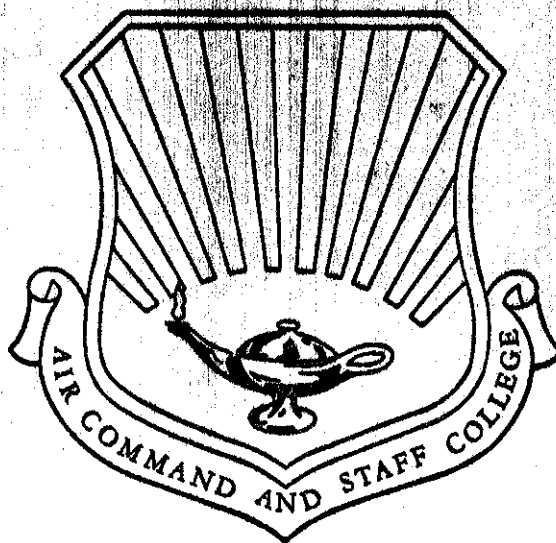


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**AIR COMMAND AND STAFF COLLEGE**

## **RESEARCH STUDY**



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**AIR COMMAND AND STAFF COLLEGE**

**THE LEGAL ASPECTS OF HERBICIDES IN WARFARE**

**BY**

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## ABSTRACT

The United States was accused of violating international law when herbicides were used in Vietnam. This study reviews the military use of herbicides in Vietnam and summarizes the controversial reaction voiced against the United States. It focuses on the current status of the United States in relation to the Geneva Protocol of 1925 and international law of custom. This study revealed the United States is subject to the prohibitions of the Geneva Protocol by international law of custom. It also ascertained that currently herbicides are not legally prohibited in warfare under the provisions of the Geneva Protocol.

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The purpose of this study is to determine the current level of status of the utilization of chemical herbicides to defoliate vegetation and destroy crops in a war zone. The principal objectives of the paper are to (1) determine if the use of herbicides in war, as employed in Vietnam, is prohibited under the restrictions of the Geneva Protocol of 1925 (Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare), and (2) determine whether the use of herbicides is subject to the same restrictions concerning herbicides as recognized in the Geneva Protocol.

This study is necessary to determine for the following reasons. The years of herbicide employment and the immediately following have been marked by repeated adverse criticism against the United States and counter-argumentative statements by the United States in defense of herbicide employment. The politically sensitive nature of herbicide operations was the cause of much of this censure.

## CHAPTER I

### INTRODUCTION

The purpose of this study is to determine the current legal status of the military use of chemical herbicides to defoliate vegetation and destroy crops in a war zone. The principal objectives of the paper are to (1) determine if the use of herbicides in war, as employed in Vietnam, is prohibited under the restrictions of the Geneva Protocol of 1925 (Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare) and (2) determine whether the United States is subject to the restrictions regarding herbicides as recognized in this Protocol.

This study is currently of interest for the following reason. The years of herbicide employment and those immediately following have been marked by repeated adverse criticism against the United States and counter-argumentative statements by the United States in defense of herbicide employment. The politically sensitive nature of herbicide operations was the cause of much of this censure.

General international opinion has been against the use of herbicides in war. Numerous nations have stated that these chemicals are actually prohibited under international law and specifically restricted by the prohibitions listed in the Geneva Protocol of 1925.<sup>1</sup> Although the United States was the primary proponent for the drafting of this Protocol, she did not ratify it after having signed it. In an effort to enhance the arms control talks and agreements, President Nixon resubmitted the Geneva Protocol to the U. S. Senate in August 1970 for ratification.<sup>2</sup>

The Protocol has remained in the hands of the members of the Senate Foreign Relations Committee since that time. A major reason causing the impasse of action is that the Executive Office and the State Department contend that the Protocol does not prohibit the use in war of chemical herbicides, while a large number of Senators do believe they are prohibited. Until this debate is settled it appears that there will be no action taken to ratify the Protocol.<sup>3</sup> Consequently, this research topic is both apropos and of deep interest at this time.

The study has been limited to determining the current international legal status of the military use of chemical herbicides in war. Debate concerning the moral issues

involved with the use of these compounds as defoliating or crop destruction agents was not addressed. Also, discussion was not included concerning the ecological impact that these agents may or may not have on the environment when used extensively in a war zone. Each of these two general areas are worthy of separate studies of their own.

This study was conducted in the following manner in order to insure comprehensive research on all aspects of the problem. First a review was made of the development of herbicides and the history of their use during the Vietnam conflict. This provided an insight of how herbicides have been used domestically and the extent to which they were used in the war. The next aspect of the study involved an examination of the actual national and international reaction and comment to the United States' herbicide program in Vietnam. This provided background as to the actual focal points and basis of comment concerning herbicide use by the United States.

The third step involved a review of the position of the United States in relation to any treaty which might involve a prohibition against the use of herbicides in warfare. This portion of the study generally focused on the U. S. position vis-a-vis the Geneva Protocol.

The final task of the study required a determination whether or not herbicides were legally prohibited under existing international law to which the United States was subject. This research involved sorting actual or legitimate arguments against the use of herbicides from the condemnation based on unfounded propaganda or hysterical and unknowledgeable reporting. The legitimate arguments were then compared with the appropriate facets of international law in order to determine the present applicability of these laws in regard to herbicide use in war.

A brief review of some of the terminology used in this research study will assist the reader in better understanding its contents. The Dictionary of United States Army Terms defines herbicides as chemical compounds which kill or damage plants. It describes defoliating agents as chemicals which cause plants to prematurely shed their leaves and it defines anticrop chemicals as those used to cause damage to food or industrial crops.<sup>4</sup> Since the chemical herbicides used in Vietnam were employed to either defoliate or kill crops by herbicidal action, these terms will be used interchangeably in this study.

## CHAPTER II

### DEVELOPMENT AND U. S. MILITARY USE OF HERBICIDES

In order to obtain a proper perspective of the magnitude of the herbicide problem currently being discussed, it is necessary to be familiar with herbicide development, its use in the civilian environment and the history of herbicide employment by the United States military forces.

Chemicals have been used for centuries to control weeds. Salt, ashes, smelter wastes, and other industrial by-products have been applied to roadsides, fence rows, and pathways to rid them of vegetation and for eliminating weed infestations from agricultural lands. Little progress was made in the scientific investigation or the practical use of weed killers until the latter part of the 19th century. With the developing science of chemistry came the many applications in industry and agriculture. Research on the use of certain inorganic compounds as herbicides continued through the turn of the century and a number of them such as copper sulfate, sodium arsenite, iron sulfate and sulfuric

acid were used.<sup>1</sup>

It was not until World War II that a major breakthrough occurred in the field of herbicides. United States ground forces in the Pacific Theater found it extremely difficult to locate the Japanese cave and tunnel entrances in the densely foliated islands. U. S. casualties were high because enemy fortifications in these areas were hard to locate and neutralize. Large amounts of white phosphorous munitions were used to explosively blow away and burn the foliage concealing the cave openings. Once pinpointed, these fortifications became very vulnerable to direct fire and flame weapons. It became readily apparent that a need existed for an economical and expedient means of defoliating this vegetation. Research in this field was undertaken at Camp Detrick (now Fort Detrick), Maryland, the United States Army Biological Warfare Research Center. Initial research and development of the herbicide 2,4-dichlorophenoxy acetic acid (2,4-D) was accomplished during the years 1944 and 1945.<sup>2</sup> Development of this hormone-like, selective, organic herbicide was considered a major breakthrough. At this same time the first military aerial spray trials were run using 2,4-D in an M-10 smoke tank on a B-25 aircraft.<sup>3</sup> The

war ended, however, before herbicides could be employed. With the introduction of 2,4-D and the general realization by the chemical industry and farmers of the great potentialities of chemical weed control, herbicides in increasing numbers were discovered and placed on the civilian market.<sup>4</sup> Herbicide use became a widely accepted practice and evolved as a major technological advance in American agriculture. Herbicide use not only lowered farm labor and tillage costs but raised the yields of harvested crops. As early as 1922 weed control sprays produced increases in certain crop yields of over 25 per cent above untreated areas.<sup>5</sup>

Although the war had ended, military interest continued along with civilian interest in the development of new herbicides. The military potential of herbicides had been realized in the war. Personnel at Camp Detrick continued their research for new herbicides and tests on aerial application systems. The military requirement for herbicides was recognized as a Qualitative Material Requirement (QMR) in CDOG Paragraph 1239d(1), Chemical Defoliant (U), which was approved prior to 1956.<sup>6</sup> In 1959 the first large scale military defoliation effort took place at Camp Drum, New York. Aerial application tests were made with a mixture of 2,4-D and 2,4,5-trichloro-

phenoxyacetic acid (2,4,5-T) esters.<sup>7</sup> Camp Drum is a large Army Reserve Forces summer training camp and contains thousands of acres of firing ranges and artillery impact areas. The annual cost of manual cutting of the foliage in these areas was prohibitive. Thus, the decision was made to use this as an operational test area. An H-21 helicopter was used to spray the defoliant on four square miles of impact area.<sup>8</sup> The 1959 operation proved to be very effective as well as cost saving.

