



John C. Hansen

Mr. Hansen is a senior evaluator recently reassigned from the Federal Personnel and Compensation Division to the Veterans Administration audit site of the Human Resources Division where he is continuing his work on Agent Orange. He joined GAO in 1974 after receiving a B.S. degree in finance and a M.B.A. from the University of Rhode Island. Mr. Hansen is a past member of GAO's Career Level Council and is a member of the American Society for Public Administration.

The Vietnam Veteran vs. Agent Orange: The War That Lingers



Almost 10 years after the end of the Vietnam War many veterans believe they are still fighting the enemy in a life or death struggle. That enemy is not the Viet Cong, but the toxic defoliant known as Agent Orange.

Since 1977, the emotionally charged Agent Orange issue has grown into a national controversy. Thousands of Vietnam veterans claim that exposure to Agent Orange has made them sick and deformed their children, and they are frustrated at the slow pace of Government efforts to find answers to their questions.

There are many emotional issues in the public forum today which are rooted in debate over Government's responsibility to the public and its influence on our lives. However, none is more fundamental than the question: What does the Government owe veterans who have served the country in battle? Vietnam veterans concerned about Agent Orange believe the Government is not fulfilling its obligation on this complex issue. GAO has contributed to the ongoing debate through several reports.

What Is Agent Orange?

From 1965 to 1970, the Department of Defense (DOD) sprayed almost 11 million gallons of Agent Orange over millions of acres of Vietnam to prevent the enemy from hiding in the jungle, thereby enhancing security and improving observation, and to destroy the enemy's food supply. Since the 1940's, the two chemicals which made

up this herbicide, 2,4-D and 2,4,5-T, were widely used in the United States by farmers and foresters to kill unwanted vegetation. In fact, you could buy them off the shelf of your neighborhood hardware store to kill weeds in your lawn or garden.

The military began using several herbicides in Vietnam in early 1962. The herbicides were identified by code names which referred to the color of bands painted on the chemical containers. Thus, they were given names like Agent Orange, Agent Blue, and Agent White. These herbicides were applied by cargo planes, helicopters, trucks, riverboats, and from backpacks. About 90 percent of the Agent Orange used in Vietnam was for forest or jungle defoliation. Crop destruction missions accounted for 8 percent of the Agent Orange applied. The remaining 2 percent was used around base perimeters, cache sites, waterways, and communication lines.

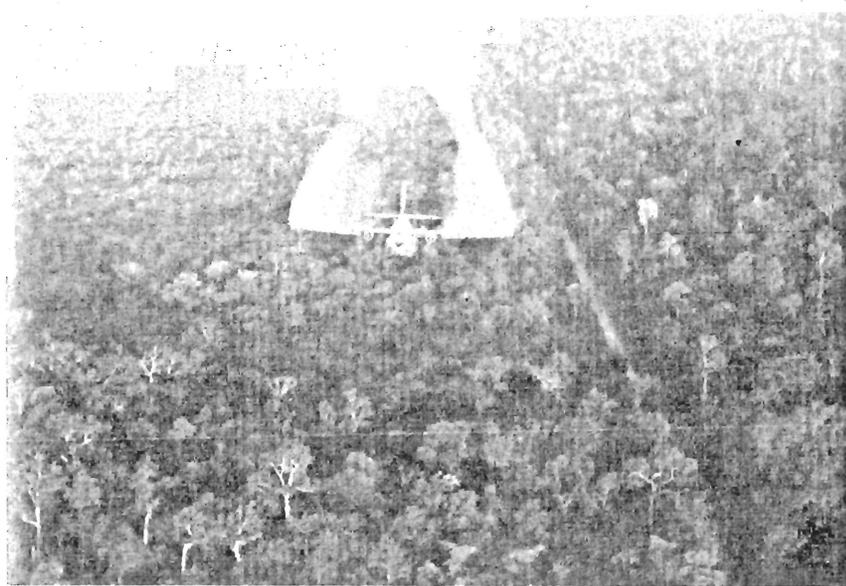
By the late 1960's, Vietnamese newspapers and various scientists began to attribute certain health problems found in the civilian Vietnamese population, such as birth defects, cancers, and skin problems, to herbicide exposure. About the same time, the National Institutes of Health reported that 2,4,5-T, one of the chemicals in Agent Orange, could cause malformations and stillbirths in mice. In April 1970, DOD suspended all use of Agent Orange in Vietnam largely as a result of the Department of Agriculture's restriction of certain domestic uses of 2,4,5-T because of its possible health hazards. These health hazards were attributed to the inevitable by-product of the manufacture of 2,4,5-T. The by-product is TCDD, a shorthand for 2,3,7,8-tetrachlorodibenzoparadioxin, simply called dioxin, which many scientists consider the deadliest of all manmade poisons.



