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**HOUSE OF REPRESENTATIVES:      Committee on Governmental Reform**

**SUBCOMMITTEE:      National Security, Veterans Affairs, and International Affairs**

**HEARING:      Air Force Ranch Hand Study on the Health Effects of Agent Orange**

**DATE:      15 March 2000**

**TESTIMONY BY:      R.W. Trewyn, Ph.D.  
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Two major problems exist with regard to health effects studies of Vietnam veterans: (1) scientific problems and (2) administrative problems. Both of these difficulties are alluded to in the GAO report of December 1999 entitled "Agent Orange: Actions Needed to Improve Communications of Air Force Ranch Hand Study Data and Results." However, the severity of the problems is not fully delineated, especially in the case of the scientific shortcomings.

The scientific deficiencies can be illustrated most effectively by first addressing some general issues, prior to discussing the Ranch Hand study specifically and then mentioning some additional problems with the congressionally mandated study of Army Chemical Corp workers. The basis for the scientific deficiencies can be best described in relationship to the following three hypotheses: (1) Vietnam veterans are suffering from excessive, service-connected health problems. (2) Herbicides sprayed in Vietnam caused adverse health outcomes in veterans who served in Vietnam. (3) Dioxin (TCDD), a minor contaminant in some of the herbicides sprayed in Vietnam, caused adverse health outcomes in veterans exposed to herbicides.

Clearly, the possibility that Vietnam veterans were suffering from service-connected health problems was the reason most studies were undertaken, and the questions raised by hypothesis #1 are those most important to answer. If military veterans – the 10% of U. S. citizens who have served their country in uniform – are suffering from severe service-connected health problems, they should be provided with first-rate health care for those problems. Identifying a causal agent may prove helpful in defining treatment regimens, but that may not be possible if multiple causal agents were involved.

With multiple agents and the potential for synergistic activities among them, there may be no way to sort out the relative importance of different levels of exposure to individual components in veterans with different genetic backgrounds and susceptibilities. And synergy is a well-known phenomenon in chemical carcinogenesis and other disease progressions. However, if an inordinate number of Vietnam veterans are sick and dying, does it matter whether a causal agent or agents are identified definitively or not? Do we owe veterans with service-connected illnesses and death warrants any less just because

we don't know why? Obviously, not! Therefore, the most important studies would be those designed to establish whether service-connected health problems exist in Vietnam veterans.

Unfortunately, the Ranch Hand study was not designed to test hypothesis #1. It was designed to examine hypothesis #2, and it will only answer the questions that underpin the hypothesis for Ranch Hand personnel, not Vietnam veterans in general. Of course, positive findings with Ranch Handers may help in extrapolating to other veterans, but the findings may not if there were multiple causal agents for any of the adverse health effects. And negative findings prove absolutely nothing for non-Ranch Hand veterans with regard to either hypothesis #1 or hypothesis #2. There are far too many variables (routes of exposure, hygiene practices, types of herbicides, chemical cofactors, biological cofactors, etc.) to derive any conclusive results for non-Ranch Handers from negative findings in the Ranch Hand study.

Moreover, it was not discovered until the most recent Ranch Hand advisory committee meeting that some of the controls in the Ranch Hand study were stationed in Vietnam and some were stationed in other parts of Southeast Asia. Therefore, the controls may have been differentially exposed to potential complicating variables, thereby further compromising the integrity of the study's findings.

To make matters worse, the Ranch Hand study has actually shifted in primary focus to testing hypothesis #3. Because dioxin can be used as an indicator of exposure to Agent Orange (the major herbicide sprayed in Vietnam), it is easy to become convinced that the only significant adverse health outcomes are those that show a direct correlation to dioxin. However, the levels of dioxin contamination varied in different production runs of Agent Orange (or, more accurately, production runs of 2,4,5-T, which along with equal parts 2,4-D, made up the herbicide known as Agent Orange), and not all herbicides sprayed in Vietnam contained dioxin. Yet, the draft Ranch Hand report reviewed at the last two advisory committee meetings was filled with examples arguing the importance of dioxin causal relationships (hypothesis #3). The congressional mandate was to evaluate hypothesis #2.

Furthermore, some of the other herbicides contained hazardous agents and contaminants (e.g., cacodylic acid and hexachlorobenzene) which, like dioxin, have been subjected to EPA exposure restrictions and bans.<sup>(1)</sup> These could have contributed to service-connected health problems, while showing no relationship to dioxin exposure. And that still doesn't take into account exposure to Chlordane (now banned by the EPA) and other insecticides sprayed around base camps in Vietnam or how any of these agents interacted with the Chloroquine/Primaquine and Dapsone<sup>(2)</sup> the troops were required to take. So, there are many scientific shortcomings with the Ranch Hand study, which preclude making generalizations about health effects for non-Ranch Hand veterans.

