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OF  
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IN  
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NUMBER 2

**HISTORY  
OF  
GERMAN CHEMICAL WARFARE  
IN  
WORLD WAR II**

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Part I  
(The Military Aspect)

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By

HERMAN OCHSNER

(Formerly Generalleutnant  
in the German Army)

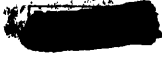
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## FOREWORD

In the course of preparing the history of the CWS in World War II it was found that one of the basic factors in the readiness of the U. S. Armed Forces to conduct retaliatory gas warfare was the plans, intentions and capabilities of the Axis powers regarding this type warfare. U. S. and Allied wartime intelligence documents indicate the status of our estimates of this factor at the various stages of the war. An adequate evaluation of our wartime intelligence on chemical warfare depends partly, however, on an examination of all available post-war information on the actual status of the planning, intentions and capabilities of the former enemy powers with respect to this type warfare. Such information has become available in certain types of documents, but it was considered desirable to have an evaluation of enemy gas warfare activities prepared by former high ranking officers of the enemy powers.

Pursuant to this need, the Office of the Chief, Chemical Corps, on 2 February 1948, requested the Historical Division, SS USA, to establish a project with Historical Division, Headquarters, European Command, for the preparation by former general officers of the German Army of a History of Chemical Warfare in the German Army in World War II. The topics to be treated in such a history were indicated in this request, and are found in Appendix No. 1 to this volume. On 16 February 1949, the manuscript for this volume was received by the Office of the Chief, Chemical Corps. The "Prefatory Letter" by Major Daniel T. Murphy, Chief, Operational History (German) Branch, Historical Division, EUCOM, and the "Prefatory Remark" by Herman Ochsner, former Generalleutnant in the German Army, indicate the approach to the subject, the qualifications of the author and the limitations imposed on the study by the absence of pertinent records.

The undersigned has made minor but rather extensive editorial changes in the manuscript. This editorial work has consisted of the rearrangement of materials, reducing some outline information to narrative form, reconciling topical headings with the table of contents, and the insertion of articles, conjunctions, commas, etc. in order to remove some of the "rough" places resulting from the translation of the original German manuscript. Extreme care has been exercised in order to avoid any editorial changes which would alter the meaning which the author intended to convey. It is emphasized, however, that no attempt has been made to do a complete job of form editing the manuscript. The language remains essentially as it was translated by H. Heitman. An untranslated copy of the original manuscript is in the files of the Historical Office, Office of the Chief, Chemical Corps. Full credit for the preparation of the manuscript is due the author, Herman Ochsner, and the Historical Divisions, EUCOM and SS USA.

BEN R. BALDWIN  
Chief, Historical Office  
Office, Chief Chemical Corps



## PREFATORY LETTER

HEADQUARTERS  
EUROPEAN COMMAND  
Historical Division

24 January 1949

SUBJECT: MS # P-004 CHEMICAL WARFARE (Part 1 "The Military Aspect") by Herman Ochsner, former Generalleutnant in the German Army.

The Chemical Warfare Project has been divided into two parts: Part 1 "The Military Aspect" and Part 2 "The Civilian Aspect".

We arrived at this decision during our research when it came to light that in Germany the decisive scientific chemical work was conducted by civilian chemical experts in civilian laboratories under the supervision of Reichs Ministry for Armaments and War Production. The office in the German Army responsible for study and research on this type of warfare consisted of a small restricted group headed by Herman Ochsner, Genlt.

General Ochsner was personally contacted by this office and at first was not prepared to do the work, fearing possible repercussions in the treatment of his brother, who as a German General was still held prisoner by the Russians. However, after his brother had been sentenced to 25 years hard labor by a Russian Military Court, he agreed to do the work.

Owing to the complete lack of data and because many of the problems did not fall within his province the author of this manuscript was unable to cover all the problems raised by the Questionnaires submitted to him. The subjects listed in the Questionnaires (Annex-1-) will also be covered in Part 2 "The Civilian Aspect".

DANIEL T. MURPHY  
Major, Infantry  
Chief, Operational History (German) Branch



## PREFATORY REMARK

The author was called upon to compile this work three years after the end of the war, unsupported by any records or other data. Hence, he has had to rely solely on his memory and his memory has suffered from the time that has meanwhile passed, from the fact that for years past he has been employed at other matters, and as a result of the very deep impression the collapse of his Fatherland has made upon his mind. It is therefore probable that minor errors have been made. It is also possible that some details have been forgotten.

Nevertheless, the author has taken great pains to show the overall inter-relations and also to give a true picture of the circumstances ruling at the time under review.

It was possible to treat fairly exhaustively questions a, b, d and g. Unfortunately gaps could not be avoided in dealing with questions c, e, f and h, and it was possible to touch upon question i only very vaguely. [See Appendix No. 1 for the topics to which reference is made here.]

Wherever possible German agencies have been cited in connection with each question, from whom further information could be obtained if necessary. The author is prepared to supplement his work in any detail if required to do so and provided he be able to. This is because he is aware of the fact that there are still innumerable unsolved problems in the field of chemical warfare, problems that might in future be of momentous importance and which probably are now exercising the minds of the victorious nations, just as they formerly preoccupied our minds.

Herman Ochsner



## CHAPTER I

### TACTICAL AND STRATEGIC CONCEPTS OF TOXIC WARFARE

#### 1. The Moral Effects

In view of the excellent protective means available nowadays, the more important effect of chemical warfare agents is their moral effect. The opinion held in German circles is that their demoralizing effect is greater than that of any other arm or means of combat. Whether this is really the case or not is of minor importance when weighed against the fact that practically all states and nations hold similar opinions. Hence the moral effect is a factor of the first order and it will therefore be discussed at the outset.


The widespread false ideas of gas warfare, as chemical warfare is commonly termed, are largely due to the often ridiculously exaggerated reports disseminated by press and radio. Even nowadays the dangers of gas warfare are often depicted as particularly grave and gruesome, such information being given for illogical and purely propagandistic purposes. Descriptions of the nature in question are often written by dilettantes with some technical knowledge, and are particularly effective with people of a primitive turn of mind. The vast majority of newspaper readers and of the radio public have no scientifically founded notions on the effects of chemical warfare agents and therefore are not in the position to form personal opinions on this modern weapon. They therefore willingly believe any information given them, even if it be false.

The reputed invisibility of these agents, the effects they have on the eyes and the respiratory organs, the fact that their harmful effects frequently only become apparent after some delay and often even cause skin burns, all these factors contribute to give the impression of something supernaturally invidious and, where simple minded people are concerned, easily lead to superstition, rendering such people an easy prey to the most evil type of propaganda.

The immense effect chemical warfare agents have on the morale was shown by experience gained during World War I. The ensuing discussions in the press and in literature generally -- taking rise with the first reports on the first use of chemical warfare agents, and continuing through to the lengthy debates on the subject in Geneva and then on to World War II -- confirmed these findings and further showed that the effects described above were incalculable and were not confined to the enemy but also affected the user's own forces and population in a degree that could not be foreseen. Even if troops and population receive the very best enlightenment and information on the nature of chemical warfare agents, no guarantee can be given against the possibility of unexpected effects on the morale, and consequently on the behaviour of those concerned. Therefore the danger of panics is greater with these than with any other methods of warfare. They can have a terribly demoralizing effect, the more so if the tactical and strategic situation be critical.

The morale of an army, of a nation and in like measure of the employees of a factory or of a town depend in decisive measure in their faith in victory. It can therefore be said that if a psychologically propitious moment be chosen for commencement of war and if military successes be gained in the early stages it will be more easy to overcome the psychological difficulties of gas warfare than if the war starts at an unfavorable time and if military reverses be suffered at the outset.

Apart from all these general factors, which are probably valid for all nations, there can be no doubt that all well educated and civilized people with a good average knowledge of chemistry and mechanics will be more ready to accept reasonable explanations of the dangers of gas warfare and the best means of combating those dangers, than would a simple minded, primitive people, lacking adequate schooling and perhaps



even inclined to superstitious beliefs. We are fully convinced that our use of chemical war agents against the Russians during World War I was so very effective solely for these reasons and that it was due to the same reasons that the Russian losses were so terribly high. During World War II we also gained the impression that the proper application of chemical war agents against the Russians would have opened up great opportunities of success. (See Chapter IV).

Experience has taught us that it is unfortunately only possible in very restricted measure to dispel these erroneous ideas of gas warfare. This is so because a true conception of attack and defense possibilities can only be attained by means of constant and careful training. It is possible to give the soldier such training, but a whole nation, including women and children can hardly be trained, and in a modern, total war, that would be necessary.

The author is convinced that in 1939 the German army had found the right way of conveying to the troops a proper understanding of the nature of gas warfare; such understanding is the only really effective protection against an exaggerated fear of gas dangers. The method employed consisted of the use of a number of genuine chemical war agents during instructions and individual training as well as during maneuvers, starting with smaller unit maneuvers, and progressing through to maneuvers involving all arms.

Just as the soldier must first be trained with training ammunition, then later with dummy ammunition and in the last phase with proper live ammunition, in order to gain a proper impression of the effects of the weapons used and the possibilities of protecting himself against them, he must also be trained as a member of a modern army in the use of genuine chemical warfare agents as well as in countermeasures. Harmful results to individuals, that might occur during such training, must be restricted (by careful planning and gradual initiation of the men) to a minimum number of lighter cases; such cases must be regarded as accidents that happen normally in other training and maneuvers. Experience gained in numerous maneuvers clearly shows this to be the best method. In a total war the entire nation is involved in the struggle. Hence similar maneuvers must take place for the civilian population, at least in big factories and cities. Such maneuvers and training must be repeated at set intervals. At the very least boys and girls at schools and high schools must repeatedly participate in such training.

However, training for the broad masses of the population presents great difficulties. As explained above, the highly potent factor of morale will ever remain an unknown quantity. Both in respect of their geographical scope and their duration the psychological effects set forth might possibly be incalculably more far-reaching, than the actual effects of the attack would seem to warrant, and might therefore exercise an unforeseeable influence on tactics and strategy, as well as on the entire course of the war and even on the policies of a nation. This fact should be noted at the outset.

Other advantages and disadvantages resulting from the use of chemical warfare agents that can be assessed on a purely physical and factual basis are described in the following pages.

## 2. Tactical Considerations

### a. Tactical Advantages:

(1) The surprise factor is due to: (a) the fact, that the use of chemical warfare agents is not expected by enemy; (b) the nature of the chemical agents used, i.e. volatile (gases and other non-persistent agents), ground contaminating agents or even a mixture of these two great groups of chemical agents. Particularly big successes could be scored if a new, hitherto unknown agent were used. (The demands made

by our responsible quarters that, our scientists develop new chemical agents was probably due to such considerations); and (c) the method adopted in using chemical agents, i.e. the technique employed and the time period used. The various techniques are: spraying or by fumes; chemical shells (fired by artillery, by chemical troops, mortars, howitzers); aircraft bombs; spraying from aircraft; and spraying from special vehicles (container trucks capable of cross-country travel, or tanks). With reference to time periods, toxics may be used alternately by day and by night; at short intervals or at long intervals, sometimes lasting even days or weeks.

(2) Area affected. The fumes being carried about by the wind, chemical agents will affect a far wider area than the most efficacious explosives.

(3) Duration of effects. In contrast with explosive ammunition, where the effect ceases immediately after detonation, the fumes of the chemical agent will remain effective for some time, according to the nature and the quantity of the agent used. It is true that volatile chemical agents will be driven by the wind and often take an undesired course, but ground contamination agents remain restricted to the area where they are applied and can remain effective for hours, days, or even weeks, according to the nature and quantity of the agent used, the nature of the terrain, and the weather.

(4) The efficiency of chemical agents in use against terrain and localities that could not be effectively reached with other weapons, or that could only be reached by means of a disproportionate expenditure of ammunition (deep trenches, field fortifications of all sorts, steep slopes with extensive dead spaces). If the enemy desires to protect such points against chemical agents, he will be compelled to carry out lengthy and extensive construction work requiring much material (gas proofing machine guns and art-gun artillery posts, even if this be done only by means of gas proof curtains).

(5) Serious effects on the combat efficiency and morale of the troops -- fatigue due to wearing gas masks and protective uniforms and the resultant prevention of proper and regular meals and, (most important of all for many) the impossibility of smoking. A point that must be taken into consideration here is the fact that fatigue weakens the will power. The soldier who is tired and battleworn and weary, and who has perhaps even become indifferent in consequence of the frequent use of gas, may well fall an easy victim to chemical agents. It is quite possible that when tired a person will not recognize the gas soon enough and that even when he does notice it he will neglect putting on his gasmask or protective clothing. In addition, the olfactory nerves become less sensitive when a person is tired, covered with perspiration, or unwashed.

b. Tactical Disadvantages:

(1) The effects of wind and weather, and therefore of climate and season, are restrictive. The use of chemical agents is still practically impossible in severe winter weather with plentiful snow, or in stormy, rainy weather. The changing seasons of the year and even the time of the day must receive careful consideration as to their respective suitability for chemical warfare.

(2) To some extent the use is dependent upon the topography of the area in question (mountains and valleys), on the nature of the terrain (open terrain or wooded, dry sub-soil, sand, damp meadows, swamps or open water, vegetation or bare ground, etc).

(3) There is uncertainty as to what direction the clouds of volatile agents might take, so that they might even endanger friendly troops. Ground contamination agents might endanger friendly troops in a later advance.

[REDACTED]

(4) The constant strain on the individual soldier, due to the necessity of taking along gas protective equipment (gas masks, gas-sheets, protective ointments, etc), is also a factor.

(5) Training and the necessity of constant practice in the use of gas protective equipment are conducted with increased difficulty.

All the tactical disadvantages mentioned, with the exception of (4) and (5) can be eliminated by carefully considered use of chemical agents by experts.

### 3. Strategic Considerations

From the viewpoint of the strategist the advantage in chemical warfare primarily is with the attacker, provided both attacker and attacked are equally well prepared, trained, and equipped on modern lines.

The attacker will decide what objective is to be attacked and what forces will be employed. He will determine the locality, the time and the extent of the attack, and thereby will decide which sectors of a theater of war or of a front will have to be defended. The attacker will have the initiative and therefore also the advantage of surprise in respect of the use of chemical agents. He will be in the position to build up a stockpile in chemical agents as well as in ordinary munition and other material required in warfare both for attack and for defense, wherever such defense might be deemed necessary..

The defender will always be at a disadvantage; it will always be extremely difficult for him to make timely preparations at the right spot for chemical warfare. It will be impossible for him to be equally strong at all points. By the wise choice of attack sectors and proper weather, attacker will force defender to fight at the most disadvantageous spot and in weather least suited to the defense. The defender will therefore always be at a decided disadvantage in respect of the strength of forces required.

a. Strategic Advantages: By the judicious use of chemical warfare agents, the attacker can gain the following advantages. At the main points of attack he will be able to neutralize the enemy positions, particularly the more important artillery concentrations and will be able to eliminate artillery observation posts in important sectors by blanketing them with smoke screens. Extensive areas that are to be bypassed, i.e. that are not to be attacked, can be tied down or eliminated by means such as chemical agents of a more permanent nature. The flanks of the attacking forces can be covered by chemical barriers. Reserves held by the enemy in his rear area can be sealed off and the movement forward of further reserves delayed. During the course of battle retiring enemy forces can be stopped in difficult sectors of the combat area by means of chemical barriers laid down by airplanes or by special armored forces.

