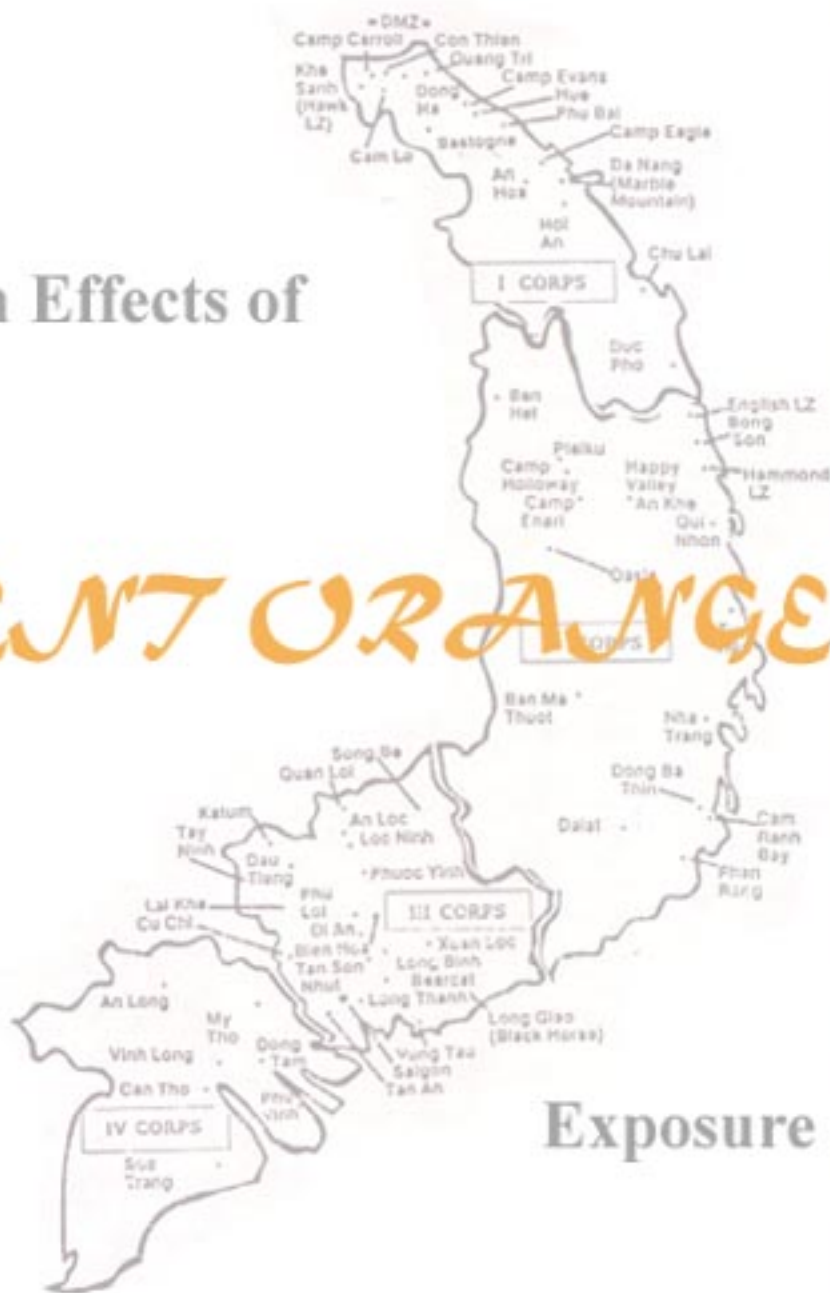


Health Effects of

# AGENT ORANGE



Exposure

A  
Unit  
Analysis

Jack Hunnicutt

**In Memory of**  
**Terry, Dale, Frank, Bruce, Mike and many others.**

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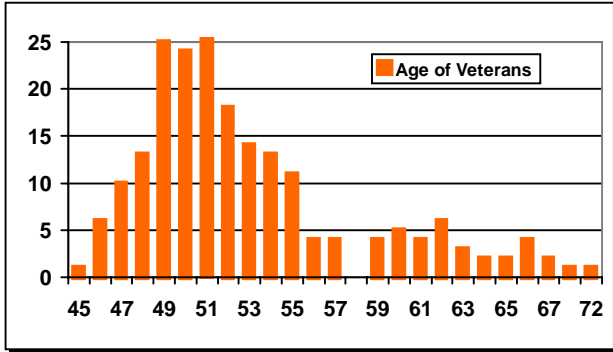
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*Printed in the United States of America*

### Case Study - 335<sup>th</sup> Assault Helicopter Company

During the summer of 1998, seven hundred and twelve former members of the 335<sup>th</sup> Assault Helicopter Company<sup>1</sup> were provided questionnaires concerning their tour of duty in Vietnam and possible exposure to the herbicide Agent Orange. Two hundred three members responded thus providing the data supporting this report.