During the latter half of 1961 the first tests of vegetation control agents were conducted in the Republic of Vietnam (RVN). Dr. James W. Brown of Fort Detrick made aerial and ground applications of 2,4-D, 2,4,5-T, and other chemicals under the sponsorship of the Advanced Research Projects Agency (ARPA). These tests were only experimental in nature and were conducted to determine if the commercial herbicides would be effective against the Vietnam vegetation.<sup>9,10</sup> One of the primary methods of aerial application utilized the H-34 helicopter with the HIDAL (Helicopter, Insecticide Dispersal Apparatus, Liquid) spray system.<sup>11</sup> An evaluation of the selected locations sprayed for the test demonstrated that effective results could be obtained during the growing season in the Republic of Vietnam.<sup>12</sup>

The first military operational defoliation tests made in RVN took place from January to March 1962 utilizing Air Force C-123 cargo aircraft with MC-1 (Hour-glass) spray systems. The operation was conducted by the Air Force Special Aerial Spray Flight, Tactical Air Command.<sup>13</sup> This operation under the code name "Ranch Hand" was carried out with the full concurrence and support of the RVN government and Vietnamese Air Force.<sup>14</sup> In August 1962 the Republic of Vietnam approved defoliation operations in the Ca Mau Peninsula. Six targets involving almost 8,000 acres of mangrove forest were sprayed. The object of the mission was to defoliate the vegetation 200 meters on each side of the approximately 50 linear miles of rivers, canals, and one road in the target area. C-123 aircraft sprayed a 2,4-D, 2,4,5-T herbicide mix on this operation from 3 September to 11 October 1962. An inspection of the target area on 9 November 1962 determined that the defoliation was from 90% to 95% effective. Effectiveness was judged by the degree of vertical visibility on the basis of the area of ground that could be seen when viewed aurally.<sup>15</sup> It should be noted that mangrove forests are very susceptible to these herbicides and the most striking results are found when mangrove vegetation is sprayed. Some

types of tropical foliage show little or no effect from similar applications of herbicides. This may be due to season of treatment and species tolerance. Overall, these missions proved how effective herbicides could be in Vietnam.

From 1962 to 1971 herbicides were used against a wide variety of targets. They were primarily used to remove the leaves from existing foliage to improve visibility. Spray targets along enemy infiltration routes and over enemy base camps and depots enhanced the collection of visual intelligence information. In most instances visual reconnaissance of ground activity in the triple canopy tropical forest was virtually impossible without the use of herbicides. Defoliation was also used to enhance the security of the friendly forces. Defoliants were sprayed along lines of communication such as roads, railroads, and waterways, in order to reduce the foliage which normally concealed enemy ambush sites. Herbicides were also used to retard the growth of vegetation around allied base camps and critical installations. This assisted friendly security forces by improving fields of fire and observation and reducing the threat of sapper attack.

Herbicides were also used for crop destruction missions

in Vietnam. Beginning in 1962, certain rice growing areas in enemy controlled territory were sprayed with a contact herbicide called cacodylic acid. This agent killed the rice crop, thus denying its use to enemy troops. This crop destruction program was aimed at placing pressure on the logistical support system of the enemy and weakening his will to fight.

There were three basic mixtures of herbicides used operationally in Vietnam. The first mixture, already discussed, was composed of 2,4-D and 2,4,5-T and possesses the code name "Orange." This was predominantly used on broad leafed vegetation. Another defoliant mix for broad leafed plants was called agent "White." This defoliant, which was introduced into RVN in 1965, is a mixture of 2,4-D and picloram.<sup>16</sup> The advantage of this herbicide is that its effect on vegetation is a little longer lasting than that of agent Orange and it is not as volatile. The third and final agent, which also has been previously mentioned, was cacodylic acid. Coded agent "Blue," this compound was used primarily against narrow leafed vegetation to include rice crops. All of these herbicides are in agricultural use in the United States.

The use of herbicides increased in Vietnam from

1962 to 1968, after which their usage declined. The table shown below appeared in an April, 1971, Sierra Club Bulletin and is based on Department of Defense data concerning the estimated area treated in Vietnam with herbicides. It can be readily calculated from the eight year period indicated that 9.6% of the herbicide effort went into crop destruction and the remainder into spraying forest land.

ESTIMATED AREA\* TREATED WITH HERBICIDES  
IN SOUTH VIETNAM.<sup>17</sup>

| <u>Year</u> | <u>Forest Land</u> | <u>Crop Land</u> | <u>Total</u>    |
|-------------|--------------------|------------------|-----------------|
| 1962        | 4,940              | 741              | 5,681           |
| 1963        | 24,700             | 247              | 24,947          |
| 1964        | 83,486             | 10,374           | 93,860          |
| 1965        | 155,610            | 65,947           | 221,559         |
| 1966        | 741,247            | 101,517          | 842,764         |
| 1967        | 1,486,446          | 221,312          | 1,707,758       |
| 1968        | 1,267,110          | 63,726           | 1,330,836       |
| 1969        | 1,221,415          | 65,700           | 1,287,115       |
| Total       | 4,984,954          | 529,566          | 5,514,410 (sic) |

\*Area measured in acres.

Since numerous forest and crop land targets were resprayed each growing season, the above figures do not reflect the actual surface area treated by herbicides. That area would be somewhat smaller in comparison. Due to a controversy involving the possible teratogenic effects of a dioxin found in small quantities in agent

"Orange" (2,4,5-T), this herbicide was suspended from use in Vietnam in 1970. Shortly thereafter in 1971 the remainder of the defoliation program was discontinued by United States military forces.

### CHAPTER III

#### WORLD REACTION TO UNITED STATES USE OF HERBICIDES

One of the first indications that the United States had been considering the use of herbicides in Vietnam surfaced publicly in a New York Times article on 6 June 1961 and was entitled "Army Seeks Way To Strip Jungles." Army officials had testified before a House Defense Appropriations subcommittee that the Army had been experimenting with herbicides for stripping jungle foliage to expose guerrillas or other hostile units and installations.<sup>1</sup> Immediately following this article, nothing was said internationally to criticize the inherent content of the article. It was not until a year after the herbicides had been used on a routine basis that the impact of this new type of ingredient of warfare was noted by other countries.

When it became known internationally that herbicides were being used for defoliation and crop destruction in South Vietnam, varied responses were made public as to the acceptance of herbicides in war. Few countries have come to the defense of the United States for having used

herbicides. To the contrary, most vocalizations in regard to defoliation and crop destruction have been to condemn United States use of such compounds.

As would be expected the elements against whom herbicide use was directed, that is the National Liberation Front (NLF) and the Democratic Republic of Vietnam (DRV), strongly argued against their legal and moral use. They "accused United States and Vietnamese forces of 'impairing health of tens of thousands of people' by chemical warfare in Vietnam."<sup>2</sup> North Vietnamese stated that they had sampled "poisonous" chemicals from these operations during the past past year (1962) in South Vietnam. "In April, 1966, Joseph Mary Ho Hue Ba, Catholic representative of the National Liberation Front (NLF), charged that the U.S. use of defoliants and herbicides was killing newborn babies."<sup>3</sup>

Also as would be expected, all other countries which supported the cause of these two parties in their war against South Vietnam or believed in the Communist cause, also took exception to herbicide use by the United States. In early February 1962, the U.S.S.R. accused the United States of waging chemical warfare in South Vietnam. The Soviet newspaper Izvestia reported that "the Pentagon has marked the beginning of a new year

by an unprecedented action: the use of chemical weapons." It continued by stating that the U. S. Air Force was destroying the Vietnamese peasants' crops by poisonous gas.<sup>4</sup>

One year later the Soviet Union again brought forth charges "that the United States was using poison gas in the war in South Vietnam." The State Department said the accusation was false and that the chemicals employed were similar to actual weed killers used in the United States.<sup>5</sup> One month later the Soviet press agency Tass reported that the Soviet Union called for an urgent international investigation of reports that poisonous substances were being used against civilians in South Vietnam.<sup>6</sup> In 1971 Soviet Engineer Major L. Nechayuk in an article in International Affairs presented a Soviet view of U. S. herbicide use which possesses the flavor of pure Communist propaganda. Major Nechayuk stated:

the consequences of the first flights of these aircraft over the fields and jungles of South Vietnam in 1961 aroused the indignation of the world public. The Pentagon bosses then proceeded to carry out a most perfidious operation under the code name of Ranch Hand. It soon became obvious that the object of this operation was to starve the population of South Vietnam by destroying the harvests and vegetation and to deprive the fighters of the Liberation Army of natural cover. For the

operation highly potent toxic chemicals were employed. Massive spraying killed all forms of life--- plants, birds, animals, and even human beings. Actually the barbarians from the Pentagon launched chemical warfare on the soil of Vietnam.

