPERIMENTAL ANIMALS. It is know that horses and sheep were used in the field experiments. By the early part of 1941, over 300 horses had been expended in experimental trials.

L. STORAGE. The fluid suspensions of the vegetative bacteria were tested at room temperature and a 90% loss of potency in three days was noted. The anthrax spore suspension was maintained with little loss at room temperature for one week. In the case of B. anthracis only the use of solid media was permitted by General Ishii. Frequent requests to investigate fluid media were refused. Other small experimental animals were also used. Because of the unsatisfactory results on storage, two courses were followed:

(1) All preparations were kept at refrigerator temperature. Bombs were loaded just previous to field trials.

(2) The program for large-scale lyophilization was initiated by General Ishii but, as previously stated, this phase of the program was delayed due to the pressure of plasma and vaccine production. (Kaneko was unable to give even an approximate quantitative estimate of any bacterial suspensions or any of the details of the media used).

m. BACTERIAL CLOUDS. Details concerning the character of the cloud resulting from Uji and Ha explosions were not know. Up to 1941, data for particle size and determination of cloud characteristics were obtained by means of a stationary explosion with the bomb suspended in tripod fashion at a height of ten meters. A base line of wind velocity of five meters per second was used, and it is estimated that under such circumstances a "fairly uniform" cloud extended for a distance of 500 meters. Neither the pattern of the cloud not its persistance was known to Kaneko. Apparently little or no information is available (as of 1941) concerning bacterial clouds resulting from munitions dropped from planes.

Discussions of particle size was somewhat vague. The only information that could be obtained was that the mean diameter was 0.5 mm for particles in a cloud resulting from a stationary Uji explosion. The only method of measurement which could be recalled was the use of colored fluid in the bombs, particle size being determined by contact with paper.

n. OTHER BOMBS. Apparently several modifications of both the Uji and Ha bombs were investigated. The number of models is not known; changes were minor and were essentially concerned with variations in capacity and shape. One modification of the Ha bomb may be mentioned—the I bomb. In this munition a smaller, central burster charge was used than in the original model. Fulminate of mercury constituted the detonator for the central burster charge of organisms pathogenic via the respiratory tract. This bomb was discarded in 1941.

A so-called "H" shell was tested. It is supposed to have been the ordinary gas shell but the only information available at this interview was the unsatisfactory trajectory and the fact that this shell had been discarded by 1937. Similarly, a so-called "S" shell was tested and discarded before 1937. This is supposed to have been an ordinary 80mm shell with turpentine removed and replaced by bacteria.

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Appendix 29-E-c

JAPANESE BW ACTIVITIES
(OFFENSIVE AND DEFENSIVE)

SUBJECT: Biological Warfare (BW)
DATE: 8 October 1945
INTERVIEWED: It Col Seiichi NIIZUMA
INTERVIEWERS: It Col Murray Sanders

Col. Niizuma furnished information this date that he had been successful in making contact with Col. Masuda, Chief of Section 3, at the Pingfan Institute. Col. Masuda has just arrived in Tokyo from Harbin. He is supposed to have been associated with Gen. Ishii during the time that Ishii was in charge of BW. Col. Masuda worked in BW until a month ago and will report for an interview, 9 October.

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JAPANESE BW ACTIVITIES
(OFFENSIVE AND DEFENSIVE)

SUBJECT: Biological Warfare (BW)
DATE: 9 October 1945
INTERVIEWED: Lt Col Saichi NIIZUMA (Army); Col. Tomosada MASUDA
INTERVIEWERS: Lt Col Murray Sanders;

1. Col Masuda expressed his desire to cooperate with the investigating officer fully and to provide whatever information he had concerning the subject of BW. He stated that he had been interested in the subject for many years and had either been directly associated with the Japanese work in all its phases or had been kept informed during periodic absences.

In response to the request for his curriculum vitae, Col Masuda provided the following information. The years marked with an asterisk denote the periods during which Col Masuda actually participated in BW activities.

1926 Grad Kyoto Imperial Medical Faculty and thence Army Medical Corps
1926-1929 - Regimental Physician
1929-1931 - Post-Graduate in Bacteriology, Microbiological Institute, Kyoto
1931-1932 - Prof of Bacteriology, Army Medical School
1932-1934 - France & Germany (Berlin) (Prof Erdemann) L'Ecole Militaire Service Sanitaire
1934-1936 - Military Service (Inf Regiment)
1936-1937 - War Ministry - Military Sanitation (Administration)
*1937-1939 - Manchuria - Water Purification Dept, under Gen Ishi
1939-1941 - To central China
*1941-1943 - Prof of Bacteriology, Military Medical College
March, 1943-December, 1944 - Burma Malaria Control
Jan, 1945 - March, 1945 - Saigon Hq
*April, 1945-August 14, 1945 - Harbin, Manchuria

2. Col Masuda stated that the BW work was carried on by the Boeki Kyusuibu (Anti-epidemic & Water Purification Dept) of the Kwantung Army under Lt Gen Shiro Ishii, and he requested permission to explain the stimulus for the initiation of Japanese BW activities. In 1935, the Kwantung Army was informed that many Russian spies, carrying bacteria in ampules or in glass bottles, had crossed into Kwantung territory. Five spies were apprehended by the Kempei and on these spies were found several glass bottles and ampules.

Such incidents were not the first nor were they the last, but Col Masuda stated that he can personally vouch for this episode involving five individuals. The examination of the various containers revealed the presence of dysentery organisms (Shiga and Flexner) and bacteria---spore mixtures of B anthracis and V cholerae. He stated that he, personally, saw the anthrax organisms.

Spurred by such incidences, the Kwantung Water Purification Dept investigated the possibilities of artificial epidemics; i.e., a plan was made to investigate BW potentialities. As one method of study of this field, the problem of munitions was investigated and Col Masuda was given the task of obtaining a practical bomb.

While the formal organization of the Kwantung Boeki Kyusuibu was made up of four sections, BW studies were carried out in secret.

To all intents and purposes, the Boeki Kyusuibu had the following sections:

Section I. Fundamental research in Immunology (typhoid, dysentery, anthrax, erysipelas, viruses, and rickettsia)
Section II. Epidemiological research
Section III. Water supply and purification
Section IV. Vaccine production

3. In order that the work might be kept secret, none of the sections which studied various aspects of offensive BW cooperated with each other. Workers were not supposed to discuss their work but carried out problems given them by Ishii.

4. Col Masuda stated that only two individuals have the complete BW story--Ishii and himself. He emphasized that the purpose of the work was to create a weapon so that an adequate defense could be developed.

5. Col Masuda stated that his personal opinion was that no practical bacterial bomb had been developed, but he placed the responsibility for this on organizational difficulties, petty jealousies, and poor equipment. He was bitter regarding the weaknesses of a system which did not recognize a scientific effort and felt that with proper encouragement BW could certainly be made into a practical weapon.

The fundamental idea of Col Masuda's research was the dispersion of bacterial emulsions at a proper height. He stated that dried organisms would undoubtedly be the ultimate payload of BW weapons, but that they could not be used in preliminary investigations because of danger to the workers. However, with the conclusion of preliminary tests on fluid it would be desirable to substitute dried material. To illustrate the research which had been carried on in his section, he explained a diagram drawn by himself before the interview. A translation of this diagram may be seen in the BW report, Supplement 3-e.

6. Additional statements which were made at the interview are given below because of their general application to the BW problem.

a. Many apologies were presented for the crude nature of the data. Admittedly the work at Harbin was not done scientifically (Masuda's opinion).

b. Destruction of the Harbin installation and its contents including all munitions had been carried out in the early part of August when it was known that the Russian Army had entered the area.

c. It was felt that both the Ha and the Uji bombs could be practical with the improvement of fins to prevent "tumbling" and with the addition of good fuses. NOTE: Masuda was bitter about the obsolete equipment given him for his experiments. Frequent reference was made to poor fuses which were made available. If proximity fuses could have been obtained, both bombs would have been greatly improved. The favored bomb was the Uji No. 50. If a thin iron fin could have been developed to improve the ballistics, this would have made an excellent munition.

d. In 1939, investigation of various types of bombs was stopped and attention was directed on the testing in the field of Uji bomb type No. 50.

7. At this point in the interview, it was suggested by the officer in charge that the discussion be continued on another day. It was obvious that Col Masuda was very ill, and it was learned that he was suffering from acute malaria. The following subjects were given him for which he was to obtain data for the next interview:

a. Detailed information on bacteria used in BW at Harbin. (Types of organisms, media, methods of mass production, method of field trials, method of assessment, animal experiments, etc)

b. Bacterial clouds (size, shape, persistence, particle size, method of measurement and sampling of cloud)

c. Data on cloud chamber work.

d. Plan of the institute at Harbin.

ESTIMATE: It is to be emphasized that Col Masuda was supposedly unaware of the other sources of information concerning Japanese offensive BW activities (App. 29-E-b). Whether or not this was the fact could not, of course, be established without possible drastic effects upon both sources of information. On the whole, the technical data provided in both this and previous interviews seemed to be consistent. However, in the matter of policy there are two important inconsistencies or omissions. Col Masuda did not explain the cause of secrecy, and when questioned stated that he did not know the answer. It is to be noted it had been disclosed that BW was being carried out without the knowledge of the emperor. Perhaps the most important point is the fact that Col Masuda blames the Russian activities as being the cause for initiation of Japanese BW. According to the previous source of information in this matter, BW originated in Japan because of Gen Ishii's intense interest in the subject.

BW ACTIVITIES AT PINGFAN

SUBJECT: Biological Warfare (BW)
DATE: 11 October 1945
INTERVIEWED: Col Tomosada MASUDA; Lt Col Seiichi NIIZUMA
INTERVIEWERS: Lt Col Murray Sanders*

1. Col Masuda requested permission to answer questions given to him on his previous conference.

a. Regarding detailed information on bacteria used in BW at Harbin, the following organisms were at one time or another considered potential BW agents and were used in experiments.

(1) S tyohi
(2) paratyphoid A and B
(3) S dysenteriae
(4) V cholerae
(5) P pestis
(6) B anthracis
(7) M malleomyces (glanders)
(8) Anerobes

(a) B welchii
(b) B novyii
(c) B hystolyticus
(d) B tetani

No viruses or rickettsia have been used in BW experiments. Generally speaking, S-form for all organisms were used with the exception of the anthrax bacillus, in which instance the R-form was studied.

b. Media. Agar was the common vehicle for cultivation for the bacteria used in all tests. The following formula for the Agar preparation was given:

Peptone - 15 grams
Agar - 30 grams
Sodium chloride - 5 grams
Distilled water - q.s. 1,000 cc

ph 7.45 after sterilization

* Lt Col Babcock, BW officer for FEAF, was invited to attend this conference.

Enteric organisms were harvested after a growth period of 24 hours, at 37° C. In the case of the plague, anthrax and glanders bacteria, a growth period of 48 hours ensued before harvesting. For the anaerobes, one week's growth was permitted before collection.

In a few instances, there were some modifications of the basic medium:

For the plague organism, 0.01% saturated solution of gentian violet was used as an anti-contaminant.

For anthrax bacteria, 7.5 grams of peptone were used instead of 15 grams, and 10 grams of sodium chloride instead of 5 grams.

For the glanders bacillus organic iron, 0.01% was added to agar. These modifications resulted in higher bacterial counts than if the basic medium alone was used. Data on bacterial counts are not available.

c. To produce bacteria en masse as required for BW field trials, special small tanks of duralumin have been constructed. The tanks used for mass production are under a military patent and arrangements were made to obtain a sample tank. The surface of this material was oxidized (alemite) for further protection against corrosion.

When Col Masuda was asked concerning the productive capacity of his unit at various times, he replied that he had no figures on this. However, it was possible to obtain some idea of the magnitude of operations by the fact that one duralumin tank yielded 40 grams of B typhi scrapings. In any preparations for bomb experiments, 900 duralumin baths were used.

d. Viability Studies. Before experimenting with the organisms in the munitions, Col Masuda investigated their capacity for remaining alive at room temperature (18-25° C). The technique followed in these determinations consisted of placing bacterial suspensions in large glass containers. (Capacity unknown, but of the order of several liters). The flasks were sealed with rubber, covered with paraffin, and were periodically tested. Following figures for viability of organisms were given by Col Masuda:

(1) Dysentery organisms died within 5-7 days.

(2) V cholerae died within 3-5 days. (Equal amounts of horse serum and bacterial scrapings were stored in peptone water).

(3) T neetis died within 5-7 days. (dextrose broth)

(4) Spore suspensions of anthrax died within three months. (0.1% phenol was added to the basic medium to prevent fermentation)

(5) M malleomyces died within 3-5 days.

(6) Anerobes were never adequately studied because of lack of apparatus.

As a result of these findings, Col Masuda decided to use only two organisms in bomb field tests: (1) the simulant, b prodigiosus; (2) anthrax spores.