The focus of this report is to document the unit's nature of operations as related to herbicide exposure, identify specific environmental conditions experienced by the unit members and obtain their current condition of health. Keeping within these guidelines, the author also finds it necessary to address some of the general issues surrounding Agent Orange and its background, to obtain a better understanding as herbicide exposure as it relates to the reader.



At times, this report may appear to be non-scientific, crude or even unjustifiable yet you will find a concerted effort at work to remain reserved and inconclusive within certain areas in order to convey an unbiased representation of the data. As in all statistical reporting, the reader makes assumptions which in some cases may be in favor of the author; I ask that while reviewing this

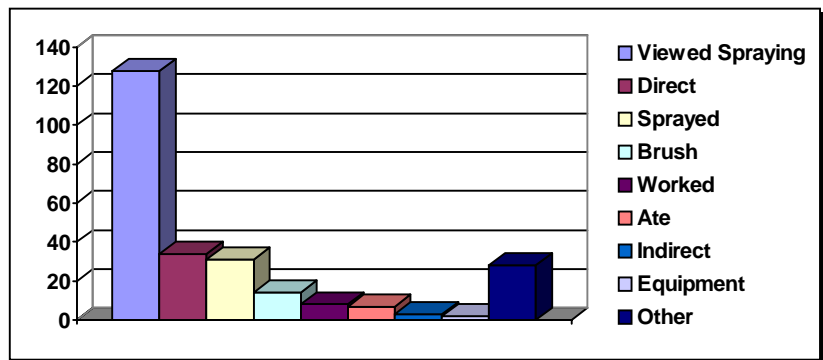
report you study the data closely and draw your own conclusions.

This unit, know as the "Cowboys," consisted of three UH-1 Huey helicopter combat assault flight platoons, a large maintenance organization, and support staff for supply, administration, transportation and mess facilities. The Cowboys were based in several locations throughout South Vietnam's II, III and IV Corps from 1965 until 1972 when the 335<sup>th</sup> was returned to the United States and eventually disestablished as an Army unit.

### Opportunity for Exposure

In addition to combat assault missions, medical evacuations, and air command and control, the unit also performed herbicide-spraying operations. In view of the unit background, this study suggests regardless of job assignment, rank or duration of their Vietnam tour, all unit members had an excellent opportunity for exposure.

Although this unit usually operated from base camps with a controlled water supply, wood framed or raised floor living quarters, and adequate hygiene facilities; the flight platoons were exposed to the jungle or rice patty field conditions on a daily basis. The tempo of operations usually had support aircraft inserting troops into landing zones (LZ) then proceeding to a standby location to await further orders based on the ground troops activity. This standby period provided an opportunity to relax on the



ground or in the aircraft, eat, take nature calls, and perform minor aircraft maintenance actions. All of these activities exposed the crews to the prevailing wind drifts, surface water, rain, and direct contact with the ground.

On the other hand, the maintenance personnel who seldom had the occasion to leave the base encampment had a completely different set of circumstances affecting herbicide exposure. The aircraft, which performed aerial herbicide spraying, would return from the mission thoroughly covered with chemicals from the main compartment to the extreme rear of the tail section. Little or no effort was given to clean the helicopters prior to the maintenance section performing repairs. Additionally, all personnel assigned to guard duties along the compound perimeter would frequently spend many hours in direct contact with the ground in and around bunkers previously exposed to herbicide spraying. The network of bunkers used as guard posts was frequently located along a cleared area 100-

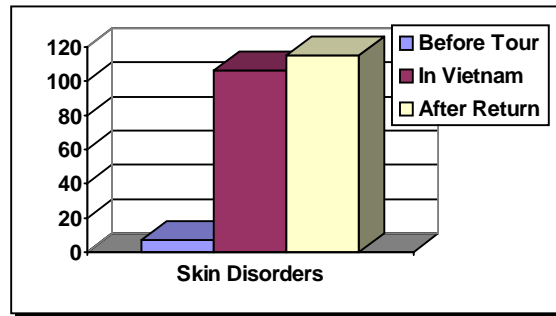
500 meters in width, separating the secured compound from the surrounding jungle or field. Although this study has no evidence of herbicides being used to clear the perimeters, herbicide spraying was the most practical means of suppressing plant growth necessary in obtaining a clear field of observation.