The Veterans' Outcry Begins

In late 1977, veterans began approaching the Veterans Administration (VA) with various health problems they believed were related to herbicide exposure in Vietnam. Extensive media coverage of the purported adverse health effects of 2,4,5-T and its dioxin contaminant also raised concerns among many Vietnam veterans. Illnesses which these veterans believed were caused by exposure to Agent Orange included skin conditions, cancer, birth defects in offspring, nervous disorders, numbness in extremities, miscarriages, reduced libido, impotency, vision and/or hearing impairment, and gastrointestinal tract disturbances.

In April 1978, the late Congressman Ralph H. Metcalfe expressed his concern about possible long-range adverse health effects of exposure to Agent Orange. He asked GAO to examine DOD's use of the herbicide in Vietnam and the VA's handling of herbicide-exposure disability claims submitted by Vietnam veterans.

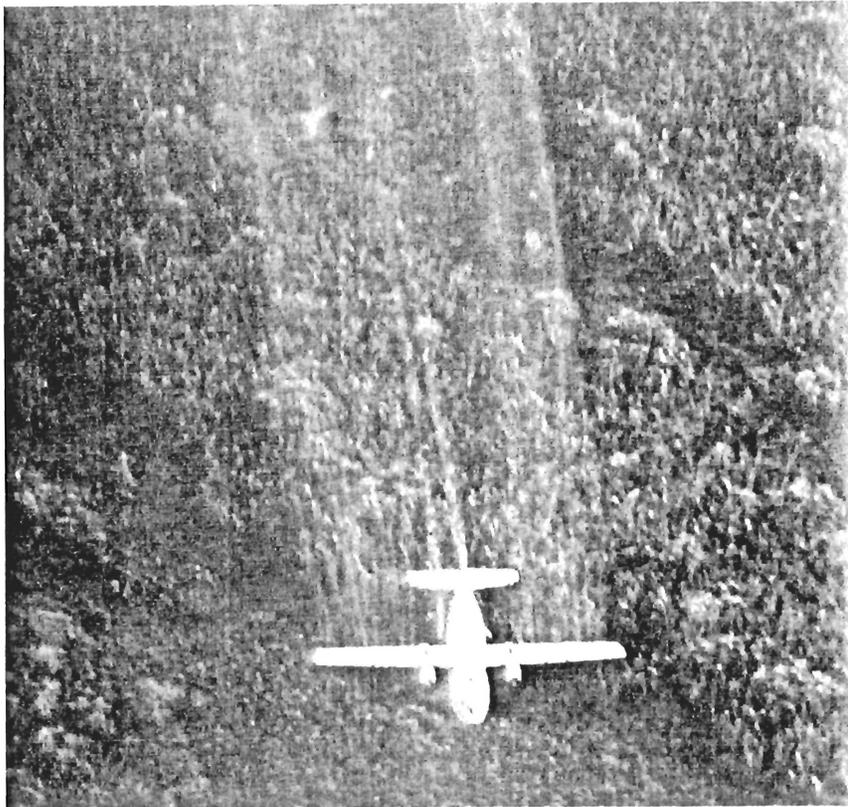


Air Force C-123B on a defoliation mission. (U.S. Air Force photo.)



Three Air Force C-123 "Ranch Hand" aircraft dispense defoliants over Vietnam jungles. (Photo by Sgt. W. A. Betts, U.S. Air Force photo.)

The Vietnam Veteran vs. Agent Orange: The War That Lingers



The use of defoliants in Vietnam deprived the enemy of jungle cover. (U.S. Air Force photo.)

An interim report (CED-78-158, Aug 16, 1978) to Congressman Metcalfe addressed the (1) extent of DOD's use of herbicides and other chemicals in South Vietnam, (2) number of military and civilian personnel exposed to these chemicals, and (3) DOD-funded studies of these chemicals' effect on health. A second report, "Health Effects of Exposure to Herbicide Orange in South Vietnam Should be Resolved" (CED-79-22, Apr 6, 1979), focused on VA's response to veterans' concerns on herbicide exposure and health effects studies of dioxin and other chemicals used in Vietnam.