When asked whether any attempts were made to investigate substances which might be added to the organisms for purposes of preservation, he stated that he was unable to apply himself seriously to the problem which he knew was of vital importance. The reasons for this limitation were, as had been previously noted, organizational and financial.

e. Contamination of Well Water. Deliberate contamination of water and testing for viability of organisms might be termed an offensive measure, but the point was made that Col Masuda's interest was limited to possible activities of the Chinese in this respect.

During the course of a year, Col Masuda's units tested more than a thousand wells in Manchuria. It is his opinion that saboteur activity on a large scale is not effective if wells are used as the vehicles for bacteria. He had two reasons for this opinion. In the first place, the enteric organisms which were tested died within a few days (2-4 days) under the best circumstances. Second, he found a tremendous variation in the viability curve of organisms in water samples from different areas. Thus, in one instance, the inoculum might have disappeared from the water within two days, whereas a comparable contamination may have been quite potent, (at least many survivors could be demonstrated) in water from a different area. In an

attempt to explain this variation, Col Masuda examined factors which might be considered as variables in the problem and made one interesting correlation. In those instances when the death rate of the bacteria in the water was great; that is, when no organisms could be recovered within 24-48 hours, it was found that the water sample came from a district where there had been a recent outbreak of cholera, typhoid, or dysentery. The more recent the outbreak, the greater appeared to be the sterilizating effect of the water. (Col Masuda agreed that this might be a bacteriophage phenomenon.)

f. Experimental Animals. For the most part, the principal small animals used in BW investigations consisted of mice and guinea pigs (marmot?). For field trials, horses and sheep were used. A total of 100 horses and 500 sheep was expended in the course of the investigation of anthrax as a BW weapon. This covered a period of two years.

g. Bacterial Clouds. The nature and characteristics of clouds resulting from bacterial dissemination in munitions were studied in a crude and qualitative fashion. In preliminary tests, clouds were investigated by the use of colored dyes in the material exploded. Based on the principle that dye so used should have a vivid color and should be very soluble in water, rhodamine (1) and
10,000

fluorescein (1) solutions of electrolytic zinc were studied.
1,000

A grid on level ground with a radius of 1,000 meters was set up with markers at 10 meter intervals, the munition filled with colored fluid in 2-5% dextrose broth being exploded in the center. For the first 50 meter radii, samples on paper were taken every 10 meters, the evaluation being made visually. Col Masuda claimed that in this fashion he was able to analyze the explosive pattern and particle size down to 50 microns. To determine smaller particle size, the paper was placed in potassium iodide baths after static explosion. Thus, the 2-5% dextrose broth revealed particles as small as 10 microns.

Beyond the 50-meter point on the grid, sampling intervals were not constant, the distances varying with the munition and purpose of individual experiments.

It is interesting to note that the climactic conditions in the vicinity of Pingfan were such that a mild wind could be expected almost year-round. Wind velocities of five meters per second were very common and in winter

the snow-covered ground, instead of paper, was used as a background for the colored particles.* In this season also, it was common for wind velocity to be two meters per second, and a dry, cold winter was the rule.

In the case of munitions dropped from the plane, an instantaneous umbrella-like cloud was discerned. This pattern was quickly dissipated but particles continued to descend for approximately five minutes. In actuality, Masuda was not able to make accurate statements as to particle descent in relation to time since his sampling was made at the end of thirty minutes. However, he stated that quantitative data had been accumulated, based on mathematical formulae.

The size of the field and stable weather conditions permitted both static explosion experiments and drop experiments from planes. When colored fluid was used as an indicator, no bacteria were included in the bomb fluid because of the bacteriostatic effect of the dyes. If bacteria were placed in the munition, dextrose broth (for starch tests) was used as the vehicle.

The question was asked concerning the significance of 10 micron particles; i.e., why was it desireable to obtain smaller particles. Col Masuda answered that he attempted only to produce as small drops as possible in approaching an aerosol.

As was to be expected, the pattern of the explosion was such that large particles were to be found in the immediate vicinity of the point of explosion with a decrease in the size of droplets occurring toward the periphery.

h. A brief discussion was held on the direct dispersion of bacterial agents from planes. While no formal program was planned for this activity, several experiments had been carried out. Again, lack of apparatus and organizational difficulties prevented Col Masuda from obtaining little more than preliminary data. He did feel that dried material would be effective dispersed directly from a plane. However, his own experience was concerned with fluids containing dyes or suspensions of S prodigiosus. The only constructive statement which was made on this subject was that a great amount of material be dispersed in as short a time as possible. Further details were sparse but it was noted that a tank in the fuselage was used. In one field test 920 liters of simulant were dispersed per second.

* Unfortunately, the movies and still-photographs of these winter and summer experiments are not available.

Another factor of importance was the viscosity of fluid vehicles for test material. 50% glycerine and 10% gelatine were found to be fairly satisfactory vehicles for direct dispersion. When large amounts of such viscous, colored material was disseminated from a plane at 4,000 meters, one hour elapsed before the colored particles reached the ground. If B prodigiosus was used, no viable organisms were recovered on the ground.

Similar tests were carried out at altitudes of 2,000, 1,000, and 200 meters with somewhat better results.

1. Casualties Among Personnel. In the course of discussion, Masuda incidentally mentioned that two soldiers had died during the course of the 10 trials. Questioning revealed that one of the two individuals had been ordered to cut the grass at the experimental site a day after an anthrax trial. He contacted pneumonic anthrax and passed away after a short course of the disease. The second soldier was the first fatality's roommate and he died of an anthrax septicemia, the result of a contact infection. In addition, five cases of anthrax infection were reported during the course of two years of field trials with this organism. Masuda thinks that other infections may have occurred either during his absence or without his knowledge.

J. Cloud Chambers. No BW investigations were carried on in cloud chambers. Such apparatus was not available and it was Masuda's opinion that chambers were unnecessary since the work could be carried on directly in the field.

2. BUDGET AND PERSONNEL. In the year 1944, six billion yen (approximately 2½ billion dollars on basis of 1944 rate of exchange) were allotted to Pingfan Institute for research purposes. The impression was gained that this was the result of consecutive budget reductions but no figures were available. It was emphasized that the utilization of the budget was within the jurisdiction of General Ishii.

When asked concerning the size of the technical strength of the Pingfan Institute in recent years, Col Masuda stated that the maximum garrison of 3,000 individuals occurred in 1939-1940. Since that time there was a gradual reduction in strength due to the necessity of meeting Army personnel requisitions and to a policy of retrenchment. By 1945, just previous to the dissolution of the Institute, the garrison strength was 1,500.

While there was no definite division between defensive and offensive personnel, Ishii and Masuda manipulating their people as desired, the following roster represents a fairly average group concerned with the field-testing of a munition:

Pilot (medical corps officer or flight surgeon)...1*
Ground crew.....20
Medical officers for preparatory work.....2*
Enlisted men (medical corps) as technicians.....30

In addition to the above personnel, Masuda had access to, and could use at will, the hundreds of individuals who made up the staff for vaccine production. These numbers varied from a peak of 400 (1939-1940) to an ebb of 100 in 1945.

3. DEFENSIVE BW IN THE KWANTO BOEKI KYUSUIBU. Col Masuda was of the opinion that BW defense would be adequately rebuilt by an alert, comprehensive, radical organization; i.e., unless new pathogens or new methods of dispersion could be found. Basically, an offense was the best defense. (This is a broad interpretation of a dissertation on the subject by Col Masuda). Furthermore, in its present state of technical development, he did not feel that the effects of BW would be realized. Finally, his scientific interest was largely in the offensive phase.

As a result of Masuda's policy, BW defense at the Pingfan Institute emphasized general measures for anti-epidemic control.

a. Organization. This may be divided into three phases. In the summer of 1938, Col Masuda felt that an efficient and large organization was the solution for defensive BW and the Boeki Kyusuibu was expanded and reorganized. (In the meantime, he continued his search for an effective, offensive weapon). By October, 1938, 12 large purification units had been set up in China. With these as foci, satellite branches were established covering the whole of Japanese-held China. To each 12 units, approximately 300 individuals were assigned. There were three such units in north China, 13 in central China, and two in south China.

NOTE: For a consideration of Japanese intentions concerning BW, it is important to emphasize at this point that the question was repeatedly and clearly stated concerning the

* Were acquainted with the nature of the work.

basic stimulus for the Boeki Kyusuibu; i.e.: Was the threat of BW so important as to stimulate the Japanese to the creation of an organization covering a huge territory involving hundreds of individuals, many of them technically trained? Or was this organization a manifestation of the desire to improve preventive medical knowledge and procedures in Japanese territories. Certainly the latter reason would have seemed logical. But Col Masuda insisted that in 1939 the Japanese fear of BW was so great that it provided the initial motivation for the Boeki Kyusuibu. Later, when no BW attacks were experienced, the emphasis was shifted.

b. VACCINE program. Another weapon in BW defense was an accelerated and enlarged vaccine program. More vaccines were produced and in larger quantities than heretofore. Furthermore, trained personnal were transferred to four installations in an attempt to make large areas self-sufficient in the manufacture of vaccine. These four centers were Manchuria, north, central, and south China. Such innovations were made as typhoid and cholera "booster" injections for military personnel every three months.

c. BW Defense Intelligence Institute. So important did this subject appear to responsible authorities in the year 1939, that they adopted a system of briefing medical officers in all echelons down to battalions. (In many cases, medical officers were briefed). Originally it had been the intention to place a separate BW-trained officer in various echelons, but because of personnel shortage it was necessary for medical officers to take on the additional duty of BW defensive intelligence.

In the final analysis, the functions of the "BW Defense Intelligence" was simply epidemiological. It was the responsibility of individuals belonging to this group or system to trace all infections to their source.

NOTE: The interesting point of departure from the usual epidemiological investigations was the fact that these teams began their initial investigations with the possibility in mind that the infection they were studying had been disseminated artificially, and that they were dealing with BW.

The military police (Kempei) assisted the medical officers in these BW activities but this help was non-technical and was purely administrative.

NOTE: Emphasis at this point of the interview was placed on the role of a military police (Kempei) because of G-2 reports which linked them with BW. However, Col Masuda's statements seemed to have solved this puzzle. He did state that during the final phases of organization, medical officers visited military police centers and lectured on BW. Inasmuch as the Kempei were ignorant and untrained individuals, these lectures were maintained on a very elementary basis.

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BW ACTIVITIES AT PINGFAN

SUBJECT: Japanese Activities in Biological Warfare (BW)
DATE: 16 October 1945
INTERVIEWED: Col Tomosada MASUDA, It Col Seiichi NIIZUMA
INTERVIEWERS: It Col Murray Sanders, Lt Harry Youngs

Q The question of toxin studies in Japanese BW was raised.
A No toxin studies were carried out in the Boeki Kyusuibu.

Q What was the budget of the Institute at Pingfan?
A There was an intensive building program from 1937 to 1940. The operating budget for 1945 was ¥6,000,000; this was the approximate budget for 1944 and did not include expenditures for new buildings. The budget for the years prior to 1945 and 1944 was greater because of building activities at the Institute.

Q What work was done in the "pepiniere" building?
A This building was used for growing all the produce needed for the workers at the Institute. It was also used to supply food for the animals. The garden plot was approximately 5 km square.

Q Give a brief historical background for the Institute.
A The Japanese BW work started in Manchuria when the Japanese gained control of the territory in 1934. In 1934, the Bureau of Laboratories was established at the Harbin Military Hospital. In the same year the Pingfan area was obtained from the Chinese government. There were no buildings in the area at this time. However, in 1937 construction was begun in the area. In the same year, field trials in connection with the BW work were carried out in this area. The actual laboratory work continued to be done at the Harbin Military Hospital where one department was located. In 1940, the building program was completed and three departments were moved to the Pingfan area, the third department remaining at the Harbin Military Hospital.

Q Did BW bomb development stop after 1939?
A All the work and tests were completed by 1939, but work on new bomb developments was continued until 1945. This was on the direct order of Gen. Ishii. Although the developmental work continued after 1939, no new bombs were perfected. All experimental work after 1939 corroborated the previous results.

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Q What protection was offered the field trial workers?
A A completely rubberized, anti-plague suit was worn over street clothing in the field trials. Immediately after the trials, the workers were required to remove all clothing and bathe themselves in 2% cresol or mercuric chloride. The workers were closely observed for any signs of infection after the trials. This routine was followed at each trial. However, as time went on the workers became careless. In 1944, there were two plague deaths as a result of field trials.

Q What protection was offered the laboratory workers?
A Frequent vaccination of all laboratory personnel was required. There were approximately 20 cases of laboratory infection a year. The workers were paid extra for working in the Pingfan Institute; officers were given an extra 60 yen a month; and enlisted men received extra food.

NOTE: According to Col Masuda, there were very few deaths.

Q What therapy for plague was available?
A Surgical treatment was practiced; i.e., exterpation of glands in bubonic cases. The patient also received anti-plague horse serum. Oral administration of sulfonamides was tried.

NOTE: In Masuda's opinion, the effectiveness of sulfanilamide was questionable. The type of sulfanilamide used was called "therapal".

There were no cases of pneumonic plague at the Pingfan Institute; however, there were one or two cases in Manchuria proper.

