Agent Orange Exposure and Attributed Health Effects in Vietnam Veterans

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ABSTRACT Serum dioxin studies of Vietnam (VN) veterans, military historical records of tactical herbicide use in Vietnam, and the compelling evidence of the photodegradation of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and other aspects of environmental fate and low bioavailability of TCDD are consistent with few, if any, ground troop veterans being exposed to Agent Orange. That conclusion, however, is contrary to the presumption by the Department of Veterans Affairs (DVA) that military service in Vietnam anytime from January 9, 1962 to May 7, 1975 is a proxy for exposure to Agent Orange. The DVA assumption is inconsistent with the scientific principles governing determinations of disease causation. The DVA has nonetheless awarded Agent Orange–related benefits and compensation to an increasing number of VN veterans based on the presumption of exposure and the published findings of the Institute of Medicine that there is sufficient evidence of a "statistical association" (a less stringent standard than "causal relationship") between exposure to tactical herbicides or TCDD and 15 different human diseases. A fairer and more valid approach for VN veterans would have been to enact a program of "Vietnam experience" benefits for those seriously ill, rather than benefits based on the dubious premise of injuries caused by Agent Orange.

INTRODUCTION

For 4 decades, controversy has surrounded the use of tactical herbicides, i.e., herbicides developed by the U.S. Department of Defense (DoD) for use in military operations in Southeast Asia. These tactical herbicides are generally distinct from commercial herbicides in a number of important ways, including their formulation, concentration, and in most circumstances in the equipment used for application. Few environmental or occupational health issues have received the sustained international attention that has focused on the tactical herbicide known as "Agent Orange" and its associated dioxin contaminant. The DoD controlled all military operations involving the use of tactical herbicides. Accordingly, in 2002 the senior author of this article was commissioned by the Office of the Under Secretary of Defense (Installations and Environment) to provide documentation on the history, use, disposition, and environmental fate of Agent Orange and its associated dioxin. This effort resulted in the publication of a book and numerous reports, as well as two workshops conducted in Vietnam with Vietnam's Ministry of National Defense in August 2005 and June 2007.[1–5] In addition to reviewing thousands of DoD's records, the authors were able to review records archived by other Federal Agencies. The authors also were able to review records of various chemical companies that provided expertise during and after Defoliation Conferences held in July 1963, August 1964, and August 1965, as well as publicly available records, particularly those based on the work of the National Institute for Occupational Safety and Health, and of the manufacturers of the tactical herbicides used in Vietnam.[1]

BACKGROUND ON THE USE OF TACTICAL HERBICIDES IN SOUTH VIETNAM

Five nations provided military forces to support the Republic of South Vietnam (South Vietnam) from 1961 through March 1973. Australia and New Zealand deployed 46,852 military personnel, the government of Thailand contributed 11,790 military personnel, the Republic of Korea sent 312,853 military personnel, and 2,644,000 military personnel from the United States served within the borders of South Vietnam.[6]

With the full concurrence and support of the South Vietnamese government and military, the U.S. Army's Chemical Corps from Fort Detrick, MD, evaluated various herbicide formulations in 1961.[1] Subsequently, on January 1962, the United States Air Force (USAF) initiated Operation RANCH HAND, using fixed-wing aerial application from UC-123 aircraft.[7] Operation RANCH HAND aircraft applied 95% of the tactical herbicides sprayed in Southern Vietnam, whereas helicopters and ground equipment of the Army Chemical Corps sprayed the remaining 5%, primarily on base perimeters and other limited targets.[1,8] The barrels of herbicides were color-coded to facilitate identification. Thus, the code names Orange, Blue, White, Pink, Green, and Purple were used to differentiate between different tactical military formulations, with Orange being the most widely used (Table I).

Only the U.S. Army Chemical Corps and USAF Logistics Command were authorized to purchase tactical herbicides, and only the Army Chemical Corps and USAF Operation RANCH HAND were authorized to spray these tactical herbicides in Vietnam. However, many commercial pesticides, including commercial herbicides, were used on U.S. and

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TABLE I. Estimated Quantities of Tactical Herbicides Used in Vietnam, 1961–1972[a]

Tactical Herbicide	Components	Number of Drums[a]	Number of Liters	Years of Use
Green[b]	2,4,5-T	365[c]	75,920	1962
Pink[b]	2,4,5-T	1,315	273,520	1961–63
Purple[2]	2,4-D; 2,4,5-T	12,475	2,594,800	1962–65
Blue	Cacodylic Acid	29,330	6,100,640	1966–72
White	2,4-D; Picloram	104,800	21,798,400	1966–72
Orange[b]	2,4-D; 2,4,5-T	208,330	43,332,640	1965–70
Total		356,615	74,175,920	