In these early reports GAO concluded that VA needed a better basis for evaluating the nature of veterans' concerns about the herbicide. GAO recommended that, in evaluating herbicide-related disability compensation claims, VA obtain all military records pertaining to a veteran's possible exposure to herbicides in Vietnam and that all veterans submitting such claims be encouraged to contact VA health care facilities. GAO also recommended that DOD study, with the assistance and guidance of an appropriate interagency group, the



After defoliation, this Viet Cong trench was discovered 22 miles outside of Saigon. Note craters from earlier B-52 bombing. (U.S. Air Force photo.)

health risks involved by its personnel exposed to herbicides in Vietnam.

In response to those recommendations and the mounting public and congressional concern, VA started a registry of all Vietnam veterans examined at VA medical facilities for herbicide-related health problems. Also, the Air Force initiated a health effects study of Air Force personnel involved in operation "Ranch Hand" who sprayed Agent Orange in Vietnam. DOD believed these individuals had the greatest potential for exposure.

By the spring of 1979, veterans' complaints were flooding congressional offices. Many complaints were from ground troops in Vietnam who believed they were sprayed and had drunk from water contaminated with Agent Orange. They disagreed with DOD's contention that only "Ranch Hand" personnel had been exposed.

In May 1979, Senator Charles Percy, acting on the growing complaints of ground-troop exposure, requested GAO to determine what precautions were taken to prevent ground troops and others from exposure and whether military units were in or near areas sprayed with Agent Orange.

Used With Few Precautions

At the time DOD started using herbicides in Vietnam, they considered Agent Orange to be "relatively non-toxic to man or animals." As a result, few precautions were taken to prevent exposure. Personnel handling the herbicide were merely instructed to use safety equipment, such as gloves and face shields, and were advised to shower and change clothes if they came in contact with the herbicide. Defense officials did not prescribe additional precautions because they believed exposure of ground troops was unlikely since they did not enter sprayed areas until 4 to 6 weeks after a mission when defoliation was completed and the herbicide had biodegraded or photodegraded. However, there was no evidence of any written regulation restricting troops from recently sprayed areas.

Innovative Approaches To Determine Who Was Exposed

After an initial review of Army and GAO Review, Spring 1981

Marine Corps unit records, it was obvious that they did not contain conclusive proof of ground personnel reporting that they were sprayed by aircraft on Agent Orange missions. Thus, another approach to analyzing available data had to be developed to show whether ground troops were in or near areas sprayed with Agent Orange. An FPCD auditor who had been an Army helicopter pilot in Vietnam, a member of FPCD's systems analysis staff, and I formed a team to focus on this difficult problem.

DOD had developed a computer data base on herbicide spraying missions conducted between August 1965 and February 1971. This data base included the date, number of planes, amount of herbicide sprayed, and the location for approximately 86 percent of all herbicide operations in South Vietnam. What was missing was a data base of troop locations and strengths which could be compared with the spraying missions to estimate the number and proximity of troops to the areas sprayed with Agent Orange.

Unfortunately, Army troop records from the Vietnam conflict were neither complete nor well organized because of the Army's rapid pullout from Vietnam. Thus, a thorough reconstruction of these records was necessary to determine the locations of Army personnel who made up the majority of roughly 2.6 million people who served in Vietnam. However, a review of 31 quarterly operational reports from 13 major Army combat units located throughout Vietnam showed that 10 of the 13 units reported using Agent Orange on base camp perimeters, roads or crops, or aircraft missions in areas of operation. Undoubtedly, Army troops were close to areas sprayed with Agent Orange.

Marine Corps unit records from Vietnam proved more encouraging. Monthly Marine Corps battalion reports contained detailed information on location, strength, and personnel turnover necessary to develop a data base to compare with Agent Orange spraying missions. A random sample of monthly reports from the 24 Marine infantry battalions stationed in the I Corps, or northern section of South Vietnam, between January 1966 and December 1969 was used to compile the data base. During these 4 years, 2.18 million gallons of Agent Orange, or about 20 percent of the herbicide used in Vietnam, was sprayed in I Corps.

Using average strength and turnover figures for the sample, GAO estimated that 218,000 personnel were assigned to the 24 battalions in I Corps between 1966 and 1969.