He continued by stating that the United States had flagrantly violated the elementary standards of human ethics and international law. He stated that the code of international law broken by the United States was the accords of the Geneva Protocol of 1925.<sup>8</sup>

It should be noted that when the above allegations were made by the Communists, they utilized such descriptive terms as: Chemical Warfare, poisonous or toxic chemicals, or that the U.S. effort was devoted towards an alleged affect of killing or making innocent civilians sick. They never treated or directed their propaganda towards herbicides as defoliants, or the target as being the jungles or Viet Cong crops instead of innocent civilians.

There also were outcries of concern from within some of the non-Communist countries. Although the NLF or DRV activities may or may not have been condoned in South Vietnam, these individuals did not agree with the U.S. participation in an herbicide program. Their motive for this response appears to be purely in their belief that the use of herbicides in war were legally

or morally wrong. In a letter to the editor of the New York Times in March 1963, the late Lord Bertrand Russell, of Great Britain, expressed his violent opposition of the U. S. conduct of the war in Southeast Asia. He defined the herbicide use as chemical warfare employed for the purpose of destroying crops and livestock and to starve the population of Vietnam. He compares the use of napalm and herbicides in Southeast Asia as reminiscent of the warfare conducted by the Germans and Japanese during World War II.<sup>9</sup> Yoichi Fukushima, head of the Japan Science Council Agronomy Section, claimed the United States ruined more than 3.8 million acres of tillable land in Vietnam and killed more than 1,000 peasants and 13,000 livestock. He stated that "appalling inhumane acts are evident even within the limited admissions officially given out by U. S. Government leaders...."<sup>10</sup>

Criticism was received not only from foreign countries. Various citizens and organizations within the United States also voiced their disapproval of the U. S. military use of herbicides. Dissent against herbicide use increased with time in line with the overall general protest against the war and American involvement.<sup>11</sup> Again dissenters against herbicide use could be divided generally into two groups. The first group being those

who had an ulterior motive for making the protest and the second group who honestly felt that something morally wrong was being done. The first group mentioned included those who were sympathetic to the NLF/DRV cause, those trying to achieve national or international acclaim, those seeking group acceptance or recognition by getting on the "band wagon" of dissent which was vogue at that time and those making a "fast buck" on books and other publications whose sales thrive on positions taken on controversial topics. The second group of individuals and organizations who publicly criticized herbicide use in warfare, appeared to do so out of pure moral and ecological concern. A representative sample of the articles depicting reaction of sincere persons or organizations will be reviewed in the remainder of the text of this chapter.

Since the greatest amount of reaction developed and centered among the scientific and educational members of the U. S. society, the majority of their printed views appeared in such publication as Scientific Research, Science, Environment, Scientific American, and the Bulletin of the Atomic Scientists. It was not until the 1965 and 1966 time frame that a considerable number of U. S. scientists began to express their concern of the

widespread use of herbicides in the Vietnam War.<sup>12</sup> As Chapter II noted, the use of these compounds in the war was well established by this time and they were beginning to be used in quantity.

During an annual meeting in December 1966 of the American Association for the Advancement of Science (AAAS), a resolution was made calling for the AAAS to investigate the use of herbicides in Vietnam.<sup>13</sup> Due to internal problems of deciding who was going to do the investigating, and how and what was to be investigated, the AAAS proposal did not get off the ground for another two years. In the meantime the Society for Social Responsibility in Science offered to send scientists to Vietnam to study effects of defoliants on the ecology. Dr. Gordon H. Orians of the University of Washington and Dr. Egbert W. Pfeiffer of the University of Montana accepted the offer and went on a 15 day tour in Vietnam in March 1969.<sup>14</sup> In articles published in the 23 June 1969 Scientific Research and 1 May 1970 issue of Science, these two scientists described what they saw as the threat of herbicide use to Vietnam and recommended that the AAAS, "in accordance with its resolutions of 1966 and 1968 take the initiative in setting up an international research program to study the long-range effects

of the military use of herbicides in Vietnam."<sup>15,16</sup>

The AAAS finally established an Herbicide Assessment Commission and in August 1970 they sent Dr. Matthew Meselson, a biochemist at Harvard University, Dr. Arthur Westing, professor of biology at Windham College, Vermont, and Mr. Robert Cook, a Yale graduate student to Vietnam.<sup>17</sup> A report of the observations made on their trip was also very critical of the ecological impact of herbicides in that Southeast Asian country. Meselson and company also related a need for an in-depth, long-range study.

The numerous complaints from the scientific community to Federal Government agencies culminated in congressional action. Senator Thomas J. McIntye, who headed the subcommittee on research and development of the Senate Armed Services Committee inserted a special provision into the military authorization bill.<sup>18</sup> The bill which became Public Law 91-441 on 7 October 1970 required the Secretary of Defense to contract the National Academy of Sciences (NAS) to conduct a comprehensive investigation of the ecological and physiological effects of the defoliation program in South Vietnam.<sup>19</sup> The NAS was scheduled to present its findings to the President and the Congress in early 1974.

Concurrent with the foregoing activities and outcries of concern from the civilian scientists, various governmental agencies also were looking into the rumored problem areas of massive herbicide use. Research on herbicides had been continuing since World War II at Fort Detrick, Maryland. In addition, in 1967 the Defense Department's Advanced Research Projects Agency (ARPA) contracted the Midwest Research Institute (MRI) to assess the ecological impact of herbicides in Vietnam. MRI prepared its report through a state-of-the-art knowledge review and formulated their conclusions on that basis. No visit to Vietnam had been made and no new experiments were set up to duplicate the possible problem areas in Vietnam. MRI acknowledged there would probably be an ecological impact in some of the areas of concern, but current data was not available to address all areas completely. Further research data was needed in these areas.<sup>20</sup>

In March 1968 Dr. Fred H. Tschirley, who was the assistant chief of the Crops Protection Research Branch, Crops Research Division, Agricultural Research Service, U.S. Department of Agriculture, went to Vietnam to make an assessment of ecological consequences of the defoliation program in that country. This study was under-

taken at the request of the U. S. Department of State. Dr. Tschirley is recognized as the first U. S. scientist to visit Vietnam in the aftermath of world criticism. He also concluded from on site observations that there had been an ecological effect but indicated it could not be fully assessed unless an in-depth, long-term study were undertaken. His evaluation of the damage was not as critical as that of the other U. S. scientists who made later trips to Vietnam.<sup>21</sup> This brings the government action up to the point where the NAS was tasked by DOD to conduct their extensive study.

In brief, this chapter relates that there was considerable feeling in the world and in our own society against the use of herbicides in the Republic of Vietnam. Basically there were those who charged the United States with conducting chemical warfare of the nature prohibited in the Geneva Protocol of 1925 and there were others who protested on the grounds that they felt that these herbicides may have a detrimental effect on the ecology of Vietnam and thus their use was wrong and herbicide operations should be terminated.

## CHAPTER IV

### UNITED STATES POSITION ON CHEMICAL AND BIOLOGICAL WARFARE

As the previous chapter has shown, there have been numerous individuals and countries which have charged the United States with conducting illegal chemical warfare through the use of herbicides in Vietnam. In order to determine the legality of United States use of herbicides in warfare, it is first necessary to review any treaties concerning chemical and biological warfare to which this country is a signatory. This chapter will highlight the current status of the United States in relation to its obligations under international treaties on the use of chemical and biological warfare.

A review of literature verifies that at the present time the United States is not a party to any treaty which prohibits the use of toxic or nontoxic gases in warfare.<sup>1,2,3</sup> However, as President Nixon has stated, it has been the policy of the United States to observe the principles and obligations of the Geneva Protocol of 1925.<sup>4,5</sup> Since this Protocol has been the guiding document for United States activities in Chemical and

Biological Warfare (CBW) and it is also the document which various countries have quoted to justify condemnation of the U. S. use of herbicides in warfare, it is essential to view the Protocol in detail.

Following World War I it was generally accepted by most countries of the world that chemical warfare as it had been known in the war was cruel and inhumane and something had to be done to curb its use in future wars. In 1925 a Conference for the Supervision of the International Trade in Arms and Ammunition and in Implements of War was convened at Geneva, Switzerland, by the League of Nations. Although the initial agenda for this conference did not make mention of including consideration of chemical and biological weapons, the United States' delegation sought to have bans on these two weapons included. It was the intent of the United States to seek a universal ban on the use of asphyxiating gases in warfare. However, since the object of the convention was arms traffic control, the United States limited its first proposal to prohibiting the export of asphyxiating, toxic, or deleterious gases intended for use in war. After considerable debate by attending countries, it was decided that the act of just restricting the shipment of chemical weapons was not enough. It was decided that

the real issue should focus on all countries abstaining from the use of chemicals in warfare. It was also agreed upon that a proposal of such magnitude of importance warranted a special protocol of its own and should not be included within any arms trade treaty.<sup>6,7</sup> The final protocol which evolved from this conference was based on the principle of the law of war concerning unnecessary suffering.<sup>8</sup> The content of the Geneva Protocol of 1925 follows:

Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare.