The Agent Orange Committee's<sup>2</sup> review of various literature indicates exposure assessment has been a weak aspect of epidemiological studies of Vietnam veterans (IOM, 1997). In contrast to these findings, the self-reported retrospective data of the Cowboy research concludes direct exposure in 65 cases by either contact with contaminated brush, in conjunction with spraying operations, or direct contact through the actual handling of herbicides. Indirect exposure was reported in 62 cases, which involved contact with contaminated equipment, food, water, or other non-disclosed means. Of the 203 individuals studied for this report, 127 (63 percent) indicated they had seen herbicides sprayed at least once during their Vietnam tour. However, one flaw of this research as well as other government-sponsored research, is the limited ability to determine the precise degree of individual exposure.

It is interesting to note that the Stellman & Stellman study conducted in 1986 concluded that 25 to 55 percent of the veterans surveyed believe they were exposed to herbicides while serving in Vietnam. And a 1997 IOM study concluded that, "it appears that groups of veterans, other than those involved in Operation Ranch Hand, were likely to have been exposed to herbicides during their service in Vietnam."<sup>3</sup>

### Health Conditions Today

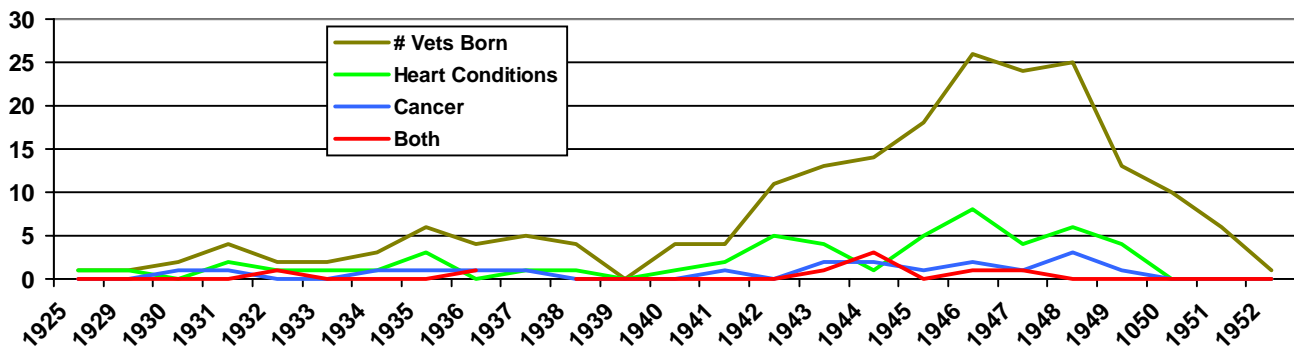
Some 25 years after their return from Vietnam these veterans reported more health problems related to skin disorders than from any other single condition. Skin problems (not including cancer or melanoma) were reported by 115 individuals as a continuing problem since their return from Vietnam. These skin disorders include: rashes, itching, raw spots and one case of Lupus.



Heart conditions<sup>4</sup> followed by various forms of cancer<sup>5</sup> were the second and third most reported health disorders with 80 veterans reporting problems with cancer, heart or both conditions.

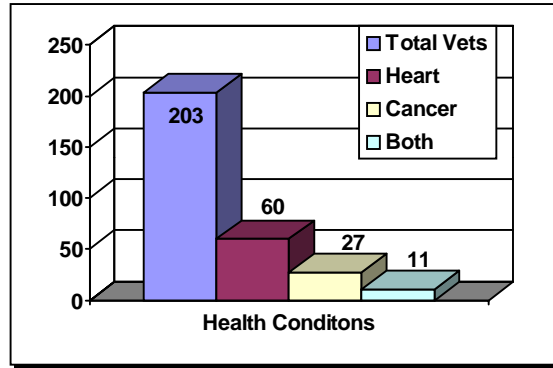
Although the survey was unable to establish exactly how many former members had died as a result of cancer, a review of an incomplete listing of deceased members found that cancer was the cause of more deaths than any other medical condition. And during a 12-month period preceding this survey, four members died as a result of cancer. Their average age was in the early fifties.