Ground troop locations were compared with Agent Orange missions, taking into account the time and geographic proximity of battalion locations to spraying sites. Various time and distance combinations were analyzed because many variables affected an individual's potential for exposure. Different estimates exist on the life of dioxin and the drift of Agent Orange from target areas.

The four time periods used were the day the mission was conducted (day 1) and within 7, 14, and 28 days after the mission. The 28th day was significant because DOD had consistently stated that ground troops' exposure to Agent Orange was unlikely because they did not enter sprayed areas until 4 to 6 weeks afterward.

The distance criteria used were .5, 1.5, and 2.5 kilometers, or about .3, .9, and 1.6 miles from a sprayed area. (A kilometer is 0.62 miles, almost 2/3 of a mile.) Distance from a sprayed area was important because the Agent Orange sprayed from a plane often drifted beyond the target area. Drift was affected by the altitude and speed of the aircraft, the terrain of the area to be sprayed, and the climate. DOD studies showed that drift was generally less than 1 kilometer when the aircraft sprayed Agent Orange at an altitude of 150 feet, an airspeed of 130 to 140 knots, and windspeed of less than 10 knots. However, the National Academy of Sciences reported that drift had caused widespread crop damage. In fact, its study showed that crop damage resulting from drift on missions designated as defoliation was greater than that caused by crop destruction missions. Herbicide mission commanders confirmed that drift was a common problem and could extend from 1 to 2 kilometers.

Table 1 shows the estimated number of marines assigned to Marine Corps infantry battalions in I Corps from January 1, 1966, to December 31, 1969, within the various time and distance criteria from sprayed areas.

About 5,900 marines were assigned to units within 5 kilometers of areas sprayed with Agent Orange on the same day. Some of the units were directly in the path of Agent Orange spraying missions. The number of marines within .5 kilometers of sprayed

Table 1
Estimated Number of Marines Near Areas Where Agent Orange Was Used

Within kilometers of sprayed area	Within days of spraying mission	Estimated no. of marines
5	1	5,900
	7	7,600
	14	9,100
	28	16,100
1.5	1	16,500
	7	21,500
	14	25,800
	28	30,100
2.5	1	17,400
	7	23,900
	14	29,900
	28	39,400

areas before the 4-week reentry period established by DOD was about 16,100.

Thus, DOD's contention that ground troops did not enter sprayed areas until 4 to 6 weeks afterward was inaccurate, and the chances that ground troops were exposed to Agent Orange were higher than DOD previously acknowledged. Since ground troops were not included in the ongoing health effects studies, GAO recommended that the Congress determine the need for a study of the health effects of Agent Orange on ground troops likely to have been exposed, on the basis of its feasibility and value in resolving veterans' concerns over alleged health risks.

Government Tackles Agent Orange Issue

Within one month after Senator Percy released GAO's report, "U.S. Ground Troops in South Vietnam Were In Areas Sprayed With Herbicide Orange" (FPCD-80-23, Nov. 16, 1979), the President and the Congress took steps toward resolving concerns about the long-term health effects of exposure to Agent Orange.

The President appointed an Inter-agency Work Group to coordinate the Government's efforts to study the effects of Agent Orange and other herbicides. The Work Group consists of representatives of agencies already involved in this issue—DOD, VA, the Environmental Protection Agency (EPA), the Department of Agriculture, and the Department of Health and Human Services (HHS). The Work

Group has focused its attention on initiating and monitoring studies concerning whether exposure to dioxin or Agent Orange causes cancer or birth defects in children and whether exposure to Agent Orange has adversely affected the health of Vietnam veterans.

About the same time the President established the Work Group, the Congress mandated the VA to conduct an epidemiology study of veterans who were likely to have been exposed to Agent Orange in Vietnam. GAO's method of determining the proximity of troops to sprayed areas is being used by DOD to develop a population for VA's study. VA is currently contracting for the design of this study.

Conclusive Scientific Evidence of Human Health Effects Remains Elusive

There is a growing frustration among Vietnam veterans, Members of Congress, and Government officials about the Agent Orange issue. Does exposure to Agent Orange's dioxin contaminant increase one's risk of cancer, birth defects in children, and other ailments? Even the experts have trouble answering this question. The President's Work Group summarized their view on the status of scientific evaluation of Agent Orange in an August 1, 1980, report. The report stated:

Current scientific knowledge does not permit unequivocal judgments as to the health risk associated with

each of the wide spectrum of health effects alleged to have resulted from these phenoxy acids or their dioxin contaminants.