2,4-D, 2,4-Dichlorophenoxyacetic acid. [a]Data based on U.S. Defense Supply Agency and Air Force Logistics Command records. Data as of March 2008. [b]These tactical herbicides contained 2,4,5-T and its trace contaminant, 2,3,7,8-TCDD. The most recent data from the analysis of 1,083 samples of Agent Orange or archived 2,4,5-T established the mean concentration of TCDD in Agent Orange as 1.88 ppm, and the total amount of TCDD released in Vietnam was between 130 kg and 144 kg before photodegradation. [c]All herbicide drums sent to Vietnam were of 18-guage steel and held 208 liters or 55 gallons of product in concentrated, undiluted form.

Allied Bases in Vietnam for purposes of routine maintenance of Bases. These commercial pesticides were purchased under Federal Specifications, and their uses were regulated by the Armed Forces Pest Control Board.[2]

The Civil Engineering units assigned to U.S. and Allied Bases were responsible for acquisition and certified use of commercial pesticides. These units were not authorized to use the tactical herbicides Orange, White, or Blue. This distinction between tactical and commercial herbicides has been a continuing source of misunderstanding by the general public, Vietnam (VN) veterans, the Department of Veterans Affairs (DVA), and the Vietnamese.[1,2] Detailed policies and procedures for approval and execution of tactical spray missions by RANCH HAND crews ensured that friendly forces were not in the areas targeted for spraying.[9] One frequent misconception regarding summary statistics on the application of tactical herbicides in Vietnam is that all of the dioxin (2,3,7,8-Tetrachlorodibenzo-p-dioxin or TCDD) in the case of Agent Orange, and other herbicides containing trace amounts of TCDD, ended up as a contaminant to the environment. TCDD in the environment has very low bioavailability and even if ground troops came into sprayed areas, absorption was very unlikely. In addition, nearly 90% of the dioxin contaminant released would have been destroyed by photodegradation before it ever reached a place where ground troops might have had an opportunity to come in contact with it.[1]

In addition to commercial herbicides used in Vietnam, large quantities of insecticides, especially malathion, were sprayed initially by helicopters, but later by aircraft from the RANCH HAND unit. The deployment of major U.S. combat forces into South Vietnam beginning in 1965 found them susceptible to the disease-ridden conditions, specifically malaria, they encountered. In late 1966, USAF directed that one of the UC-123 herbicide-spray planes be modified to an insecticide-spray configuration to counter the Anopheles mosquito (Operation FLYSWATTER). By March 1967, a second RANCH HAND aircraft was reconfigured to spray insecticide. From 1967 through 1972, these "Silver Bug Birds" routinely sprayed malathion insecticide over 14 bases and their adjacent South Vietnamese cities; and by 1970, the respray interval had been reduced from every 14 days to every 9 days.[10] The frequent anecdotal reports of UC-123s directly spraying troops in Vietnam with herbicides likely reflected RANCH HAND's support of Operation FLYSWATTER.[10] On October 31, 1971, all tactical herbicide activities under U.S. control were terminated. The remaining inventories of White and Blue herbicide were expended by tactical operations in 1972 by the Vietnamese Air Force using the few remaining in-country UC-123 aircraft.[1] The remaining amounts of Agent Orange were removed from Vietnam in April 1972 in Operation PACER IVY and stored on Johnston Island, Central Pacific Ocean.[1,2]

THE PUBLIC AND GOVERNMENT RESPONSE

The first media reports about the use of tactical herbicides in Vietnam concerned a petition by the American Association for the Advancement of Science in 1967 urging the DoD to stop the use of tactical herbicides in Vietnam, primarily on the basis of ecological effects.[11] In October 1969, a White House Science Advisory Committee reviewed the results of a study by the Bionetics Research Laboratories of Bethesda, MD, that had been commissioned by the National Institutes of Health, and described the teratogenicity in laboratory mice exposed to massive doses of the herbicide 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), a component of Agent Orange. A subsequent analysis revealed that a contaminant, 2,3,7,8-TCDD, was the cause of the toxicity, and 2,4,5-T in itself was not teratogenic.[11] The White House Science Advisory Committee concluded that the use of 2,4,5-T represented a potential risk to human health that outweighed the benefits of its use domestically or by the DoD in Vietnam.[12] On April 15, 1970, the Secretaries of the Department of Health, Education, and Welfare, the Department of Agriculture, and the Department of the Interior announced the immediate suspension of all uses of 2,4,5-T herbicide, except for registered applications on noncrop lands such as ranges and pastures.[12] The Secretary of Defense followed their lead and announced, "The Department of Defense will temporarily suspend the use of 2,4,5-T in all military operations pending a more thorough evaluation of the situation."[13]