The defender, on the other hand, can make advantageous use of chemical agents. He can disrupt enemy attack preparations by firing gas shells, or by low altitude air attacks during which chemical agents can be sprayed. The chief deterring factor in such chemical attacks will be their demoralizing effect and the fact that they will considerably detract from the impulse of the enemy attack. Big defense successes can be scored by the skillful withdrawal of defending troops, whereby attackers can be lured into contaminated areas. It would not be possible for the enemy to penetrate such areas without troublesome and tedious decontamination measures.

Both attacker and defender can advantageously use smoke screens to blind enemy air observation and to screen their own movements.



b. Strategic Disadvantages: The chief strategic disadvantage in gas warfare is the enormous increase in supplies necessitated. This is particularly the case with gas warfare equipment and protective equipment and even more so with equipment for the medical services. Initially this disadvantage will militate more heavily against the defender than the attacker. This is so because the attacker will plan his attack operations as they best suit his facilities so that he will be able to foresee likely difficulties.

However, if the attacker should fail to attain his objectives within the envisaged time, then the increased supply difficulties may prove a far greater strain on him than on the defending forces, who by careful planning and owing to their shorter supply routes will be able to move chemical agents and protective equipment to the required spots more speedily than the attacker could. In such case the defender could inflict severe losses on the attacker. In any event the severe strain that gas war imposes, particularly upon the medical services, must be considered a serious strategic drawback. It should be remembered that gas casualties are very high and that sufferers from gas poisoning need especially careful treatment. Gas patients suffering from eye, lung, skin or blood circulation irregularities require numerous hospital personnel. The cure for such disorders is slow, so that these patients take up hospital space for a much longer period than ordinary casualties would.

In summarizing, it must be said that what applies to all means of combat applies equally to chemical agents: the pros and cons of the way they affect all tactical and strategic situations must be very carefully weighed. They are but one of a number of means of combat.

However, owing to the complicated technique which their use necessitates, owing also to the great expenditure of material required in attack and defense and owing further to their farreaching effects on the morale of all concerned, chemical warfare agents have considerably increased the difficulties of modern warfare. These difficulties affect the industry of a country as well as those responsible for the conduct of war for that country, and in equal measure each individual soldier and each citizen. Hence the responsible military command and the statesman mutually should decide for or against the use of chemical agents.

(The advantages and disadvantages of gas warfare, particularly from the German point of view, will also be dealt with in Chapter IV.)



**CHAPTER II**  
**ADMINISTRATIVE AND OPERATIONAL CONTROL**

If there had been any gas warfare during the past war, German control of it would have been handicapped owing to the fact that preparations had not been centralized, and furthermore because in the conduct of such warfare there would probably also have been no unified command.

If any branch of service during war can be termed as being of mutual interest to the whole Wehrmacht i.e. of the German Army, Navy, and the Luftwaffe then this is pre-eminently the case with that branch dealing with the use of chemical warfare agents and defense against such agents. The latter function also includes the interests of the civilian population and should therefore also be controlled by the supreme authority responsible for the conduct of war. Unfortunately the Army, the Navy and the Luftwaffe in Germany functioned as parallel organizations, even maintaining their own individual ordnance offices or similar agencies.

The author's opinion is that the reason for this faulty arrangement must be sought in the fact that no OKW existed during peace time; the RKM (Reichs War Ministry) was not able to make its authority effectively felt against the important personages immediately surrounding Hitler. In this respect I would mention Hermann Goering, who held several offices as Minister of the Reich and was later Reichs Marshal.

After the outbreak of war OKW was apparently reluctant to burden itself with the sphere of work which, it thought at the time, had not yet reached an acute stage; it therefore instructed the several branches of the Wehrmacht to cooperate. Basically the Army was to be responsible in all matters pertaining to gas warfare.

During the war all technicalities and matters relating to manufacture in ever increasing measure were relegated to the appropriate civil ministries, so that the influence of Army, Navy and Luftwaffe steadily decreased.

It was only after the American and British forces had successfully landed in Normandy and when the steady growth of the Anglo-American air-forces became apparent that OKW came to the conclusion that the danger of chemical warfare agents being used was steadily increasing. SS-Obergruppenfuehrer Brand, Hitler's former physician was thereupon appointed to control all preparations for defense against gas attacks both in the military and the civilian sector. One of Brand's functions (probably in collaboration with Speer, chief of Ministry for Munitions) was to determine the manufacture of gas warfare and gas defense equipment, and the allocation of that equipment to the Wehrmacht as well as to the civilian air defense authorities, for which latter the Reichs Minister for Air was also responsible. Army, Navy and Luftwaffe were required to report their requirements. It is not known to the author whether Brand was a member of OKW i.e. whether he was under command of Genfldm Keitel or not, but it is known that he had immediate access to Hitler at least from autumn 1944 on, and that he obtained decisions there on all matters of fundamental importance.

Prior to Brand's appointment, Genfldm Keitel in OKW had been the highest authority responsible for all matters pertaining to gas warfare and anti gas protective measures.

### **1. Offensive Gas Warfare**

OKW had definitely reserved to itself the decision as to whether and when chemical agents were to be used by German forces, expressly stipulating that this hinged upon any one of our enemies first doing so. Accordingly strict instructions had been

given that any use of chemical agents by the enemy was to be reported to OKW immediately by telegraph; samples of the chemical agent were to be sent at once by special air courier to the Army Antigas Defense Laboratories (Heeresgasschutz Laboratorien) at Spandau for chemical analysis. The results of such analysis were also to be reported immediately by telegraph to OKW. The transport of German gases or any chemical warfare agents or spraying containers filled with agents, gas candles or gas munitions or airplane gas bombs to any points beyond the borders of the German Reich, or their storage at any such point had been strictly prohibited. (See Chapter IV).

In the event of orders being given to commence gas warfare, OKW reserved to itself the determination of the fronts, and of the sectors within those fronts, where chemical agents were to be employed by our forces and the decision as to where anti-gas equipment and the corresponding medical installations were to be concentrated. Similarly, it reserved the power to allocate all available gas warfare and anti gas protective equipment to the several branches of the Wehrmacht.

Within the three branches of the Wehrmacht (Army, Navy and Luftwaffe), the individual arms were to employ their equipment according to their training instructions, i.e. artillery and projector battalions would use their gas munition, or their spraying vehicles for ground contamination (which would also be retained in the Z I until such time), while the Luftwaffe would use their aerial gas bombs or their spraying planes.

This strict adherence to the Geneva Gas Warfare Convention (See Chapter IV) alone would have made it impossible for Germany immediately to retaliate if the enemy had employed chemical agents, as all material required for such retaliation (chemical agents, gas-munitions, spraying vehicles and other equipment) would first have had to be moved to the front. By our calculations, this would have required at least three weeks.

Such a period would also have been urgently necessary for appropriate training of the troops, as it would have been necessary to explain their new duties to both officers and men; the majority of the troops would also have had to receive basic training in this type of warfare. All instructions for the use of chemical warfare agents had been kept strictly secret and for the greater part had not even been completed by the outbreak of war; staffs and units were entirely ignorant of their nature. It had therefore been planned immediately to furnish the training schools of all branches of Wehrmacht with these instructions if gas warfare should break out. The instruction officers in such schools, together with the necessary NCO's and enlisted men, were immediately to form instruction staffs and instruction units. These staffs and units would take the instruction manuals to the front in order to conduct training within the individual army groups or armies. All armies would detail suitable officers and NCO's of all army corps and divisions to these schools for training. It was hoped that the training of the troops, which had been purposely neglected, could be completed within a very short while by this system.

It was considered that a short course of training would suffice because for all arms that would fire gas munition it was only necessary to give instructions in the handling of that ammunition, for instance, the number of rounds for required density of gas with the various types and according to the ruling weather and terrain conditions, and the required rates of fire and distribution of fire. Training could be restricted to the fire control staffs (in the artillery to the commanders) and, so far as the troops were concerned, to officers and NCO's, so that only a limited number of soldiers of above-average mentality would be affected. So far as the average soldier was concerned, there would be no change in the handling of his weapon; to him it would remain the same whether he hauled or fired explosive bombs or gas shells.



## 2. Defensive Gas Warfare

Responsibility for the strict observance of all protective measures against gas rested with all commanders-in-chief and all unit commanders, who were assisted by gas defense officers (Gabo) as specialists. Gabos were assigned to staffs of armies, army corps and, during the latter part of the war, to divisional staffs, whereas on lower levels one of the officers filled this function along with his other duties. All units and staffs further included a number of gas specialist NCO's who assisted in the training of the units and supervised and cared for the valuable anti gas protective equipment.

In order to secure uniformity of ideas on anti gas defense, OKH constantly detailed representative officers to tour the front, and furthermore currently informed all staffs and units through the bulletin "Mitteilungen ueber Gaskriegsvorbereitungen im Auslande" i.e. "Information on Preparation for Gas Warfare in Foreign Countries", which was published at regular intervals. Everything of importance to the troops that could be gathered from foreign sources was published in these bulletins in brief form. Besides the instruction manuals, they provided the most important groundwork for the work of gas defense officers with the armies in the field.

Short front training courses were found to be particularly suited to sustain the interest of the troops in gas defense; these courses lasted only a few days and were carried through by all armies and even by army corps and divisions immediately behind the front. In this way it was possible to distribute the load of work entailed by anti-gas training so that the big army gas defense schools at Celle, and later at Bromberg, from then on only had to train staff officers and the gas defense officers required by the replacement army; the gas defense officers (Gabo) and NCO's for the field armies received their additional training in the courses conducted by armies and army corps. From about 1943 on, gas defense courses were also conducted by provisional corps headquarters (Military Area Hq in Z I) for officers and NCO's of the replacement army; they functioned on lines similar to those of the field army. In addition, special courses were conducted in Celle and Bromberg for medical and veterinary officers, for officials and technical sergeants, etc.

The supply services for gas warfare and gas defense was controlled by the respective quartermasters general of the individual branches of the Wehrmacht in similar manner to the other supply services. The quartermasters general had provided special facilities for the storage of all necessary equipment and munitions. Supplies were forwarded in quantities equivalent to expenditure, on the basis of the stock reports submitted. These reports were channeled through divisions (Ib) direct to the respective armies and from there direct to OKH Quartermaster General.



## CHAPTER III

### FACILITIES FOR OFFENSIVE AND DEFENSIVE GAS WARFARE

#### 1. General Evaluation

I lack the necessary figures to give information on this question. The figures can be obtained for any desired period from the following sources:

OKW - Wehrwirtschaftsamt -	Armed Forces Economic Office
AHA In 9	Army General Office Inspectorate 9 (Inspector of Chemical Troops Note by Translator)
Wa A; Wa N; Wa B; WA Pruef 9	Army Ordnance Office - Army Chemical Warfare; Ballistics; Chemical Research.
Reichsministerium fuer	
Ruestung	Reichs Armament Ministry
RIM	Reichs Air Ministry.

It will be shown on an historical basis that at the outbreak of war in 1939 Germany was in no way prepared for either offensive or defensive gas warfare. Preparations for the manufacture of chemical warfare agents were entirely inadequate; factories and storage facilities were in process of being built. Available supplies in gas munitions for all arms -- including the projector units -- and in gas bombs for the Luftwaffe were correspondingly low and not worth the mention. No preparations had been made to ensure supply over a long period of war even of these few agents needed for smoke screening, etc., of which small supplies were to be furnished to the troops: smoke candles for all arms; smoke shells for the projector units, artillery and the Luftwaffe; tear gas munitions for certain armor piercing weapons of the infantry; gas munitions for light and medium field howitzers; and spray containers for chemical troops and engineers. In fact, the supply even in gas masks and filters would not have been adequate to the demands of a long period of gas warfare.

Admittedly, the standard of gas defense equipment and, what was more important, the rate of production of such equipment had improved considerably by the spring of 1940 when the campaign in the west began, but it was still not possible for us to initiate gas warfare. Even in the years of warfare that followed we would only have been able to retaliate on a very modest scale and in isolated sectors if the enemy had attacked with gas, but under no circumstances could we have dared to initiate this type of warfare ourselves.

Owing to the fact that gas warfare was not initiated and due to the enormous efforts made in Germany during the war to start production of the necessary equipment, etc., it is only natural that available supplies increased from year to year. However, enemy air attacks on German towns, factories and communication systems so reduced the production capacity, the stockpiles of raw materials, and available manpower, that screening smoke agents for instance, which were called for in ever increasing quantities by commands and by troops, could no longer be supplied in sufficient quantities. Many justifiable demands both for the Z I as well as for the field forces had to be refused with consequent heavy losses in lives.

The position was similar in respect to the production of munitions for the chemical projector units, the outstanding value of which units both command and

[REDACTED]

field troops had meanwhile realized. At no time during the war was it possible to supply this arm a quantity of munitions commensurate with its firing capacity. Hence, if gas warfare had started it was to be feared that similar shortages would arise in all spheres after depletion of the big stockpiles that had gradually accumulated. Experience in other spheres (for instance the artillery ammunition supply 1941 compared with two years later) had vindicated the disappointing fact that in wartime even apparently illimitable stocks melt away rapidly owing to the enormous expenditure, quite apart from the destruction caused by air attacks, the rate of which progressively increased on the German side during the past war as time went on.

Briefly stated, our capacities were too small to enable us, in addition to the armament program made necessary by the war, to assume the added burden of a mode of combat so complicated and so demanding both technically and volumetrically.

I shall now go into details.

## 2. Facilities For Offensive Gas Warfare

### a. Chemical agents.

Production facilities were available for the following chemical agents at the outbreak of war and a beginning had been made at building up stockpiles:

Screening smoke agents:	smoke producing acids of all types for use in smoke sprayers: Berger type compounds (on a base of two of zinc dust to 3 of hexachlor-ethane) for all types of smoke candles; SO <sub>3</sub> (Tri-sulfide) <u>sulphur tri-oxide</u> for all types of gas shells.
Volatile agents:	Phosgene; Chloracetophenon; Adamsite (only very small quantities); Various types of Clark.
Ground contamination agents:	A wide variety of mustard gas compounds such as Sommerlost (mustard gas compound for use in summer) Winterlost (cold-resistant mustard gas compound -- 50 to 50 mixture of mustard and Lewisite) Mustard and Arsine compounds.

Two new chemical agents -- Tabun and Sarin -- had been so far developed that production could be commenced, but it only started during the war. Both acutely affected the central nervous system. They were not malodorous and were non-irritant. Strict secrecy was maintained on their composition, which was unknown to me.