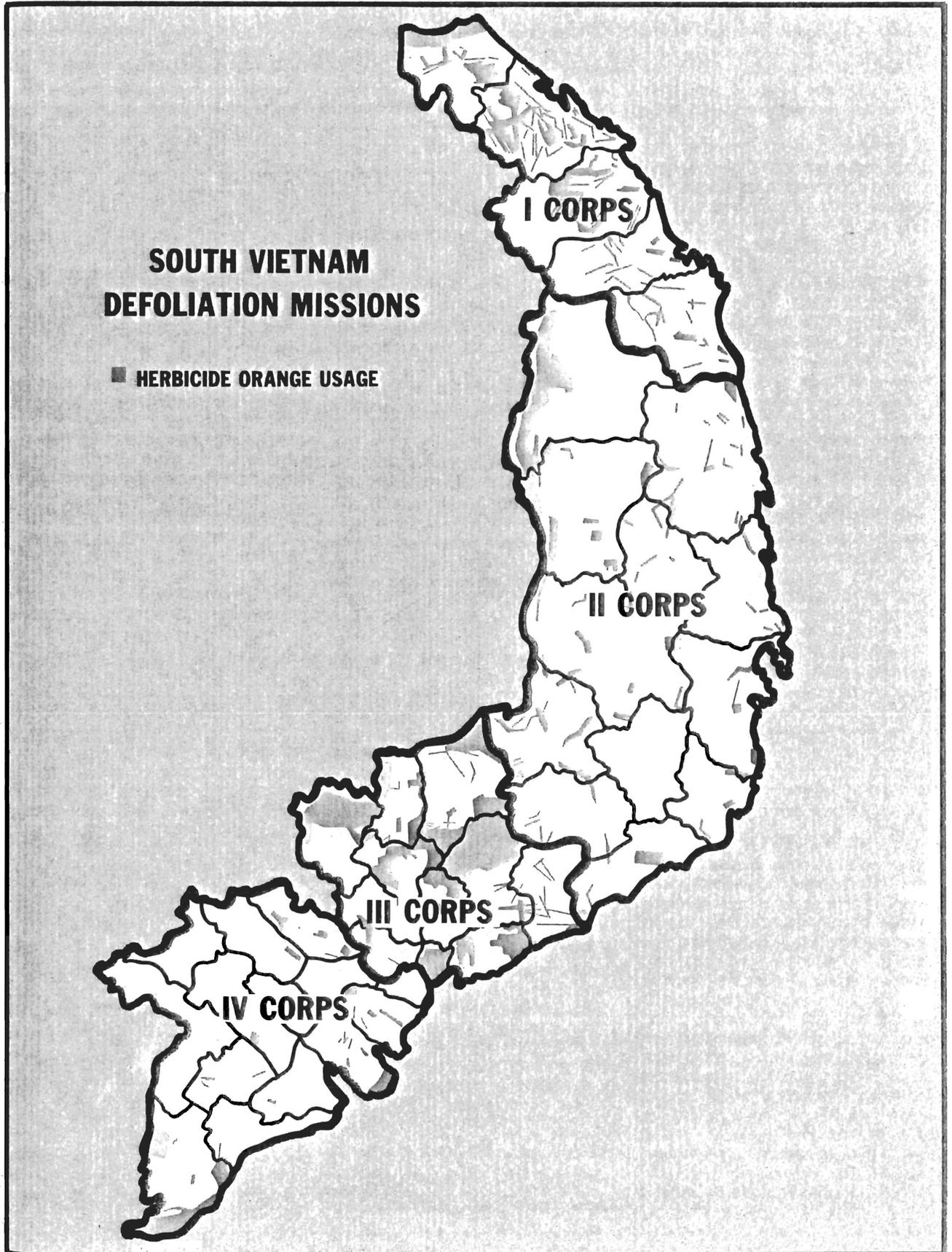
For years scientists have examined the physiological effects of chemicals, including those in Agent Orange, on animals. Most believe animal studies are helpful in suggesting the potential for toxic actions of chemicals in humans. The Food and Drug Administration and EPA make extensive use of animal studies in assessing the risks of chemicals on human health.