The undersigned Plenipotentiaries, in the name of their respective Governments;

Whereas the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices, has been justly condemned by the general opinion of the civilized world; and

Whereas the prohibition of such use has been declared in Treaties to which the majority of Powers of the world are Parties; and

To the end that this prohibition shall be universally accepted as a part of International Law, binding alike the conscience and the practice of nations;

Declare:

That the High Contracting Parties, so far as they are not already Parties to Treaties prohibiting such use, accept this prohibition, agree to extend this prohibition to the use of bacteriological methods of warfare and agree to be bound as between themselves according to the terms of this declaration.

The High Contracting Parties will exert every effort to induce other States to

accede to the present Protocol. Such accession will be notified to the Government of the French Republic, and by the latter to all signatory and acceding Powers, and will take effect on the date of the notification by the Government of the French Republic.

The present Protocol, of which the French and English texts are both authentic, shall be ratified as soon as possible. It shall bear today's date.

The ratifications of the present Protocol shall be addressed to the Government of the French Republic, which will at once notify the deposit of such ratification to each of the signatory and acceding Powers.

The instruments of ratification of and accession to the present Protocol will remain deposited in the archives of the Government of the French Republic.

The present Protocol will come into force for each signatory Power as from the date of deposit of its ratification, and, from that moment, each Power will be bound as regards other Powers which have already deposited their ratifications.

In witness whereof the Plenipotentiaries have signed the present Protocol.

Done at Geneva in a single copy, this seventeenth day of June, 1925, One Thousand Nine Hundred and Twenty-Five.

The United States delegation signed the Protocol on 17 June 1925 and it was sent to the Senate in 1926 for ratification.<sup>10</sup> At this point in time an interesting change of events occurred. The United States refused to ratify the Geneva Protocol of 1925 even though the Protocol existed mainly through the initial efforts of the U. S. Delegation at Geneva. By 1926 strong opposition had developed against the ratification. The opposition based its arguments on the premise that gas

warfare was no more cruel than any other weapon and that it may even be more humane and effective than some of the other weapons that were currently accepted in warfare in the international community.<sup>11</sup>

In 1947 President Truman finally withdrew the Protocol from Senate consideration.<sup>12</sup> It remained in the White House until August, 1970, at which time President Nixon resubmitted the Geneva Protocol to the Senate for ratification.<sup>13</sup>

In testimony before the Senate Committee on Foreign Relations on 5 March 1971, Secretary of State Rogers urged early Senate action on the Protocol. He stated that this action was necessary to emphasize United States reaffirmation of its often repeated renunciation of the first use of chemical weapons and thus would strengthen world wide legal prohibitions against the use of chemical and biological weapons in war. He indicated that this would also constitute a positive and constructive movement towards international arms control and would enhance the position of the United States in developing initiatives for future arms control measures in the chemical and biological warfare area. Secretary Rogers also recommended that the Senate should view ratification of the Protocol with a statement of reservation. This

had been the practice of numerous other countries that have ratified the Protocol. Both he and President Nixon have indicated the United States ratification be subject to a reservation which allows the United States to retaliate with chemical weapons should any aggressor country or its allies use either chemical or biological weapons against the United States.<sup>14</sup>

It should also be noted that the State Department and the Executive Office have presented their interpretations to the Senate as to the use of chemical herbicides and riot control agents in warfare. Secretary Rogers has mentioned that it was the understanding of the United States that the Protocol does not prohibit the use in war of chemical herbicides or riot control agents. He stated: "Because we do not believe that the protocol imposes any obligations concerning the use of riot control agents and chemical herbicides, it would be both unnecessary and inappropriate for the United States to enter a reservation on this point."<sup>15</sup>

As of March 1974 the United States Senate has not yet ratified the Geneva Protocol of 1925. In summary, this still leaves the United states in the position of not being a signatory to any international treaty forbidding the use of chemical or biological agents.

However, the United States publically declares that it will be national policy to adhere to the principles of that Protocol until the time the Protocol is ratified. Subject to different future interpretation by the United States Senate, it is also the understanding of the United States that chemical herbicides and riot control agents are not subject to the provisions of the Protocol.

## CHAPTER V

### DISCUSSION

It has been determined, from the preceding chapter, that the United States is not a signatory of any treaty prohibiting the use of chemical agents in warfare. A question may arise that does the absence of any ratified treaty give the United States the legal right to use chemicals in warfare? During the past decade there has been considerable discussion on this highly controversial subject. The intent of this chapter is to explore the possibility of any such legal restrictions on the United States, and if these restrictions include the use of herbicides in warfare.

The majority of the international condemnation of the United States use of herbicides in Vietnam stems from the fact that many nations state the United States is violating international law when she apparently disregards the Geneva Protocol. The international critics believe that the Geneva Protocol of 1925 has now been accepted as international law and all countries of the world, whether they are signatories to the Protocol or

or not, are subject to its restrictions.

In order to achieve a better understanding of this complex problem, a review of the formulation of international law is , therefore, apropos at this time.

Plano and Olton state that, "international law is based on the concept of the sovereign equality of states and rests ultimately on agreement among them."<sup>1</sup> They further indicate that international law is generally derived from four sources. These sources include: (1) treaties among nations, (2) the general principles of law involving such things as morality, equity, etc., (3) sources of law found in court decisions and teachings of recognized legal scholars of various nations, and finally (4) the source of international custom which is derived by nations following a given practice for so long as to consider that practice binding to all states.<sup>2</sup>

It is this last source of international law that most critics address when chastising the United States for the apparent disregard for the Geneva Protocol. Since the United States is one of the major nation states of the world today, it is both proper and correct to assume that she would most definitely be subject to any law considered to be a law of international custom. The question then arises, whether or not the Geneva Protocol is

actually considered to be a law of international custom.

Thomas and Thomas state, "Customary law regulates the conduct of all states, and if a treaty is actually a codification of customary law, then any attempt to limit its application and obligatory effect would appear to violate the principle of equality of states."<sup>3</sup> Many countries, including France, the Soviet Union, and Great Britain, ratified the Protocol with reservations.<sup>4</sup> These reservations generally fall into two categories. The first is that they state that their ratification of the Protocol does not bind them to non-use of asphyxiating, poisonous, or other gases against non-signatories or allies of non-signatories of the Protocol. Second, they have reserved the right to retaliate in kind against any signatory who uses these chemicals against them. By these reservations alone it would appear that the signatories consider the Protocol to have different weight and meaning among the various nations of the world. How could all countries of the world be expected to accept the Protocol as international law by custom when many of the signatories have openly stated that they will apply the war gas prohibition as they see fit? From this argument it might be hastily concluded that the Protocol could not possibly be considered within the international law of

custom. Determination of international law, however, is not as simple as the above may make it seem. Due to the vagueness of the subject and the complex inter-relationships among the various countries, a more in-depth analysis of the situation is therefore warranted.

Thomas and Thomas state, "International custom as a procedure for creating international norms must meet two conditions: (1) usage or practice among states coupled with (2) the conviction that the practice is applied because it is legally binding."<sup>5</sup> In regard to the first condition of creating international custom, it is generally considered that only tacit consent of the general membership of the states of the world is necessary to achieve law of custom. There is no specified duration of time recognized as being a prerequisite for the formulation of this law. It is important to note that scholars emphasize that not all countries have to participate in or recognize a certain practice for it to become international law. The second constituent necessary to the formulation of international law of custom is that the states adhering to the generally accepted law are doing so because they deem the practice as legally binding and that if that practice is not followed, they will be subjected to some form of coercive force.<sup>6</sup>

How does this all relate to the status of the Geneva Protocol? In order for the Protocol to be considered as international law of custom there must have been a continuing abstention by the general membership of nations of the world of not employing asphyxiating, poisonous, or other gases in war because they in fact believe it not to be internationally legal to do otherwise. Therefore, it is important to examine the international reaction and acceptance of the Protocol since its inception in 1925.

It was only a few years prior to the formulation of the Protocol that many of the great nations of the world were embroiled in a war in which they all utilized toxic gases as a weapon of warfare. The Geneva Protocol was an outgrowth of the horror of the use of these agents in World War I. Although attempts were made in the control of chemical warfare since the Hague convention of 1899, the events of the war that followed reflected the actual degree of restraint attained at that time.<sup>7</sup> However, since 1925, there has been another major world war and hundreds of small wars involving at one time or another almost all countries of the world. During this period of intense world turmoil these have only been a few instances where the belligerents used chemical warfare.

The first use of chemicals in war following the formulation of the Geneva Protocol was noted when the Italians used poison gas against the Ethiopians during their war between 1935 and 1936. Later in 1938 the Japanese were charged with having used chemical agents in their war against the Chinese.<sup>8</sup> The last conflict noting the use of chemicals occurred in the Egyptian-Yemenese war. The Egyptians were accused of using gas warfare on the Yemenese during the period 1963-1967.<sup>9</sup> It is interesting to note that Italy, Ethiopia, and Egypt were signatories to the Geneva Protocol.