### b. Toxic munitions.

The following toxic munitions had reached production stage and were currently produced: gas munitions in very small quantities (almost sample lots) containing lacrimator gas (Marked Weisskreuz i.e. White Cross) for certain infantry and panzer antitank guns; a nose and throat irritant, usually Clark gas, (Marked Blaukreuz i.e. Blue Cross) for light and heavy field howitzers: gases affecting the respiratory organs and the nerves (Marked Gruenkreuz i.e. Green Cross), usually phosgene, tabun and sarin, for light and heavy field howitzers and for airbombs; ground

contamination agents or skin poisons (Marked Gelbkreuz i.e. Yellow Cross) for light and heavy field howitzers, 105 mm chemical projectors; spraying cylinders of smoke units and engineers; spraying cylinders of small and heavy spraying vehicles of the smoke units; spraying cylinders of the Luftwaffe; and shells containing flamethrowing oil for smoke unit heavy projector.

In place of the designations Weisskreuz (White Cross) and Blaukreuz (Blue Cross) etc. the new designation Weissring (White Ring), Blauring (Blue Ring) etc. were to be introduced.

#### c. Chemical troops.

When war broke out the chemical troops of the German army (smoke troops) were only just being organized. In 1933 there were only three chemical battalions in existence, each having three batteries and one training and experimental battalion. Even for these few units and their respective mobilization T/O's we had no reserve supplies of arms and ammunition and no trained reserve in officers, NCO's and men. The units were still equipped with the old Model 35 smoke projector, a model based on the Stokes-Mortar being a muzzle-loader with a range of 3000 meters. Details concerning the chemical units are given in Appendix No. 2.

### 3. Facilities For Defensive Gas Warfare

Our position for gas defense was more favorable. At the outbreak of war there was available for each member of the Wehrmacht (Army, Navy and Airforce) a complete basic equipment, namely, gas mask with container and filter, gas sheet, skin decontamination ointment and agent for decontaminating weapons. There was also available for all units the stipulated supplementary first reserve supply in the form of a reserve of complete outfits and for decontamination squads of all arms a first issue of gas suits, gas detectors and decontamination agents. For fortress units the equipment varies from case to case; apart from a liberal supply of gas protection equipment as furnished to all units of all arms, they were further provided with CO filters, army type breathing apparatus, and considerable quantities of decontamination agents.

Provision had been made for a first replacement of all equipment mentioned and for current manufacture of same. Unfortunately, however, the factories producing gas protection equipment at the outbreak of hostilities were inadequate for the requirements of the Wehrmacht through a long period of war, not to mention requirements for the civilian population, for only a fraction of whom basic equipment was available.

The stockpiles in gas protection equipment available at the outbreak of war were a result of years of accumulation. One of the most serious flaws was that so few factories were turning out gas masks, though these few had a high output. Among these factories were the Auer-Werke in Oranienburg and the Draeger-Werk in Luebeck. The factories were known abroad so that we had to count on their being attacked from the air, with a possible serious reduction of their capacities. It was only possible under pressure of war to convert further factories to the production of gas masks. (See Annex 3 for further details on gas defense equipment.)

### 4. Training.

The troops were trained in gas defense measures in accordance with the regulations as described in Appendix No. 4; chemical troops (with the exception of the Instructors Battalion) were also trained along identical lines, except that they were trained only in firing and in terrain decontamination. (For additional information on chemical warfare training see Chapters II and IV).

CHAPTER IV  
GERMAN PLANS AND INTENTIONS  
REGARDING INTRODUCTION OF GAS WARFARE

The German attitude toward gas warfare was ruled by political and moral considerations which could be assessed exclusively by the politician and the diplomat, as well as by the purely military estimate of the chances of success, which could only be assessed by the military. A point that both military and political authorities had to bear in mind was that it did not rest with Germany alone to decide whether or not gas warfare was to be inaugurated. The possibility existed that some other powers might commence using chemical warfare agents, in which case Germany would be compelled *nolens volens* to follow suit.

What were the possibilities of gas warfare being inaugurated in any future war, without Germany giving cause for such inauguration? This was the extremely important question that was constantly under discussion after 1919.

1. In the Period 1919 to about 1925

General feeling in all German government and military circles as well as public opinion in Germany definitely rejected the use of chemical warfare agents. If for no other reasons, than because of the moral grounds that had been so heavily stressed by the League of Nations. However, the ultimate attitude of government and military circles could be decided alone by real, factual considerations. And what was the position in this respect?

In World War I the use of gas had come as a complete surprise, and yet it had not been possible thereby to force a decision. It was found, on the contrary, that effective means of countering this kind of warfare were very quickly discovered and produced. Admittedly certain mistakes had been made, if one may term them mistakes, on the first occasions when the new weapon was used: it was first used on too small a scale and the system first employed, namely the spray system, was soon found to be impracticable. The success achieved was nevertheless considerable, but higher commands had not expected such successes and therefore did not exploit them. Hitherto no experience had been gained in the practical use of gas in warfare and apparently leading military authorities either had little confidence in the theoretically based predictions of the civilian inventor of gas warfare, Professor Dr Haber and his assistants, or failed to understand the import of those predictions.

It is true that the weak points in the use of the new weapon were soon recognized and that in strenuous efforts science, industry and the army united to exploit new and very promising methods. The cumbrous spray method, which was entirely dependent upon weather conditions for success, was abandoned in favor of the artillery gas shell and later the chemical projector; new agents were discovered in the *Blaukreuz* (Blue Cross) volatile gases, (which are not gases in the strictest sense) with which the gas mask in use could be penetrated. In the form of *Gelbkreuz* (Yellow Cross), an agent was eventually developed which, besides the eyes and the respiratory organs, also affected the skin on the unprotected parts of the body. At the same time a higher degree of permanency was attained in these new agents which was far beyond expectations, and this permanency was coupled with the possibility of restricting the gas coverage to definite areas. The use of these new agents was also in far less degree subject to weather conditions and the wind. Meanwhile the most important prerequisite for the successful use of any chemical agent in warfare had been fully realized, namely, that apart from the surprise effect gained by the nature of the agent used and the method employed, it was essential that all such attacks be carried out on the greatest possible scale. Only by the use of gas on a grand scale could real success be gained.

[REDACTED]

But in spite of the novelty of this new method of warfare in World War I, and the apparently spectacular chances it offered, the use of gas failed to bring about a decision. Gas had simply become another of the many weapons used in modern warfare. Together with the tank and the airplane, gas and these other weapons contributed to render warfare more complicated technically and, while progressively lessening the influence of the personal courage and ability of the individual soldier, increased to enormous dimensions the effectiveness of material on the field of battle. Viewed logically and without bias, this meant that the preponderance of the side that was superior in material and technical industry was immensely increased. As this could never be Germany, every German civilian and military authority must realize that this method of warfare must be avoided. This was all the more so in view of the enormous development of the air arm (which Germany at that time was precluded from possessing) which offered immense opportunities for gas warfare, the effects of which could not be restricted to the fighting forces, but must also effect the rear zone and the homeland and particularly big cities and industrial centers; and which could in fact result in the total destruction of such cities and centers under certain circumstances. The author is of the opinion that the teachings of Douhet on operational air warfare only became known at a later date, but these teachings must have deepened the impression of such ideas as set forth above; they were still further deepened by the ideas of the Italian General Maltese who was director of the Centro Chimico Militare in Rome toward the end of the thirties.

All German authorities had to reckon with the additional important factor that the head of the state, Hindenburg, and later Hitler, were against the use of any chemical agents. Hitler's attitude was largely the outcome of the fact that he himself was poisoned by Yellow Cross gas in 1918, which temporarily blinded him.

Thus author is firmly convinced that Germany joined the Geneva Gas-Warfare Convention of 1925 with honest intentions and, in fact, with relief, hoping that this Convention would preclude the use of the chemical weapon in future wars.

## 2. In the Period 1926 to 1936

The German conception as set forth above was shaken by two facts. First, certain great and powerful states refused to sign the Geneva Convention (including Russia, who was so close to Germany, but also including the USA); this alone rendered the security sought in the Convention very precarious; and second, information received from abroad showed that several states were not restricting themselves to the development of gas protective means but rather were quite openly and busily engaged in investigating gas warfare problems. Reports in the daily papers, in chemical, technical and military journals as well as questions asked in parliaments and the answers given to such questions all served to deepen the impression at an ever increasing pace that without the borders of Germany preparations were being made for offensive gas warfare. Finally, a steady increase was noted in the number of preliminary remarks contained in field manuals of foreign armies, stating that though the respective states had joined the Geneva Gas Warfare Convention and intended abiding by that Convention so long as any future enemy might do so, it was by no means certain that such enemies would actually abide by the Convention, so that preparations had to be made against all eventualities.

In plain words, this meant that the states in question were in the position to retaliate by the use of chemical agents and would do so. Hence, so Germany necessarily had to deduce, these powers were capable of conducting gas warfare and so must have made preparations to do so in spite of the provisions of the Geneva Convention and in spite of the League of Nations. Hence the opening question of this chapter as to the probability of gas being used by one of our possible enemies in any future war must be replied to with "yes", and more emphatically so from year to year. This realization gained ground very slowly, but the result of it was that very careful attention was given in Germany to the problem of gas defense; everything possible was

done to develop and obtain first rate gas masks, filters, skin protective ointments and protective suits for the Wehrmacht and for civilian use.

A natural development was that a fundamental basis for all preparations for modern gas defense had to be sought in a proper conception of modern warfare, in fact in an accurate knowledge of such warfare conditions, i.e. of the new gases that might be used and the possible methods of employing them. The knowledge we already had in this sphere was due to the wide experience gained on all fronts in West and East Europe during World War I. We also endeavored to augment our knowledge by a most careful study of all obtainable foreign postwar literature. We had ourselves gained very wide experience and had thoroughly exploited it, but it only covered the period up to 1918. Foreign literature available to us dealt with experience gained after the war by other states. Unfortunately, the subject was very incompletely and at times even inaccurately covered.

In this sphere more so than elsewhere, secrecy is written with a capital S. We found it necessary to check foreign statements, which recurred ever more frequently and in part with entirely new reports, and which were often contradictory. To carry out such checks it was absolutely essential that we ourselves should carry out research on chemical warfare.

It was only in about 1934 that a special division for gas defense was formed in Army Ordnance Office under the heading Wa Pruef 9, and even later, in 1936, the corresponding division was established in Army General Office under the title In 9 -- (Chemical Forces and Gas Defense Inspectorate). Prior to that date the entire sphere of gas defense had been handled by only a few officers, officials and employees of Army Ordnance Office - Pruef S, and Army General Office - In 4 (Artillery Inspectorate). Army General Office had one specialist with one employee for this purpose.

Prior to 1937 army personnel received only very rudimentary training in gas defense training courses held in the Scharnhorststrasse in central Berlin; it was only after establishment of the Army Gas Defense School in Celle in 1938 that such training was provided on an adequate basis.

Efforts had been made earlier to offset our lack in gas and gas defense facilities by collaboration with other states, including Russia. In particular, information had been sought on how gas warfare would affect tanks and airplanes, the importance of which had been steadily growing since World War I. However, such efforts were frustrated by the eternal distrust inherent in the Russian, and by the endless difficulties arising in all negotiations as a result of the entirely foreign Russian mentality which rendered all such negotiations more or less futile. Once National Socialism commenced to make itself felt in the Wehrmacht, as it had done in all other spheres of state life after it came to power, all these efforts in foreign countries were dropped.

### 3. In the Period 1937 to 1938

The target fixed for the newly established gas defense agencies was, broadly speaking, provision of adequate gas protection for the Wehrmacht and the civilian population. The necessary equipment was to be up to date and of good quality and sufficient quantities were to be provided. Furthermore, preparatory steps were to be taken making it possible to retaliate in the event of any possible enemy launching a gas attack. The theory propounded was that a country totally devoid of defensive possibilities represented a temptation to launch such an attack. The individual requirements were clearly determined in detail, so that the lines for development were prescribed. All supplementary measures that became necessary later were taken as occasion demanded.

[REDACTED]

What made it particularly difficult to execute this mission was the fact that suitable personnel as well as the appropriate installations and equipment for research and practical working, (testing installations and fields, demonstration and training units, etc.) had first to be obtained and established. All this took years to accomplish.


Towards the middle of the thirties the Reichs Ministry for Air was made responsible for all preparations for air defense, including gas defense. In their respective spheres Army, Navy and Luftwaffe remained responsible for gas defense, whereas responsibility for development of new chemical agents and methods of using them, as well as for the development of gas masks and filters, for the time being remained with the Army Ordnance Office. At a later stage all research and development work in this sphere was conducted under the control of the minister who had meanwhile been appointed for armament (Todt and later Speer).

So far as is known to the author and so far as the author can remember, it was at this stage that first preparations were made for the industrial production of gases, though those preparations were still on a very modest scale. The author was not apprised of any details as they did not concern his sphere of duties, being the sole responsibility of Army Ordnance Office.

The establishment of units suitable for chemical warfare also made very slow progress and was only carried through under pressure of developments abroad, which were becoming increasingly evident as time passed. In the autumn of 1935 there were in existence only two smoke battalions of two batteries each, which only later received their third battery each. The only additional units of this type formed prior to the outbreak of war were the Chemical Demonstration and Testing Bn (Nebel Lehr- und Versuchs-Abteilung) and one additional chemical battalion. (See Chapter III). The general impression held in Germany was that in all matters pertaining to gas warfare we lagged seriously behind foreign powers. It was felt that this was particularly the case in respect of our eastern neighbor -- Russia, where it seemed almost certain that special preparations were being made for the use of gases by armored vehicles, tanks and airplanes. (See Chapter III). The menace of gas warfare in any future war seemed to grow more ominous in view of the information received on the extension of and improvements to the Edgewood Arsenal and the extremely thorough training courses conducted there in which reserve officers also took part. Information was also received on Russian, American, French and British tests at spraying gases from airplanes -- for instance by the British and the French in North Africa -- and Italian work in the Centro Chimico Militare, at the Chemical Training Grounds at Civitavecchia, in the Abbruzzi Mountains and in Africa, and work done by the Italian generals Dohet, Ricchetti and Maltese, particularly the latter.

It became increasingly evident to the responsible German authorities that Germany, restricted as she was in all spheres of armament, had probably been left farther behind in the field of chemical warfare than in any other. It was also realized that it would be impossible for Germany within any reasonable time to catch up with foreign powers who had such a lead, either technically, in respect of producing capacity, or in the training of the Wehrmacht and the entire nation. This possibility was even more remote in respect of protection for the big cities for which the threat was most imminent. In view of all these factors the realization was forced home that it was of vital interest to Germany that chemical warfare agents should not be used in war.

Toward the end of the thirties indications were seen that German research and science had apparently discovered several very useful chemical agents, including some that seriously affected the central nervous system -- but this could not alter the situation described above. The mass production of these agents presented a difficulty that could not, in addition to the consumption of raw materials, power and manpower required for other armament programs, be surmounted.