To obtain a better perspective on the frequency of reported cancer and heart conditions, consider the ratio of conditions reported for each birth year. *Age span of veterans at time of survey was from 45 to 72 years old.*



The occurrence of medical conditions remains somewhat proportional with the actual number of veterans born in each year group except for 1944-45. This change was the result of increased numbers of veterans reporting cases of both cancer and heart conditions. There were no veterans born for the years 1926-28 and 1939.

Formulas obtained from the American Cancer Society were used to estimate probabilities of developing cancer. These calculations provide only a rough approximation of the number of people in this study group who may develop or die of cancer. The results indicated 84.6 members will eventually develop cancer (invasive), 11.6 colon & rectum, 14 lung, and 37 prostate. In comparison, the reported 27 cases of cancer seems lower than expected however, since these formulas do not reflect age or racial characteristics of the group, these estimates should be used with caution. For instance, prostate cancer is generally a disease of older men, and the risk among Vietnam veterans would not be detectable in today's studies.



The 27 reported heart conditions vary in seriousness from multiple bypass surgery to mild hypertension to elevated cholesterol levels. Hypertension was the most reported heart and circulatory condition by the group.

Cancer		Heart Conditions	
Melanoma (Skin)	16	Hypertension	19
Prostrate	3	Bypass Surgery	5
Lung	2	Heart Attack	5
Throat/Vocal	3	Artery Disease	7
Non-Hodgkin's Lymphoma	1	Circulation	4
Hodgkin's	1	Cholesterol	2
Gastric	1	Stroke	2
Soft Tissue Sarcomas	1	Murmur	1
Other	1	Other	19

Note: Some veterans reported more than one type of heart or cancer condition.

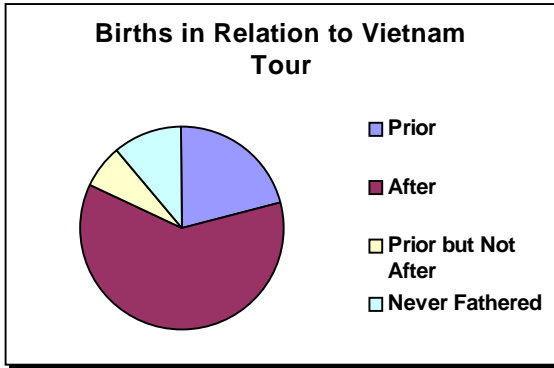
As a comparison with national statistics, consider the following data published by the American Heart Association. Cardiovascular disease (CVD) was responsible for 41.5 percent of all deaths in 1995. These include high blood pressure, coronary heart disease, stroke and rheumatic heart disease. From 1985 to 1995 death rates from CVD declined 22 percent while the total U.S. death rate declined by only 2.8 percent. Additionally, it is estimated that 51 percent of all Americans have blood cholesterol values of 200 mg/dl and higher. While diet is the leading factor in the reported high cholesterol values, it appears that education and lifestyle changes have contributed to the overall lower death rates.

### Effect on Children

The number of children born to veterans both prior to and after their Vietnam tour was quite simple to obtain, however, analysis of the data proved to be most challenging. The majority of veterans surveyed were too young to have families prior to their tour and had not attempted to have children. Conversely, some older veterans who had children prior to their Vietnam tour did not have additional children upon returning.

The difference in ages creates a difficult set of circumstances to analyze and may fail to give a clear representation of actual birth rates. However, the "Never Fathered" category is conclusive that 14 percent of the veterans never had children. Additionally, of the 431 children born, 98 were conceived prior to the father's Vietnam tour, and 333 were conceived upon return. This produces a ratio of 2.12 children per veteran.

The occurrence of stillborn births and miscarriages were reported by 1 out of every 5 veterans surveyed.



Specifically, 19.7 percent reported at least one (1) miscarriage with several reporting multiple miscarriages. Incidences of stillborn births were 3.9 percent.

Data was not available to determine when (before or after Vietnam tours) these conditions were experienced. Additionally, 22 individual cases of either mental or physical disabilities in children were reported.

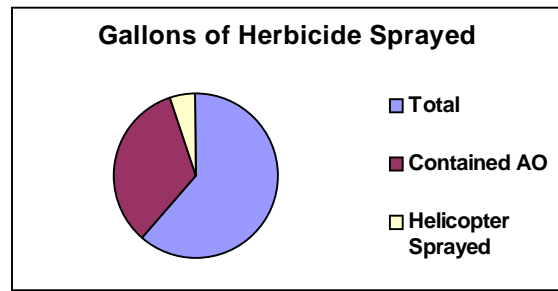
### About the Chemicals

Agent Orange was one of several different herbicides used in Vietnam for defoliation and crop destruction. The name Agent Orange originated from the orange stripes on the barrels used to store and ship the chemicals. This 50 – 50 solution of herbicide 2,4,5-T and 2,4-D contained a varying concentration of numerous dioxins.