Q What work was carried out in the drying building?
A This building was used primarily as an experimental unit by the defensive group. It was used by this group for the desiccation of vaccines. Because of excessive cost, no work was done on the desiccation of large amounts of material for offensive BW. Altogether they had 20 drying units but no figures on production were available.

Q What was the glanders program?
A In 1937, undoubtedly due to carelessness on the part of the laboratory workers, two deaths resulted from experimental infection. Because of the severity of the infections, the authorities discontinued the work in this field. There was no therapy for glanders available.

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Q What work on tyrhus vaccine was done at Pingfan?
A The Institute owned 50,000 chickens. The chickens were loaned out to the local farmers in lots of 100-200 per farmer. All eggs were the property of the Institute, and were given by the farmers to collecting agents from the Institute. In addition to this source, eggs were purchased from local farmers. The total egg supply was approximately 20,000 a week. On the average, 70% of these eggs were fertile.

Q How were fertile eggs supplied?
A Lung and egg vaccines were made.

Only experimental egg work on virus vaccines was carried out at the Institute. No virus vaccines were in production. A good vaccine for the protection of animals against Russian tick-borne encephalitis was developed at the Institute. However, they had not developed any vaccine for human use.

Q What work was done in the machine shop?
A This building was used as a production and repair shop for laboratory supplies; i.e., construction of animal cages, machine shop to repair damaged instruments, etc.

Q If the Japanese had theoretically used BW as an offensive weapon, how did you intend to protect your troops?
A Methods of disinfection:

1. Heat - boil clothing, water, etc.

2. Solutions - use chemical solutions-($HgCl_2$ or lysol) on skin and material coming in contact with agent.

3. Washing - wash all parts of body (hands, face, body)

B. Serum therapy - all cases of infection were to be treated with serum.

C. Area decontamination - Col Kasuda stated that contaminated territory was denied to troops for three days, since he felt that during this interval, terrain contaminated with B anthracis would be safe for troops.

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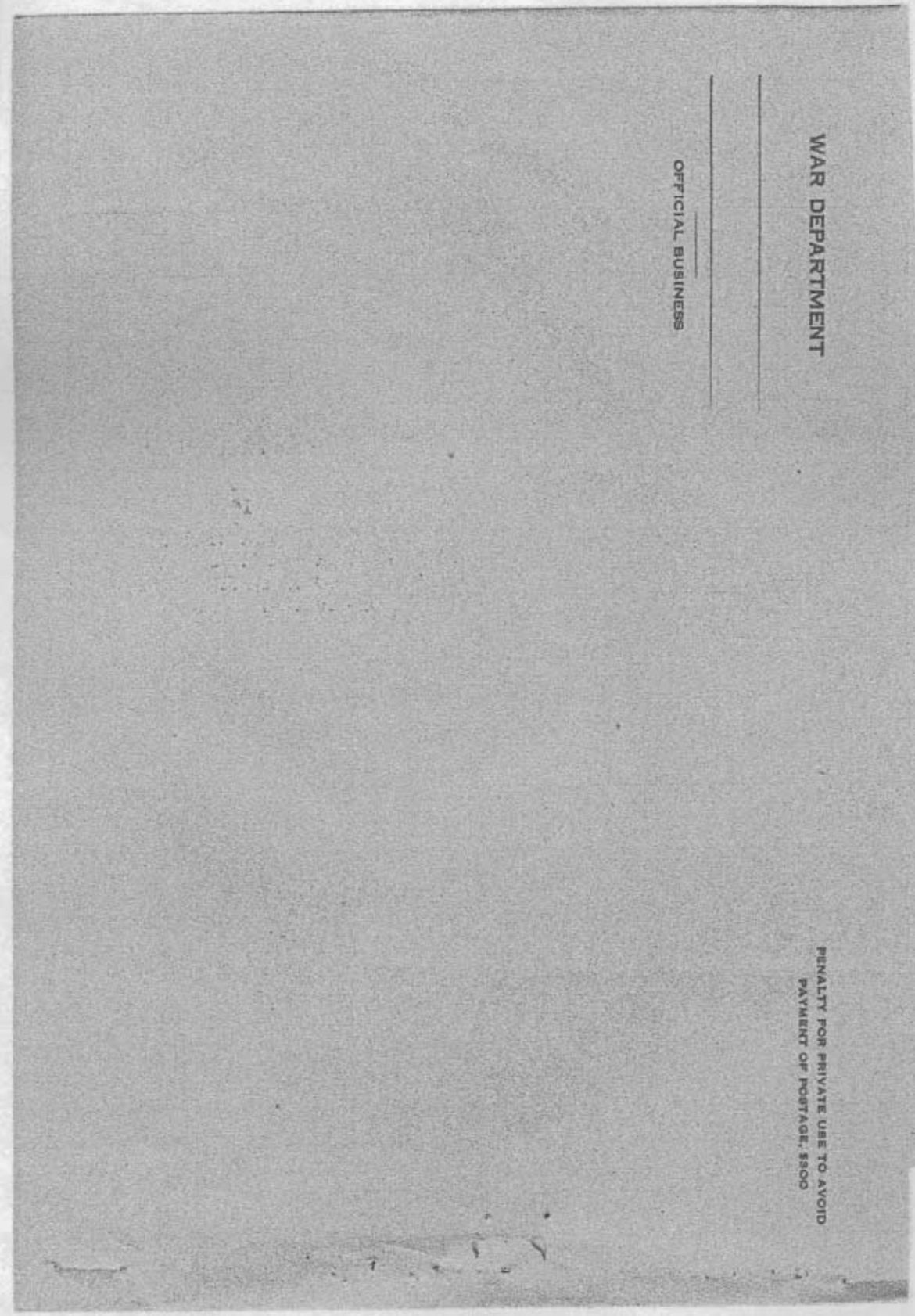

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SKETCH MAP SHOWING
DISTRIBUTION OF UNITS
IN THE WATER PURIFICATION
DEPARTMENT

SUPPLEMENT 1a

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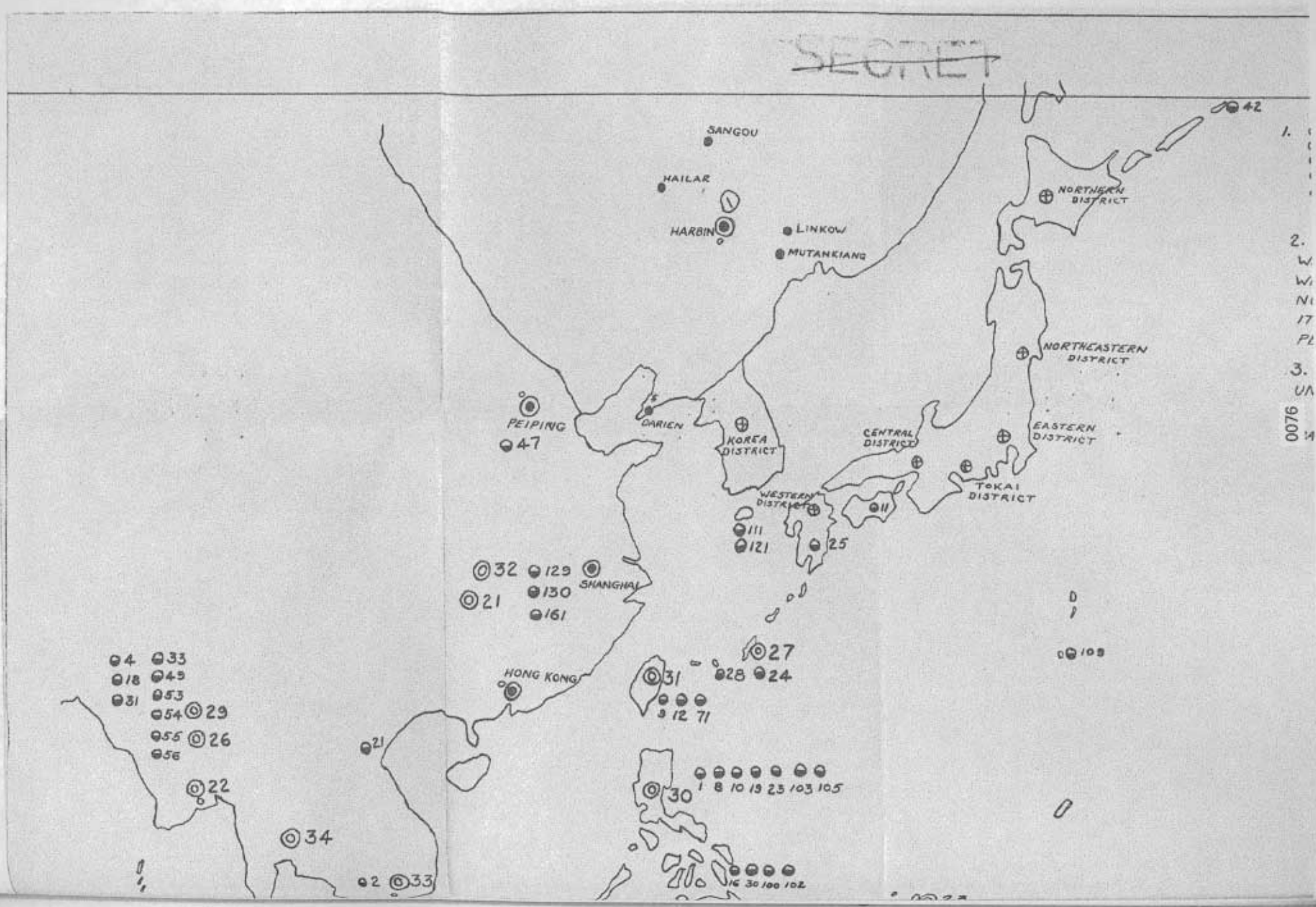

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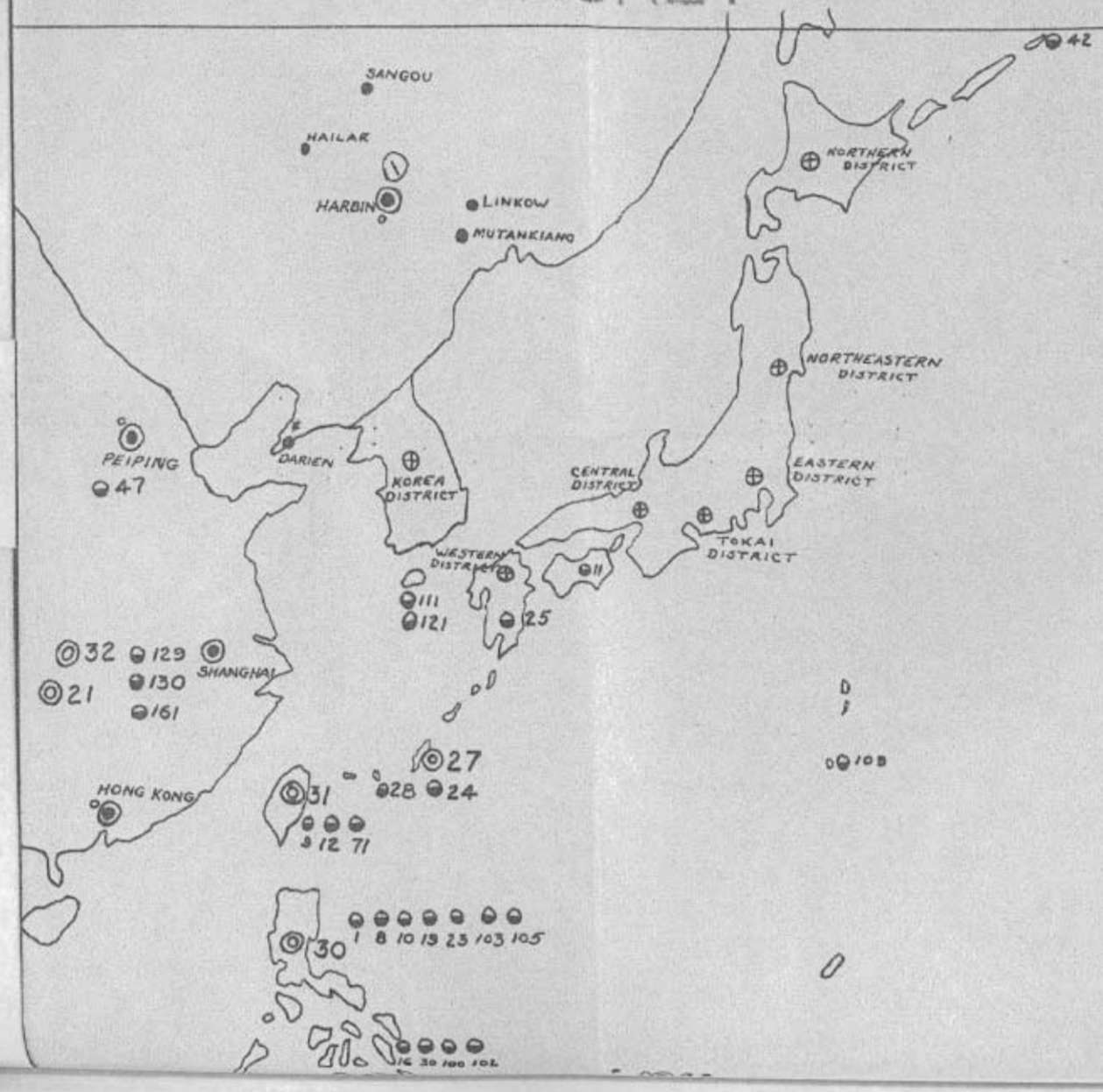
SUPPLEMENT 1-a.