It is indeed remarkable that there were so few occasions that toxic chemical agents were employed in war during a period of almost continual upheaval. There was general abstention by most countries of the world not to use lethal chemical agents. This abstention was observed by non-signatories as well as signatories of the Geneva Protocol. It appears then that since its inception, the Protocol may have taken on more weight internationally than just a multilateral treaty. Initially the prohibition of gas warfare would have been directed against only the signers of the document. It would have been within the bounds of international law for all other non-participating countries to use these

agents in an armed conflict whenever they saw it to their advantage. This did not happen and restraint appeared internationally. The continual actions and declarations concerning this subject by the United States have assisted substantially toward molding the Geneva Protocol into international law of custom. Here is one of the greatest countries of the world, who is a non-signatory to the Protocol, who has the technological base to effectively wage such a war, but who has elected to condemn and abstain from the use of asphyxiating or poisonous gases in warfare. In 1966 the United States sponsored and voted for a United Nations General Assembly resolution which called for all states to strictly observe the principles and objectives of the Protocol. The State Department stated that by taking this action the United States re-affirmed its longstanding support of the Protocol and proclaimed that "the 'basic rule' set forth in the Protocol 'has been so widely accepted over a long period of time that it is now considered to form a part of customary international law.'"10

Viewing the actions and declarations of the United States and other countries, and the discussion brought forth in the United Nations on this topic, it can be

reasoned that the Geneva Protocol has been accepted as international law, as far as chemical warfare is concerned, and all countries of the world must adhere to its precepts.

Since it has been proven that the Geneva Protocol stands as international law of custom and the United States is subject to it, the question arises whether the United States violated this law by using herbicides in military operations in Vietnam. As stated in Chapter IV, the official position of the United States Department of State and the Executive Office has been that herbicides are not considered to be restricted by the Protocol.<sup>11</sup> This is contrary, however, to the opinion of critics of military herbicide operations. There appears to be considerable ambiguity as to whether the Protocol actually intended to include herbicides.<sup>12</sup>

Certain critics of the herbicide program have stated that the actual wording of the Protocol does include herbicides. This, they relate, is covered by the Protocol's phrase, "...and of all analogous liquids, materials or devices..." They proclaim that analogous liquids or materials could be considered the antiplant agents such as defoliants and soil sterilants.<sup>13,14</sup> There are many of those who claim herbicides are not included within

the text of the Protocol that argue herbicides were not known in the days when it was being drafted and consequently not specifically mentioned. Therefore, it is impossible for antiplant agents to have been considered within the restriction of the Protocol.<sup>15,16</sup> The author must differ in part to this particular argument. As indicated in Chapter II, herbicides had been used many years prior to the time of the drafting of the Protocol. However, the military potential for the use of antiplant chemicals probably was not realized until World War II. There are other critics of herbicide use, who admit that the potential of these chemical agents was not known in 1925, but had they been known, antiplant agents would have been specifically mentioned in the text. Thus, they conclude that it is perfectly reasonable to include them in the context of the Protocol today.<sup>17</sup>

Individuals who favor herbicide use in war claim that these agents do not fall under the restrictions of the Protocol because they are actually domestic chemicals. They state that these are the same agricultural chemicals that are used domestically in the Soviet Union, the United States, and in scores of other countries on a routine basis to control weeds or other unwanted vegetation. They contend that the intent of the Protocol is to limit

the use of war gases in armed conflicts. They claim that in no way is it inhumane to use herbicides on the enemy.<sup>18,19</sup>

The herbicide critics attempt to counter the above reasoning by stating that it is not how a chemical is used in peacetime that reflects its status to the Protocol, but how it is used in war. They contend that herbicides are not used for crop destruction and systematic forest defoliation in normal domestic usage. They argue that herbicides are normally used to kill weeds and thus increase food production and they are not domestically used to destroy food crops.<sup>20,21</sup>

This appears to be one of the strongest arguments that favor the possible inclusion of military use of herbicides in war into the Geneva Protocol. Although this argument provides possible grounds for inclusion of herbicides in the Protocol, it does not prove that they are now one of the chemicals prohibited by the Protocol.

Two weaknesses appear in their argument against the use of herbicides in warfare. First, domestically herbicides are used in different instances to systematically defoliate forests. Large areas of range land in the western part of the United States are subject to invasion of scrub brush and undesirable trees. These

areas are sprayed periodically to reduce the broad-leaved vegetation. Also in large forested areas of the Southeastern United States, defoliants are sprayed on the foliage to kill the hardwood trees, thus allowing better growth of the softwood trees for the pulpwood industry. Many railroads and electric power companies spray herbicides to control encroachment of forest growth on their respective right-of-ways. So, it can be seen that, domestically, herbicides are not just used to increase crop production. They are used to control a considerable amount of forest growth.

The view of the critics concerning crop destruction is absolutely true. This happens to be the major point of attack by critics of the herbicide program. Yet, they never acknowledge the fact that less than ten per cent of the U. S. military herbicide effort was directed toward that program in Vietnam. Possible herbicide prohibition could be acknowledged on the basis of a distinction made by the types of uses of these chemicals in war. This does not, however, assist in alleviating the current problem and question at hand. The answer may lie in an analysis of the reasoning for the drafting of the Geneva Protocol in the first place.

As stated, the Protocol was drawn up after a great

world war in which tens of thousands of soldiers fell victim to chemical agents. These agents were employed to cause casualties in the opponent's military forces. Hersh states that following the war the world wide revulsion over the use of such weapons led to the convening of the Geneva Conference in 1925.<sup>22</sup> In a speech before the United Nations General Assembly in 1966, U. S. Representative James M. Nabrit also emphasized the fact that the Protocol was framed to counter the horrors of poison gas warfare used during the First World War.<sup>23</sup> Thomas and Thomas also acknowledge that this original treaty was based on the unnecessary suffering principle of the law of war. This is one of the major ingredients for a strong legal argument that the Protocol applies only to those chemical agents used in war which are lethal or severely injurious to humans.<sup>24</sup> From this analysis it could be concluded that herbicides are not considered under the prohibitions of the Protocol. In recent years, however, the United Nations has viewed this problem differently.

On 16 December 1969 the General Assembly of the United Nations adopted a resolution stating that the Geneva Protocol prohibited the use in war of all toxic chemicals against man, animals, and plants. This

resolution was passed by a vote of 80 to three with 36 abstentions. The United States, Portugal, and Australia were the only countries voting against the resolution.<sup>25,26</sup> This pronouncement by the U. N. General Assembly may not be as legally binding as it may seem at first. U. S. Ambassador Leonard, in a statement before the United Nations General Assembly in December 1969, declared that the United States "considered it inappropriate for the General Assembly to attempt to interpret international law as embodied in the Geneva Protocol, or any other treaty, by means of a resolution." He continued by stating that, "For the Assembly now to arrogate to itself the right to resolve by majority voting a matter of deep dispute and differing interpretation of international law would be real disservice to the international community."<sup>27</sup> The Carnegie Endowment for International Peace also recognized the fact that the General Assembly is not the appropriate maker or interpreter of international law and stated that an authoritative interpretation should be secured from the International Court of Justice.<sup>28</sup>

Although this leaves the legal interpretation to be accomplished by an appropriate international body, one point was made clear from the United Nations General

Assembly resolution. It brought to light the general position the majority of the nations took in regard to this issue. From this it would appear that if and when the appropriate body, such as the International Court of Justice, made a decision, it would most likely include herbicides within the context of the prohibitions of the Geneva Protocol. However, until that decision is made there is no clear cut international legal restriction as to the use of herbicides in military operations in a war zone.

In summary, it has been determined that although the United States is not a signatory to the Geneva Protocol of 1925, she still is required to observe the Protocol restrictions by reason of the international law of custom. In reviewing the Geneva Protocol, it is reasonable to conclude that when the Protocol was written, herbicides were not considered to fall within its scope. The primary intent of the Protocol at that time was to prohibit those chemicals which caused undue suffering among the humans against whom they were employed. Since that time, technology has produced other chemicals which possess the capability of being used effectively in war against plants. General world opinion also has changed since its original drafting and most countries maintain

that the scope of the Geneva Protocol should encompass all aspects of chemical warfare against man, animals, and plants. Until a legal decision is rendered on this aspect of the Protocol interpretation, international dispute will continue concerning the use of herbicides in war.

## CHAPTER VI

### CONCLUSIONS

This study has reviewed the history of the employment of herbicides in support of military operations in Vietnam. Their use was greatly expanded from the initial test operations in 1961 to the time spraying operations peaked in 1967. Herbicide use steadily declined from that period until 1971 when all U. S. forces use of herbicides was terminated. There was considerable discussion and condemnation nationally and internationally concerning the employment of these chemicals in Vietnam. Many of those who criticized the United States use of herbicides claimed that their use was in direct violation of the Geneva Protocol of 1925.