Admittedly, the circumstances set forth above led to gas defense measures being regarded as particularly urgent and a vital necessity that must definitely be met. However, the difficulties that had to be overcome were very great, especially as information received about foreign gas mask filter elements and filter containers complicated the decision as to which type of filter element would be the most practicable for the Wehrmacht and for the civilian population. Foreign gas masks were found to have very definite peculiarities such as, for instance, a particularly high protective efficacy against phosgene, or hydrocyanic acid or volatile gases. This was why Germany at the commencement of the Poland campaign in 1939 was entirely unprepared for offensive gas warfare. In fact, even the army would not have had enough supplies to replace gas defense equipment, not to mention the problem of protection for the civilian population of even the more important cities by means of gas masks.

In this connection it seems most appropriate here to point out and stress the fact that particularly those responsible for Germany's armament could not at any time possibly have expected Germany to initiate a war of aggression. Consequently, they had not the slightest grounds for doubting the head of the state when he stated at the time that he had no intention of ever starting such war.

#### 4. In 1939

A few days after the opening of the Poland campaign reports arrived from the front that chemical warfare agents had been used at Jasalo, causing very serious burns. A committee of three (including the author) at once travelled by air to the spot. It was found that the Poles had undoubtedly used mustard gas when abandoning a bridge over the Wisloka river near the small town of Jasalo. When the committee arrived on the scene three to four days later it was found that the characteristic odor of mustard gas was still prevalent; the gas detector indicated mustard gas, and a chemical analysis of traces of the agent used proved beyond doubt that it was mustard gas. Of the soldiers affected, one or two died a few days later and a number remained in the hospital with severe swellings and blisters, particularly under the armpits, in the region of the genital organs and around the eyes. The author personally saw them. The description given by the injured engineer was as follows: the bridge was blocked by means of personnel road blocks (Spanish Riders) and barbed wire entanglements. When the men commenced removing these obstacles, demolition charges, cans, and drums exploded, spraying the surrounding area with a fluid that had a peculiar odor. In the heat of battle the men affected did not stop to think of this incident and took no precautionary measures. When the bridge was cleared the troops crossed it. All this happened during the afternoon and it was during the ensuing night, whilst sleeping in an overcrowded tent and in their dirty clothing, that the first effects became apparent in the affected engineers. Toward morning and in the course of the following day a number of men fell ill.

It was with tense expectation that command headquarters waited to hear whether any further similar incidents were reported. No such reports arrived. However, similar cans were reported to have been found in other localities. It was discovered later that the cans contained an agent used by the Polish army in gas defense training, and that it contained a high percentage of real mustard gas.

This confirmed our first impression, which was that the use of mustard gas at the Jasalo bridge had not been ordered by the Polish supreme command. In the purely local use it would have been of no value either strategically or even tactically and would have apprised us, at comparatively low cost, of the nature of a Polish chemical warfare agent, while the Polish army would have been stigmatized as the first to have employed methods of warfare outlawed by public opinion in the world and by international agreements. This realization was a great relief to us.



[REDACTED]

The incident described above served as a last warning to those who still were reluctant, impelling them now to exert the utmost pressure in order to complete gas defense equipment, and to press forward preparations that would enable us to retaliate if retaliation should ever become necessary. Germany's armament situation was such that any retaliatory measures would have remained very modest; nevertheless, if preparations were made then the enemy at least would not be able to use chemical agents without at least some retaliation. So far as the author is informed, instructions were now forwarded to the appropriate authorities in control of industrial production. However, it took years for these instructions to take full effect.

## 5. In 1940

No fundamental changes had taken place in Germany's state of preparedness for gas warfare when the French campaign took place in 1940. Admittedly, the supply replacement service for army gas defense equipment had improved and production of an improved filter element (Model 40) had commenced, but not much progress had been made in preparations for the use of chemical warfare agents. The few projector battalions in existence had been provided with 100 mm projectors (Model 1940), with a firing range of 6000 meters, but their number was still totally inadequate. The few decontamination battalions that had been established and the few provisional road decontamination battalions only served as a palliative for the army, but under no circumstances could they be described as adequate to cope with a gas attack even on the restricted front of a few army corps. Hence the situation was all the more tense when reports of gas casualties arrived from Valenciennes. Immediate investigations showed, however, that the symptoms were comparatively slight rashes around the eyes, in the faces, and on the necks of a few soldiers, caused by their having crawled through a field of tall clover that had been treated with an artificial fertilizer (top dressing). It was only at a later stage that gas munitions for the French artillery, as well as very effective gas candles containing adamalite, were found; it was thereby clearly revealed that the French had experimented with chemical agents and prepared for their use. Thus this campaign also provided a warning to us not to neglect preparations for gas defense.

The French, on the other hand, had feared that we would employ gas against them as had been done in World War I. The British had similar fears when Northern France had been overrun and a German invasion across the English Channel (the much discussed and feared invasion) seemed within the realm of possibility.

In the foregoing pages it has already been clearly set forth that this was impossible in view of the lack of means. Nevertheless, some highly important, compelling reasons will be given here, showing why Germany, even if she had been in possession of all means necessary to conduct gas warfare, would not have employed them against either France or Britain and that, on the contrary, she at all times had reason to fear that her enemies would do so.

Let us examine the situation! France and Britain were at war with Germany. It was essential for Germany to defeat her enemies and to defeat them as speedily as possible because World War I had proved conclusively that in a protracted war, Germany, centrally situated, cut off from the oceans, geographically small, inexorably would be forced into an unfavorable position economically and in respect of material. It was definitely certain that if the war lasted long the Anglo-Saxon world powers would succeed in drawing into the war those who had hitherto remained neutral and, in fact, would mobilize the peoples and the economic, mineral and food resources of the whole world against us.

In addition, a long war would bring about the danger of warfare on two fronts and of a starvation blockade. Hence Germany's plan of campaign was built up on the surprise element and on speed, on the intention to overrun the enemy by means of the strength and speed of panzers and airplanes. Could gases have been a help in such a campaign? The only answer must be a plain: No!

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[REDACTED]

At the best, a surprise gas attack on a wide scale could perhaps have made it easier to break through the Maginot Line, but this was very uncertain in view of the pattern on which French fortifications were constructed; that pattern was perfect from the technical point of view in gas warfare. Such intentions would have hampered the German army in its advance, impeding its progress by the dead weight of extra supplies in gas that would have had to be forwarded to the required points at the front, and of gas defense equipment that would have become necessary for all branches of the Wehrmacht on all fronts. This was so because once chemical warfare had been initiated at any one point of the front it would perforce have been extended to all fronts. Not only would we have lost control, but it was to be assumed that the enemy would have attempted to slow down our advance at the crucial points by means of gas barriers and gas attacks on our spearheads, thus frustrating our operational plans which were based on speed. Once the German attack had reached the Somme without the French having used gas, the responsible German authorities heaved a sigh of relief.

If the French did not use gas in the Weygand line, then it was assumed, the danger we had so much feared would definitely have passed so far as the west front was concerned. In anxious suspense reports were awaited from the front. Once again no signs of gas were reported. The German advance raced on into Southern France. Even at this stage the use of gas could have proved a serious obstacle to us.

However, by now the French army was probably too badly battered and too urgently pressed for time to be able to handle so complicated and difficult a matter as a systematic gas attack on a large scale, even if such an attack had ever been intended. This possibility the author is not in position to judge.

We were faced by similar considerations when, after we had subdued France, we were suddenly apprised in the summer 1940 of the order by Supreme Command to prepare for an attack across the English Channel against England. Quite apart from any other considerations, technical reasons alone would have made the use of gases by us extremely difficult because of the strong currents of air and the extreme dampness of the air along the coast; these factors were extremely unfavorable for the use of certain gases and would have required enormous quantities. Furthermore, the use of gas would have restricted the highly complicated amphibian operation to periods when favorable winds and favorable weather conditions prevailed and in addition would have called for an immense increase in shipping space for gases, gas defense equipment, chemical troops and decontamination units; that increase we could not have met.

Another point to be considered was that the operation plans were also based on surprise and speed both in effecting the crossing and the landing of our assault armies, as well as in the later operations by these forces against the British army and in the conquest of the island. For these reasons all ideas of using gas in the so-called invasion had to be rejected -- quite apart from the question whether such use would have been possible at all for technical reasons. On the other hand we had to reckon with the possibility of the British, in the defense of their homeland and in their attempt to defeat our invasion, using every weapon and all means available to them that might hold out even the slightest hope of success. We had to allow for the possibility of our troops being attacked already while approaching the English coast with volatile gases (sprayed and generated by gas candles) as well as with vesicant agents sprayed by airplanes. This meant that right from the outset all ships and all troops taking part in the invasion would have to be well supplied with gas defense equipment, including gas suits, and with decontamination agents.

Another possibility was that immediately after landing our troops would come up against large scale Yellow Cross (vesicant) gas barriers and that they might be subjected to further gas attacks from the air and by gas shells fired by artillery and chemical projectors. Hence, it would not be sufficient to supply gas defense equipment for each individual soldier of the very first landing units, but a large number of ground decontamination squads and high capacity decontamination units would have to be included in the organization. This was truly a most distressing increase of deadweight right at the very outset.

Finally, we had to count on the possibility that as operations progressed inland, gas would again and again be encountered which would have imposed an unheard of strain on our replacement supply service in gas masks and medical supplies, so that this factor alone might have thwarted the rapid advance we aimed at. For these reasons we had very grave misgivings if the British should decide to use gas and therefore at no time during the planning for our invasion did we entertain any thoughts of using gas, just as we had at no time planned on doing so during our Poland and France campaigns. When, after repeated postponement, operation "Seelowe" was finally cancelled, we were spared putting the matter to the test.

Experience gained during the 1939 and 1940 campaigns had shown us that artillery gas shells would not be required and also that far less smoke shells were fired by the artillery than we had anticipated. The artillery's trump card seemed to be the explosive shell. The same held good for the few chemical battalions that had taken part in the Poland campaign; their constant and principle demand had been for explosive shells, of which their expenditure had been considerable.

At last, in the spring of 1940 the first 150 mm smoke-rocket projectors were ready for service, so that a beginning could be made at rearming the existing chemical battalions with rocket projectors, and at establishing new units of this type. Ammunition stockpiles for them were also built up in ratio of one smoke shell to three explosive shells. Gas munitions were considered unnecessary and the training of these specialized troops was restricted to firing explosive and smoke shells and to ground decontamination. I think I should mention here that ground decontamination training was more and more neglected as the war progressed, so that in the final stages of the war it was practically unknown to the troops.

Heavy projectors with a caliber of 280 mm and 320 mm and with a firing range of 3000 meters were also ready for service about this time and, though suitable for firing gas, they were supplied solely with explosive shells or shells containing flamethrower fuel. Finally, training for chemical warfare in the army dealt exclusively with gas defense measures.

## 6. In the Period 1941 to 1943

From the autumn of 1940 through the winter 1940/41 the German army was stationed as occupation forces in Central Europe (as far as the then Russian borders) and in Norway; during that period general training was continued. In the spring of 1941, considerable forces were moved eastward, but they brought no new directives on gas defense training. All training remained strictly for the defensive. In addition, as a result of Hitler's constant reiterations that war on two fronts must be averted, and because of the pact concluded with the Soviet Union, the army did not even dream of any possibility of war with Russia. In 1941 the author for the first time heard of the possibility of war against Russia, but did not believe the rumors. Right up to the time when our troops were concentrated the author shared the opinion held by the overwhelming majority of the German officers, namely, that the entire concentration in the east was only intended to serve political ends and was therefore nothing but a bluff that would be called off just as operation "Seelowe" had been. If a military bluff is intended, then it must be done thoroughly and for this reason it seemed only logical that the reconnoitered positions were munitioned. We ourselves had made no preparations for the use of gas, and it was unknown whether the enemy would do so or not. It was considered quite possible that gas might be used on restricted sectors, but no decisive importance was attached to such a possibility in view of the great length of the front and the wide expenses involved.

Therefore the gas protective equipment of the individual soldier was again carefully examined, as had been done prior to the former campaigns; gas defense training was furthered in courses; ground and road decontamination groups were formed; and considerable quantities of decontamination agents were made available. Again, throughout the entire war in the east, gas was not once used.

Surprisingly enough, the Russians even did not use gas in 1941 in defense of their excellently prepared field fortifications within their rear defense lines, thus for instance before Leningrad or in the middle sector in the so-called Stalin Line, and not even in the summer of 1942 when countering our great offensive in the middle and south sectors, where they had ample time to prepare. In the autumn of 1941 and the summer 1942 we thought it possible that the Russians might employ gas because, as masters in the construction of positions and in position fighting, they had fully realized its value. This was known to us from the instruction manuals we had captured shortly after outbreak of war. These manuals stressed the effectiveness of gas when sprayed from airplanes on troops or on important terrain sectors such as passes, wooded areas and river crossings. They further dealt in detail with the use of special tanks and ordinary tanks for the purpose of breaking through the enemy lines and there contaminating the ground in the enemy's rear.

We never discovered what caused the Russians consistently to desist from the use of gas. If one assumes that they actually were totally surprised by the German attack, that could explain why they did not employ gas in the early stages of the war, but it is no solution for the problem of their not using it later in defense of the very existence of their state.

The author does not believe that they did not possess sufficient quantities, even though we found gas nowhere, because the Russians achieved marvellous feats in clearing their country of anything that might have been of any use to us. Thus it is possible that they removed their stockpiles of chemical warfare agents (which presumably, and in common with other states, they did not store near the borders) just as thoroughly as they removed their weapon and ammunition dumps, their food and clothing depots, their factories and other important installations.

The author also cannot share the opinion sometimes expressed that it was out of consideration for the Russian population that the Russians did not use gas because of the fact that that population would have suffered severely from such use. During the middle thirties this ruthless Soviet state had allowed innumerable compatriots to perish miserably in the famine in Ukraina -- and had nevertheless continued exporting immense quantities of cereals in exchange for armament imports. It was therefore to be presumed that this state in time of war would not rate the wellbeing of a number of civilians higher than the chances of gaining military successes, -- if it had really been sure of achieving those successes. It must be presumed that this latter was not the case, and here an explanation is offered: possibly the Russians feared gas warfare on account of their experiences during World War I, where their losses through gas casualties were inconceivably high, and which led to their feeling that they were inferior at this type of warfare. For it must be borne in mind that in World War II also the majority of the Russian soldiers came from the rural areas and in ever increasing numbers from the nations in the eastern territories of Asia, who had been pressed into service.

Admittedly, this supposition is countered by the fact that technically the Russian is very able, and that since World War I a giant social reshuffle of the population in the Soviet Union had taken place, together with a growing mechanization which had greatly reduced the density of the peasant population in favor of industry. Much had also been done to foster the fighting spirit of the nation by state promoted enlightenment and training. Thus the Ossoaviachim \* was developed and supported. This organization established numerous local chapters and apparently took an especially active part in enlightening the masses on gas and air defense. Our experience showed that, in spite of all this, Russian soldiers were very unequally trained in the knowledge of gas defense measures and their application; the unformed or the mal-informed were vastly in the majority, so that the reasons assumed above for the Russians desisting from the use of gas cannot be disproved.