Animal studies of the effects of 2,4-D, 2,4,5-T and TCDD (dioxin) have shown a variety of health problems. In mice, rats, rabbits, and hamsters, small doses of dioxin cause cancer, birth defects, liver malfunctions, skin rashes, immune system failure, and enzyme changes.

However, many scientists and Government officials believe that the only way to reach definite conclusions about the effects of Agent Orange on humans is through studies of exposed human populations. These types of studies, known as epidemiology studies, deal with the relationships of the various factors which determine the frequency and distribution of illness and diseases. Although epidemiology studies of Vietnam veterans exposed to Agent Orange are just getting underway, there are completed studies of workers exposed to the chemicals in Agent Orange during their manufacture or use. However, results of these studies conflict.

A study funded by the Monsanto Company on the mortality rates of workers exposed to TCDD in an accident at its Nitro, West Virginia plant in 1949 showed that there were fewer deaths among exposed workers than in individuals of the same age and sex in the U.S. population. Also, worker death rates from cancer were not increased.

However, more recently several European studies of railroad workers exposed to constituents of Agent Orange show a correlation between exposure and an increased risk of cancer. Also, Dr. Ton-That Tung, a Vietnamese physician and scientist, has reported a higher incidence of liver cancer among exposed Vietnamese populations, and a higher incidence of abortions and birth defects among exposed women. Unfortunately, the validity of this data cannot be confirmed due to lack of access to Vietnam.



m of health
sulted from
their dioxin

examined
chemicals,
Orange, on
nal studies
e potential
emicals in
g Adminis-
isive use of
the risks of
1.
ects of 2,4-
oxin) have
problems. In
sters, small
ncer, birth
skin rashes,
nd enzyme

s and Gov-
iat the only
onclusions
Orange on
of exposed
e types of
ology stud-
hips of the
ermine the
n of illness
idemiology
is exposed
st getting
leted stud-
the chemi-
uring their
ver, results

Monsanto
ty rates of
in an acci-
nia plant in
were fewer
orkers than
ge and sex
iso, worker
were not

tly several
ad workers
of Agent
on between
sed risk of
at Tung, a
d scientist,
ence of liver
Vietnamese
ncidence of
ects among
nately, the
ot be con-
access to

Although most attention has been focused on Agent Orange, some scientists now believe that it may be only one of a variety of potentially toxic chemicals to which American servicemen were exposed. In its April 1979 report, GAO acknowledged that other chemicals used in Vietnam may pose health problems. While the toxic potential of some of these substances is known, no studies have been done of the synergistic or combined effects of the so-called "toxicological cocktail" which existed in Vietnam. Some of these chemicals were

- *Cacodylic acid*: An arsenic-based component of Agent Blue used on base camp perimeters is under renewed EPA investigation because of its potential for causing cancer.
- *2,4-D*: A herbicide used in Agent Orange and Agent White has been linked by some animal tests to cancer and reproductive disorders. EPA has requested more tests on its effects. The National Park Service recently suspended the use of 2,4-D in all national parks until more is known about its human health risks.
- *DDT*: A pesticide used for mosquito control was banned by EPA in 1972 for most domestic uses.
- *Chlordane*: A pesticide used for termite control was banned for most domestic uses by EPA in 1975 after being found to cause cancer in test animals.
- *Dapsone*: An experimental anti-malarial drug given to many combat troops to ward off a resistant strain of malaria. Studies show this drug to be a potential carcinogen in male laboratory rats.

Recognizing veterans' health problems may be related to exposure to a variety of chemicals, including Agent Orange, the President's Work Group recommended that scientific studies focus on whether service in Vietnam, rather than solely Agent Orange exposure, may have caused Vietnam veterans to suffer certain health problems. The Senate Veterans Affairs Committee endorsed this recommendation and urged VA to broaden the planned epidemiology study to consider service in Vietnam as the causal factor of veterans' illnesses. VA will explore this possibility in planning the study design.

When will we be able to draw conclusions about the effects of Agent Orange and other chemicals on veterans' health? The Work Group

believes that, while the results of several studies of workers exposed in industrial accidents will soon be available, it may be 2 or 3 years before the preliminary results are in on studies of Vietnam veterans. This conclusion is hardly comforting to the large number of Vietnam veterans concerned about their health.