As stated in the first chapter of this paper it was the desire of the author to determine if U. S. use of these agents in Vietnam did violate any international law to which the U. S. was subject. An in-depth review of literature and a detailed analysis of the facts concerning this problem culminated with the following conclusions.

1. The United States is not a signatory to any treaty forbidding the use of herbicides in warfare.

2. The United States is subject to International Laws of Custom.

3. The Geneva Protocol of 1925 has been accepted as International Law of Custom and thus the United States and all other countries of the world are subject to observe its restriction in the international arena.

4. The current legal interpretative status of the Geneva Protocol reflects that the use of herbicides in warfare is not included within its context and thus not restricted for use in war at this time.

5. It will require a decision by a properly recognized international body to make a legal change in the interpretation of the Protocol in the future as regarding the legal status of herbicides. Only under those conditions and at that time can the restriction of the use of herbicides in warfare be included within the list of prohibitions of the Protocol.

In the end, the act of the United States Senate ratifying or not ratifying the Geneva Protocol will make no difference concerning the legality of the United States use of herbicides in the future. That point of legality will be decided in the international arena.

The United States Senate realizing this fact should ratify the Protocol without reservation being noted concerning herbicides. United States ratification of the Protocol would eliminate one of the focal points of communist propaganda and possibly assist in easing the way for future disarmament talks.

The principles behind the solution of the problem studied in this research paper are not limited to their effects on this problem alone. There are many other new potential facets of warfare that have come to light in recent years that could also fall under the swing of the sword of interpretory prohibitions. Examples such as laser weapons or control of meteorological events in warfare could in the eyes of many be included in the list of prohibited weapons. It is easy and profitable for other nations which do not possess the technological knowledge or the economic capability to produce these weapons to voice their condemnation against the use of them in warfare. By submitting to the propaganda of these countries, the developing nation, such as the United States, may find itself losing a capability to save lives if its own men in combat and even the capability of terminating a war faster and in a more humane manner. The developing country must use its own con-

science and weigh the true facts of the morality and  
legality of the use of each weapon system employed.

## FOOTNOTES

### Chapter I

1. Thomas Whiteside, Defoliation (New York: Ballantine Books Inc., 1970), pp. xi-xii.
2. Matthew Meselson, "Gas Warfare and the Geneva Protocol of 1925," Bulletin of the Atomic Scientists, Vol. 28, February 1972, p. 34.
3. L. Craig Johnstone, "Ecocide and the Geneva Protocol," Foreign Affairs, Vol. 49, July 1971, p. 711.
4. United States Army Regulation 310-25, Dictionary of United States Army Terms (Washington: Department of the Army, 1 June 1972), pp. 47, 171, 254.

### Chapter II

1. Alden S. Crafts and Wilfred W. Robbins, Weed Control (3d ed.; New York: McGraw-Hill Book Company, Inc., 1962), p. 173.
2. Plant Sciences Laboratories, Department of the Army, Fort Detrick, Maryland. "Vegetation Control, Agents (Defoliants and Herbicides)," Fort Detrick, 12 February 1970, p. 2. (Mimeographed.)
3. Plant Sciences Laboratories, Department of the Army, Fort Detrick, Maryland, "Vegetation Control, Dissemination Systems," Fort Detrick, 12 February 1970, p. 2. (Mimeographed.)
4. Crafts, op. cit., pp. 176-177.
5. Ibid., p. 174.
6. Plant Sciences Laboratories, Vegetation Control, Agents (Defoliants and Herbicides), loc. cit.

7. Plant Sciences Laboratories, Vegetation Control, Dissemination Systems, loc. cit.

8. Information Manual for Vegetation Control in Southeast Asia, Miscellaneous Publication 33, Department of the Army, Fort Detrick, Maryland, December 1969, p. 8.

9. Plant Sciences Laboratories, Vegetation Control, Agents (Defoliants and Herbicides), loc. cit.

10. Lieutenant Colonel Stanley D. Fair, "No Place to Hide, How Defoliants Expose the Viet Cong," Armed Forces Chemical Journal, Vol. 8, (March 1964), p. 6.

11. Plant Sciences Laboratories, Vegetation Control, Dissemination Systems, loc. cit.

12. Curtis Jordan, "Uncovering Charlie, Spray Destroys Hiding Places of Viet Cong," Air Force Times, Vol. 26, (11 May 1966), p. 14.

13. Plant Sciences Laboratories, Vegetation Control, Dissemination Systems, loc. cit.

14. Lieutenant Colonel Arthur F. McConnell, Jr., "Mission Ranch Hand," Air University Review, Vol. 21 (January-February 1970), pp. 89-94.

15. Fair, loc. cit.

16. Plant Sciences Laboratories, Vegetation Control, Agents (Defoliants and Herbicides), op. cit., p. 3.

17. John Constable and Matthew Meselson, "The Ecological Impact of Large Scale Defoliation in Vietnam," Sierra Club Bulletin, Vol. 56, (April 1971), p. 6.

### Chapter III

1. Jack Raymond, "Army Seeks Way to Strip Jungles," New York Times, 6 June 1961, p. 11.

2. New York Times, 9 April 1963, p. 12.

3. Seymour M. Hersh, Chemical and Biological Warfare, America's Hidden Arsenal, (New York: The Bobbs-

Merrill Company, 1968), p. 154.

4. Ibid., p. 145.

5. "Washington Rebuts Poison Gas Charge," New York Times, Western Edition, 11 March 1963, p. 4.

6. "USSR Calls for International Probe of Reports of Chemical Warfare: US Says Chemicals Used to Destroy Foliage are not Injurious to Man," New York Times, 27 April 1963, p. 2.

7. Engineer Major L. Nechayuk, "Weapons of 'Civilised' (sic) Barbarians," Soviet Military Review, No. 8, August 1971, p. 52.

8. Ibid., p. 53.

9. Lord Bertrand Russell, "Vietnam Policy Protested, Russell Holds Our Aim is to Block Economic Reform," New York Times, Editorial, 8 April 1963, p. 46.

10. Carnegie Endowment for International Peace, The Control of Chemical and Biological Weapons, (New York: Carnegie Endowment, 1971), p. 40.

11. Hersh, op. cit., p. 154.

12. Robert E. Cook, "Completely Destroyed," Yale Alumni, Vol. 34, No. 8, May 1971, p. 36.

13. "Defoliation: AAAS Study Delayed by Resignations from Committee," Science, Vol. 159, No. 3817, 23 February 1968, p. 857.

14. Gordon H. Orians and Egbert W. Pfeiffer, "Mission to Vietnam, Part 1," Scientific Research, Vol. 4, No. 13, 9 June 1969, p. 22.

15. Gordon H. Orians and Egbert W. Pfeiffer, "Mission to Vietnam, Part 2," Scientific Research, Vol. 4, No. 13, 23 June 1969, pp. 26-27, 29-30.

16. Gordon H. Orians and Egbert W. Pfeiffer, "Ecological Effects of the War in Vietnam," Science, Vol. 168, No. 3931, 1 May 1970, p. 554.

17. Cook, op. cit., pp. 36-39.

18. "Herbicides in Vietnam: AAAS Study Runs into a Military Roadblock," Science, Vol. 170, No. 3953, 2 October 1970, p. 43.

19. U. S. Congress, Senate. "National Academy of Sciences Study on Effects of Herbicides in Vietnam," Congressional Record - Senate, 6 October 1971, pp. S15995-S16001.

20. "Assessment of Ecological Effects of Extensive or Repeated Use of Herbicides," Final Report 15 August-1 December 1967, MRI Project No. 3103-B, Midwestern Research Institute, pp. 288-293.

21. Fred H. Tschirley, "Defoliation in Vietnam," Science, Vol. 163, No. 3869, 21 February 1969, pp. 779-786.

#### Chapter IV

1. "The Law of Land Warfare," Department of the Army Field Manual 27-10, (Washington: U. S. Government Printing Office, 1956), p. 18.

2. Department of the Army, "The Use of Chemical, Biological, and Radiological weapons in warfare," Fact Sheet for U. S. Army CBR Weapons Orientation Course, Dugway Proving Ground, Dugway, Utah, 1 August 1967, p. 8.

3. James N. Marsden, "Moral Aspects of CBR Warfare," Armed Forces Chemical Journal, Vol. 17, June 1963, p. 10.

4. Richard M. Nixon and William P. Rogers, "Geneva Protocol on Gases and Bacteriological Warfare Resubmitted to the Senate," Department of State Bulletin 63, 7 September 1970, pp. 273-275.

5. Richard M. Nixon, "Biological Warfare Renounced: A Statement by the President of the United States," Ordnance, Vol. 54, January-February 1970, p. 372.