From 1962 to 1971, the U.S. military sprayed over 20 million gallons of herbicides in Vietnam with approximately 11 million gallons containing Agent Orange. The U.S. Air Force project named Operation Ranch Hand was responsible for the majority of spraying with C-123 fixed-wing aircraft. Additionally, a documented 1.6 million gallons were applied by helicopter and surface spraying some of which involved the 335<sup>th</sup> AHC.

Perimeter spraying by hand or helicopter at base camps and other installations was required to control the growth of tall grasses and brush. To keep the vegetation low, it was necessary to respray at 2 to 3 month intervals in areas where bamboo or tall grass surrounded a base. Depending upon topography, minefields and limited work force, hand spraying was not feasible.

Although aerial operations represented the larger quantity of herbicides spraying, ground spraying likely resulted in heavier human exposure since it probably was done at higher application rates and in closer proximity to ground troops. "Ground spraying could reportedly be approved by unit commanders at the Corps level, and the spraying does not appear to have been documented as carefully as the aerial mission of Air Force Ranch Hands."<sup>6</sup>



A scientific report in 1969 concluded that one of the primary chemicals used in Agent Orange could cause birth defects in laboratory animals. The U.S. military suspended use of Agent Orange in 1970 and halted all herbicide spraying in Vietnam the following year.

### Department of Veteran Affairs' Position

Exposure to Agent Orange or other herbicides alone is not sufficient evidence in establishing claim to VA disability, compensation or medical treatment. At time of publication, the VA has recognized nine conditions in adults and one in children that are recognized as service-connected for Vietnam veterans based on exposure to Agent Orange or other herbicides.

The National Academy of Sciences anticipates an early 1999 release of *Veterans and Agent Orange: Update 1998*. This Institute of Medicine (IOM) report is the third periodic report reviewing and analyzing world literature regarding health effects of Agent Orange and other herbicides used in Vietnam. Depending on what the IOM scientist conclude in the 1998 update, there may be changes in VA compensation policy.

In 1978, the VA developed the Agent Orange Registry Examination Program to identify Vietnam veterans concerned about Agent Orange exposure. Some 257,762 Vietnam veterans have been provided examinations under the Registry program as of September 1997. The VA maintains a computerized registry of data from these examinations. Registrants receive periodic updates on studies and policy.

*To participate, contact your nearest VA Hospital or Medical Clinic and request to be screened for Agent Orange exposure. The national toll-free telephone number for information regarding VA benefits is 1-800-827-1000.*

The Vietnam Veterans of America Inc. (VVA), has announced that legislation would be introduced in Washington this month (January 1999), and around \$1.5 million could be provided to fund research into the crippling legacy of Agent Orange. Additionally, if the initial phase was successful \$50 million more could be provided to fund further research over 10 years.

**Service-Connected Conditions**

- Chloracne
- Non-Hodgkin's Lymphoma
- Soft Tissue Sarcoma
- Hodgkin's Disease
- Porphyria Cutanea Tarda
- Multiple Myeloma
- Respiratory Cancers (lung, larynx, trachea and bronchus)
- Prostate Cancer
- Peripheral Neuropathy (acute or subacute)

**Children of Vietnam Veterans:**

- Spina Bifida

**Conclusion**

It is highly probable that all unit personnel, with very few exceptions, had an excellent opportunity for exposure to Agent Orange on a recurring basis over an extended period of time. Due to the limited scope of this report and the one-time gathering of survey data, conclusions cannot be reached which determines whether or not this exposure opportunity directly contributed to the numbers of health disorders reported. It may be necessary to collect updated health conditions from all members of the group over a period of years to establish any changes or patterns in adverse health effects. However, should future research or determination by the Department of Defense indicating exposure alone justifies cause for Agent Orange related disabilities, this report will have served its purpose.

Without drawing any hard conclusions, the numbers of reported health problems associated with skin disorders raises suspicion due to the significant increase of reported cases during the period while in Vietnam and continuing after returning to the U.S.

The 335<sup>th</sup> AHC is in a category of higher risk of exposure due to both ground and ariel spraying and could be closely compared to the Air Force personnel of Operation Ranch Hand for determining herbicide exposure.

