



**DEPARTMENT OF THE AIR FORCE**  
**AIR FORCE RESEARCH LABORATORY**

23 March 2000

Dear Participants,

Well here it is, the summary we promised would be in the annual letter. We have tried to make it readable and concise as possible, while still maintaining accuracy. Quite a job for a 1,700 page report! We had to delay this letter until we released the report, and by the time you get this, it should be available to the public.

<http://www.brooks.af.mil/AFRL/HED/hedb/afhs/afhs.shtml>

We think our website has been greatly improved; check it out and please give us your comments. The entire 1997 report can be viewed on the site. We have added our annual reports to Congress, abstracts (summaries) of all our scientific journal articles, executive summaries of all previous reports, and a link to the GAO website to read their 1999 report on the study. You may have read some newspaper articles regarding the GAO report, and they bear little resemblance to the information in the report, so we are encouraging people to read the report itself.

In answering one of the GAO's two recommendations for us, we will release the data from all of our previous physical exams this year. This is a huge undertaking, is not normal procedure for studies, and was not planned for in the study protocol. Therefore, the data will be released throughout the year as they are completed and turned over to the Government Printing Office for public availability on CD-ROM. Rest assured that all identifying personal data will be removed prior to release- one of the reasons this is such a huge effort. Anyone will be able to order the data for a nominal fee, and each CD will contain one report, the accompanying data for that report, the study protocol, and the birth defect data. The 1997 data will be the first available and will probably be the data most in demand. Dr. Michalek testified on our responses to the GAO report to the House Committee on Government Reform, Subcommittee on National Security, Veterans Affairs, and International Affairs. Again, despite what you may have read in the papers, the hearing went well, and we have every indication that our study will continue, and will only be improved by the GAO's suggestions. We believe that this hearing and this year's data release will help our critics understand what we have been saying all along; this is the best epidemiologic study on Agent Orange exposure ever done- and you have made that possible.

We have already traveled to San Diego, to review and document all the lessons we have learned from the last exam. We are planning to make the last exam the best one yet! Based on your recommendations, we are going back to the 3-day format, so the trip will be worth your while. Please start making your plans now. One last teaser- we have come to realize by listening to your stories at these exams that there was a lot of history that was being lost. So we are planning to videotape you telling your best operational stories at the next exam, so start thinking about them now and writing them down.

A handwritten signature in black ink, appearing to read "Burnham", is located below the main text.

Bruce R. Burnham, Lt Col, USAF, BSC  
Chief, Population Research

## Summary of the 1997 Report

A total of 2,121 Vietnam veterans participated in the 1997 examination, of which 870 were Ranch Hands and 1,251 were Comparisons. Eighty-six percent (86%) of living Ranch Hands and 87% of living Comparisons who fully participated in the 1982 baseline examination returned for the 1997 examination. The examination results are summarized in a report to be released to the public in early 2000. The report summarizes conclusions drawn from the analysis of 266 measures of health. The analyses focused on differences between Ranch Hands and Comparisons as well as on the association between dioxin levels and each measure of health.

Please keep in mind that we place particular importance on any finding in the Ranch Hand enlisted ground crew, since that group had the highest overall level of dioxin. A basic principle of toxicology is "as the dose increases, the effect increases" if the substance is truly toxic. Which brings us to the first of two major limitations to our study which were highlighted in a recent GAO report:

1. Our results cannot be generalized to other groups (such as all Vietnam veterans or Vietnamese civilians) who have been exposed in different ways and to different levels of herbicide. We do not know what effect herbicides or dioxin have at levels other than those found in our study group, or from other sources such as contaminated food. But as the principle stated above points out, groups with higher exposures may well have effects not seen in our study.
2. The size of the study makes it difficult to detect increases in rare diseases, so small increases of these diseases may be missed by the study. For example, since liver cancer is very rare, even a ten-fold increase would not be detected.

Let me assure you that the AFHS is widely regarded as the best epidemiologic study ever done on dioxin. However, by stating these limitations, we avoid creating the inevitable contradictions between our study and other studies. For example, a larger study that focuses on one rare disease, or uses a population with a much higher exposure could get results that would seemingly contradict our study. However, our study focuses on what did happen to one population, not on diseases which rarely occur in any population, or on what may happen to other populations with very different exposure levels and routes of exposure.

Based on the findings of the 1997 and previous physical exam cycles, we have drawn the following conclusions:

**Adult-Onset Diabetes:** Similar with previously reported results, 1997 results suggest that as dioxin levels increase, not only are the presence and severity of adult-onset diabetes increased, but the time to onset of disease is decreased. A 47% increase in diabetes was seen in those with the highest dioxin levels.

**Cardiovascular disease:** Cardiovascular (heart and blood vessel) findings are inconsistent, but we have observed an increased risk of cardiovascular death in the Ranch Hand enlisted ground crew. As an overall group, Ranch Hands examined in 1997 have experienced a 26% increase in heart disease. Within the Ranch Hand group, the presence of diagnosed essential high blood pressure and the percentage of veterans with ECG findings of prior heart attack tended to increase with dioxin levels.

**Peripheral Polyneuropathy** (i.e., loss of sensation in the feet): The occurrence of neurological abnormalities appears to be greater in Ranch Hands than Comparisons

historically, on physical examination, and as reflected by loss of sensation in the feet. Peripheral neurological disorders increased with dioxin levels. Measures of bilateral (i.e., both left and right) peripheral loss of sensation, confirmed by sensory measurements in the feet, increased with dioxin. These findings are new and are consistent with some and inconsistent with other studies.

**Blood tests regarding liver function and lipids:** Several blood tests that measure liver function and lipids were slightly elevated, and did tend to increase with dioxin level. These findings were also noted in 1987 and 1992. For example, the average cholesterol level in Ranch Hand veterans with the highest dioxin levels are about 5 mg/dl higher than Comparison veterans and Ranch Hands with the lowest dioxin levels. However these tests may be elevated for many reasons, are not a disease by themselves, and cannot be explained entirely by any other finding in the study.

**Cancer:** At the end of 15 years of follow-up, Ranch Hands as a group exhibited a statistically nonsignificant (the most likely explanation for the variation is chance) 6% increase in the risk of cancer relative to Comparisons. Differences by military occupation were inconsistent and therefore do not suggest that herbicides or dioxin exposure are related to cancer. *Most importantly, the Ranch Hand enlisted ground crew exhibited a 22% decreased risk of cancer.*

**In conclusion, adult-onset diabetes and cardiovascular disease represent the most important herbicide and dioxin-related health problems seen in the Air Force Health Study.** These two areas appear to have the greatest magnitude of effect in terms of quality of life and healthcare costs and, from a public health perspective, demand the greatest attention. Therefore, the Air Force has funded new research at two separate academic institutions in an attempt to elucidate any biological mechanism between dioxin and diabetes.