LEGEND

1. ◎ PERMANENT FIXED W.P.U. (5)
   ⊛ FIELD W.P.U. (ARMY) (13)
   ◒ DIVISIONAL W.P.U. (39)
   ⓓ DIVISIONAL W.P.U. (4)
   ⊕ ARMY DISTRICT W.P.U. (7)
   • BRANCH OFFICE OF PERMANENT W.P.U.

2. NUMERAL ADJACENT TO ◎ INDICATES NUMBER OF W.P.U. ◒ INDICATES NUMBER OF DIVISION TO WHICH W.P.U. IS ATTACHED. ⓓ INDICATES NUMBER OF W.P.U., NOT DIVISION TO WHICH IT IS ATTACHED. ◎, ⊛ INDICATE NAMES OF PERMANENT UNITS.

3. 18, 31, 33 (DIVISIONS) ADJACENT TO ◒ INDICATES UNITS REACTIVATED.

4. 1, 8, 10, 28, ADJACENT TO ◒ INDICATES THAT PARTICULAR UNIT WAS NEVER ACTIVATED.

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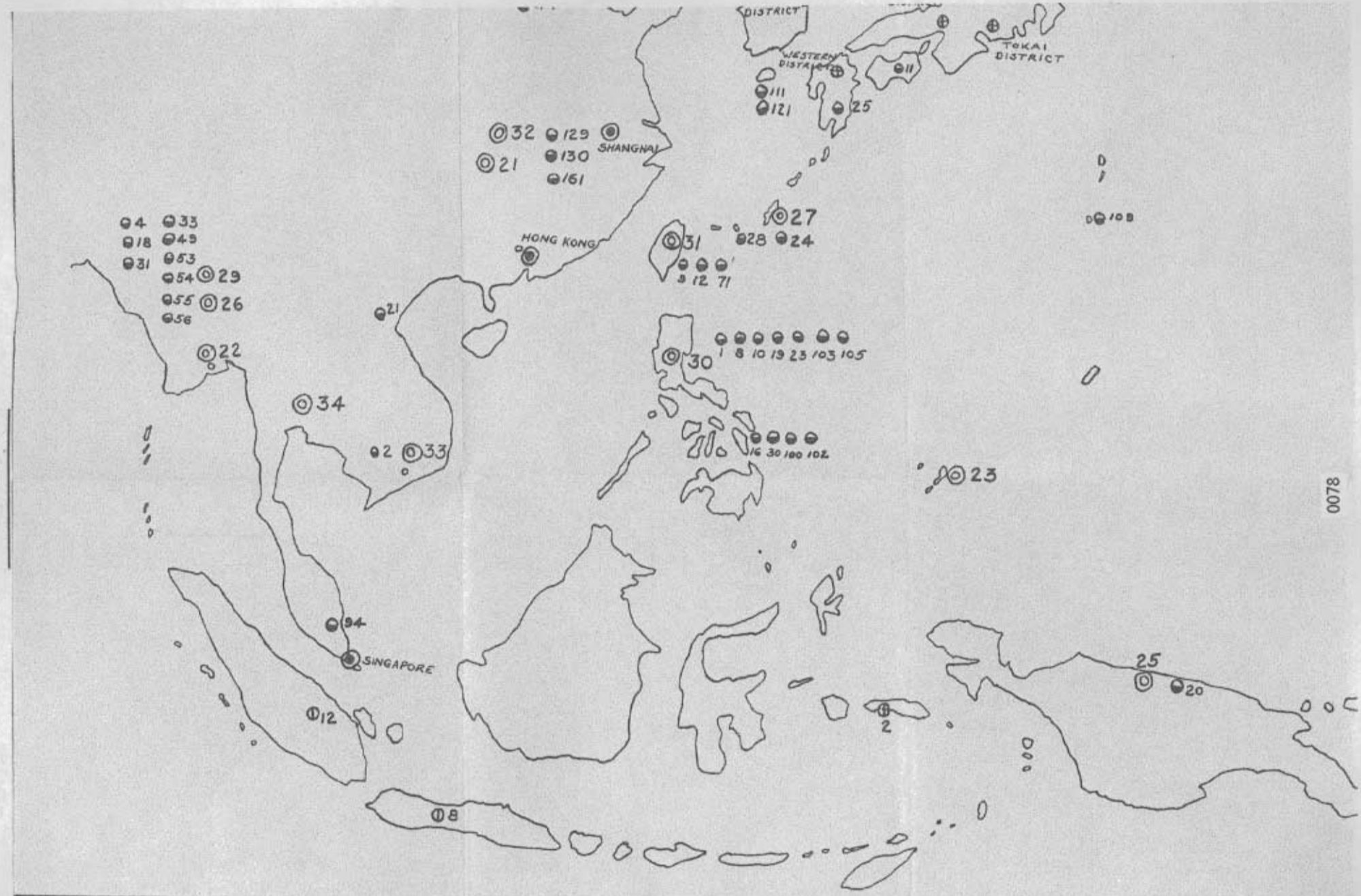
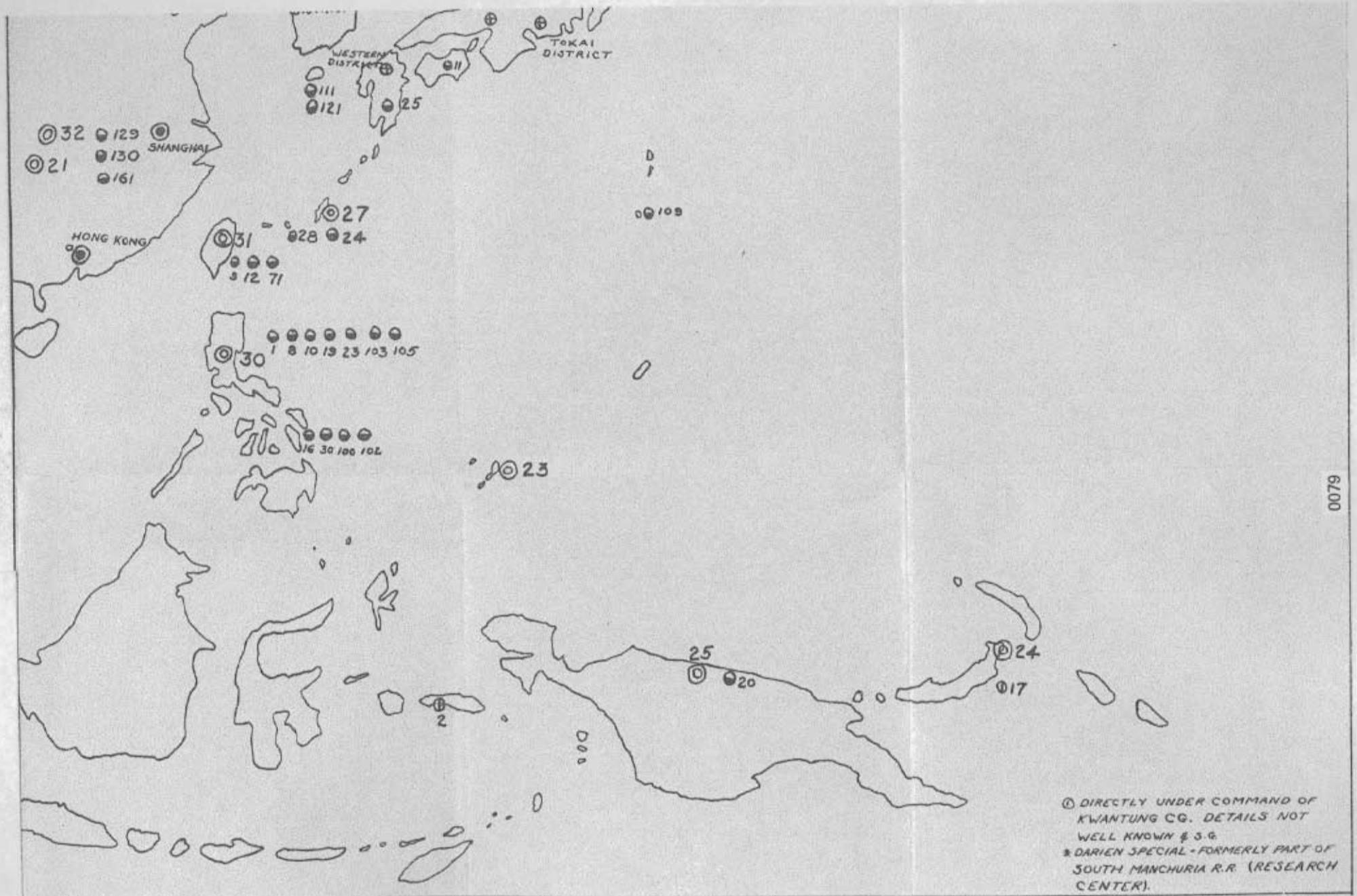


SKETCH MAP SHOWING DISTRIBUTION OF W.P.U.



SKETCH MAP SHOWING DISTRIBUTION OF W.P.U.

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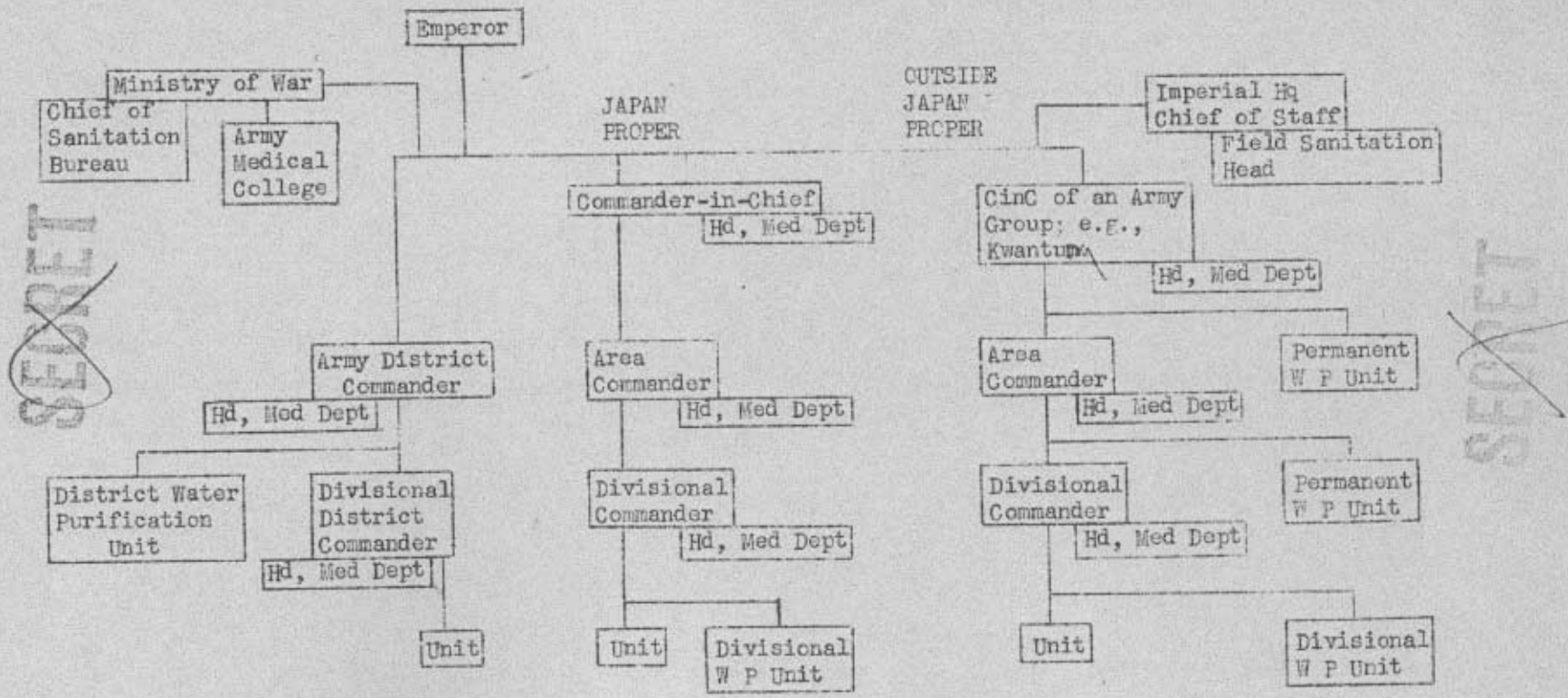
Supplement 1-b

CHART

CHAIN OF COMMAND OF WATER PURIFICATION DEPARTMENT



Supplement 1-b

Supplement 12c

DUTIES OF THE WATER PURIFICATION ~~SECTION~~ DEPARTMENT.