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\*A Russian youth movement for air activities.

[REDACTED]

For us the premises were entirely different: our intention was to shatter the Russian front (if the Russians succeeded in establishing a front at all in the face of our sudden surprise attack) by means of swift, powerful thrusts with our assault armies, supported mainly by panzers and the Luftwaffe, then to envelop and annihilate entire army groups, and to follow up with a deep thrust into Russia in the direction of Moscow and the industrial centers. There the lifelines and the sources of Russia's might were to be mortally struck. The use of chemical agents could only have reduced the speed in operations of this nature; further, it would have strained to the breaking point our supply service, which was difficult enough anyhow in view of the poor railroad communications, the inadequacy of roads for modern motor transport, and the great distance from the German bases. We had to do everything possible to avoid this happening. Hence, under no circumstances did we dare commence the use of chemical agents. This applied equally to the opening stages of our 1941 campaign and to our offensive in the summer of 1942, which was planned along similar strategic lines.

Subsequent to the Stalingrad catastrophe the heavy fighting going on in the east was subject to even greater handicaps in respect to supply transport which, through Partisan action, was rendered increasingly difficult month by month. The urgency of the problem of how to deal with the growing Partisan movement in our rear areas increased progressively as the war dragged on. The widely varying suggestions put forward also included that of the use of gas.

The following points were propounded in favor of such use: the Partisans were not real combatants and did not fight fairly as soldiers do; they wore no uniforms, or at least they discarded their uniforms whenever it suited their purpose. They employed women and even children to spy out opportunities for their criminal activities, to convey orders and reports, and even in the smuggling of arms and ammunition. They carried on their work far behind the fronts in the vilest manner, by attacks on trains, bridges, shelters, and the supply and communication installations of our forces. It was not possible to get them by the use of legitimate means of warfare except with an expenditure of disproportionately big forces, which could not be drawn from the front.

The Partisans fought in a treacherous and cruel manner. Again and again German soldiers, when alone or in small groups behind the front, were murdered or attacked in the most atrocious manner. The bodies of such murdered soldiers, often terribly mutilated, were often found later in farms, in gulleys or in the forests.

Why should gas not be employed against an enemy fighting in such a despicable war, particularly as he apparently was highly vulnerable to the weapon? Why should one hesitate to simply smoke out his hiding places, to which he constantly had to retire? Typical hiding places were the catacombs in Odessa, the caves at Kertsch, the innumerable bunkers in former Russian positions now behind our lines. It was impossible to blast or otherwise demolish all these hiding places as neither the necessary manpower nor the explosives were available, and also because there was no time to do so. But by the use of Yellow Cross gas they could with comparative ease be rendered inaccessible for considerable periods, and that doubtless would have had a great effect on the morale of the guerillas. In fact -- out of deference to the League of Nations and to Geneva -- signboards could have been placed warning people not to enter such spots. It could hardly be assumed that the Partisans would be able to decontaminate such areas, so that success was inevitable.

Against the use of gas was the fact that once a beginning had been made it could never again be undone, and the stigma would have been placed upon Germany of having contravened the Geneva Convention whilst -- speaking in a broader sense -- no really favorable decision could have been forced. Of course we would have been successful in countering the Partisans and thus would have lightened the burden of our forces locked in bitter combat, and lives would have been spared. On the whole however, we would but have furnished our enemies, who were vastly superior to us in material on all fronts in all theaters of war, with a good excuse also to use gas against our

[REDACTED]

[REDACTED]

armies on all fronts, and perhaps even against our homeland. In such event we would not have been able to retaliate as enemy air power was growing perceptibly.

These sober deliberations not only justified the decision of our Supreme Command: under no circumstances to use chemical agents, but in fact, made that decision obligatory. In fact, the former order was repeated, most strictly prohibiting the removal of any chemical gas agents in even the most minute quantity -- not a single gas shell or gas bomb -- to any point outside the borders of the Reich or their storage at any such point. Everything possible was to be done to prevent the use of gas by lower level army agencies, whether such use resulted from lack of understanding, arbitrary action, as an emergency measure (lacking other ammunition) or just purely by mistake. Also the danger was to be averted of such munitions being captured by the enemy in local penetrations or in the event of our having to retire and this fact then being exploited against us in the political and the military field.

This is how it came about that until the Anglo-Saxons landed in Normandy in 1944, no chemical warfare agents had been used in Europe.

Our plans in the African campaign had been ruled by the same considerations as set forth above, and there was the added fact that the climatic conditions in Africa are particularly unfavorable for gas warfare. The supply service through Italy and the Mediterranean was also particularly difficult and constituted an important factor against any use of gas.

## 7. The Period 1944 - 45

After the spring of 1944 reports increased concerning an impending landing by American and British forces on the French, Belgian or Dutch coast. No indications were given where the landing might take place. Once more, and now for the last time in this gigantic struggle, the question was raised whether gas should be used, this time in defending the Atlantic Wall in an effort thereby to decisively bolster the German forces whose numbers had become so small.

The great decisive battle was approaching and all means promising any chance of success must be used in that battle. Were gases a suitable weapon for this purpose? At first glance the answer must be in the affirmative. Entire sectors of the coastal front could have been rendered impenetrable for the enemy, or at least untenable unless he decontaminated them. To do so however, he would have needed enormous quantities of decontamination agents, innumerable vehicles, specialized units and forces, and these could only have crossed the channel at the expense of combat units. Besides the gain in time and in man power, there was the added factor that the morale of the landing enemy troops would have been seriously affected. The individual results could not be foretold, but definitely they would have been in our favor.

Gas mines and spray cylinders could have had a similar effect on the morale, thus rendering the enemy advance more difficult and thereby delaying it. It would have been possible to strike the enemy in air attacks with gas bombs and gas sprayers at the crucial moment of his landing and, finally, after the landing had been effected, artillery and projectors could have inflicted heavy losses. If the landing troops had been forced to wear gas masks and gas protective suits, this alone would seriously have hampered the enemy's advance. In particular it would have disrupted the difficult work that had to be done at landing, would have slowed down and hampered movements, and could have proved a terrible strain on the enemy's supply lines by rendering it necessary to move in enormous quantities of decontamination agents and vehicles as well as gas defense equipment of all types, and to remove gas casualties, empty containers, etc. The effects on the enemy would definitely have been all the more devastating as he would probably have been restricted to a comparatively narrow area for a number of days and would have had no space for retirement.

[REDACTED]

So far as the author is informed, quite considerable stocks of chemical agents had been accumulated by the time this stage of war was reached. These included gas munitions for use by ground and air forces as well as for chemical projector forces. There was also time to make the necessary arrangements. In short; from all angles the idea seemed to hold out good prospects of success, and no technical difficulties were expected. Nevertheless, the idea had to be abandoned. Enemy superiority in the air had become so overwhelming in the meantime that -- quite apart from the moral and political aspects -- the initiation of gas warfare by us might have had incalculable consequences for our homeland if the enemy had decided to bomb our factories and communication facilities with gas, thus compelling us to carry out extensive decontamination work, not to mention the detrimental effect gas would have had on the morale of the population of big cities already severely stricken.

It also had to be taken into account that supply transportation for the Atlantic front, which already was not functioning too well on account of enemy air superiority, would not have been able to cope with the additional load of material for chemical warfare. The author is further of the opinion that the armament industry in Germany was already so overstrained that it could not have met the added demands of chemical warfare. It is known to the author that the Reichs Minister for Armaments in 1944 had awarded huge contracts for the manufacture of gas masks for the population, fearing that gas attacks might be launched against Germany proper. It had therefore been possible to furnish gas masks to industrial centers and major cities that appeared particularly endangered, and this had stabilized the morale there. But even this output of gas masks, small when compared with the requirements of a gas war, had only been possible under great strain and at the expense of a reduction of other armament production. At this stage of the war it was even more necessary than ever before that Germany avoid anything that might impose an additional burden on her economic life and so she was not able to accept the additional burden gas warfare would have meant.

During the latter half of 1944 the situation deteriorated rapidly as a result of the serious reverses suffered on the east and the west fronts. It was only with an utmost effort that the Ardennes Offensive was carried through by the exhausted army and the worn-out homeland on the scale it actually assumed.

## 8. Summary

The greatest war in history had drawn to its close without gases having been used -- probably a most astonishing fact to all military authorities throughout the world. Never before in the history of mankind had weapons of proven efficacy (and all concerned agree that gases had proved decidedly effective during World War I), remained unused in later wars of equal or even greater proportion.

An effort has been made to briefly sketch the reasons why Germany refrained from such use. The reasons for our enemies refraining from the use of gases can only be assumed. The Czechs did not fight at all and the Poles knew that their industrial capacity was too small. Even if they had used gas against the concentric German attack they could not have effected any decisive change in their strategically unfavorable position. The French probably assumed -- and quite rightly so -- that they were safe from gas attacks behind their Maginot Line. But they could well have used gas with good chances of success against our forces sweeping through Holland and Belgium. It is unknown to the author whether political considerations or inadequate preparations prevented them doing so. The probable reasons for Russia refraining from the use of gas have already been mentioned. These reasons were probably to be sought in the time realization that in view of the length of their front and the wide extent of the areas involved, their enemies would always have found opportunities to bypass and detour gased areas, and possibly also in a feeling that in its entirety the Russian nation was inferior both technically and in training.

With respect to the British, it can probably be presumed that their concern for their own country, that was so vulnerable to German air attacks, was what decided them against initiating gas warfare. At least this was probably the case during the first years of the war when Germany held superiority in the air. Later, however, they and the Americans planned much as we had planned in the first years of the war against the Poles, the French and the Russians, namely, once the landing was effected immediately to overrun us in what could be termed a Blitz war; and in operations of this nature gas would probably have helped us more than them.

So far as the Americans are concerned, the previously mentioned unfavorable weather and climatic conditions in Africa mitigated against the use of gas in that theater of war, whilst the same reasons given for the British apply for the Americans in their Italy campaign and the invasion on the Channel coast. An additional factor was the atom bomb, in which, though it had not yet been tested, America believed to hold an even more effective weapon in reserve, with the added advantage that no other power would be able to produce it for some considerable time, so that no enemy of America would be able to retaliate.

The author cannot adduce any reasons for America not having used gas in the Far East. America was not bound by the Geneva Convention and the Japanese were so intensely hated by the American public that the government would have found no opposition in public sentiment. One of the causes for the non-use of gas was probably to be sought in the climatic conditions and another in the great distances to be covered, which forced even America with her giant fleet to decide against the use of gas. And in the Far East the atom bomb, at a later stage, actually did bring the war to a dramatically sudden close.

It can probably be assumed as definite that the atom bomb will decisively influence the next war, but it can hardly be expected to render all other weapons obsolete. In any event there is no reason to suppose at the present juncture that it will take the place of chemical warfare agents, nor that it could replace the other arms, such as the artillery.

Hence, it is not possible, on the basis of experience during World War II, to decide whether or not a coming war will also pass without gas being used. The mere fact that gases exist makes it incumbent upon every nation to take precautionary measures and therefore every nation must experiment with the most modern methods of employing gas. As a logical consequence, every big nation comes into possession of offensive chemical weapons and thus is also in the position of being able to use such weapons.

The question whether any given nation will make use of these weapons will have to be decided from case to case in the light of existing conditions. The non-use of gases during the past war deprives soldiers throughout the world of the opportunity of putting to the test their ideas as to how gas warfare should be conducted to attain success. Therefore a history of the war will not be able to close this gap. For instance, the thorough investigations and careful deliberation devoted by Germany to the problems that would have arisen if gas had been used, have therefore remained untested theories, in common with similar investigations carried out by other belligerent states.





## CHAPTER V

### GERMAN INTELLIGENCE ON USA AND ALLIED CAPABILITIES

All information of value to our command and our forces concerning enemy preparations of gas warfare were transmitted currently to the German agencies, headquarters and units by Gen d Nebeltruppen (Commanding General of Chemical Forces) in regularly printed papers under the title "Mitteilungen ueber feindliche Gaskriegsvorbereitungen, i.e. Information about Enemy Preparations for Gas Warfare." These papers were also sent to all gas defense officers so that they must be in the files of the gas officers attached to all higher level headquarters.

Additional data on this subject can be found in the records of the following agencies:

General Staff (Division for Foreign Armies, East and West);  
Army General Staff (In 9, i.e. Inspectorate for Gas Warfare);  
Army Ordnance Office (Pruefw 9, i.e. Chemical Warfare Research);  
General Commanding Chemical Forces;  
OKW;  
Reichs Minister for Air and OKL;  
OKM.

The author has to rely solely upon his memory, and it is only natural that he has forgotten many details owing to the lapse of time and the deep impressions made by events that have happened since. The following is stated from memory.


#### 1. Czechoslovakia And Poland


Nothing of importance was discovered in Czechoslovakia. In Poland, the gas used by the Polish army in training contained a certain percentage of actual mustard gas. (See Chapter IV).

#### 2. France

Nothing new was learned from French gas defense equipment. The quality of French gas munitions was not much higher than that of World War I. We could learn nothing new from them. However, the big French gas candles were something new to us. They could be ignited by a simple ignition system and then for a few minutes produced a gas that very seriously irritated the eyes and the respiratory organs. So far as the author can remember, the gas used consisted of an adamsite compound. The presence of this volatile substance could be detected in the immediate vicinity of the smoldering gas candle and also at a distance not exceeding a few hundred meters, by the yellow tint of the gas, but at a greater distance it was scarcely visible.

There is no doubt that the characteristic yellow color of the gas, which made it easily discernible, very often made it possible to sound a timely gas warning. But even when the gas came as a surprise the irritation was so severe that gas masks were immediately donned, so that casualties would have been few if it were used against well trained troops equipped with gas masks. Hence, in our opinion, the significance of this gas was to be sought in:





(1). the possibility of using it together with other gases, above all with skin affecting gases, and to conceal other gases such as mustard gas; and

(2). the possibility of exhausting and weakening the enemy by a simple means requiring little manpower, and by depleting his supply of gas filters, namely by releasing the gas at frequent intervals and, if necessary, over a period of several hours.

The gas candles were admirably adapted to this purpose, as it was possible by a simple and practical method to connect any required number in such manner that they would ignite in succession, resulting in a gas period that could be determined exactly in advance without any but the initial servicing. It was possible, with proper preparation, to fire any desired number of these gas generators simultaneously, so that the density of the gas coverage and the extent of the gas cloud could also be controlled. Of course, weather conditions had to be allowed for, as is the case with all sprayed gases. The weak point in this method is the fact that the gas generators were stationary and all stationary generators are entirely dependent for success upon direction and force of the wind and thus upon weather conditions, which so far no man can control. (See Chapter I).

It is also known to us that, together with the British, the French had carried out extensive experiments with gas in North Africa, using airplanes. In these tests the effect of the gases on various animals was studied. Obviously the gases used affected not only the eyes and the respiratory organs, but also, and particularly, the skin.