The precise degree of risk from Agent Orange exposure remains unknown as reported by the IOM Agent Orange committee chair David Tollerud who stated, "the newest studies give us hope that researchers are getting closer to answering the lingering questions about the health effects of herbicide exposure."<sup>7</sup>

**Additional Information:**

**Internet Resources**

<p><b>Agent Orange Act of 1991</b> – <a href="http://www.goiv.com/ao/articles/104-4.html">www.goiv.com/ao/articles/104-4.html</a>  <b>Agent Orange Debrief</b> – <a href="http://www.goiv.com/ao">www.goiv.com/ao</a>  <b>IOM AO Update 98</b> – <a href="http://www.nap.edu/readingroom/books/update98/">www.nap.edu/readingroom/books/update98/</a>  <b>Lymphoma Resource</b> – <a href="http://www.alumni.caltech.edu/~mike/lymphoma.html">www.alumni.caltech.edu/~mike/lymphoma.html</a>  <b>National Academy of Sciences</b> – <a href="http://www.nas.edu">www.nas.edu</a>  <b>Operation Ranch Hand</b> – <a href="http://cpcug.org/user/billb/ranchhand/ranchhand.html">cpcug.org/user/billb/ranchhand/ranchhand.html</a></p>	<p><b>Peripheral Neuropathy Web Forum</b> – <a href="http://neuro-www.mgh.harvard.edu/forum/PeripheralNeuropathyMenu.html">neuro-www.mgh.harvard.edu/forum/PeripheralNeuropathyMenu.html</a>  <b>Sarcoma Central</b> - <a href="http://www.charm.net/~kkdk/sarcoma_html/">www.charm.net/~kkdk/sarcoma_html/</a>  <b>Title 38 U.S.C. 1116</b> - <a href="http://www.goiv.com/ao/articles/1116.htm">www.goiv.com/ao/articles/1116.htm</a>  <b>Veterans Administration</b> – <a href="http://www.va.gov">www.va.gov</a>                  VA 1-Stop Service Inquiry - <a href="http://www.va.gov/customer/CustomerServicee-mail-g.vhacss@forum.va.gov">www.va.gov/customer/CustomerServicee-mail-g.vhacss@forum.va.gov</a>                  Customer Service e-mail - <a href="mailto:g.vhacss@forum.va.gov">g.vhacss@forum.va.gov</a>                  Forms On-line - <a href="http://www.va.gov/forms/default.asp">www.va.gov/forms/default.asp</a></p>
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Department of Veterans Affairs, 1998, Agent Orange Fact Sheet Series, U.S. Government Printing Office.

### **References**

IOM, 1997, Characterizing Exposure of Veterans to Agent Orange and other Herbicides Used in Vietnam: Scientific Considerations Regarding a Request for Proposals for Research, National Academy Press.

IOM, 1996, Veterans and Agent Orange Update 1996, National Academy Press.

American Cancer Society, Surveillance Research, 1998, How to Estimate Cancer Statistics Locally, American Cancer Society, Inc.

Department of Veterans Affairs, 1998, Agent Orange Review, U.S. Government Printing Office.

American Heart Association, 1998, Heart and Stroke A to Z Guide, American Heart Association.

### **Footnotes**

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<sup>1</sup> Also designated A Company 82d Aviation Battalion, 173d Abn Bde (Casper Platoon), 166<sup>th</sup> Transportation Detachment., 25<sup>th</sup> Medical Detachment and 234<sup>th</sup> Signal Detachment.

<sup>2</sup> The Committee on the Assessment of Wartime Exposure to Herbicides in Vietnam was formed in 1996 under a contract with the Department of Veterans Affairs.

<sup>3</sup> Kriebel et al., 1997, The Assessment of Exposure to Herbicides Among Vietnam Veterans: A Review and Recommendations for Future Studies, National Academy Press.

<sup>4</sup> References to heart conditions include both heart and circulatory conditions.

<sup>5</sup> References to cancer include both situ (non-invasive cancer) and invasive forms of cancer. It is important to note that most situ cancers cause no symptoms and do not always progress to invasive cancers and cannot be counted as accurately as invasive cancers.

<sup>6</sup> IOM, 1997, Characterizing Exposure of Veterans to Agent Orange and other Herbicides Used in Vietnam: Scientific Considerations Regarding a Request for Proposals for Research, National Academy Press.

<sup>7</sup> Quinn et al., 1996, News from the Institute of Medicine, Office of News and Public Relations.