Divisional Water Purification Section

1. Epidemic Prevention (includes malaria prevention).

a. To carry out and direct epidemic prevention work in the div. Mainly analysis of causes and carrying out disinfection. Unit CO is responsible for epidemic prevention work in the unit.

b. When necessary, and upon orders, it takes over part or the entire epidemic prevention work in the area.

c. When necessary, it takes over the quarantine work at an embarkation or debarkation point.

2. Supplying Water.

a. Look for water source.

b. Water analysis (includes analysis for poison).

c. Water purification. Sanitary water filter used.

d. Hauling water. Normally, trucks are used. During combat vehicles, pack horses, or foot soldiers (using water carrier pack) are used to supply water to the front line troops.

e. Direct the supplying of water to the forces. Digging of wells is the responsibility of the engineers.

3. Examination of sanitary conditions in the area.

4. Repair of equipment.

Field Water Purification Section (attached to army or area army).

Duties are the same as those given for division, Differences and additions are indicated below.

1. Supplies water only to rear area forces.

2. Examination and research in connection with epidemic prevention and water supplying.

3. When there is difficulty in supplying vaccines (yoboeki) or when there is a breakout of an epidemic, it will undertake preparation thereof (necessary serums and vaccines).

4. Quarantine work at a debarkation or embarkation point is mainly done by a Field Water Purification Section or higher. Div water purification section does this work only when necessary.

Fixed Water Purification Section (attached to a general army).

Differences from and additions to those given for Fd Water Purification Sec.

1. Supplying of water limited to line of communication area.

2. Research and examination in connection with epidemic prevention and water supply cover wider scope than that for Fd Water Purification Section.

3. Preparation of standard army vaccines, vaccine lymph (or virus) serums. When necessary, those for civilian use are also prepared.

4. Carry out examination and research on general sanitation.

5. To give training in epidemic prevention and water supply work.

DUTIES OF THE KWANTUNG ARMY WATER PURIFICATION DEPARTMENT (BOEKI KYUSUIBU)

1. Duties.

a. To carry out and direct epidemic prevention and water supplying work in the Kwantung Army.

b. To prepare and supply vaccines and materials for epidemic prevention.

c. Give training in epidemic prevention and water purification and supply work.

d. Examinations and researches in connection with epidemic prevention.

e. Mobilization of the Water Purification Sections of the div and armies of the Kwantung Army.

2. Allocation of Duties within the Department. The duties of the various sections are based on the Kwantung Army service regulations and are determined by the chief of the department, with approval of CG of the Army.

a. General Affairs Section. Plans, control, personnel, routine affairs.

b. Section 1. Prevention and treatment of each type of contagious disease. Research for improvement of vaccines and treatment sera, etc.

c. Section 2. Carrying out and directing epidemic prevention work.

d. Section 3. Carrying out and directing water purification and supply work. Manufacture and repair of equipment used in water purification.

e. Section 4. Preparation of vaccines, serums, and culture media.

f. Supply Section. Purchase, custody, supply of material used in epidemic prevention and research. Breeding of test animals.

3. Duties of the various branches.

a. To carry out and direct water purification and supply and epidemic prevention work in their assigned areas.

b. Dairen (Dalny) Branch. Epidemic prevention work in its area; improvement, research and preparation of vaccines and treatment sera.

4. The Kwantung Army Water Purification Department is responsible for the mobilization of the water purification sections of the divisions and armies in the Kwantung Army. Upon opening of hostilities, it will send out personnel for these sections.

5. In peacetime the various branches are under the department chief and take care of the epidemic prevention and water purification and supply work in their area. Upon opening of hostilities, they are attached to the army, div in ther area.

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SUPPLEMENT 1-d

ORGANIZATION TABLE OF THE KW-WATER PURIFICATION DEPARTMENT (Boeki Kyusuibu)

CG, Department	Medical Lt Gen or Maj Gen	1
Chief, Gen Affairs Section	Med Col or Lt Col	1
Chief, No. 1 Section	Med Major Gen	1
Chief, No. 2 Section	Med Col or Lt Col	1
Chief, No. 3 Section	Med Col or Lt Col	1
Chief, No. 4 Section	Med Col or Lt Col	1
Chief, Supply Section	Pharmacy or Med Col or Lt Col	1

Members of Department		Attached to Department	
Med Officers	35	NCO's	98
Pharmacy	18	Assistant Engineers	175
Sanitation	22	Others - Sanitation corpsmen, hired help	- Several
Technical	11		
Engineers	29		
Professors	3		
Interpreter	1		
Paymaster	5		

Branches

CO	Medical Lt Colonel (Major)	1
	Med Officer, Company grade	1
	Pharmacy Officer, Co grade	1
	Sanitation Officer, Co grade	1
	Finance Officer, Co grade	1
	NCO's	20
	Assistant Engineers	20
	Privates	400
	Others, hired help	Several

Specific Personnel

CG Dept	Med Lt Gen Shiro ISHII
Chief Gen Affairs Sec	Med Col S OTA
Chief No. 1 Section	Med Maj Gen Hitoshi NIKUCHI
Chief No. 2 Section	Med Col T IKARI
Chief No. 3 Section	Med Col C MASUDA
Chief No. 4 Section	Med Col S OTA
Chief Supply Section	Med Col C MASUDA
CO, Mutankiang Branch	Med Maj M OKAMI
CO, Linkow Branch	Med Maj H SAKAKIHARA
CO, Sungwu Branch	Med Lt Col S NISHI
CO, Hailar Branch	Med Maj T KATO
CO, Dairen (Dalny) Branch	Civilian Engineer K ANDO

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Supplement 1-e

ANNUAL PRODUCTION CAPACITY OF VACCINES AND SERUMS BY THE KWANTUNG ARMY WATER PURIFICATION ~~SECTION~~ DEPARTMENT

The Kwantung Army Water Purification Section on orders from CG, Kwantung Army, prepares and supplies vaccines and serums for the army units, civilian employees of the military and a portion of the general populace in the area under the jurisdiction of the Kwantung Army in Manchuria, No. China, and Korea. Main items and quantities are as given below.

Vaccines

	Item	Approximated Quantity Amt. Handled Annually
1.	Dried vaccine	human doses
2.	Plague vaccine	2,000,000
3.	Typhoid-fever para typhoid vaccine	4,000,000
4.	Gas gangrene vaccine	2,000,000
5.	Tetanus vaccine	2,000,000
6.	Cholera vaccine	500,000
7.	Dysentery vaccine	4,000,000
8.	Scarlet fever vaccine	100,000
9.	Whooping cough vaccine	100,000
10.	Diphtheria vaccine	100,000
11.	Eruptive typhus vaccine	
	a. Chicken egg vaccine	1,000,000
	b. Rat lung vaccine	2,000,000
	c. Field squirrel lung vaccine	1,000,000
12.	Tuberculosis vaccine	500,000
13.	Vaccine lymph	2,000,000

Treatment Anti-Sera

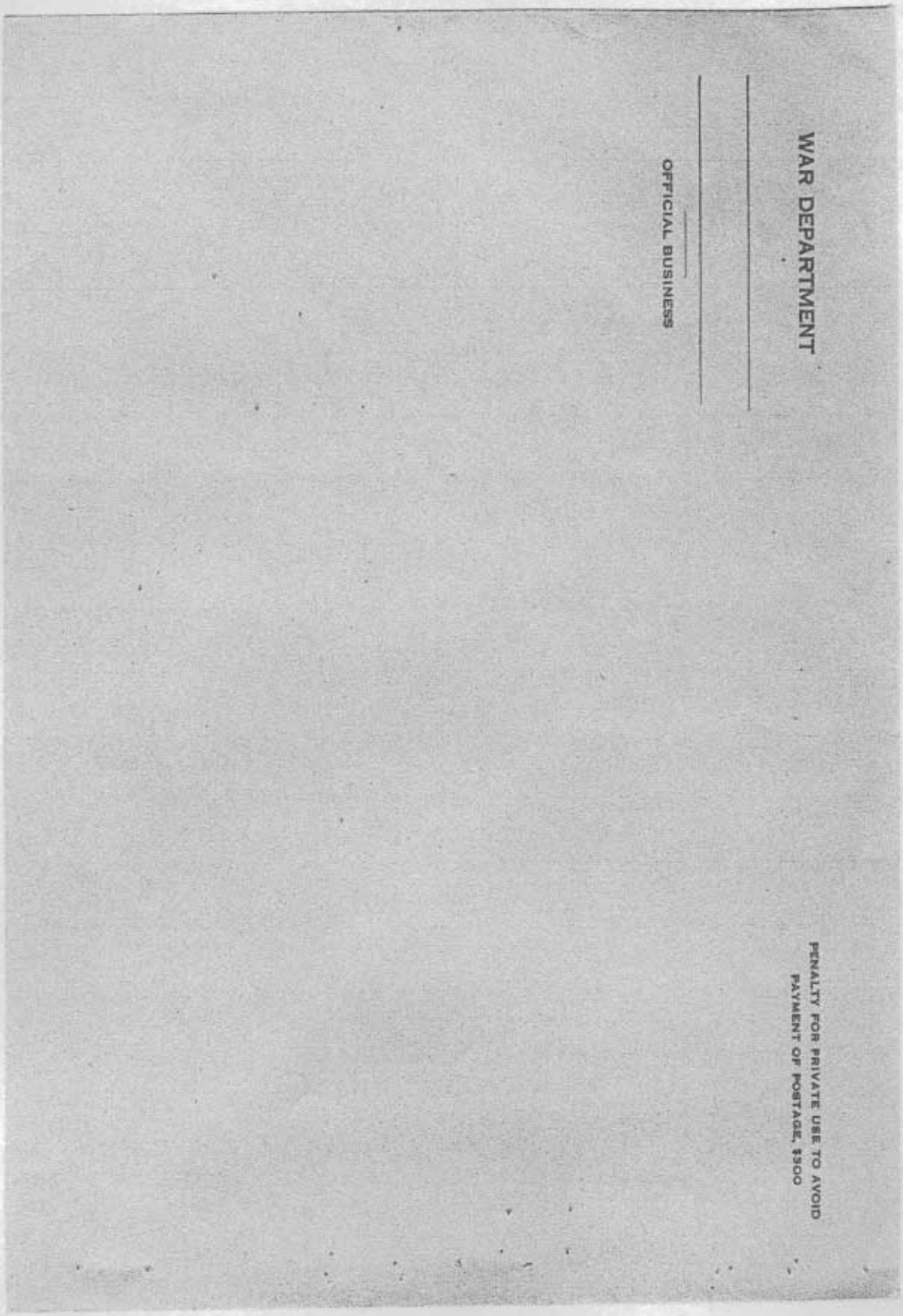
	Item	Liters
1.	Gas gangrene serum	5,000
2.	Tetanus serum	5,000
3.	Diphtheria serum	500
4.	Dysentery treatment serum	1,000
5.	Streptococcal serum	500
6.	Staphyloccal serum	500
7.	Erysipelas treatment serum	500
8.	Pneumonia treatment serum	1,000
9.	Cerebo-spinal meningitis treatment serum	500
10.	Anthrax treatment serum	50
11.	Plague treatment serum	1,000
12.	Plasma for blood transfusion	100,000

Diagnostic Antigens

Item	
1. Typhoid fever, para-typhoid	Each 20 liters
2. Eruptive typhus	5 liters
3. Tuberculin	3,000,000 human doses
4. Dried tuberculin	3,000,000 human doses

Sera for Diagnosis

Item	Liters
1. Typhoid fever, para-typhoid diagnostic serum	5
2. Dysentery (each kind) diagnostic serum	5
3. Cholera (each type) diagnostic serum	5
4. Cerebro-spinal meningitis diagnostic serum	2
5. Pneumonia diagnostic serum	2
6. Salmonella serum	2