### 3. Italy

Italy's great success in Abyssinia was largely due to the use of gas by Italy's air force. Airplanes sprayed a highly effective compound of mustard gas and arsine on the totally unprotected and in part even naked and barefooted natives. The inexperience of these uncivilized people rendered them practically helpless against this modern weapon. They discovered that if the gas be wiped away with the hand, the effects became even worse. In addition, the climatic conditions were favorable to this method of warfare. The casualties were therefore high and the effect on the morale intense.

All other Italian gas equipment, such as gas hand grenades, smoke munitions (including smoke candles) and small mustard gas spray cylinders was suitable from the technical point of view, but was available in altogether insufficient quantities. The training of the troops was particularly inadequate. The Italian "Pirelli" gas mask was very good and the rubber used in its manufacture excellent; this was also true of the rubber used in their heavy gas suits and gas gloves as well as their boots. The filters and filter containers also in every way met modern requirements. Very thorough and able work was done in the Centro Chimico Militare. Large scale smoke screen tests carried out in Northern Italy with big tanker trucks shortly before the outbreak of war proved successful. Special chemical battalions and companies had been constituted for this purpose.

The Italian chemical force was yet in its infancy when war broke out. Various organizational set-ups and various weapons had been tested out, but no final decisions had been reached, probably because no definite opinion had yet been formed as to the weapons with which it would be best to equip the units. Calcium hypochlorite, to be mixed with earth on the spot, was intended for ground decontamination, and a very simple cart had been developed for this purpose. On the basis of experience gained in the Abyssinia campaign, those responsible for the development of the chemical forces in Italy held high expectations for chemical warfare in the future. However, the Italian chemical forces did not come into evidence during the past war.

#### 4. Britain

No details on Britain's preparations for gas warfare ever became known to the author. As already mentioned, this applies also to the tests carried out together with the French in Northern Africa. A new factor for us was the constantly recurring report of successful tests in spraying gas from airplanes at comparatively high altitudes. We attached great importance to these reports. From information received, as well as from reports on British military exercises and maneuvers, it was also known to us that the British expected great success from the use of screening smoke in battle and consequently were using it widely and successfully in maneuvers. Our experience shows that secrecy was well maintained by Britain in respect to chemical warfare.

We had already captured British gas defense equipment in Norway, including gas masks with filter containers, gas suits, skin and eye protective ointment and goggles. As a result of the fact that we were constantly in contact with the British in fighting, we currently received such equipment throughout the entire war. What we could discover from such equipment, coupled with reports received on changes made in the capacities of British filter containers during the war, made it possible for us to estimate what gases the British expected to encounter and in what concentrations and by what methods they thought such gases could be used; however, we were not able to form any definite estimate of what measures the British themselves intended.

#### 5. United States Of America

The author at no time received any useful information on American preparations for gas warfare; this applies particularly to what types of gas the American forces intended using. It was known to us from the press, from literature and from speeches and statements in congress, as well as from American instructions and regular bulletins relating to the training courses held in Edgewood, and from papers published there for reserve officers, that the United States attached great importance to gas warfare and was making careful preparations for it. It seemed that several types of mustard gas -- including in particular a nitrogen-mustard gas compound -- spraying from airplanes, and generation by means of gas candles, played a big role in these preparations.

What interested us most in American and British literature on the subject was the frequent recurrence of reports on the successful spraying of gases from airplanes flying at high altitudes. For a long time our tests in this direction remained unsuccessful as we were not able to calculate the effects of the wind accurately enough and because the gases we employed generally reached ground level in too thin concentrations, in fact in concentrations hardly equivalent with a moist fog. It was only in 1942 that we discovered the flaw, learning from the Russians that it was not due to the density of concentration, as we had thought, but to the faulty construction of our spraying apparatus.

It was also known to us that the American chemical projector (with excellent munition and high rate of fire), was expected to play a significant role in gas warfare, though we considered the firing range of the models known to us very low for gas projectors.

In the light of our experience during World War I it was a foregone conclusion with us that the American artillery would have an ample supply in all types of gas munitions, that besides screening smoke the American chemical forces would also use other chemical agents which would be released by spraying from special vehicles\*, from stationary spray cylinders\* and by gas candle generation, and it is equally self-understood that we took into consideration the probability that if the situation so

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\*Gas spruehen - gas spraying.

developed that gas was used, then the steadily growing American air force would play the chief role in gas warfare. However, no details became known. American gas defense equipment had fallen into our hands in Africa, Italy and finally in France and Germany. (See Chapter VI).

We had no doubts whatever that even if the war should last very long, the US would have immense stockpiles of material for gas warfare, just as they had for other methods of warfare, and those stockpiles would be available once the supply system across the Atlantic had been established. All German experts concurred in the opinion that the US held a strong trump card in their chemical arm and that, as their air supremacy grew progressively with the duration of the war, they alone would decide whether this card should be played out or not.

## 6. Russia

From our former collaboration with the Russians and from their literature we knew that the Russians had made an intense study of gas warfare possibilities. (See Chapter IV). However, prior to the outbreak of war in 1939 we had few details, and there was little change in the situation even after the close contact that resulted after the division of Poland. As Slavs, the Russians are very distrustful, and had therefore ordered that strict secrecy be maintained on all military matters; owing to the authoritarian system of government these orders had been ruthlessly enforced.

Subsequent to our invasion of Russia in 1941 the following chemical weapons became known to us. They had a firebomb consisting of a thin metal shell containing about one liter of fluid. Following fracture of the shell, the fluid combined with oxygen present in the air and combustion took place within a few minutes, setting up a conflagration lasting several minutes. Soon after our invasion, shells of this type were dropped from Russian planes on German airfields, setting fire to a number of German planes. The oily greenish-yellow fluid contained phosphorus and therefore reignited automatically if extinguished. The only remedy was to cover it totally with sand, etc.

From 1942 on the Russians also dropped phosphorus incendiary bombs. As had been the case in the use of the fire-balls described above, the main objectives attacked with these phosphorus incendiary bombs were German ammunition and equipment dumps, provision dumps, airfields, shelters and railway installations.

The so-called Stalin Orgel i.e. Stalin Organ, was a motor truck capable of cross country travel and equipped with rocket launchers. It had a firing range of roughly 5000 meters and a high rate of fire, launching 50 to 80 mm gun-powder propelled rockets with explosive shells, usually in salvos. It was very cleverly handled, the system being much as follows: a great number of firing-positions were prepared beforehand, making it possible for the trucks to enter them suddenly, and unexpectedly deliver surprise fire concentrations; the positions were then immediately abandoned, so that it was extremely difficult for us to take these batteries-on-wheels under fire. The firing accuracy of this weapon was extremely erratic and the damage to objectives protected by trenches or buildings very small. As our troops soon learnt to take cover when they heard the projectiles approaching, they soon lost all fear of the Stalin Organs, which, however, could do quite considerable damage in the absence of cover. The projectiles were equipped with supersensitive detonators. I am only mentioning the Stalin Organs here, because we suspect that in the event of gas war beginning, the projectiles were to be charged with irritants.

After the summer of 1942 we captured Russian rocket propelled mines; they were intended for firing from metal launchers and were apparently copied from our own heavy projectors. They were charged with explosives, but could have been used with a chemical charge in gas warfare.

All Russian powder propelled rockets that came to our notice had one central jet and stabilizing fins, in contrast to ours that had no fins and were stabilized by the twist they received when fired. The fins on the Russian rockets were very sensitive and in consequence the dispersion area was increased out of all proportion, particularly during windy weather.

The Russian chemical projector was an excellent weapon, having a caliber of 120 mm and a firing range of 6000 meters and weighing, so far as the author can remember, roughly 200 kilos less than our 1940 Model 105 mm smoke projector. Even though the Russian weapon was built along lines approximating the Stokes mortar, it was nevertheless simple to unhinge it and then move it as a trailer. It would also have proved a very useful weapon in gas warfare.

The Russians had also developed spray tanker trucks as well as spray cylinders for airplanes. The intention was to use these in laying mustard gas barriers to delay the enemy in favorable terrain sectors, in order to seal the enemy off in the flanks or in the rear.

Our study of pertinent Russian instructions revealed that they referred mainly to the use of chemical agents in support of operations subsequent to successful penetration of the enemy lines, as an aid to exploit successes during pursuit, and to ensure the annihilation of the enemy in such circumstances. Almost no mention was made of the use of chemical agents during actual attack, i.e. to decide battle, or for the purpose of economizing manpower on fronts intentionally brought to a standstill.

The author is of the opinion that very few spraying cylinders for use in tanks were captured whereas quite a number intended for use in airplanes were found on Russian airfields north of the Caucasus.

No Russian chemical warfare agents were found, also no gas candles, no gas munitions and no gas air bombs.

The Russian gas defense equipment, (such as gas masks with tubing, and filter container, heavy gas suits with rubber boots and rubber gloves) was good. On the other hand, after the heavy Russian losses in 1941 the supplies available and the quantities produced were not sufficient to fully equip the Russian army. Hence, for this reason alone the use of gas against the Soviets would have held out good chances of success, at least until US aid began to make itself felt.

A further factor was that training in gas defense had suffered severely as a result of the losses in trained personnel, in capable trainers and in equipment for training. It would only have been possible to restore this deficit very slowly.

We watched the situation very closely and during the further course of the war were able to make very valuable observations with regard to the reequipment of the Russian forces with gas masks and the apparent principles the Russians followed, which principles differed considerably from ours.

The Russians frequently made use of screening smoke in close combat, during patrols (gas handgrenades). Otherwise they made little use of smoke and when they did, it was particularly to protect bridges or river fords.

## CHAPTER VI

### GERMAN EVALUATION OF U.S. NON-GAS CHEMICAL WARFARE OPERATIONS

#### 1. Smoke Screening Operations

Unfortunately I have no personal experience of US screening operations in Italy. However, I am acquainted with them from official reports and therefore know that technically they were well prepared and conducted and that in effect the desired end was gained -- for instance at Nettuno. They interfered in high degree with our defensive fire, as they obstructed German ground and air observation, and also prevented action by our weapons with direct line of fire, such as machine guns, antitank guns, etc., or at least reduced such action to ineffective zone fire.

We also ascertained that US smoke screening of supply routes in Italy, as protection against observation by our long range artillery and against German air attacks, was successful. Such screening operations induced our own forces in ever increasing measure also to request supplies of screening agencies as protection for our supply routes, which suffered terribly from the enemy air superiority; these routes in Italy offered no cover or possibilities of detouring dangerous spots, and heavy losses were caused by enemy air attacks.

As early as 1943 our production in smoke munitions and the supply transport of same could no longer meet all demands of our forces, so that to our utmost regret we often had to put them off with promises. Besides all fronts in all theaters of war, we also needed great quantities of smoke munitions constantly in the ZI.

#### 2. German Concept of Smoke and German Smoke Munitions

By German conceptions, screening smoke does not fall within the scope of gas warfare. For this reason it has not yet been dealt with. Commonly, gas warfare is called chemical warfare abroad, implying that chemical agents are employed with the intention (by means of their toxic chemical effects) of inflicting losses on the enemy, and in terms of international law both the League of Nations and the Geneva Convention regulating gas warfare prohibit their use. The use of screening smoke, however, is permissible because, though a chemical warfare agent, it is not employed with the intent to poison as laid down by the Geneva Convention, the purpose of the smoke screen being a more immediate one, i.e. to prevent the enemy from making full use of his weapons, by obstructing his vision.

German command expected great things of screening smoke and made preparations accordingly. However, it was not possible before the outbreak of war to make the troops and their officers in all arms conversant with this new weapon; this was particularly so with the infantry. Whereas those arms that had a greater measure of understanding for technical matters (artillery, engineers, armored forces, airforce and navy) were quick to realize the advantages and disadvantages of the new weapons, the infantry were very cautious in their approach. The rapid growth of the army voided the intentions of the command to overcome the infantry's suspicion of the new weapon; it was the infantry in the first place who were to gain by the clever use of smoke screening.

At the outbreak of war we had far too few smoke generating units to provide our troops with sufficient opportunities to practice combat in, with, and against screening smoke.

The German idea was that the object of screening smoke was above all to blind enemy ground observation, if possible also to eliminate air observation, to prevent

directed firing, and thus to rob enemy artillery fire of its actual force. This could be of great importance in numerous situations. Enemy artillery observers and weapons delivering direct fire, as well as flanking installations, could be denied observation. By blanketing with a smoke screen the enemy positions and the terrain immediately before the positions, armored attacks can be carried forward, perhaps without being subjected to directed fire at all, and take the enemy by surprise. Particularly dangerous antitank pockets can also be eliminated by smoke screening.

In river-crossings, the attacking forces can blind the defenders during the crossing and during the landing on the opposite river bank. During retirement, the last combat groups, the rearguard units, can be disengaged from enemy. Protected by smoke screens, tanks are able to disengage from the enemy and thus escape from critical situations. For this purpose all armored reconnaissance cars and tanks were provided with rapid smoke candles (Nebelkerze S i.e. Smoke Candle S). Diversion smoke screens were intended to divert enemy's attention and fire, by misleading him with respect to time and location.

Large scale smoke screening was to cover troop and supply movements against observation and attack from the air, and to protect factories and important installations (U-boat bases, railway shunting yards, ammunition and equipment dumps, headquarters) against air attacks.

Fundamentally, the smoke screen on the battle field is the ally of that party that intends taking the initiative. Generally this will be the attacker. The attacker, in determining the locality and time of attack, can increase the potency of the surprise factor by smoke screening at the decisive moment, to disrupt the well arranged coordination of observation and fire by the enemy. Thus he can very seriously interfere with the enemy's direction of fire.

The defender on the other hand has few opportunities of using smoke screens without endangering his own troops. One of these few opportunities is during retirement. Under especially favorable circumstances enemy armor concentrations can be upset by smoke shell fire or by a smoke screen laid in an airattack; this is particularly the case when the concentration is taking place in unfavorable terrain or within a restricted area.

Behind the front and in the ZI the smoke screen is the friend of the defender in his battle against airattacks.

The great disadvantage of screening smoke is that its use depends very largely upon weather and wind, as well as terrain conditions.

The efficiency of the smoke screen, its density and its motion will all be decisively affected by following factors: the method of generation (smoke shells, spraying, by airplane); humidity; temperature (particularly the difference between the local ground temperature and the temperature of the air); direction and speed of the wind; terrain contours (mountains, valleys); nature of the ground and vegetation (forest, meadow, fields, sand, swamp, open water).