The congressionally mandated study of Army Chemical Corp personnel in Vietnam also deserves brief mention. This study is intended to establish whether Chemical Corp workers in Vietnam who sprayed herbicides (and who, presumably, were exposed to other potential hazardous cofactors) are suffering from an enhanced level of health problems. Sounds reasonable. Of course, as currently structured by the VA, increased

health problems are compared exclusively to Army Chemical Corp workers not stationed in Vietnam. While the pilot study suggests that measurable health differences do exist between these two groups, one could argue that the baseline for Chemical Corp workers might be well above the norm for the general citizenry who have not been exposed routinely to hazardous chemicals. As a result, this study is flawed as well (see Attachment 1 for additional information). Perhaps congressional intervention and oversight could still salvage additional information from this ongoing investigation.

With regard to the administrative problems with the Air Force Ranch Hand study (and the Army Chemical Corp study as well), these involve mainly oversight issues that can also be corrected. These problems are best illustrated with examples involving the Ranch Hand advisory committee appointed by the Secretary of Health and Human Services (the Advisory Committee on Special Studies Relating to the Possible Long-Term Health Effects of Phenoxy Herbicides and Contaminants). Essentially, the advisory committee lacks authority, appropriate reporting lines, and sufficient resources to function properly.

At the first advisory committee meeting I attended after being appointed in 1995, it was decided by the membership that we needed to meet twice a year in order to oversee and advise the Air Force Ranch Hand and Army Chemical Corp studies effectively. Our next meeting was three years later. We were informed at the meeting in 1998 that the FDA had no budget to hold any Ranch Hand advisory committee meetings, much less meetings every 6 months. Moreover, it was clear from the meetings that were held that we had no authority to impose changes in study protocols. We reviewed findings of the studies, provided editorial comments on reports generated, and made suggestions to the Air Force and Veterans Affairs personnel conducting the studies. And while they did follow many of our suggestions voluntarily, that was by no means universal.

Although it may be too late to resolve the controversies about service-connected health problems for Vietnam veterans, it would be nice to prevent similar fiascoes for tomorrow's veterans. The federal investigative debacle has already been duplicated with Persian Gulf War veterans (with far too many similarities to Vietnam veterans), so it may be necessary to step up the level of congressional oversight and changes are needed in the way veterans' health studies are conducted.

First and foremost, the studies should be contracted in a peer-review process to non-federal entities for implementation. Although the Air Force seemed to be doing a reasonable job with the Ranch Hand study during the four years I was on the advisory committee, they can hardly be viewed as a neutral party. And I know of no veteran who believes that the Department of Veterans Affairs serves and advocates for veterans. The opposite appears to be more accurate. Yet, the VA has been charged with conducting the Army Chemical Corp study. That does not bode well for a believable outcome.

And finally, the matter of how the nation treats its veterans is becoming an issue of national security, not just veterans' affairs. How is the military going to attract and retain the top quality, technically proficient service members needed in this new millenium when America treats its veterans so abominably? The time for governmental reform of the system is now!

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## BIOGRAPHICAL SKETCH

**R.W. TREWYN** was a Staff Sergeant in the US Army Infantry in Vietnam in 1969, serving in III Corps where he earned the Combat Infantry Badge and Purple Heart. Trewyn obtained a Ph.D. from Oregon State University in 1974, specializing in cellular and molecular biology. After four years of cancer research at the University of Colorado Medical Center, he joined the medical school at Ohio State University, attaining the rank of Professor of Medical Biochemistry in 1988. During his tenure at Ohio State, Trewyn brought more than \$3.5 million in cancer-related grant support to the university. Trewyn was inducted into the Ohio Veterans Hall of Fame in 1994, an honor bestowed for his efforts to overcome employment discrimination against veterans on college campuses. That same year he assumed the positions of Associate Vice Provost for Research and Professor of Biology at Kansas State University. He currently holds the positions of Vice Provost for Research and Dean of the Graduate School at K-State along with that of President of the KSU Research Foundation. Trewyn is the author or co-author of numerous published articles and studies related to veterans' employment rights. Based on his expertise in cancer etiology, he was named by the Secretary of DHHS to the Advisory Committee on Special Studies Relating to the Possible Long-Term Health Effects of Phenoxy Herbicides and Contaminants in 1995 and served until 1999.