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PLAN OF THE GROUNDS AND
BUILDINGS AT PINGFAN

SUPPLEMENT 2a

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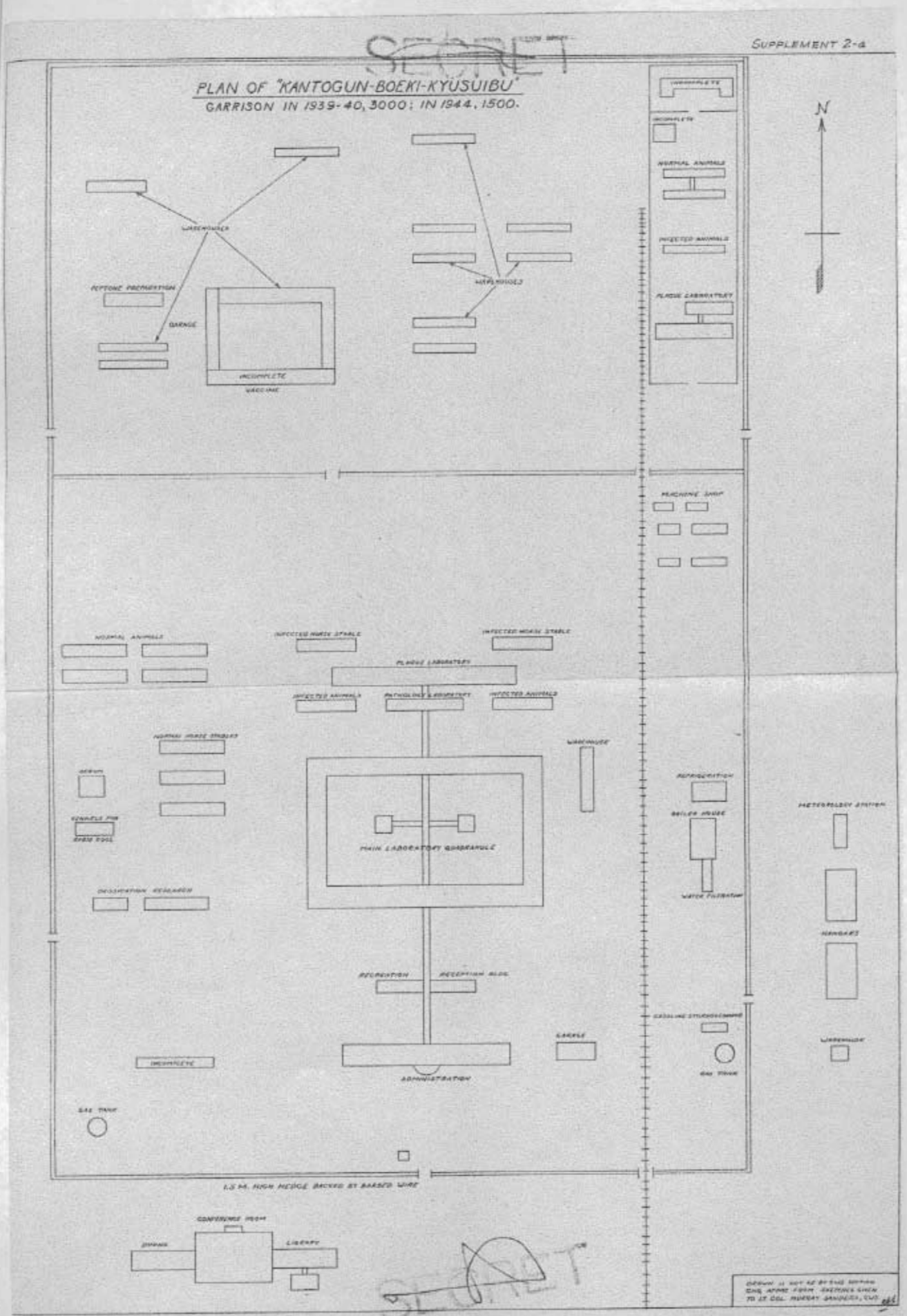
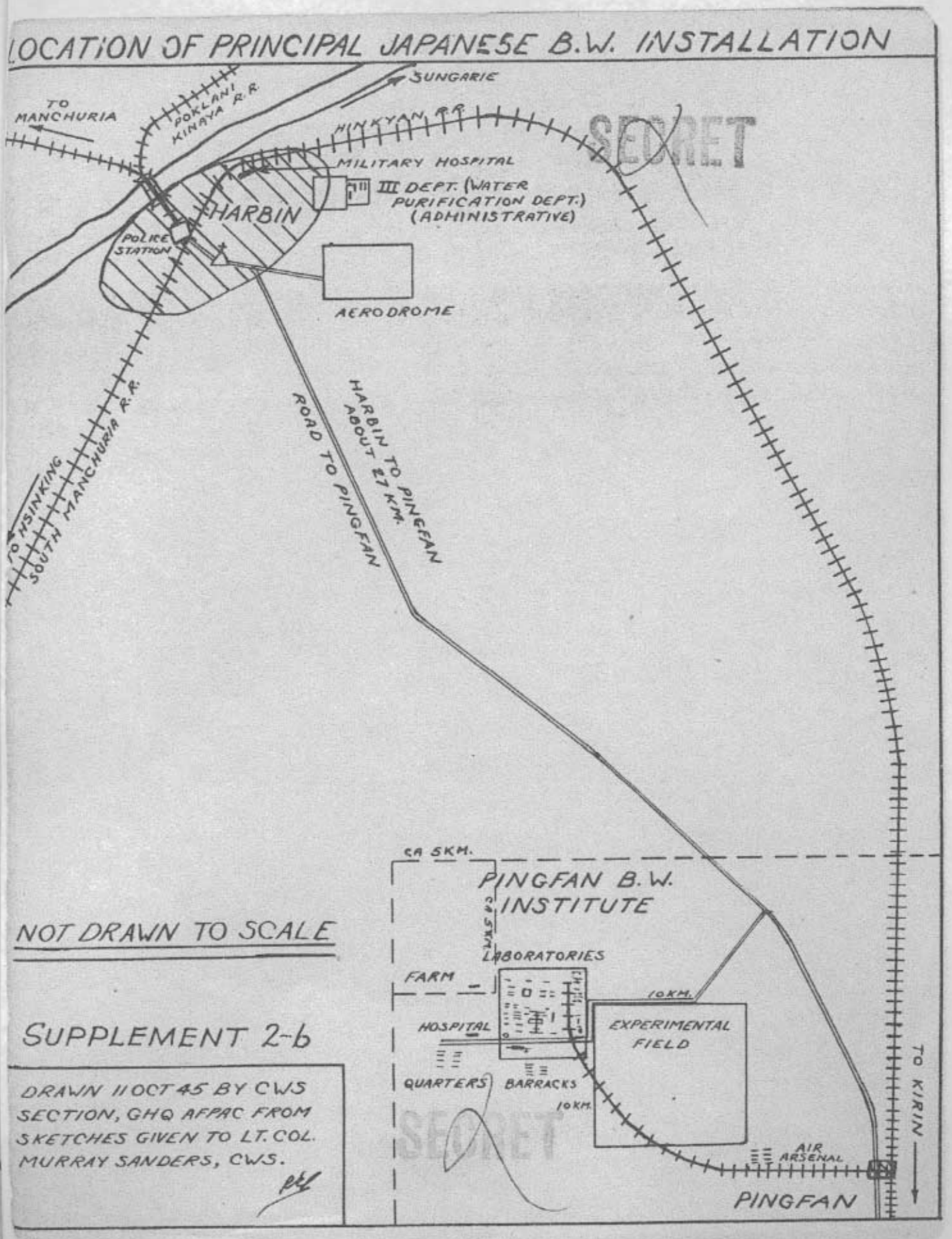
SUPPLEMENT 2-a

PLAN OF "KANTOGUN-BOEKI-KYUSUIBU"

GARRISON IN 1939-40, 3000; IN 1944, 1500.

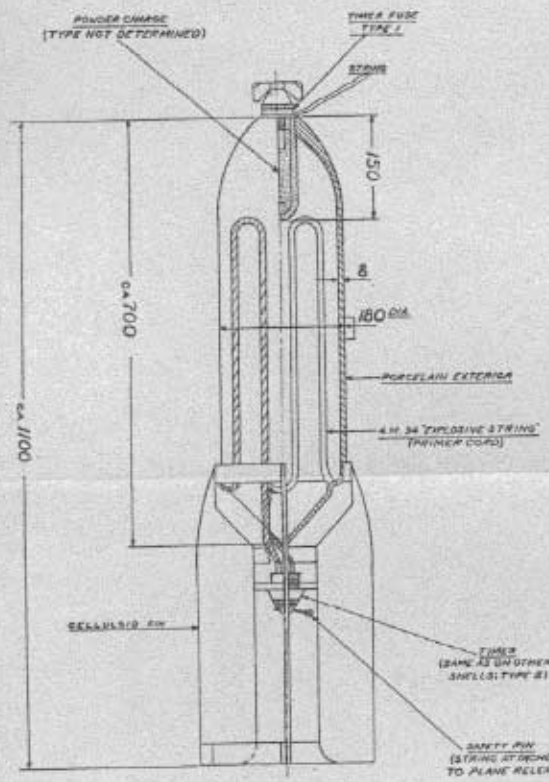


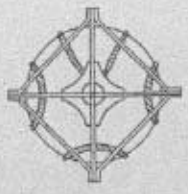


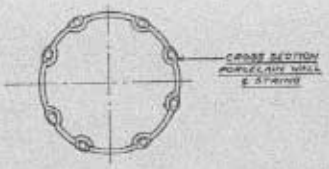
SOURCE OF INFORMATION NO. 1

UJI BOMB
BACTERIAL
ALL PURPOSE TYPE

SECRET







PAY-LOAD 10 L. FLUID CONTAINING BACTERIA
FLUID IS PLACED IN BOMB THEN CHARGE IS SCREWED IN

WEIGHT
EMPTY 25 KG.
FILLED 35 KG.

DIMENSIONS IN MILLIMETERS

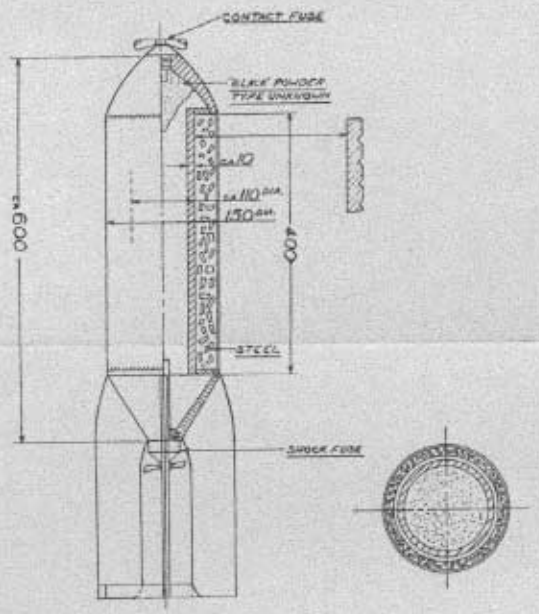
SECRET

DRAWN AUGUST 46 BY CWS SECTION
DWG. APPROX. FROM SKETCHES
GIVEN TO LT COL. MURRAY
SANDERS, CWS.

SOURCE OF INFORMATION NO. 1

~~SECRET~~

HA BOMB
BACTERIAL
SINGLE PURPOSE TYPE FOR ANTHRAX

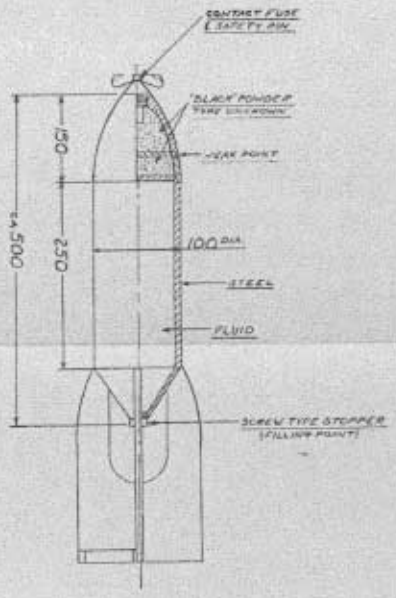


PAY-LOAD 500 cc. FLUID EMULSION CONTAINING ANTHRAX ORGANISMS

WEIGHT
EMPTY 40 KG.
FILLED 41 KG.

STEEL MUNITION WITH INTERNAL AND EXTERNAL SURFACES COATED WITH SHELLAC TO PREVENT CORROSION. CONTAINS 1600 CYLINDRICAL STEEL PARTICLES WHICH WEIGH 8 KG.

RO BOMB
BACTERIAL
ALL PURPOSE TYPE



PAY-LOAD 2 L. FLUID CONTAINING BACTERIA

WEIGHT
EMPTY 20 KG.
FILLED 22 KG.