If the user makes mistakes, or if he be unfortunate, the smoke may rise and leave a clear visibility at ground level, or be blown in a wrong direction; at the worst it may be blown to his own lines where it would be very disturbing. The author remembers a case where a smoke screen that had been successfully laid at daybreak by the attacker was unexpectedly blown back again at about 0900, thereby greatly influencing the further course of the attack. It is absolutely essential that the weather service be carefully consulted each time before screening smoke is used. In the use of smoke screens to protect permanent installations against airattack, the great disadvantage is the time it takes to render the screen really effective. Even if very careful preparations have been made beforehand, 15 to 20 minutes are required, and with the ever-increasing speed of modern airplanes so much time is hardly

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available. Furthermore, when far distant enemy planes are first reported approaching, their objective for the time being will remain unknown. It would therefore be necessary to smoke-screen all prepared installations within a very wide area in order not to be too late. This would consume enormous quantities of screening smoke and dissipate an enormous amount of men-power; and the result would nevertheless remain doubtful. The white color of screening smoke is a disadvantage as it attracts fliers; we had attempted to lessen this disadvantage by tinting the smoke. However, the colors tried (green, reddish-brown, etc) proved just as unsuitable as smoke rendered black or dark gray by the use of soot. The admixed colors or soot, which were produced by smouldering suitable substances, proved too nonpersistent; after a short while they separated, so that the smoke soon lost its color; and as it became lighter in color it again became increasingly white. The best smoke screening substance, white phosphorus, was not available to us. The substances available to us were far less productive so that we had to use far greater quantities in order to obtain equal results in smoke screening. This proved a severe disadvantage.

In like manner and for the same reasons we were not able during the war to solve the problem of neutralizing smoke screens or natural fog. This factor might be of great importance in any future war in the event of the enemy attempting, by means of smoke screening, to cover extensive areas against observation for any length of time. This might be the case if he is moving supplies and reinforcements through narrow mountain valleys or over passes or bridges.

In summarizing it can be said that in a future war screening smoke will play an important role on the battlefield, especially in view of the use of mechanized units and more particularly so the use of armor; great possibilities are foreseen for these arms, especially when operating in coordination with air forces, which can lay the desired smoke screens swiftly and unexpectedly.

We Germans are in the position to cite a number of instances where screening smoke was successfully used during the past war.

However, in the rear areas and in the ZI smoke screening will lose greatly in importance because of the increasing speed with which airplanes can approach their objectives, and because of modern electric equipment which will enable the flier to see through the smoke.

The following smoke munitions had reached the production stage and were currently produced:

Smoke candles for all arms

Smoke Candles Mark S (for rapid generation) for armored cars and tanks

Smoke hand grenades

Smoke projectiles chiefly for antitank action

Tall\* smoke candles for projector and engineer units

Smoke agent spraying cylinders, large and small

Smoke bombs of widely varying types and calibers for the Luftwaffe

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\*The German designation "lang" i.e. tall, indicates that it is purely a screening smoke candle.



Smoke munition for the following heavy infantry guns:

105 mm light field howitzer  
150 mm heavy field howitzer  
100 mm chemical projector (Model 40)  
100 mm " " (Model 35)  
150 mm " " (rocket) (Model 41)  
(starting in 1940)  
210 mm chemical projector ( " ) (Model 42).

### 3. White Phosphorus Ammunition

The American white phosphorus ammunition was outstandingly good; an equal quantity of white phosphorus will produce five times as much smoke as sulphur trioxide, or the smoke producing acid used by us, or the so-called Berger compound. No white phosphorus was available to us for smoke munitions as we lacked the necessary raw materials for its production in Germany, and this fact alone made us inferior to our enemies so far as smoke screening was concerned.

A further characteristic of white phosphorus which is important in its use against personnel is the fact that, apart from the effects on the morale, it also inflicts very painful injuries, which often are difficult to heal. It is well-nigh impossible to find protection against the fire it produces. Owing to the lack of requisite raw materials we would never have been able to provide all our forces and medical installations adequately with protective equipment and remedies against phosphorus wounds, and would have been far less able to retaliate in kind against its use. The Russians also had large quantities of white phosphorus, and this fact caused us great anxiety. Fortunately, our reflections on this weapon and its significance in modern warfare, and the logical conclusions that had to be drawn, were, apparently, not shared by our enemies.


In the Germany army flamethrowers were a weapon of the engineer units, so that the author is unable to evaluate them. The author is also unable to comment on fire bombs and incendiary bombs, as they were in part used by the Luftwaffe. We knew no occasion where the US forces used a weapon similar to the heavy German projector, which fired a shell containing fifty liters of flamethrower oil.

### 4. 4.2-Inch Chemical Mortars

From the technical point of view the American 4.2-inch chemical projector is very good; the construction is simple, it is a very handy weapon in battle and its firing efficiency is high. The various types of ammunition used with it are excellent. The models that came to our notice had one drawback, however: their firing range was too low for modern purposes.

### 5. Gas Masks

The equipment of the US forces, for gas warfare of any kind, at least as far as the equipment that became known to us was concerned, was absolutely up to date and very good. In our opinion, however, some of the items, such as the American gas mask with air pipe and filter container, were too heavy for our army, which was not fully motorized. The American gas mask, with air tube and filter container was highly effective in protection against gas and in that respect would meet even the highest demands. In our opinion, however, it has following disadvantages: (1) Owing to the big filter container and the airtube rendered necessary thereby, as well as the carrier required to hold them, the whole outfit was extremely heavy and hampered and impeded the individual soldier in battle, at least from the moment he had to leave his



vehicle; (2) the airtube not only hampered its wearer, but was also vulnerable in its entire length to damage by projectiles and fragments, and any leak in the tube would have rendered the entire gas mask useless, as it was not even possible in an emergency to attach the heavy filter container to the gas mask directly; and (3) the airtube and the big filter container impose an added strain on replacement supply services. For all these reasons we made a special point of avoiding the big filter container and the airtube in constructing the German gas mask; both of these features had been retained right up to the thirties. There were additional, carefully considered reasons that added impetus to our efforts in this direction, and those reasons are just as valid today as they were then.

## 6. Protective Clothing

The American gas suits were very good and the same applies to the boots and the gloves. One flaw was that the great weight of the equipment and the fact that all air was entirely excluded from the body, led to early fatigue and also restricted the wearer's movements. We attempted to avoid these disadvantages in our lightweight gas suits, which were developed in accordance with definite specifications. Unfortunately our shortages in raw materials did not allow full realization of our aims.

## 7. Decontamination Agents

Decontamination agents: It is unknown to the author whether the US army, besides chloride of lime, had any other decontamination agent resembling our losantin. We were aware of the fact that our losantin was ineffective against nitrogen mustard and were therefore endeavoring to develop an improved decontamination agent. Though we were successful in our efforts, the new agent never reached the production stage owing to war conditions.

## 8. Protective Ointment

The author can not give any opinion on the efficacy and healing powers of the American protective skin ointment, which, apparently, easily dried out.

## CHAPTER VII

### ADAPTABILITY OF "V" WEAPONS FOR GAS WARFARE

The "v" weapons developed in Germany, V-1 and V-2, were not intended for gas warfare for the following reasons: the field of dispersion was too wide; and the carrying capacity of the individual projectile was too small, so that with the very low rate of fire it would not have been possible to gas any considerable area. Hence only locally restricted and relatively small danger zones with gas coverage could have been created.


Worthwhile objectives for "V" weapons fire were: industrial and harbor installations; traffic junctions; supply depots of all types; and all similar installations. It was to be assumed that in all belligerent states, and most certainly in Britain, all such installations had been adequately equipped with modern air protection for the troops, for labor and/or the civilian population. Hence there was no room for hope that if the "v" weapons had been given a gas charge, the effect would have been any greater than that of an explosive charge. Under existing circumstances gas casualties undoubtedly would have been less than those caused by explosive bombs. In addition, allowance had to be made for political considerations. A further factor was that a certain number of V-1 projectiles had to be expected to land en route i.e. possibly within our own lines, so that the uneasiness of our own population would have increased.

German "V" weapons contained a one-ton charge of highly effective explosives. Hence they could be expected to do quite considerable damage where they landed; possibly casualties, in dead and wounded, would also be high. Furthermore, the element of uncertainty as to when and where the next projectile might strike was bound to prove a severe mental strain for the population of the endangered areas. This applied particularly to the V-2; its ultimate speed was so high and its striking angle so steep that it was possible neither to give any prior warning of its arrival, nor to deflect it in any way from its course nor even yet to detonate it before it landed. Calculating on the basis of this element of uncertainty, it was therefore assumed that its effect on the morale of those subjected to its fire would be extremely great, so great that it could scarcely be enhanced by the use of gas.

For us these were the ruling factors at the time, but they will be greatly modified if rockets capable of carrying a greater pay load should ever be available. Thus, for instance, if it be presumed that it were possible to fire rockets, each individual one of which could carry several tons of highly lethal gas, then it would be possible with a few projectiles to produce gas clouds that would be driven about by the wind over many square miles of country in highly concentrated density. Such toxic clouds could surprise and mortally endanger people at points quite far distant from the point of impact, hence at points where no one would be forewarned. Phosgene gas, for instance could play a big role in such operations.

If the projectiles were filled with more permanent irritants such as tear gas, or if they were filled with ground contaminating agents such as mustard gas, then personnel at the point of detonation and in an area varying in extent according to the ruling wind conditions, around that point, would be compelled to wear gassuits for days following and to carry out extensive decontamination work. In any event they would be seriously hampered. This would be particularly the case in narrow quarters of cities, in well camouflaged forest shelters, and in similar installations.

If it were possible to fire great numbers of such super "v" weapons, then, in spite of the unavoidable wide field of dispersion, it would be possible to create a dense cloud of toxic gas over quite a considerable area, which would be extremely dangerous and would also very seriously affect the morale.



In all weapons of big caliber and long firing range, everything depends upon the purpose they are intended to serve, and this also applies to the use of super-sized rockets. Used against an already discouraged population, gas can achieve great successes. However, the author personally is rather of the opinion that the heavy explosive charges such projectiles can carry (vide the atom bomb), if properly used against wisely chosen big scale objectives will always have a great effect. Therefore, under normal circumstances, it would seem that explosive charges would be more likely to attain success than gas charges.

In addition to all the above considerations, there remains the fact that by international law the use of explosives is allowed without restriction, so that they can be employed quite independently of any initiation of gas warfare during war.

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## CHAPTER VIII

### RESEARCH AND DEVELOPMENT ON TOXIC AGENTS IN COLD CLIMATES

No details and no figures ever became known to me regarding this phase of research work. All such work was controlled by Army Ordnance Office -- Wa, i.e., Development and Testing of Ordnance Equipment Section 9, and later by Army Medical Inspectorate and finally by the appropriate Reichs ministries. However, the following problems were of acute interest to us.

#### 1. For Offensive Operations

Of volatile agents that could be vaporized, sprayed or generated by gas candles (smoldered), and that would remain suspended in the air for a long period even under conditions of extreme cold, the gas candle system (smoldering) proved the best method with reference to ground contamination agents that would remain fluid enough at temperatures around 40 degrees below freezing for spraying from airplanes, from tanks equipped with spray cylinders, etc. It is essential that such ground contamination agents should not solidify entirely even at still lower temperatures. In the event of their freezing and solidifying they would no longer stick to the clothing and boots of personnel; thus they would not be carried to the quarters and shelters, where it was intended that they should evaporate and take effect as poison to the respiratory organs, the eyes and the skin. For such purposes we had developed a winter type of mustard gas (Winter Lost) which was particularly thin.

#### 2. For Defensive Operations

In Russia, the author experienced strong winds -- one could almost describe them as storm winds -- at temperatures running down to minus 33 degrees Fahrenheit. In such wind the water in radiators of motor vehicles repeatedly became thickened, in spite of the addition of the Glysantin compound provided for by the regulations in such temperatures. It was only when vehicles stopped with idling motors in spots protected against the wind that the water in the radiators became properly fluid once more.

Naturally, such weather conditions are about the worst imaginable for the use of any kind of chemical agents. But even in less extreme cold -- for instances with temperatures around 4 degrees below zero and with only light winds blowing -- we encountered serious difficulties. The face part of several types of gas masks (both rubberized fabric and Buna rubber masks) became so hard in the extreme cold that they did not fit closely enough. Hence, they leaked and were practically valueless. The only possible remedy would be to use good, soft rubber with a far smaller percentage of Buna artificial rubber than some of our firms had to use during the war. In gas masks built on a leather frame, this leather frame became so soggy from the moisture condensed within the mask when it was worn during cold weather that once the mask was removed it immediately froze hard; it was therefore useless for later wear. To counter these disadvantages it was found advisable to remove the gas mask from its container prior to action. It was then carried suspended around the neck and buttoned up inside the blouse in order to keep it warm.

Owing to the great differences between the outside and inside temperatures and the resultant great quantities of water condensed within the gas mask, the useful life of antidim glasses was very much shortened. Frostbitten faces were a frequent occurrence when the gas mask ribbons were drawn a bit tight. Under normal circumstances it is necessary to draw them tight during battle and when hard work is being performed in order to ensure a proper fit, and under normal circumstances the wearer is not unduly hampered by that fact.

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The outer surface of the exhale valve became frozen. While the gas mask was worn, breathing pressure usually sufficed to keep it clear of ice and it was possible to exhale through it. Once the mask was removed, however, the valve immediately froze fast, so that breathing pressure was not great enough to clear it of ice. It became necessary for the wearer of the mask to force the exhaled air out of the mask where it fitted the face. This led to uneasiness, as most men gained the impression that the mask was leaky. Experience showed, however, that this did not impair the efficacy of the mask, if it was a good fit and had been properly put on. Nevertheless, breathing under such circumstances was a severe strain owing to the resistance that had to be overcome. Furthermore, those parts where the exhaled air escaped easily became frost and ice coated. Small icicles formed on the lower part of the mask, starting at the exhale valve and growing in size the longer the mask was worn. Attempts to remedy this defect and to keep the exhale valve open by applying glycerine were only partially successful, and were only effective for a short while. It was proposed that the diameter of the exhale valve be altered, but it is unknown to the author whether this could have been done without reducing the efficacy of the gas mask during warm weather.

The defects described above were equally prevalent with rubber and with mica valves, and they were all caused solely by the great difference between the temperatures inside and outside the mask. From the unpleasant experiences described above, we learned that it was necessary strictly to train our men to make quite sure to thoroughly dry their gas masks after use. Under no circumstances were the masks to be placed in their receptacles while wet. Under combat conditions it was not always possible to adhere to this rule. On the battle field it was often not possible to supervise the individual man properly.

Very frequently this method was also adopted by patrols or shock troops in order to eliminate the danger of rattle, when the possibility existed that either we ourselves or the Russians might use gas candles or burning fluids.

### 3. Conclusions

Our experience goes to show that a long period of extreme cold renders gas attack operations of any kind extremely difficult; on the other hand the defense difficulties, both of a technical nature and in practice, are so great that it is hardly likely that either side will resort to the use of gas during unfavorable weather. In this respect a further point must be particularly stressed: throughout the year, both in summer and in winter, we experienced in Russia repeated spells of firm weather with steady winds lasting for days at a time.

Such weather would have been excellently suited to the use of gas candles, which can be employed quite well in winter. Gas spraying air-attacks would also have been possible during such spells, even right close to the friendly front lines. However, it was distinctly to our disadvantage that such firm spells were particularly frequent when easterly winds were prevalent. Thus they would favor the Russians in Europe in the event of a gas war, rather than any western European forces that might be fighting. As shown above, this would result in very severe disadvantages and added burdens for any troops compelled to wear gas masks during extreme cold.