6. Ann Van Wynen Thomas and A. J. Thomas, Jr., Legal Limits on the Use of Chemical and Biological Weapons, (Dallas, Texas: Southern Methodist University Press, 1970), pp. 71-72.

7. Dr. D. M. MacArthur, "Treaties and the Use of

Military Chemicals," Ordnance, Vol. 50, March-April 1966, p. 466.

8. Thomas and Thomas, op. cit., p. 102.

9. Carnegie Endowment for Peace, The Control of Chemical and Biological Weapons, (New York: Carnegie Endowment, 1971), pp. 125-126.

10. Nixon and Rogers, op. cit., p. 273.

11. Thomas and Thomas, op. cit., p. 73.

12. C. V. Glines, "Nixon's CBW Policy: Unilateral Disarmament?," Armed Forces Management, Vol. 16, January 1970, p. 45.

13. Nixon and Rogers, op. cit., p. 273.

14. William P. Rogers, "Department Urges Senate Approval of Geneva Protocol on Poisonous Gases and Biological Warfare," Department of State Bulletin, Vol. 64, 29 March 1971, pp. 445-446.

15. Ibid., p. 257.

#### Chapter V

1. Jack C. Plano and Roy Olton, The International Relations Dictionary, (New York: Holt, Rinehart, and Winston, Inc., 1969), p. 252.

2. Ibid.

3. Ann Van Wynen Thomas and A. J. Thomas, Jr., Legal Limits on the Use of Chemical and Biological Weapons, (Dallas: Southern Methodist University Press, 1970), p. 79.

4. Ibid., pp. 80-82.

5. Ibid., p. 135.

6. Ibid., pp. 135-136.

7. Stockholm International Peace Research Institute, The Problem of Chemical and Biological Warfare, Vol. IV,

CB Disarmament Negotiations, 1920-1970, (New York: Humanities Press, 1971), pp. 17-18.

8. Ibid., pp. 175-186, 189-191.

9. Seymour M. Hersh, Chemical and Biological Warfare, (New York: The Bobbs-Merrill Company, 1968), pp. 282-287.

10. U. S., Congress, House, Committee on Foreign Affairs, Chemical-Biological Warfare: U. S. Policies and International Effects, Hearings, before a subcommittee on National Security Policy and Scientific Developments of the Committee on Foreign Affairs, House of Representatives, 91st Congress, 1st session, 1969, p. 53.

11. Jozef Goldblat, "Are Tear Gas and Herbicides Permitted Weapons?," Bulletin of the Atomic Scientists, April 1970, p. 13.

12. Phillip A. Karber, "The Nixon Policy on CBW," Bulletin of the Atomic Scientists, Vol. 28, January 1972, p. 25.

13. Thomas and Thomas, op. cit., p. 75.

14. Carnegie Endowment for Peace, The Control of Chemical and Biological Weapons, (New York: Carnegie Endowment, 1971), p. 14.

15. Goldblat, op. cit., p. 16.

16. Ambassador James F. Leonard, "Chemical and Biological Methods of Warfare," Statement, 10 December 1969, with Test of Resolutions, Department of State Bulletin, Vol. 62, 26 January 1970, p. 97.

17. Goldblat, op. cit., p. 16.

18. Stockholm International Peace Research Institute, op. cit., p. 241.

19. Karber, op. cit., p. 25.

20. Karber, op. cit., p. 25.

21. L. Craig Johnstone, "Ecocide and the Geneva

Protocol," Foreign Affairs, Vol. 49, July 1971, p. 716.

22. Hersh, op. cit., p. 6.

23. Hersh, op. cit., p. 32.

24. Thomas and Thomas, op. cit., p. 102.

25. Johnstone, op. cit., p. 715.

26. Matthew Meselson, "Gas Warfare and the Geneva Protocol of 1925," Bulletin of the Atomic Scientists, Vol. 28, February 1972, p. 37.

27. Leonard, op. cit., p. 96.

28. Carnegie Endowment for Peace, op. cit., pp. 28, 109.

## BIBLIOGRAPHY

### Books

- Carnegie Endowment for International Peace. The Control of Chemical and Biological Weapons. New York: The Carnegie Endowment for International Peace, 1971.
- Crafts, Alden S. and Wilfred W. Robbins. Weed Control. 3d ed. New York: McGraw-Hill Book Company, 1962.
- Hersh, Seymour M. Chemical and Biological Warfare. New York: The Bobbs-Merrill Company, 1968.
- Lerche, Charles O., Jr. and Abdul A. Said. Concepts of International Politics. 2d ed. Englewood Cliffs: Prentice-Hall, Inc., 1970.
- Plano, Jack C. and Roy Olton. The International Relations Dictionary. New York: Holt, Rinehart, and Winston, Inc., 1969.
- Rose, Steven. CBW Chemical and Biological Warfare. Boston: Beacon Press, 1969.
- Stockholm International Peace Research Institute. The Problem of Chemical and Biological Warfare. Vol. IV: CB Disarmament Negotiations, 1920-1970. New York: Humanities Press, 1971.
- Thomas, Ann Van Wynen, and A. J. Thomas, Jr. Legal Limits on the Use of Chemical and Biological Weapons. Dallas: Southern Methodist University Press, 1970.
- Whiteside, Thomas. Defoliation. New York: Ballantine Books, Inc., 1970.

### Articles and Periodicals

- Aaronson, Terri. "A Tour of Vietnam," Environment, Vol.

- 13, No. 2, (March 1971), pp. 34-43.
- "Agent Orange Affair," Time, Vol. 96, 2 November 1970, pp. 39-40.
- "Ban the Chemicals?," Editorial, Ordnance, Vol. 57, (July - August 1972), p. 52.
- Bazell, Robert J. "CBW Ban: Nixon would Exclude Tear Gas and Herbicides," Science, Vol. 172, (16 April 1971), pp. 246-248.
- Beecher, William. "Chemicals vs the Viet Cong - 'Right;' or 'Wrong?'," The National Guardsman, Vol. 20, (February 1966), pp. 2-6.
- "Blight That Failed," Newsweek, Vol. 77, 11 January 1971, p. 79.
- Boffey, Philip M. "Defense Issues Summary of Defoliation Study," Science, Vol. 159, (9 February 1968), p. 613.
- "Herbicides in Vietnam: AAAS Study Finds Widespread Devastation," Science, Vol. 171, (8 January 1971), pp. 43-47.
- "Herbicides in Vietnam: AAAS Study Runs into a Military Roadblock," Science, Vol. 170, (2 October 1970), pp. 42-45.
- Butz, J. S., Jr., tech. ed. "Tactical Airpower in Vietnam ... the Trial by Fire," Air Force/Space Digest International, Vol. 2, (August 1966), pp. 12-14, 17.
- "Chemical and Biological Defense Policies and Programs," Department of State Bulletin, Vol. 61, (15 December 1969), pp. 541-543.
- "Chemical War," Environment, Vol. 13, No. 2, (March 1971), pp. 44-47.
- Constable, John D. and Matthew S. Meselson. "The Ecological Impact of Large Scale Defoliation in Vietnam," Sierra Club Bulletin, Vol. 56, No. 4 (April 1971), pp. 4-9.
- Cook, Robert Edward. "Completely Destroyed," Yale Alumni, Vol. 34, No. 8, (May 1971), pp. 36-39.

- "Defoliants - A Closed Case?," Commonweal, Vol. 93, (15 January 1971), pp. 363-364.
- "Defoliation: AAAS Study Delayed by Resignations from Committee," Science, Vol. 159, No. 3817, (23 February 1968), pp. 857-859.
- Ehrlich, Paul R. and John P. Holdren. "Ecocide in Vietnam," Current, Vol. 136, (January 1972), pp. 61-63.
- Fair, Lieutenant Colonel Stanley D. "No Place to Hide, How Defoliants Expose the Viet Cong," Armed Forces Chemical Journal, Vol. 8, (March 1964), pp. 5-6.
- "Geneva Protocol," Time, Vol. 70, 8 March 1971, p. 12.
- Glines, C. V. "Nixon's CBW Policy: Unilateral Disarmament?," Armed Forces Management, Vol. 16, (January 1970), pp. 42-43, 45.
- Goldblatt, Jozef. "Are Tear Gas and Herbicides Permitted Weapons?," Bulletin of the Atomic Scientists, Vol. 26, (April 1970), pp. 13-16.
- Golhaber, Samuel Z. "CBW: Interagency Conflicts Stall Administration Action," Science, Vol. 169, (31 July 1970), pp. 454-456.
- Gonzalez, Arturo F., Jr. "Defoliation - A Controversial U. S. Mission in Vietnam," Data, Vol. 13, (October 1968), pp. 12-15.
- Greenberg, D. S. "Defoliation: AAAS Study Delayed by Resignations from Committee," Science, Vol. 159, (23 February 1968), pp. 857-859.
- Haseltine, William, William R. Carter, and Ngo Vinh Long. "Human Suffering in Vietnam," Science, Vol. 169, No. 3940, (3 July 1970), p. 6.
- "Hong Kong, April 8th," New York Times, 9 April 1963, p. 12.
- Johnstone, L. Craig. "Ecocide and the Geneva Protocol," Foreign Affairs, Vol. 49, (July 1971), pp. 711-720.
- Jordan, Curtis. "Uncovering Charlie, Spray Destroys Hiding Places of Viet Cong," Air Force Times, Vol.