In 1977, the USAF disposed of the remaining inventories of Agent Orange in Operation PACER HO. At about the same time, veterans of Vietnam service began to complain of health problems that they believed resulted from exposure to Agent Orange while on duty in Vietnam.[11] The basis was press reports related to TCDD following the 1976 massive exposure from an industrial accident in Seveso, Italy, and the continued concern over the domestic use permitted by the U.S. Environmental Protection Agency.[11] In 1978, with the help of a reporter from CBS, the issue of Agent Orange and its possible impact on veterans' health was widely disseminated

to veterans and to the general public in a television documentary entitled "Agent Orange, Vietnam's Deadly Fog."[14] A special presentation was given to the Congress of the United States.[11] Attempts by the scientific community to refute the inaccuracies of the documentary failed to correct the record and simply aroused suspicions of a cover-up within the veteran community.[1,11]

The perception that government has done little to resolve whether Agent Orange, its associated dioxin, or other causes were responsible for the many health problems in the VN veteran population is not based on fact. President Ronald Reagan elevated the issue of Agent Orange to a unit in the Executive Office of the President by forming "The Agent Orange Working Group" (AOWG).[1] The AOWG was "… to guide and monitor all Federal research into the possible adverse health effects of Agent Orange and similar chemicals on humans, with a particular focus on the health of VN veterans."[1]

The AOWG undertook a massive effort encouraging, supporting, and monitoring studies conducted by Federal Agencies and the international community (particularly Australia and New Zealand). Between 1979 and 1990, U.S. Federal Departments and Agencies committed vast sums of research funds and scientific expertise in addressing the health effects that were allegedly caused by exposure to Agent Orange. More than 50 major health studies, many involving VN veterans and applicators of commercial herbicides, were conducted and reported.[1] These studies failed to substantiate higher rates of mortality (except by suicides and accidents) from soft tissue sarcomas, Hodgkin's disease, non-Hodgkin's Lymphoma, or testicular cancer among VN veterans.[15] Even a study of the health status of a self-selected group of 104,000 VN veterans who had participated in the Agent Orange Registry between 1982 and 1988 and who claimed to having been exposed to Agent Orange failed to find significant differences in prevalence for any cancer site compared to veterans who did not serve in Vietnam.[16] The dilemma for AOWG was that many of the study results should have been viewed by the Veteran community as "good news," but the question of health effects of herbicide exposure remained shrouded in controversy and mistrust. In addition, when exposures of most Vietnam service personnel to herbicides could not be specifically documented, a presumption was established by the DVA that all those who set foot on Vietnam soil were exposed to Agent Orange.

CURRENT SITUATION

Ignoring the outcome of the extensive research conducted by the Federal Agencies throughout the 1980s, while acknowledging the demands and concerns of VN veterans, the U.S. Congress passed Public Law 102-4, the "Agent Orange Act of 1991." This legislation directed the Secretary of the DVA to request that the National Academy of Sciences' Institute of Medicine (IOM) conduct a comprehensive review and evaluation of available scientific and medical information regarding the health effects of exposure to Agent Orange, the other tactical herbicides used in Vietnam, and their components, including the TCDD contaminant.[17] In February 1992, the IOM signed an agreement with DVA to review and summarize the strength of the scientific evidence concerning the statistical association (not causation) between herbicide and/or dioxin exposure during Vietnam service and each disease or condition suspected to be associated with such exposure.[17] Additional mandates were included in the agreement, including making recommendations on the need for additional scientific studies. To carry out the tasks, the IOM established "The Committee to Review the Health Effects in Vietnam Veterans of Exposure to Herbicides," a committee that was to act independently of the DVA and other government agencies. Although the makeup of the Committee has changed over the years (1992 to the present), it has been composed almost exclusively of academic scientists trained in medicine or related fields (versus governmental or academic scientists trained in agriculture or forestry), most without experience or knowledge of either the agricultural or forestry use of herbicides, or what actually occurred with their use in Vietnam. Evidence of the DoD commitment to the development and evaluation of safe tactical herbicides and the historical military records of their controlled use in the Vietnam War, which are central to the issue of exposure, have been largely ignored by the IOM.