## CHAPTER IX

### PROTECTION OF CIVILIAN POPULATION AGAINST GAS ATTACKS

Soon after inauguration of the Reichs Air Ministry (Reichs Luft Ministerium, abbr. RLM) all matters relating to civilian air defense were taken over by Hermann Goering; later in the war, the Reichs Ministry for Armaments in ever increasing measure took over control. After 1944 procurement of all means required for civilian air defense was attended to by SS Obergruppenfuehrer Brand, (formerly Hitler's personal physician) who was now appointed Hitler's special representative for this mission and given far-reaching powers.

There was a principal objective aimed at in civilian air defense. Adequate provision was to be ensured for the inhabitants of all big cities and those employed in all major vital factories -- particularly armament factories -- and for all hospitals with respect to bomb and gas proof shelters equipped with gas traps, airfilters, air-conditioning, and with installations for first medical aid. Hospitals and operating theaters were also to be provided with gas masks with filters, skin protectors, decontamination agents, gas detectors, etc. In addition, air defense squads were to be organized in all houses, and provisional air shelters were to be built; these measures were intended to reduce the danger to life and to ensure immediate action to extinguish fires at the outset. Besides fire brigades, auxiliary decontamination squads were also to be formed. During the first years of warfare, while the German air force was still equal to that of the enemy, these measures met all requirements.

Finally, radio, press and training courses combined to inform the entire population about the dangers of air warfare and the protective possibilities available. This latter mission was entrusted largely to the Reichsluftschutz-Bund (Society for Air Defense), an organization that received government support throughout Germany and in consequence spread rapidly. The most important feature of all these measures was that the broad masses were enlightened concerning the danger of air warfare, so that it was possible to counteract the chief danger (whether gas was used or not), namely, the danger of panic; and if a panic were nevertheless to spread, an adequate number of well-informed, practical and fearless helpers would be available to encounter it.

The giant demand for gasmasks for the civilian population in addition to the requirements for the Wehrmacht made it necessary to develop a simplified model for the people; this was particularly necessary in view of the shortage of raw materials. The chief features of this "Peoples' Model" gasmask were: very little material was required in its manufacture (rubber and high grade fabrics); and it was intended chiefly to enable its wearer to escape through gas to a gasproof shelter. In addition, it was intended to bolster the morale of the wearer so as to enable him to face gas dangers courageously. However, the advantage gained by the savings in raw materials was more than offset by the disadvantage of having two different gas mask models in circulation with the civilian population, namely the superior army gas mask for those engaged actively in air defense and the less good and lighter model "Peoples' gasmask" with its small filters. Admittedly, these latter were astoundingly good from the technical point of view and served their intended purpose admirably, i.e. they enabled the wearer to escape from gassed terrain. Nevertheless the masses distrusted them and did everything possible to obtain the better army model. Psychologically this was a very serious drawback and cost us much effort and work in counter-propaganda to convince our own people. In gas warfare the enemy propaganda could have made much of this point.

However, we were too impoverished to follow the only course that could be right, namely to supply an identical, good, model to both Wehrmacht and the civilian population.



During the latter years of the war, and particularly after the spring and summer of 1944, much was done to expedite the production of the "Peoples' gas mask" model, but nevertheless the impression gained by the author, and also all information received by him, went to show that the target aimed at had not been reached and that not everybody had been provided with at least a "Peoples" model mask. (See Chapter IV).

Details and figures relating to civilian air defense may be found in the files of the Reichs Minister for Air, the Reichs Minister for Armaments Hq of SS Obergruppenfuehrer Brand, former personal physician to Adolf Hitler.

signed: Hermann OCHSNER.





APPENDIX NO. 1

TOPICS TREATED AS PER  
REQUEST OF OC CML CORPS

- a. German concepts of the tactical and strategic advantages and disadvantages of toxic warfare.
- b. The administrative and operational control of chemical warfare functions in the German army.
- c. German capabilities of waging both offensive and defensive gas warfare.
- d. German plans and intentions relative to the inauguration of gas warfare, including an analysis of the reasons for not initiating this type warfare.
- e. German intelligence with reference to United States and Allied capabilities to wage gas warfare (period by period during World War II).
- f. German evaluation of United States screening operations, white phosphorus munitions, flame throwers, fire bombs, incendiary bombs, 4.2-inch chemical mortars and our various items of protective equipment.
- g. Evaluation of the adaptability of "V" weapons to toxic warfare.
- h. German research and development on the employment of toxic agents in cold climates, to include an evaluation of the results of this research and development.
- i. German plans, administrative organization and material for the protection of civilian population against gas attack, to include an evaluation of the effectiveness of those factors.

APPENDIX NO. 2  
GERMAN CHEMICAL WARFARE UNITS

Details on the organization of the Chemical forces (batteries, battalions, regiments and brigades), as well as their armament, the guiding principles for the use of such armaments and their training are to be found in the instructions embodied in Appendix 4.

<u>Constituted in</u>	<u>Unit Designation *</u>	<u>Remarks</u>
October 1934	Arty Abt Koenigsbrueck (Bn Staff, Signal Plat, 2 Bttrs)	100 mm Chemical Projector Mod 35
October 1935	Neb Abt I i.e. Chem Bn I (formed from Art Abt Koenigsbrueck)**	100 mm Chemical Projector Mod 35
October 1935	Neb Abt II	as above
October 1936	Neb Lehr und Versuchs Abt (Chem Train & Testing Bn) (Bn Staff, Sign Plat, two Bttrs)	as above and weapons and equipment for testing.
	3 Bttr of Neb Abt I	100 mm Chemical Projector Mod 35 as above
October 1937	3 Bttr of Neb Abt II	as above
	3 Bttr of Neb Lehr und Versuchs Abt	as above
October 1938	Neb Abt V (Bn Staff, Sign Plat, three bttrs)	as above
Aug - Nov 1939	Neb Abt III	100 mm Chemical Projectors Mod 35
	Neb Abt IV	as above
	Neb Ers Abt I, i.e. Chemical Repl Bn I	as above
	Neb Ers Abt II	as above
	Neb Ers Abt III	as above
	Neb Abt VI	as above
	Neb Abt VII	as above
	Neb Abt VIII	as above
	Neb Abt IX	as above

\*Abt - Abteilung i.e. Battalion.

\*\*After 1934 all name places as unit designations were abolished - Translator.



Aug - Nov 1939 (cont'd)	Entgiftungs Abt 101 (Decontamination Bn)	Light and heavy duty spraying vehicles
	Entgiftungs Abt 102	as above
	103	as above
	104	as above
	105	as above
February 1940	Chemical Warfare Training Depot	
March 1940	Chemical Repl Bn 6	
	Chemical Repl Bn 7	
July 1940	Chemical Projector Regiment 51 (Regimental Staff, Signal Platoon two Battalions)	150 mm Projectors Mod 41
	One Chemical Repl Regiment Staff	
September 1940	Neb Lehr Regt 1, consisting of two battalions (Chemical Demonstration Regiment)	
Autumn 1940 to Spring 1941	Chemical Regiment 52	150 mm Projector Mod 41
	Chemical Regiment 53	as above
	Chemical Regiment 54	as above
	Road Decontamination Bn 131	provisionally equipped with spray- ing vehicles
	Road Decontamination Bn 132	as above
Dec 1941 to May 1942	Heavy Chemical Regiment 1	each regiment three battalions, each bat- talion differently armed with 150 and 300 mm projectors later also 210 mm.
	Heavy Chemical Regiment 2	
	Heavy Chemical Regiment 3	
	Chemical Demonstration Regiment 2 with two battalions	150 mm Chemical Pro- jectors Mod 41
	Kdr d Neb Tr 1 i.e. Kommandeur der Nebeltruppe 1 --Senior Officer of Chemical Forces	
	Geb Neb Abt 10 - Mountain Chem Bn 10	
	Werfer Regiment 70	
	Werfer Regiment 71	
	Werfer Regiment 56	



May 1942

Kdr d Neb Tr 2

Kdr d Neb Tr 3

Kdr d Neb Tr 4

After Summer  
1943

Roughly fourteen batteries of self-propelled projectors, also designated Pz Werfer Btr.

Autumn 1943

Stellungs-Werfer Regt 1, i.e. Static Chemical Regt

Autumn 1943 to  
Spring 1944

Chemical Regimental 81, 82, 83, 84.

Aug to Nov 1944

Neb Ers Regt 3

New Chemical brigades formed from the remnants of battered regiments.

- a. Each chemical regiment consisted of two battalions of each three batteries each six 150 mm Projectors Mod 41  
one battalion of three batteries of each six 300 mm Projectors or three batteries of each six 210 mm Projectors  
one battery of six 150 mm Projectors (self-propelled).
- b. Each heavy chemical regiment consisted of two battalions of each three batteries of each six 300 or 210 mm Projectors  
one battalion of three batteries of each six 150 mm Projectors

Re: (a) and (b) above: Throughout the war composition varied according to the munitions produced in ZI.

In addition all regiments were able to handle heavy projectors.

Firing ranges were as follows:

100 mm Chemical Projector Model 35	3000 meters
100 mm Chemical Projector Model 40	6000 meters
150 mm Chemical (Rocket) Projector	6700 meters
210 mm Chemical (Rocket) Projector	7800 meters
300 mm Chemical (Rocket) Projector	3000 meters
After about 1943 the range of this latter was increased to	4500 meters

The types of munitions used were as follows:

100 mm Projector Model 35	explosive and smoke shells
100 mm Projector Model 40	as above
150 mm Projector	as above
210 mm Projector	as above (?)
300 mm Projector	explosive and flamethrower oil

After the Spring of 1944 the chemical regiments were consolidated to form chemical brigades. Each brigade comprised two chemical regiments or one chemical and one heavy chemical regiment.

This organization into brigades proved most valuable, making it possible to control the chemical forces more firmly during battle; furthermore, in the person of the respective brigade commanders experts were made available to higher headquarters as advisors on the employment of these specialized forces. In addition, thorough supervision of training was guaranteed as well as a regulated supply of munitions, guns, vehicles, and all manner of equipment for the chemical forces.

In summarizing it must be said that the chemical forces could have done much more during the past war if: (1) higher command agencies and other arms during peace time could have become better acquainted with and accustomed to the excellent and novel capacity of this arm. (Rocket propulsion with simple projector models, smoke as a new war agent, the possibility of fire concentrations in a measure hitherto considered impossible); and (2) if ammunition production in Germany could only nearly have kept pace with the great possibilities opened up by the rapid rate of fire these weapons developed.

Throughout the entire war munitions production sufficed to make available only one (1) so-called first issue per month to the existing chemical units. This entire supply could easily have been expended within an hour or two and consequently was sufficient to allow only a very few short but intense fire concentrations. Thus, because of scarcity of ammunition the excellent chemical forces often found themselves compelled to remain idle for days at a time and in some instances units even had to refrain from firing for weeks.

## APPENDIX NO. 3

### GERMAN GAS DEFENSE EQUIPMENT

1. Individual Equipment. Each man in all services of the armed forces was supplied with one gas mask with a screwed-in filter; two pairs antidim glasses; one gas mask container with belt; one gas sheet; two packs skin decontamination agents (Losantin Tablets) or one bottle skin decontamination ointment; and one bottle weapon decontamination agent. From about 1943 on Model 40 filters were supplied to troops on the west front. In the event of gas warfare breaking out, each individual man was to be issued a spare filter, which was to be carried in a canvas pouch attached to his belt.

2. Unit Equipment. Each unit of all arms, (hence all staffs, company headquarters, battery headquarters, light columns, etc.) was issued a complete chemical utility outfit based on repair and replacement requirements for thirty to fifty men. Bigger units received a corresponding number of outfits. These supplies were administered by the gas defense noncoms of the respective units and comprised, roughly:

- six masks
- about twenty filters
- two eye frames
- twelve packings for intake and exhale valves
- twelve packings for filters
- twelve exhale valves
- one exhale valve spanner
- fifty pairs antidim glasses
- one bag container weapon decontaminator
- 150 containers skin decontaminators
- one container disinfecting agent
- six detector cylinders
- one pack detector powder
- fifty gassed-area markers
- fifty meters tracing tape
- one gas detector with test tube
- mending for gas masks.

Each gas detecting squad received:

- one gas suit
- gas detector with test tube
- gas detector powder with gas detector pump
- tracing tape.

3. Apart from the equipment enumerated under (1) and (2) above, the individual arms were supplied as follows:

a. Panzer forces: Air tubes for the gas masks were furnished all members of all tank crews. These air tubes were stored in the tanks for use when required.

b. Engineers: Heavy gas suits were issued to decontamination squads and Army type respirators for mining and salvage units.

c. Fortress garrisons: These organizations received CO detector, heavy gas suits, gas detector powder, tracing tape and decontaminating agents.

d. Chemical units: Gas detector vehicles, heavy and light model spraying vehicles for ground decontamination, ample supplies of gas suits, decontamination agents, gas detector agents, etc., were issued to these type units.

Heavy and light model spraying vehicles for ground decontamination were held in reserve in the ZI.

APPENDIX NO. 4

INSTRUCTION MANUALS, ETC.

Instructions for the commitment and methods of employing chemical forces; secret. Issued about Spring 1943.

Leaflet on chemical forces; secret. About Spring 1943.

Leaflet on armored chemical projector batteries; secret. About Spring 1943.

Directive OKH/Operations Section and Gen commanding Chemical Forces; secret orders; About early 1944.

H Dv\* 210 Training Directive for chemical forces.

H Dv 210/2b The chemical projector battery (motorized)

H Dv 210/2d The heavy chemical projector battery (motorized)

H Dv 210/3 Firing manual for chemical forces

H Dv 210/5b The chemical projector battalion and regiment

H Dv 210/6 Firing manual for chemical forces using rocket propelled projectiles

H Dv 210/2 The smoke screening platoon \*\*

H Dv 211/1 Smoke screening agents and their use

H Dv 211/2 Smoke candle and smoke handgranade

H Dv 211/3 The smoke sprayer

H Dv 211/4 Filling instructions for smoke sprayers

H Dv 211/5 Smoke candle, model S (accelerated action - Note by Tr) with projector

H Dv 211/6 Smoke spray cylinder

H Dv 211/7 Smoke candle, long model

H Dv 119/? Ballistic table for 150 mm Chemical Projector Mod 41

" " " 210 mm " " " 42


" " " 300 mm " " " 42

Equipment instruction manual for all types of chemical projectors.

Leaflet on action with heavy projector.

\*H Dv - Heeres Druckvorschrift i.e. Army Field Manual

\*\*The German term "Nebel" has been given as smoke, it being quite obvious that screening smoke is actually meant in contrast to the common use of the designation "Nebel" for chemical forces, agents and weapons in general.



Gas firing by all arms, H Dv 99 (?)

Leaflet on countermeasures against ground contamination (secret).

Leaflet on provisional ground decontamination.

Leaflet on the use of screening smoke in plains (secret).

H Dv 395 Gas defense for all arms.