DIMENSIONS IN MILLIMETERS

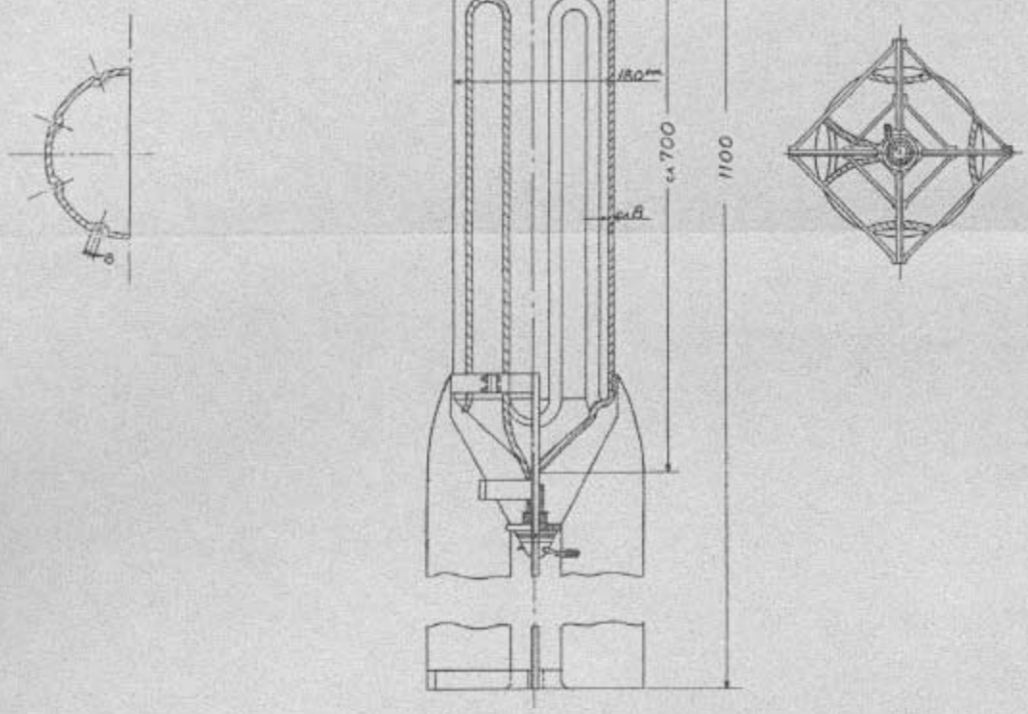
~~SECRET~~

DRAWN ABOUT 1942 BY CWS SECTION BASED ALMOST ENTIRELY ON SKETCHES GIVEN TO ET COL. MURRAY SANDERS, CWS.

SOURCE OF INFORMATION NO. 2

UJI BOMB
BACTERIAL
ALL PURPOSE TYPE
FORM 50

SECRET



PAY-LOAD 10 L. FLUID CONTAINING BACTERIA

WEIGHT
EMPTY 25 KG.
FILLED 35 KG.

SCALE IN MILLIMETERS

SECRET

DRAWN OCT 45 BY CWS SECTION GHQ AFPAC FROM SKETCHES GIVEN TO LT. COL. MURRAY SANDERS, CWS.

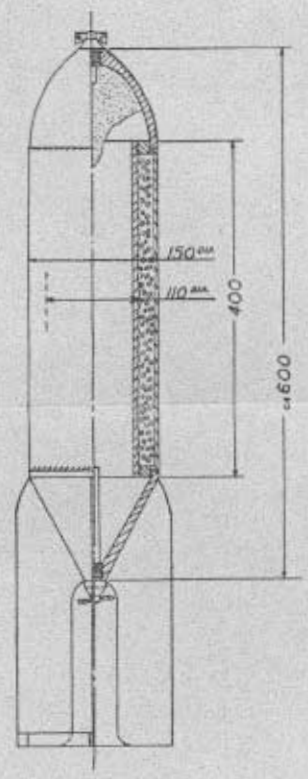
SUPPLEMENT
3#

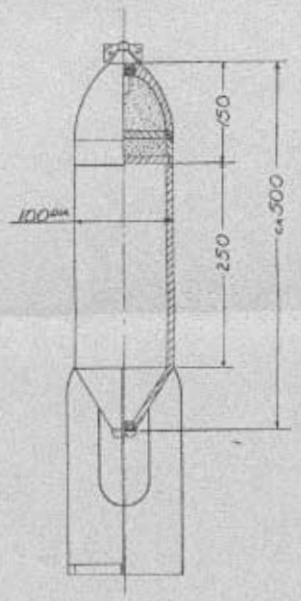
SOURCE OF INFORMATION NO. 2

HA BOMB
BACTERIAL
SINGLE PURPOSE TYPE
FOR ANTHRAX

SECRET

RO BOMB
BACTERIAL
ALL PURPOSE TYPE





PAY-LOAD 500 cc FLUID EMULSION CONTAINING ANTHRAX ORGANISMS	WEIGHT FULL 40 KG. CONTAINS 1500 STEEL BALLS

PAY-LOAD 2 L. FLUID CONTAINING BACTERIA	WEIGHT	
	EMPTY	20 KG.
	FILLED	22 KG.

SCALE IN MILLIMETERS

SECRET

DRAWN SOLELY AS AN AID TO IDENTIFICATION FROM SKETCHES GIVEN TO LT. COL. MURRAY SANDERS, CWS.

SECRET

TABLE OF EXPERIMENTAL TYPES
OF BACTERIAL BOMBS

SUPPLEMENT 3-e

SECRET

SEC

TABLE OF EXPERIMENTAL T

BOMB TYPE		SHAPE AND CONSTRUCTION				
	MATERIAL	BOMB PROPER	EXPLOSIVE	FUZE	QUAN. OF BACT. FLUID	TOTAL WGHT.
I †ca 300 1937	IRON	500 x 100 MMS. CYLINDRICAL BODY, EGG-SHAPE HEAD. STEEL TAIL FINS. EXPLOSIVE CHAMBER AT HEAD AND CENTER OF BOMB. JUNCTION OF TAIL WEAK. WEAK, BLACK POWDER FINELY GRANULATED, SHORT DELAY POWDER TNT.	FINELY GRANULATED POWDER. (BLACK)	PERCUSSION	2 LITERS	20 KG
RO ca 300 1937	IRON	500 x 100 MMS. CYLINDRICAL BODY, EGG-SHAPE HEAD STEEL TAIL FINS. EXPLOSIVE AT HEAD, BACTERIAL FLUID IN BODY CHAMBER. EXPLOSIVE CHAMBER PARTITIONED INTO FRONT AND REAR SECTIONS. BLACK POWDER IN FRONT SECTION, BROWN POWDER IN REAR SECTION. SECTIONS CONNECTED THRU PARTITIONS BY SHORT DELAY FUZE.	FRONT SECTION FINELY - GRANULATED POWDER. REAR SECTION BROWN POWDER (TNT)	PERCUSSION	2 LITERS	20 KG
* HA ca 500 1938	IRON	600 x 150 MMS. CYLINDRICAL BODY, EGG-SHAPE HEAD STEEL TAIL FINS, DOUBLE CHAMBER. EXPLOSIVE IN INNER CHAMBER AND BOTH ENDS. OUTER CHAMBER FILLED WITH STEEL PELLETS AND BACTERIAL FLUID. THE NUMBER OF PELLETS 1500 (3 GMS. PER PELLET), BACTERIAL FLUID 500 cc.	TNT 3 KGS.	FRONT AND REAR - BOTH PERCUSSION	500 cc	40 KG
NI ca 300 1939	IRON	700 x 150 MMS. SHAPE AND CONSTRUCTION SAME AS HA BOMB EXCEPT THAT CHAMBER RADII ARE TWICE THAT OF HA BOMB.	TNT 1.5 KGS	SAME AS ABOVE	1 LITER	50 KG

SECRET

EXPERIMENTAL TYPES OF BACTERI

AND CONSTRUCTION					ACTION	AREA OF DISPERS
ER	EXPLOSIVE	FUZE	QUAN. OF BACT. FLUID	TOTAL WGHT.		
EGG-SHAPE CHAMBER AT N OF TAIL WEAK. ULATED, SHORT	FINELY GRANULATED POWDER. (BLACK)	PERCUSSION	2 LITERS	20 KG	HEAD EXPLODES UPON PERCUSSION, EXPLOSIVE PRESSURE TRANSMITTED THRO CHAMBER. AFTER CONTENTS OF CHAMBER AND RIVET AT TAIL ARE BLOWN OUT, EXPLOSION IS TRANSFERRED TO POWDER IN CENTER, BREAKING AND SCATTERING BOMB PROPER.	STATIC EXPL 10 TO 15 x 200 TO 30 (WIND SPEED 5 DROP TEST FROM EMBEDDED 1 TO 2 M GROUND. NO DISPE
-SHAPE HEAD STEEL ERIAL FLUID IN PARTITIONED INTO POWDER IN FRONT ECTION. SECTIONS RT DELAY FUZE.	FRONT SECTION FINELY - GRANULATED POWDER. REAR SECTION BROWN POWDER (TNT)	PERCUSSION	2 LITERS	20 KG	FRONT AND REAR EXPLOSIVE SECTIONS SEPARATE UPON PERCUSSION THROWING BOMB PROPER 20 TO 30 METERS INTO THE AIR, TOGETHER WITH REAR EXPLOSIVE SECTION. EXPLOSION OCCURS AT THIS HEIGHT AND SCATTERS CONTENTS OF BODY CHAMBER.	SAME AS AB
, EGG-SHAPE HEAD EXPLOSIVE IN INNER AMBER FILLED WITH LUID. THE NUMBER LET), BACTERIAL	TNT 3 KGS.	FRONT AND REAR - BOTH PERCUSSION	500 cc	40 KG	EXPLODES UPON PERCUSSION SCATTERING BOMB FRAGMENTS AND PELLETS TOGETHER WITH BACTERIAL FLUID.	STATIC EXPL SCATTER-DISTANCE C 400 TO 500 M RADIUS OF DISPERSION; ABOU PER SQ M. WITHIN R 50 M. FROM SITE OF
ONSTRUCTION HAT CHAMBER HA BOMB.	TNT 1.5 KGS	SAME AS ABOVE	1 LITER	50 KG	SAME AS ABOVE	AREA OF DISP LESS THAN HA

TYPES OF BACTERIAL BOMBS

ACTION	AREA OF DISPERSION	EFFECTIVENESS	DISADVANTAGE	CONCLUSION
HEAD EXPLODES UPON PERCUSSION. EXPLOSIVE PRESSURE TRANSMITTED THRU CHAMBER. AFTER CONTENTS OF CHAMBER AND RIVET AT TAIL ARE BLOWN OUT, EXPLOSION IS TRANSFERRED TO POWDER IN CENTER, BREAKING AND SCATTERING BOMB PROPER.	STATIC EXPLOSION 10 TO 15 x 200 TO 300 M. (WIND SPEED 5M/SEC) DROP TEST FROM PLANE EMBEDDED 1 TO 2 METERS IN GROUND. NO DISPERSION.		DROP TEST FROM PLANE. RESULTS VERY POOR	UNSUITABLE FOR DROPPING FROM PLANE
FRONT AND REAR EXPLOSIVE SECTIONS SEPARATE UPON PERCUSSION THROWING BOMB PROPER 20 TO 30 METERS INTO THE AIR, TOGETHER WITH REAR EXPLOSIVE SECTION. EXPLOSION OCCURS AT THIS HEIGHT AND SCATTERS CONTENTS OF BODY CHAMBER.	SAME AS ABOVE.		DROP TEST FROM PLANE RESULTS VERY POOR	UNSUITABLE FOR DROPPING FROM PLANE
EXPLODES UPON PERCUSSION SCATTERING BOMB FRAGMENTS AND PELLETS TOGETHER WITH BACTERIAL FLUID.	STATIC EXPLOSION SCATTER-DISTANCE OF PELLETS 400 TO 500 M RADIUS. PATTERN OF DISPERSION, ABOUT 1 PELLET PER SQ M. WITHIN RADIUS OF 50 M. FROM SITE OF EXPLOSION.	PATH OF FRAGMENTS AND PELLETS LOW. EFFECTIVENESS OF WOUNDING AND KILLING - GREAT % ADHERENCE OF BACTERIA TO PELLETS: 60 TO 70 %	1. BACTERIAL FLUID LEAKS. 2. % ADHERENCE OF BACTERIA LOW. EXPLOSIVE TOO STRONG 3. UNSATISFACTORY TRAJECTORY 4. DIFFICULT TO MAKE 5. TOO SHORT AND DIFFICULT TO HANDLE	PROBABLY EFFECTIVE IN ATTACKING PASTURES
SAME AS ABOVE	AREA OF DISPERSION LESS THAN HA BOMB.	INCREASED PERCENTAGE OF ADHERENCE OF BACTERIA TO PELLETS.	1. BACTERIAL FLUID LEAKS 2. EXPLOSIVE PATTERN POOR 3. DIFFICULT TO MANUFACTURE	SAME AS ABOVE

ca 300 1939	IRON		1.5 KGS	ABOVE		
U 20 1938	IRON	700 x 180 MMS. JUNCTION BETWEEN HEAD AND BODY WEAK. EXPLOSIVE TUBE IN MIDDLE. SELF-TIMER (SUCH AS USED IN CAMERA) INSERTED IN TAIL AND CONNECTED TO COMPRESSED AIR CHAMBER. WEAK COMPRESSED AIR CHAMBER. SELF TIMER. PRIMER.	THT	NONE	CA 10 LITERS	30 KG
UJI OLD TYPE 300 1938	PORCELAIN	750 x 180 MMS. CYLINDRICAL BODY, EGG-SHAPE HEAD. CELLULOID TAIL FINS. GROOVE 8 MMS WIDE AND CIRCLES BOMB 8 TIMES. PRIMER CORD INSERTED IN GROOVES.	PRIMER CORD 2.5 M	TIME FUZE (COMPLEX ACTION FUZE) "5TH YEAR" (OBSOLETE TYPE)	18 LITERS	35 KG
UJI** TYPE 50 1939	PORCELAIN	700 x 180 MMS. GENERAL CONSTRUCTION SAME AS OLD TYPE. SEPERATE EXPLOSIVE CHAMBER OF PORCELAIN ADDED TO HEAD OF BOMB.	PRIMER CORD 4 M. TNT IN HEAD	TIME FUZE IN TAIL (SAME AS ABOVE) PERCUSSION TIME FUZE IN HEAD (TYPE 1)	10 LITERS	25 KG
UJI TYPE 100 200 1939	PORCELAIN	900 x 180 MMS. SAME CONSTRUCTION AS TYPE 50	SAME AS ABOVE	SAME AS ABOVE	25 LITERS	50 KG
GA 20 1938	GLASS	SAME CONSTRUCTION AS OLD TYPE OF UJI BOMB, EXCEPT BOMB PROPER IS MADE OF GLASS.			SEC	

