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**Recommendations for
Conducting the Herbicide Orange Exposure
Study of Vietnam Veterans**

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The undersigned strongly advocates that the Herbicide Orange Exposure Study of Vietnam Veterans be accomplished for the following reasons:

(a) Congress has directed this study and we owe it to our veterans to resolve this issue once and for all or else it may haunt us for many years to come and cause great disillusionment in the veteran community and a lack of faith in the intentions of the Executive Branch of the Government.

(b) The Ranch Hand Study cannot provide an unequivocal answer to ground troop exposures to just Herbicide Orange because: (1) Ranch Hand study subjects were exposed to Herbicides Orange, White, and Blue and no distinction can be made for exclusive Orange exposure; (2) Ranch Hand personnel operated under very different environmental working conditions (daily showers, barracks living) when compared to ground troops in the field; (3) No differentiation as to likelihood of high exposure such as by duty AFSC is being made in Ranch Hand study subjects, in fact some of these people may have had little or no exposure; and (4) The sample size is limited and smaller than should be used to detect rare forms of cancer.

(c) The study is needed as a corollary to the Vietnam Experience Study to establish whether there are unique Herbicide Orange effects which are separate and distinct from the many other rigors and effects of being in combat in the jungle environment of Vietnam.

(d) We, as scientists, and the Administration, have a social responsibility to resolve this issue because of the confidence implications to our present active duty members, our retirees, and Reserve Force members whom we may need to call on for another Vietnam type war. We also need to have these data to avoid future contamination hazards in subsequent combat environments.

The recently completed and long needed Pilot Study of seven battalions has provided valuable new information as to the problems incident to the selection of Herbicide Orange exposed and non-exposed Army ground troops. One finding of real value is that valid exposures are not as common as originally thought and consequently unexposed personnel are readily obtainable. This finding, coupled with an as yet not statistically defined dispersion of company sized units at certain variable times, makes the job of selecting exposed ground troops more difficult and hence will require more extensive research to be accomplished by the Army and Joint Services Environmental Support Group to come up with the desired number of exposed veterans. The task is thus made more complex and time consuming but not impossible.

My recommendations for continuing the Herbicide Orange Exposure Study include the following actions:

(a) Expand the Corps Zones to include the three other Vietnam Corps areas in addition to the III Corps zone.

(b) Do not disqualify study subjects who perform duties or combat outside of III Corps.

- (c) Expand the time zone from March 1966 to and through all of 1970.
- (d) Expand the number of battalions to be tracked until the required number of Herbicide Orange exposed subjects are found. Supply the names of these exposed persons to GDC on an incremental basis as they are found. The same for unexposed soldiers.
- (e) Conduct, on a selected basis, serum and adipose tissue residual dioxin concentration determinations for Herbicide Orange exposed and non-exposed veterans to confirm the adequacy of the exposure selection process.
- (f) Determine Herbicide Orange exposures based on all possible opportunities for exposure ranging from perimeter sprayings, abort dumps, to Ranch Hand defoliation missions.
- (g) Consider using the methods suggested in the "Agent Orange Exposure Probability Modeling for Vietnam Field Conditions" paper to provide a time and distance weighted exposure index.
- (h) Establish through Subcommittee recommendation what is a valid unitary exposure value based on TCDD concentration existing per square meter surface area with respect to time zero conditions. Use this value to compare potential exposure relationships for perimeter sprays (ground & helicopter) to Ranch Hand dumps, and to Ranch Hand defoliation missions at various distances from the spray source and days elapsed after the spraying mission. This would enable one to develop a method of ranking the degree of hazard of various exposure situations and arriving at a summation value of exposures of the veteran while he served in Vietnam.
- (i) Exposure probability determinations need to incorporate dioxin assimilation into the human body by three routes, namely: respiratory inhalation, alimentary tract absorption, and percutaneous absorption.
- (j) The hazardous exposure calculations must also consider the residual dioxin buildup in the soil as a result of repeated sprayings of the same area such as may occur in firebase perimeter and lines of communication defoliation activities.

As a personal observation it seems that other epidemiological studies related to toxic chemicals have been accomplished and published in the scientific literature based on less definitive exposure situations and data (Swedish studies on soft tissue sarcoma) than we have in this Vietnam study of Herbicide Orange.

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