Veterans Take Chemical Companies to Court

In January 1979, a class action suit was filed in Federal District Court in New York on behalf of veterans and their families who suffer health problems they attribute to Agent Orange exposure. The veterans in the suit are asking that a trust fund be created to reimburse the Government for the compensation and care of all veterans and their children injured by dioxin. The fund, which could reach billions of dollars, would be administered by the court and financed by the chemical companies who manufactured Agent Orange. The five chemical companies named as defendants are the Dow Chemical Company, the Monsanto Company, the Thompson Hayward Chemical Company, Hercules, Inc., and the Diamond Shamrock Corporation.

In what has been called the largest product liability suit in history, the veterans claim that the chemical companies knew that Agent Orange was highly dangerous, but failed to warn either DOD or servicemen who might be exposed. The defendants have denied all liability, claiming that the herbicides they sold to the military posed no danger to human health.

Recently, the manufacturers asked that the U.S. Government be named as a defendant, because any harm caused by Agent Orange was due to the military's misuse of an otherwise safe product.

Although a three-judge panel of the Circuit Court of Appeals dismissed this suit in November 1980 on procedural grounds, the veterans are likely to appeal this decision, extending this case for many years.

What Is VA Doing Until Scientific Answers Become Available?

In testimony before the Subcommittee on Oversight and Investiga-

tions of the House Interstate and Foreign Commerce Committee on September 25, 1980, VA Administrator, Max Cleland, reaffirmed the agency's policy on the Agent Orange controversy:

I cannot state in strong enough terms that in the interim, it has been and will continue to be the stated policy of the Veterans Administration that no eligible veteran will be denied medical care and treatment by the VA because the answers are not in. Our goal remains to provide compassionate and understanding service. This is a responsibility that we take very seriously.

VA has participated in several activities on the Agent Orange issue. In April 1978, VA established an advisory committee to exchange information on Agent Orange and its potential health effects, and to advise VA on future courses of action. This advisory committee, composed of representatives of various Government agencies, veterans' organizations and academia, is still active.

VA has also participated in the efforts of the President's Work Group to coordinate Federal research efforts and other activities regarding the possible health effects of herbicides such as Agent Orange.

The focal point of VA's effort to assist veterans is the Agent Orange registry initiated in 1978. The purpose of the registry is to identify veterans who are concerned about possible health effects resulting from exposure to Agent Orange, and to gather baseline medical information on individual veterans who might later develop illnesses which could be related to herbicide exposure. This information is obtained from a questionnaire and medical history, a physical examination, and a set of basic laboratory tests. While the registry was not intended to serve as a research study, it should give scientists some idea about the symptoms Vietnam veterans are experiencing.

However, the registry has been the target of a growing number of veteran complaints that VA is not keeping their pledge to provide thorough medical care and treatment until scientific answers are available. Many veterans allege that they have to wait months for examinations, that they are treated with contempt by VA physicians and staff, that the examinations are not thorough, that the physicians fail to

provide adequate treatment and followup of diagnosed symptoms, that medical records are falsified, and that VA just does not care about them.

Veterans are also critical of VA for denying most disability compensation claims related to Agent Orange. VA has denied most claims because it believes there is insufficient evidence that the claimed disabilities were incurred during the veterans' service as a result of exposure to Agent Orange. This situation is likely to continue until more scientific evidence on the long-term effects of herbicide exposure on veterans becomes available.

A final criticism of VA is that it has failed to undertake an outreach program to inform veterans of the potential hazards of herbicide exposure and the availability of a physical exam and treatment at VA medical facilities.

Once again Members of Congress have requested GAO to continue its work on the Agent Orange controversy and review complaints about VA's response to concerned veterans.

The Social Policy Decision

It is now 3 years since the Agent Orange controversy began, and many believe answers are still years away. There is a growing realization that it may not be possible to determine how much Agent Orange or other toxic chemicals a veteran was exposed to in Vietnam, and there may never be conclusive scientific evidence on the long-term effects of exposure on human health.

Ultimately, this complex and controversial matter is likely to become a social policy issue that only the Congress and the President can resolve. This decision will require judgments on several key factors. What constitutes fair treatment of veterans while scientific data is being gathered? How much evidence is necessary to prove or disapprove adverse health effects and a veteran's right to disability compensation? Who bears the burden of proof of adverse health effects as a result of Agent Orange exposure—the veteran or Government? And finally, what must the Government do to uphold the immortal words of Abraham Lincoln which serve as VA's motto—"To care for him who shall have borne the battle and for his widow and his orphan"?