**Cowboy Agent Orange Data Collection (CAODAC)**

All information supplied is confidential and will be used only for the purpose of obtaining and presenting statistical data. You are asked to provide your name and address so that we may contact you in the event additional follow-up information or clarification is desired.

INSTRUCTIONS: It is important that ALL questions are answered. If a question does not apply to you, please mark it NA or Not Applicable.

**Personal Data**

Name: \_\_\_\_\_ Year of Birth: \_\_\_\_\_  
 (First) (M.I.) (Last)

Mailing Address: \_\_\_\_\_ Apt: \_\_\_\_\_  
 \_\_\_\_\_,  
 (City) (State) (Zip)

Email Address: \_\_\_\_\_

If you are submitting this survey on behalf of a deceased or disabled veteran, please circle your relationship to the veteran named above.

Myself      Spouse      Child      Family Member      Other

**Service Information (CIRCLE YOUR CHOICE)**

Enter Your Service Dates	FROM: mm/dd/yy	TO: mm/dd/yy
Military Service	/ /	/ /
Vietnam First Tour	/ /	/ /
Vietnam Second Tour	/ /	/ /

**First Tour**

Enter the unit you spent most of your first tour: \_\_\_\_\_

Primary MOS (or NA) : \_\_\_\_\_

Port of Entry : (circle) DaNang      Siagon      Camron Bay      Other

**Second Tour**

Enter the unit you spent most of your second tour (or NA): \_\_\_\_\_

Primary MOS (or NA) : \_\_\_\_\_

Port of Entry : (circle) DaNang      Siagon      Camron Bay      Other

**Health & Exposure Data (CIRCLE YOUR CHOICE)**

1	Did you spend time in the Field ?	Yes No
2	How many months Total time did you spend in the Field ?	1-3    4-6    7-9 9 or more
3	Did you ever drink water which came directly from the field, jungle, rice paddies, or wells ?	Yes No
4	Did you bathe in streams, rivers, lakes, creeks, or any other body of water in Vietnam ?	Yes No
5	Did you engage in field operations which required the crossing of streams, creeks, rivers, lakes, or other water areas ?	Yes No
6	Did you eat food which was cooked in the field ?	Yes No

7	Did you operate in an area where you actually saw Agent Orange being sprayed, dropped or used ?	Yes No
8	Do you believe you were exposed to Agent Orange ?	Yes No
9	If yes, how were you exposed ? (circle one) a. Directly Sprayed b. Contact With Brush c. Work With Spraying Equipment c. Ate or Drank d. Sprayed Substance e. Other	
10	Were you wounded in Vietnam ?	Yes No
11	If yes, circle type of wound: a. Small arms fire b. Shrapnel c. Explosive devices d. Booby traps e. Mine f. Knife/Bayonet g. Aircraft crash/explosion h. Boat crash/explosion i. Other	
12	If wounded more than once select again here, if not circle NA : a. Small arms fire b. Shrapnel c. Explosive devices d. Booby traps e. Mine f. Knife/Bayonet g. Aircraft crash/explosion h. Boat crash/explosion i. Other j. NA	
13	While in Vietnam were you treated for any Dental problems (including extractions or other treatment) ?	Yes No
14	Did you receive Blood transfusion(s) in Vietnam ?	Yes No
15	At the time of your <b>arrival</b> in Vietnam, your general health was :	Excellent Good Fair Poor
16	At the time you <b>departed</b> from Vietnam, your general health was :	Excellent Good Fair Poor
17	During the <b>first five years</b> after your return from Vietnam, your general health was :	Excellent Good Fair Poor