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Army file photo of herbicide spraying of a riverbank near a fire support base in Vietnam.<sup>(3)</sup>

## FOOTNOTES:

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- (1) For an informative review of the potential problems these less studied herbicides might have caused, see the article written by LTC Patrick H. Dockery, USAR (Retired) entitled “Agents Orange, White, and Blue – New Disclosures: A Combat Soldier’s Research” (JOURNAL OF THE VIETNAM VETERANS INSTITUTE 6: 5-29, 1997). Although LTC Dockery is not a scientist, he has rigorously researched the topic and uncovered critical information about the hazards the ignored herbicides Agents White and Blue may have posed. Why have federal studies to date ignored the potential contributions of cacodylic acid, hexachlorobenzene, and other hazardous agents to which Vietnam veterans were exposed?

Additionally, the statistics LTC Dockery has collected with regard to his battalion in Vietnam are, as he states, “staggering.” With less than 15% of the surveys returned at the time the article was written, he had found 19 cancer deaths, 3 heart disease deaths, 19 active cancer cases, 45 miscarriages, 27 children with birth defects, and 6 suspected sterilities. If a non-scientist can gather this type of information, why can’t the VA collect meaningful statistics on health outcomes?

- (2) The information LTC Dockery uncovered and presents about Dapsone, the daily “anti-malarial” pill we took in Vietnam, is also of interest. It is used in the treatment of leprosy, but in non-leprosy cases, it sometimes causes peripheral neuropathy – a problem for many Vietnam veterans. Dapsone can cause “male infertility, drug-induced lupus erythematosus, and an infectious mononucleosis-like syndrome.” It can cause blood disorders that may result in fatalities. Why have questions not been raised in federal studies about the role Dapsone may have played in causing adverse health outcomes?
- (3) Note that the individuals (presumably Army Chemical Corp workers) spraying the herbicide were not wearing respirators or other protective gear. According to the notes with the National Archives photo, the soldiers in the boat were spraying Agent Blue – cacodylic acid, an arsenic-based herbicide. As noted in LTC Dockery’s article, “cacodylic acid is toxic by inhalation.” Why did the Army not provide better training for those exposed routinely to potentially hazardous chemicals, and why has the VA not considered these hazards in assessing health outcomes for Vietnam veterans?

## Attachment 1

**DATE:** 4 January 1999

**TO:** Ranch Hand Advisory Committee

**FROM:** R.W. Trewyn  
Interim Vice Provost and Dean  
Professor of Biology  
President, KSU Research Foundation

**RE:** Army Chemical Corps Vietnam Veterans Health Study

As an overdue follow-up to the last Ranch Hand Advisory Committee meeting, I would like to provide to the full committee some of my concerns with the Army Chemical Corps Vietnam Veterans Health Study. Most of my comments will focus on the issue of control groups for the study, since I am still concerned about this aspect even though the majority of the committee members in San Antonio were not similarly inclined.

First, I would like to reiterate a point made at the last meeting: it had been recommended at the first committee meeting reviewing the Army Chemical Corps Study that the number of control groups in the Phase I, pilot study should be expanded to include non-Chemical Corps service personnel. I am unaware of the committee approving otherwise prior to the meeting in San Antonio. However, only Vietnam and non-Vietnam cohorts of Army Chemical Corps personnel were evaluated in the pilot study.

Among the material provided at the meeting in San Antonio was a 10-page statement, including references, entitled "Responses to the October 25, 1995 Ranch Hand Advisory Committee Meeting Minutes," signed by Han K. Kang and Nancy A. Dalager, two of the study's principal investigators. This response includes their arguments for *not* including non-Chemical Corps service personnel in the study, and there is an indication that the 10-page statement had been distributed to the Ranch Hand Advisory Committee in 1996. Although I do not recall seeing this material prior to San Antonio, seeing it would still not equate to the committee affirming its contents and endorsing a change in the study protocol as approved at the meeting in 1995. However, the pilot study has been completed without non-Chemical Corps controls, so my point in rehashing the matter is that I still believe Phase II of the study will fail to resolve the actual health outcomes if only Vietnam and non-Vietnam cohorts of Chemical Corps personnel are examined.

Since I'm not an epidemiologist, I posed these concerns to a scientist with such training and expertise who has conducted health studies at the CDC. She concurred that the inclusion of a non-Vietnam, non-Chemical Corps control group (and, perhaps, others) would be highly appropriate for comparison, since Chemical Corps workers, whether in Vietnam or not, might be expected to have had more exposure to hazardous chemicals than the general population. Therefore, the "normal health" baseline could be skewed significantly. Her bottom line: "The study is seriously flawed, and can, at best, only provide partial answers to questions that are answerable."