The results of IOM comprehensive reviews of occupational, environmental, and veterans' studies conducted over the past 16 years have been provided periodically to the Secretary of Veterans Affairs, together with an extensive list of IOM's findings "regarding the association between specific health problems (illnesses) and exposure to herbicides".[17] IOM has not provided evidence or findings of the Veterans likely levels of exposure to or absorption of herbicides or 2,3,7,8-TCDD. Indeed, the IOM's reports of linkages between herbicides or TCDD and human disease are based not on causality, but on "statistical association." The term "statistical association" was not defined, but was interpreted by IOM committees as evidence of an increased risk in as little as one study for which bias, confounding and chance could be reasonably dismissed without weighing contrary or conflicting evidence. In fact, most evidence of association is derived from populations highly exposed to TCDD or herbicides in manufacturing or accident situations rather than in veteran populations.[17]

In addition, the U.S. courts that have considered Agent Orange injury claims have consistently held that the evidence presented was insufficient to establish that VN veterans were injured by their alleged exposure to Agent Orange in Vietnam. Most recently, the U.S. District Judge who has presided over the Agent Orange litigation for the last 23 years, Judge Weinstein, reaffirmed that conclusion when he observed that, "the scientific basis for that conclusion of lack of any substantial proof of causality, either general or specific to individuals, remains much the same" (in re "Agent Orange" Product Liability Litigation, 304 F. Supp.2d 404, 407 (E.D.N.Y. 2004).

Based upon the IOM reports, the various Secretaries of Veterans Affairs have presumed that all military personnel who served in Vietnam were exposed to Agent Orange and

other tactical herbicides. Thus, Federal policy now presumes that certain illnesses are a result of those exposures, making VN veterans eligible for associated compensation and health care. The diseases that the DVA currently associates with Agent Orange exposure include: acute and subacute peripheral neuropathy, AL amyloidosis, chloracne (or similar acneform disease), chronic lymphocytic leukemia and B cell leukemias, diabetes mellitus (Type 2), Hodgkin's disease, ischemic heart disease, multiple myeloma, non-Hodgkin's lymphoma, Parkinson's disease, porphyria cutanea tarda, prostate cancer, respiratory cancers, and soft tissue sarcoma. Spina bifida in offspring of VN veterans is also compensated (http://www.publichealth.va.gov/exposures/agentorange/diseases.asp).

CONSEQUENCES OF THE IOM REPORTS AND VA PRESUMPTIONS

The DVA now receives annually approximately 15,500 requests from VN veterans for participation in the Agent Orange Registry Examination Program.[18] Each such participant becomes eligible for compensation and health care for those diseases on the Department's Agent Orange list of presumptive disabilities. The indications are clear; if a VN veteran has any of the disabilities or diseases associated with Agent Orange exposure, then that veteran receives financial compensation and health care regardless of the actual cause of that disease. This is so even though the IOM has acknowledged that the evidence on which its conclusions on health outcomes are based comes primarily from studies of people exposed to TCDD or herbicides in occupational and environmental settings, rather than from studies of VN veterans. Moreover, the IOM admitted that the available quantitative and qualitative evidence about herbicide exposure among various groups studied suggested that VN veterans as a group had lower exposure to the herbicides and TCDD than the subjects in many occupational and environmental studies.[17] The expense of the veteran's program is enormous. The DVA recently added Parkinson's disease, ischemic heart disease, and certain leukemias to its list of Agent Orange–related diseases and said in its most recent notice in the Federal Register, in which the cost of doing so is reported:

> "We estimate VBA's [the Veterans Benefits Administration] total cost to be $13.4 billion during the first year (FY2010), $24.3 billion for five years, and $39.7 billion over ten years" (75FR14394).