* FIRST TO BE TESTED FROM AIR. ** TOTAL PRODUCTION NOT KNOWN. 2000 FOR EXPERIMENTAL PURPOS

	1.5 KGS	ABOVE	[illegible]	[illegible]		LESS THAN HA
VEEN HEAD AND IDDLE. SELF-) INSERTED IN PRESSED AIR AIR CHAMBER.	TNT	NONE	CA 10 LITERS	30 KG	ACTION OF SELF TIMER CAUSES EXPLOSIVE TUBE IN COMPRESSED AIR CHAMBER TO ADVANCE SEPARATING BOMB HEAD FROM BODY. FORWARD PARTITION OF COMPRESSED AIR CHAMBER DISLODGES, BLOWING OUT CONTENTS FOLLOWED BY EXPLOSION OF TUBE AND SCATTERING BOMB PROPER.	
ODY, EGG-SHAPE GROOVE 8 MMS IMES. PRIMER S.	PRIMER CORD 2.5 M	TIME FUZE (COMPLEX ACTION FUZE) "5TH YEAR" (OBSOLETE TYPE)	18 LITERS	35 KG	OPERATION OF COMPLEX ACTION FUZE IN TAIL TOUCHES OFF PRIMER CORD. BOMB PROPER EXPLODES, SCATTERING CONTENTS.	STATIC EXPL. AT H 20 TO 30 X 500 TO 60 (WIND SPEED 5 M. DROP TEST FROM (HEIGHT OF EXPLOSI 300 M) 20 TO 30 X 6 (WIND SPEED 5M/SEC)(BOMB PROPER BREAKS I FUZE OPERATES. DISP
ONSTRUCTION ATE EXPLOSIVE ED TO HEAD	PRIMER CORD 4 M. TNT IN HEAD	TIME FUZE IN TAIL (SAME AS ABOVE) PERCUSSION TIME FUZE IN HEAD (TYPE I)	10 LITERS	25 KG	OPERATION OF COMPLEX ACTION FUZE IN TAIL TOUCHES OFF PRIMER CORD, CAUSING BOMB TO EXPLODE AND SCATTER CONTENTS WHEN FUZE IN REAR FAILS TO OPERATE, FUZE AT HEAD CAUSES EXPLOSION AT OPTIONAL HEIGHT (OR SAME ACTION IS OBTAINED) (PERCUSSION)	STATIC EXPL. AT HEI 20 TO 30 X 400 TO 50 (WIND SPEED 5 M/ DROP TEST FRON (HEIGHT OF EXPLOSI 300 M) 20 TO 30 X 50 (WIND SPEED 5M/SEC BOMB PROPER BREAKS FUZE OPERATES. DISPE
STRUCTION	SAME AS ABOVE	SAME AS ABOVE	25 LITERS	50 KG	SAME AS ABOVE	STATIC EXPL AT HEI 30 TO 40 X 600 TO 700 (WIND SPEED 5/M/S DROP TEST FROM (HEIGHT OF EXPLOSI 300 M) 30 TO 40 X 7 (WIND SPEED 5 M/SE BOMB PROPER BREA FUZE OPERATES. DISPE
D TYPE OF ROPER IS						

CTION NOT KNOWN. 2000 FOR EXPERIMENTAL PURPOSES. † PRODUCTION FIGURES AND YEAR BOMB WAS MADE A

SECRET

DRAWN 9 OCT GHQ AFPAC FR GIVEN TO LT. SANDERS, CWS

DECLASSIFIED Authority NND 745074

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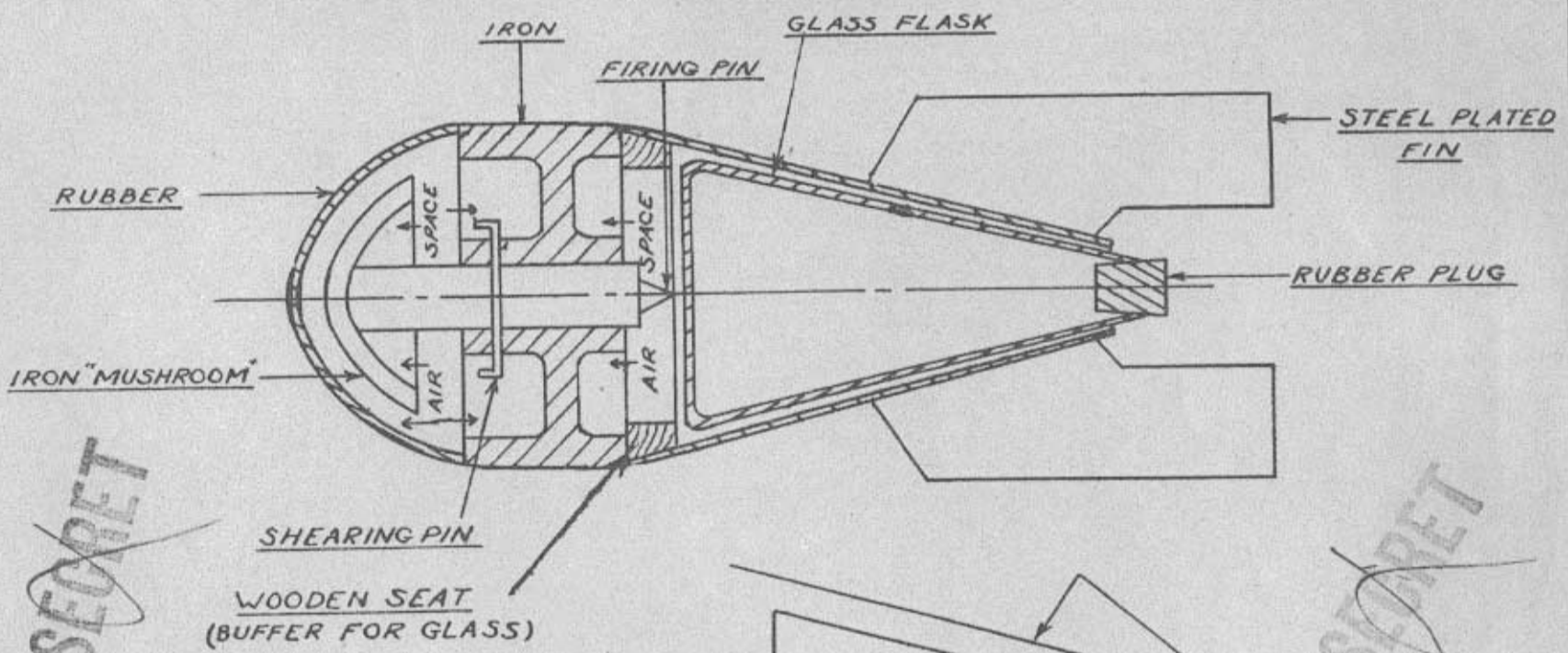
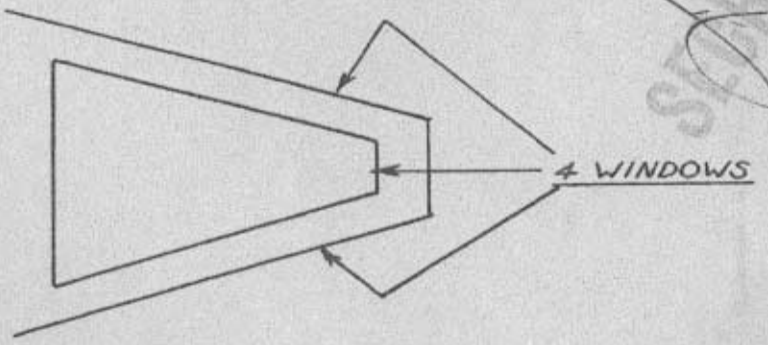
	LESS THAN HA BOMB.	BACTERIA TO PELLETS.	3. DIFFICULT TO MANUFACTURE	
ACTION OF SELF TIMER CAUSES EXPLOSIVE TUBE IN COMPRESSED AIR CHAMBER TO ADVANCE SEPARATING BOMB HEAD FROM BODY. FORWARD PARTITION OF COMPRESSED AIR CHAMBER DISLODGES, BLOWING OUT CONTENTS FOLLOWED BY EXPLOSION OF TUBE AND SCATTERING BOMB PROPER.			1. BASIC CONSTRUCTION POOR. (PROBABLY WRONG TO DEPEND ON MECHANICAL MEANS OF OPERATION) 2. TOO MANY FAILURES, POOR PRECISION OF EXPLOSION.	NOT USABLE
OPERATION OF COMPLEX ACTION FUZE IN TAIL TOUCHES OFF PRIMER CORD. BOMB PROPER EXPLODES, SCATTERING CONTENTS.	STATIC EXPL. AT HEIGHT 15M 20 TO 30 X 500 TO 600M. (WIND SPEED 5 M/SEC) DROP TEST FROM PLANE (HEIGHT OF EXPLOSION 200 TO 300M) 20 TO 30 X 600 TO 700M. (WIND SPEED 5M/SEC) (PERCOSSION) BOMB PROPER BREAKS BEFORE FUZE OPERATES. DISPERSION POOR.	LOW INTERNAL EXPLOSIVE PRESSURE AND LACK OF METALLIC EFFECT ARE ADVANTAGEOUS FOR PRESERVING BACTERIAL VIABILITY. LIVE STOCK EATING GRASS IN BREEZE WITHIN RANGE OF 100 TO 200 METERS KILLED AS FOLLOWS. HORSES 50 TO 90% SHEEP 90 TO 100%	TRAJECTORY UNSATISFACTORY	EFFECTIVENESS POOR
OPERATION OF COMPLEX ACTION FUZE IN TAIL TOUCHES OFF PRIMER CORD, CAUSING BOMB TO EXPLODE AND SCATTER CONTENTS WHEN FUZE IN REAR FAILS TO OPERATE, FUZE AT HEAD CAUSES EXPLOSION AT OPTIONAL HEIGHT (OR SAME ACTION IS OBTAINED) (PERCUSSION)	STATIC EXPL. AT HEIGHT 15 M 20 TO 30 X 400 TO 500M. (WIND SPEED 5 M/SEC.) DROP TEST FROM PLANE (HEIGHT OF EXPLOSION 200 TO 300M) 20 TO 30 X 500 TO 600M. (WIND SPEED 5M/SEC) (PERCUSSION) BOMB PROPER BREAKS BEFORE FUZE OPERATES. DISPERSION POOR.		1. TRAJECTORY UNSATISFACTORY (EFFECTIVENESS 10%) 2. ERROR OF FUSE OPERATION GREAT 3. TIME FUSE OPERATION AT HIGH ALTITUDE DIFFICULT. (35 SECONDS)	BEST AMONG UJI BOMBS EFFECTIVENESS QUESTIONABLE
SAME AS ABOVE	STATIC EXPL AT HEIGHT 15 M 30 TO 40 X 600 TO 700 M (WIND SPEED 5/M/SEC) DROP TEST FROM PLANE (HEIGHT OF EXPLOSION 200 TO 300M) 30 TO 40 X 700 TO 800M (WIND SPEED 5M/SEC) (PERCUSSION) BOMB PROPER BREAKS BEFORE FUZE OPERATES. DISPERSION POOR.		1. TRAJECTORY UNSATISFACTORY (EFFECTIVENESS 10% 2. ERROR OF FUSE OPERATION GREAT 3. TIME FUSE OPERATION AT HIGH ALTITUDE DIFFICULT (35 SECONDS) 4. TOO LARGE	EFFECTIVENESS POOR IN RELATION TO SIZE.
RET	DRAWN 9 OCT 45 BY CWS SECTION GHQ AFPAC FROM SKETCHES GIVEN TO LT. COL. MURRAY SANDERS, CWS.		1. DIFFICULT TO MANUFACTURE	

ES. †PRODUCTION FIGURES AND YOKN BOMB WAS MADE AND TESTED.

NAVAL MARK 7
MODIFICATION OF TRAINING BOMB





PROVISIONAL DESIGNATION
OF BACTERIAL BOMB
CONTEMPLATED WEIGHT 1 KG.

DRAWN 5 OCT 45 BY CWS SECTION
GHQ AFPAC FROM SKETCHES
GIVEN TO LT. COL. MURRAY
SANDERS, CWS.

SUPPLEMENT 3-f