26, (11 May 1966), p. 14.

Karber, Phillip A. "The Nixon Policy on CBW," Bulletin of the Atomic Scientists, Vol. 28, (January 1972), pp. 22-25, 27.

Kelly, Major Joseph Burns. "Gas Warfare in International Law," Military Law Review, (July 1960), pp. 1-67.

Leonard, Ambassador James F. "Chemical and Biological Methods of Warfare," Statement, 10 December 1969, with Test of Resolutions, Department of State Bulletin, Vol. 62, (26 January 1970), pp. 95-99.

-----, "Control of Chemical and Biological Weapons: Statement," Department of State Bulletin, Vol. 63, (21 September 1970), pp. 330-336.

-----, "United States Explains Position on Chemical and Biological Weapons," Department of State Bulletin, Vol. 62, (27 April 1970), pp. 552-557.

MacArthur, Dr. D. M. "Treaties and the Use of Military Chemicals," Ordnance, Vol. 50, (March - April 1966), pp. 464, 466.

Marsden, James N. "Moral Aspects of CBR Warfare," Armed Forces Chemical Journal, Vol. 17, (June 1963), pp. 5-6, 8, 10-11.

McConnell, Lieutenant Colonel Arthur F., Jr. "Mission Ranch Hand," Air University Review, Vol. 21, (January - February 1970), pp. 89-94.

Meselson, Matthew S. "Behind the Nixon Policy for Chemical and Biological Warfare," Bulletin of the Atomic Scientists, Vol. 26, (January 1970), pp. 23-24, 26-34.

-----, "Chemical and Biological Weapons," Scientific American, Vol. 222, (May 1970), pp. 15-25.

-----, "Gas Warfare and the Geneva Protocol of 1925," Bulletin of the Atomic Scientists, Vol. 28, (February 1972), pp. 33-37.

Miller, Colonel Lloyd G. "The Use of Chemicals in Stability Operations," Military Review, Vol. 46, (De-

- cember 1966), pp. 43-47.
- Nechayuk, Engineer Major L. "Weapons of Civilised (sic) Barbarians," Soviet Military Review, No. 8, (August 1971), pp. 52-54.
- Nelson, Bryce. "Herbicides in Vietnam: AAAS Board Seeks Field Study," Science, Vol. 163, (3 January 1969),
- , "Herbicides: Order on 2,4,5-T Issued at Unusually High Level," Science, Vol. 166, (21 November 1969), pp. 977-979.
- Nixon, Richard M. "Biological Warfare Renounced: A Statement by the President of the United States," Ordnance, Vol. 54, (January - February 1970), p. 372.
- Nixon, Richard M. and William P. Rogers. "Geneva Protocol on Gases and Bacteriological Warfare Resubmitted to the Senate," Department of State Bulletin, Vol. 63, (7 September 1970), pp. 273-275.
- "Operation Wasteland," Time, Vol. 95, 25 May 1970, pp. 70-73.
- Orians, Gordon H. and Egbert W. Pfeiffer. "Ecological Effects of the War in Vietnam," Science, Vol. 168, No. 3931, (1 May 1970), pp. 544-554.
- , "Mission to Vietnam, Part 1," Scientific Research, Vol. 4, No. 13, (9 June 1969), pp. 22-23, 27-28, 30.
- , "Mission to Vietnam, Part 2," Scientific Research, Vol. 4, No. 13, (23 June 1969), pp. 26-27, 29-30.
- , "United States Goals in Vietnam," Science, Vol. 169, (11 September 1970), p. 1030.
- Pfeiffer, Egbert W. and Arthur H. Westing. "Land War," Environment, Vol. 13, No. 9, (November 1971), pp. 2-15.
- "Preliminary Assessment of Herbicides and Defoliation," Environmental Science and Technology, Vol. 2, No. 3, (March 1968), pp. 176-181.

- Pugwash Committee. "Pugwash: Raison d'etre," Bulletin of the Atomic Scientists, Vol. 29, (February 1973), pp. 22-29.
- Raymond, Jack. "Army Seeks Way to Strip Jungles," New York Times, 6 June 1961, p. 11.
- . "Weed Killers Aid War on Vietcong," New York Times, 28 March 1965, p. 2.
- Rogers, William P. "Department Urges Senate Approval of Geneva Protocol on Poisonous Gases and Biological warfare," Department of State Bulletin, Vol. 64, (29 March 1971), pp. 455-459.
- Russell, Lord Bertrand. "Vietnam Policy Protested," New York Times, 8 April 1963, p. 46.
- Shapley, Deborah. "Herbicides: Academy Finds Damage in Vietnam after a Fight of Its Own," Science, Vol. 183, No. 4130, (22 March 1974), pp. 1177-1180.
- "Silent Weapons," Army Digest, Vol. 23, (November 1968), pp. 6-11.
- Skierkowski, Captain Paul. "One More Job for Army Aviation," United States Army Aviation Digest, Vol. 13, (July 1967), pp. 6-7.
- Tschirley, Fred H. "Defoliation in Vietnam," Science, Vol. 163, (21 February 1969), pp. 779-786.
- "United States Experts Report on Defoliation in Cambodia," Department of State Bulletin, Vol. 61, (29 December 1969), p. 635.
- "USSR Calls for International Probe of Reports of Chemical Warfare," New York Times, 27 April 1963, p. 2.
- Vinnedge, Harlan H. "Let's Hear it for Pollution (If It's in Asia)," New Republic, Vol. 163, (17 October 1970), pp. 14-15.
- "Washington Rebuts Poison Gas Charge," New York Times, Western Edition, 11 March 1963, p. 4.
- Westing, Arthur H. "Proscription of Ecocide," Bulletin

- of the Atomic Scientists, Vol. 30, (January 1974), pp. 24-27.
- Wheeler, John A. "On the Use of Herbicides in Vietnam," Science, Vol. 161, (19 July 1968). pp. 253-256.
- Whiteside, Thomas. "Reporter at Large - Defoliation," New Yorker, Vol. 45, (7 February 1970), pp. 32-38.
- , "Reporter at Large - Defoliation," New Yorker, Vol. 46, (14 March 1970), pp. 124-129.
- , "Reporter at Large - Defoliation," New Yorker, Vol. 46, (4 July 1970), pp. 64-66.
- Winchester, James H. "Cargo Planes in the Vietnam War," NATO's Fifteen Nations, Vol. 11, (August - September 1966), pp. 50-53.

#### Official Documents

- Department of the Army, Fort Detrick Miscellaneous Publication 33. Information Manual for Vegetation Control in Southeast Asia, Fort Detrick, December 1969.
- Department of the Army Field Manual 27-10. The Law of Land Warfare. Washington: U. S. Government Printing Office, 1956.
- Department of the Army Training Circular 3-16. Employment of Riot Control Agents, Flame, Smoke, Antiplant Agents, and Personnel Detectors in Counterguerrilla Operations, Washington: Department of the Army, April 1969.
- United States Army Regulation 310-25. Dictionary of United States Army Terms. Washington: Department of the Army, 1 June 1972.
- U. S. Congress. House. Committee on Foreign Affairs. Chemical - Biological Warfare: U. S. Policies and International Effects, Hearings, before a subcommittee on National Security Policy and Scientific Developments of the Committee on Foreign Affairs, House of Representatives, 91st Congress, 1st Session, 1969.

U. S. Congress. Senate. National Academy of Sciences  
Study on Effects of Herbicides in Vietnam. Congres-  
sional Record - Senate, 6 October 1971, pp. S15995-  
S16001.

Unpublished Material

Department of the Army. The Use of Chemical, Biolog-  
ical and Radiological Weapons in Warfare, Fact Sheet  
for Department of U. S. Army CBR Weapons Orientation  
Course. Dugway Proving Ground; Department of the  
Army, 1 August 1967. (Mimeographed.)

Midwest Research Institute. Assessment of Ecological  
Effects of Extensive or Repeated Use of Herbicides,  
Final Report, 15 August - 1 December 1967, MRI Pro-  
ject No. 3103-B, of Midwest Research Institute,  
Kansas City, Missouri, 1967. (Mimeographed.)

Plant Sciences Laboratories, Department of the Army,  
Fort Detrick, Maryland. "Vegetation Control, Agents  
(Defoliants and Herbicides)," Fort Detrick, 12  
February 1970. (Mimeographed.)

Plant Sciences Laboratories, Department of the Army,  
Fort Detrick, Maryland. "Vegetation Control, Dis-  
semination Systems," Fort Detrick, 12 February 1970.  
(Mimeographed.)