The recent IOM Report on the presumptive disability decision-making process noted:

> "Both prostate cancer and type 2 diabetes illustrate situations in which the contribution of military exposures should be assessed against a background of disease risk that has other strong determinants: age in the case of prostate cancer and family history and obesity in the case of type 2 diabetes. For both…the magnitude of the relative risks observed for pesticide exposure implies that the contribution of military exposures is likely to be small in comparison to those of other contributing factors."[18]

It has become increasing obvious that in many cases the evidence of association is quantitatively and qualitatively far below the level of proof needed to support a finding of causation. The DVA has erred in deciding to compensate when the evidence is insufficient to establish that exposure can and did cause the veteran's illness. In the same IOM report on presumptive disability, the Committee recommended a change in the approach used for Agent Orange as future assessments of disability are evaluated:

> "The Committee recommends a two-step approach for evaluation of scientific evidence on exposures of military personnel and risks to health. The first step is to determine the strength of evidence in support of causation and to classify the strength of the causal classification. The second step is to describe the magnitude of the disease burden caused by the exposure in a specific group of veterans." (IOM 2008, p. xii)

Indeed, we are now experiencing the impact of a "phantom Agent Orange" in which some VN veterans have come to the misguided conclusion that all their health problems are related to this cause. This failure has occurred because both the IOM and the DVA have failed to examine fully the totality of the historical records of the use of tactical herbicides in Vietnam, and to understand the science associated with the distribution and environmental fate of the phenoxy herbicides and the associated TCDD contaminant. Instead they contracted for a study of exposure opportunity, which might provide some indication of the potential for exposure, but is severely flawed.[19–21] The IOM's endorsement of the flawed exposure opportunity model has unfortunately permitted what is at best a measure of exposure possibility to be widely misinterpreted as an estimation of actual exposure. A more complete examination of the historical records and the science leads to a very different assessment.

REVIEW OF THE HISTORICAL RECORDS

During the Vietnam conflict, the RANCH HAND operation, initially a 3-plane flight of the 309th Air Commando Squadron and later a squadron (the 12th Air Commando Squadron) of over 20 aircraft, kept higher headquarters agencies apprised of their operations through a Daily Air Activity Report (DAAR).[7] These reports detailed most, but not all, the elements of each spray mission flown, including number of effective aircraft, type and amount of herbicide expended, Universal Transverse Mercator grid coordinates of only the lead aircraft spray track, and information concerning aborts, hits taken, and target area weather. The J3 Chemical Office at the Military Assistance Command, Vietnam, Headquarters entered these data into a logbook that, in 1970, was converted into a computerized program called the Herbicide Reporting System, the oft-cited

HERBS Tape.[7] However, as noted by Christian and White,[22] "To use military records created for combat purposes in an entirely new and complex manner, e.g., for epidemiological studies, may not be accomplished within the capabilities of the existing records."

Although the HERBS Tape may have some uses that do not rely too heavily on precise data for the spray missions, the Tape contains data generated over several years by different personnel and undoubtedly contains errors of fact, is missing some records (particularly pre-1966), and does not include certain critical mission information. The original HERBS Tape was "updated" by subsequent researchers using project planning documents, "imputing" likely flight paths for missing information by using target planning documents, or simply by dropping entries that appeared to have errors.[19] A data quality analysis by the MITRE Corporation in 1971 of an earlier "cleaned up version" found 2% of the records had missing data, 6% serious transcription or measurement errors, and that 25% of the records with complete track data resulted in a spray "track length that is in error by 50%." In 2006, the junior author of this article cross-checked the current cleansed HERBS Tape against the available original DAARs and still found transcription and interpretation errors.[1] For example, of the 310 verifiable fixed-wing entries in January 1967, 14.2% contained entry errors of some kind, and the quantities of herbicides reported sprayed (432,655 gallons) exceeded by 19,360 gallons the amount reported issued (413,295 gallons). Although the early databases developed during the Vietnam War and before the computerization of records that is in place today may be useful for some purposes, they may not be useful for precise determinations, such as estimating exposure from exact spray locations in relation to troop locations.[1,22] On the other hand, when the entire corrected HERBS Tape (re-titled by Cecil as "RANCH HAND Revised Tape"[1]) was cross-checked against the available original DAARs, against the chemical supply reports in the 315th Wing historical records, and against the DoD herbicide purchase reports and PACER HO destruction data, quantitative differences were insignificant and essentially in agreement with the Table I.

Furthermore, various attempts to develop an exposure index model have failed to take into account the procedures actually used during the spray operations.[8,19] Mission reports did not give details such as formation alignment or multiple passes, nor did exposure model creators address the issue of mixed-load formations. As a result, the exposure models are based on some misleading assumptions concerning spray procedures, mission documentation, and the resultant spray areas.[20,21] Ironically, the exposure models fail to take into account critical information concerning the temperature, wind speed, and wind direction data recorded for every mission.