It was contended at the meeting in San Antonio that neither the congressional mandate for the study nor the National Academy of Sciences committee recommendations authorized the inclusion of non-Chemical Corps controls. I would argue that it is our responsibility, and charge, to sanction what we believe is appropriate for a health effects study of this type. And while the results from Phase I suggest that significant health differences may, in fact, be seen between the Vietnam and non-Vietnam cohorts, that does not preclude even greater differences being established for other reference cohorts. I don't recall anyone arguing at either Ranch Hand Advisory Committee meeting that the inclusion of non-Vietnam Army Chemical Corps personnel as a control group in the study is inappropriate; it certainly is appropriate. But, why limit the study by including only a single control group? Why fail to establish a normal health baseline?

Kang and Dalager noted in their 10-page response statement that "members of (the) Army Chemical Corps would have handled chemicals that others who were not members of the Corps were not required to handle regularly." They use this as an argument for not having non-Vietnam, non-Chemical Corps veterans as a control group, and state that "this will further complicate an interpretation of any positive findings." I disagree. Non-Vietnam Chemical Corps workers could be suffering from adverse health effects precisely because they "handled chemicals that others who were not members of the Corps were not required to handle regularly." Without a non-Vietnam, non-Chemical Corps control group, there will be no way of determining whether or not that is the case. Furthermore, failing to include an additional, non-chemically exposed control group may obfuscate the potential for synergy between various chemicals in eliciting adverse health effects.

It was also argued in the response statement by Kang and Dalager that the inclusion of other non-Vietnam veterans was problematic "because of their potential for being significantly different from members of (the) Army Chemical Corps with respect to pre-service and post-service characteristics." However, no evidence was provided to indicate that personnel in the Chemical Corps are any less "poorly defined" with respect to these characteristics than non-Chemical Corps workers. Without such evidence, it might seem equally (or more) plausible that the MOS assignment for enlisted personnel during the Vietnam War had more to do with military "need" than "pre-service characteristics" of those inducted. Moreover, when one considers that the average age of those who served in Vietnam was 19, selection criteria based on "pre-service characteristics" would appear minimal, at best.

Considering all of the above, I would summarize by saying that I still believe a non-Vietnam, non-Chemical Corps control group should be included in Phase II of the Army Chemical Corps Study. In my opinion, the study is flawed without it. And, while I'm expressing my concerns, let me add a few other points regarding the study.

Based on the materials presented in San Antonio regarding Phase I of the study, the Vietnam cohort appears to differ significantly from the non-Vietnam cohort in a number of ways. (1) The number of veterans age 45 or younger is less in the Vietnam cohort. (2) The number of veterans age 55 or older is greater in the Vietnam cohort. (3) The number of individuals who entered military service in 1964 or before is greater in the Vietnam cohort. (4) The number of individuals who entered military service between 1970 and

1973 is less in the Vietnam cohort. Because age is a crucial parameter when assessing health effects, the age constraints within the Vietnam and non-Vietnam cohorts should be examined thoroughly in Phase II. It's also possible that the pre-service and post-service characteristics of those entering military service in 1964 or before and those entering military service between 1970 and 1973 could be quite different. Since the Vietnam cohort is slanted toward the former timeframe and the non-Vietnam cohort toward the latter, this should be reexamined in Phase II as well.

With additional time to review the materials provided to us in San Antonio, I would also like to question the value of doing more serum TCDD analyses on Army Chemical Corps workers. This aspect is being well covered by the Ranch Hand Study of Air Force personnel, and the significant limitations associated with these measurements are well documented. It would seem not to justify the excessive expense in the Army Study just to have additional marginal data, derived near the limits of detection, that tell us little if anything about the herbicide exposure one received 25-35 years ago. It might be more beneficial to consider other serum analyses (e.g., liver enzymes and other indicators of adverse health effects) as indicated by Ranch Hand, the preliminary survey, the earlier CDC study, IOM, etc.

Lastly, it's clear that the Air Force sprayed more Agent Orange in Vietnam than any other herbicide. What documentation is available regarding which herbicides the Army sprayed? It would seem feasible that the herbicides most efficacious at defoliating trees might be different from those used on other foliage. Therefore, the preferred agents in the Delta might have differed from those in the Highlands. Was it Agent Orange or some other herbicide that the Army generally sprayed around base camps? If it were something other than Agent Orange, there would be little reason for doing any additional TCDD measurements with either cohort of Army Chemical Corps workers.

Thanks for reviewing my concerns.

RWT/rt