Most important to the issue of exposure, these researchers have ignored the role of command directives that prohibited fixed-wing herbicide operations when and where Allied personnel were present on the ground.[8,9,19] The actual purpose of the directives was to avoid friendly fire casualties because of fire from the escorting fighters. It is also evident from historical records that Allied soldiers were not present in the areas being sprayed. "Free Fire" zones were mandatory for RANCH HAND. All units that could possibly have troops in the target area were notified of the mission parameters during the planning stages to insure the areas were clear of friendly forces. Then, immediately before each mission the Forward Air Controller (FAC) responsible for the geographical area made an aerial survey to see that it was clear; and finally, just before RANCH HAND descended to start spraying, the FAC had to contact by radio the appropriate Direct Air Support Center to check for any last minute troop movements into the planned spray area.[1,7,9] Compliance with these policies is reflected in the existing RANCH HAND abort records. These records verify that when friendly forces were reported in areas targeted for spraying, the missions were aborted and the cause cited as a result of "friendly forces in the area" or "free fire zone not approved."[1] The costs and man-hours associated with rescheduling and recoordinating the lost spray missions were substantial (they directly involved 3 to 4 and occasionally as many as 12 spray planes, at least 1 FAC, and 4 to 8 escort fighter aircraft), but were acceptable in order to avoid any possibility of "friendly fire" casualties. Significantly, in the history of the RANCH HAND operation, no U.S. Army findings were recorded of "friendly fire" deaths or injuries to ground personnel as a direct result of fixed-wing spray operations.[7,9] Although the actual purpose of the directives was to avoid injury as a result of fire from the escorting fighters, it is also historical evidence that Allied soldiers were not present in the areas being sprayed.

REVIEW OF THE ENVIRONMENTAL FATE OF TCDD

In 2004, a team of professors affiliated with six universities and knowledgeable about the environmental fate of dioxin and phenoxy herbicides and the military use of Agent Orange in Vietnam published three articles[9,23,24] addressing the question, "Does our knowledge about the environmental fate of Agent Orange and TCDD support the conclusions that ground troops could have been contaminated, if not by direct exposure, perhaps by entering previously sprayed areas?" They concluded that the prospects of exposure to TCDD from Agent Orange in ground troops in Vietnam was unlikely in light of the environmental dissipation, low bioavailability, the protection by overhead canopy, the properties of the herbicides, and circumstances of application that occurred. Indeed, the only appreciable accumulation of TCDD in serum was found in veterans of Operation RANCH HAND and the Army Chemical Corps, who were subjected to repeated, long-term, direct skin contact with the liquid herbicide during the course of their duties applying Agent Orange in Vietnam.[25] Serum TCDD analyses beginning in the late 1980s and 1990s failed to produce evidence of exposure to other veterans who served in areas of Vietnam where Agent Orange had been sprayed.[26,27] These studies suggest neither the soldier 1 hour and 1 kilometer away from a RANCH HAND mission, nor the soldier

30 days and 5 kilometers away were likely to absorb any significant quantity of TCDD from Agent Orange. Further, the failure to detect TCDD in sprayed areas supports the loss to photodegradation.[28] TCDD detected in soil is limited to areas where storage and handling occurred and spills to soil prevented photodegradation.[5,23] Thus, historical and environmental data are consistent with results of serum TCDD analyses and further call into question assumptions of exposure to Agent Orange.

CONCLUSION

The postwar question asked was HOW IS AGENT ORANGE to blame for illnesses in VN veterans. The question should have been WHAT IS THE CAUSE of illness among VN veterans. The extensive medical and scientific studies of Agent Orange over the past 35 years tell us that very few veterans had contact with Agent Orange, and hence exposure, unless their jobs required them to actually handle the herbicide, e.g., the Army Chemical Corps. They also show that even those with measurable exposure (via serum TCDD analysis) have not suffered the diseases identified by the IOM and presumed by the DVA. But we should also acknowledge that many VN veterans do appear to be at risk for a range of diseases and health problems due to the "Vietnam experience" as a whole.[27] In hindsight, instead of artificially focusing on Agent Orange as a means of providing compensation, we could have been fairer and more generous to all VN veterans with a program of "Vietnam experience" benefits, which would include medical treatment and possibly some compensation, rather than Agent Orange medical benefits and compensation for specific diseases. The current situation of identifying studies to "link" more diseases to Agent Orange compromises important scientific principles in the process and sets a precedent of unwisely spending massive resources that favor neither the veterans as a group nor the Nation.

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