18	During the period <b>five years through ten</b> years after your return from Vietnam, your general health was :	Excellent Good Fair Poor
19	What was your weight when you <b>arrived</b> in Vietnam (in pounds) : _____ (fill in blank)	
20	What was your weight when you <b>departed</b> Vietnam (in pounds) : _____ (fill in blank)	
21	Have you gained or lost 40 pounds or more in any one year since your Vietnam service:	Yes No
22	If yes, When did you began to experience weight change? (in years AFTER returning) :	0 1 Year 2-4 Years 5-8 Years 9 or More
23	Did you gain or lose this weight :	Gained Loss NA
24	<b>Before you went to Vietnam</b> , did you suffer from or experience any skin rashes, lesions, jungle rot or skin disorders, on any part(s) of your body ? :	Yes No
25	<b>During your tour in Vietnam</b> , did you suffer from or experience any skin rashes, lesions, jungle rot or skin disorders (including toes) ? :	Yes No
26	After your return from Vietnam, did you ever, or do you now suffer from or experience any skin rashes, lesions, jungle rot or skin disorders ? :	Yes No
27	Have you ever had a blood test since your return from Vietnam ? :	Yes No
28	Have you ever been diagnosed with Heart or Circulatory problems? :  If yes, provide your Heart or Circulatory diagnosis:	Yes No
29	Have you ever been diagnosed with any type of Cancer ? :  If yes, provide your Cancer diagnosis:	Yes No
30	Have any members of your immediate (birth) family (parents, siblings, children, aunts or uncles) ever been diagnosed as having any type of Cancer ? :	Yes No
31	Have you ever coughed, urinated or passed blood ? :	Yes No
32	Do you NOW take any prescription medication ? :	Yes No
33	Are you presently under the care of a physician or other health professional for the treatment of any medical problem or condition (exclude psychological or Dental)?:	Yes No
34	Have you had any surgery <b>SINCE</b> your return from Vietnam?	Yes No
35	Do you believe that your health has suffered as a result of exposure to Agent Orange ? :	Yes No
36	Enter the number of children that you have fathered <b>PRIOR</b> to your tour of service in Vietnam.	_____

37	Enter the number of children that you have fathered <b>SINCE</b> your return from Vietnam :	_____
38	Did you Father a child who was conceived <b>after your Vietnam service</b> that was stillborn ? :  If yes, is there any past history of stillborn deliveries in your family background ? :	Yes No  Yes No NA
39	Did you father a child conceived <b>After</b> your return from Vietnam, that ended in miscarriage ? :	Yes No
40	Did you father a child, conceived <b>After</b> your Vietnam service, with any type of physical or mental disability, including learning disabilities ? :	Yes No
41	Have you fathered a child, conceived <b>After</b> your Vietnam service, that died as a result of an illness or disease ? :	Yes No
42	Did you father a child, conceived <b>After</b> your Vietnam service, who is not in good physical or mental health today ? :	Yes No
43	Do you believe that your children are or may be effected as a result of your exposure to Agent Orange ? :	Yes No

Use the space below to provide brief details as you feel necessary.

**Comments:**

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Thank you for your time in completing this important survey. Please forward the completed survey for to:



### Statistical Data Cross Reference

Year of Birth(1)	Total	Percent	Year																								
			1925	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
# Vets Born	203		1	1	2	4	2	2	3	6	4	5	4	0	4	4	11	13	14	18	26	24	25	13	10	6	1
Heart	60	30%	1	1	1	2	1	1	1	3	1	1	1	0	1	2	5	5	4	5	9	5	6	4	0	0	0
Cancer	27	13.3%	0	0	2	1	0	0	1	1	2	1	0	0	0	1	0	3	5	1	3	2	3	1	0	0	0
Both Conditions	8	3.9%	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	3	0	1	1	0	0	0	0	0	0
Family Cancer	106	52.2%	1	1	2	2	0	1	1	2	1	2	1	0	0	1	8	7	8	11	16	8	14	10	5	4	0
Drank Field Water	76	37.4%	0	1	0	1	2	0	1	3	1	1	1	0	0	1	6	5	4	12	7	9	9	4	3	5	0
Bathed in Field	83	40.9%	0	0	1	1	1	0	1	1	3	0	2	0	1	1	7	7	5	11	8	12	12	4	3	2	0
Wet Operations	44	21.7%	0	0	0	0	1	0	0	1	1	1	2	0	0	1	1	3	4	7	3	9	5	2	2	1	0
Ate in Field	134	66.0%	0	1	2	3	2	2	2	5	4	0	3	0	4	3	8	9	10	15	13	18	18	6	2	4	0
Saw AO Sprayed	127	62.6%	0	0	0	2	1	2	3	4	4	2	3	0	2	3	8	7	10	13	14	16	14	7	7	4	1
Skin Problems Before	7	3.4%	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	1	0	0	1	1	0	0
Skin Problems During	106	52.2%	1	0	2	0	0	0	1	3	2	3	2	0	0	1	8	7	9	10	8	16	18	6	5	3	1
Skin Problems After	115	56.7%	0	1	2	0	1	0	1	5	4	1	2	0	1	2	8	8	8	10	13	16	17	6	6	2	1
Child Born Prior	98	N/A (2)	0	5	0	8	2	6	4	11	9	7	7	0	3	4	3	5	7	4	6	1	4	0	0	2	0
Child Born After	333	N/A (2)	0	0	0	4	1	0	2	4	5	4	3	0	1	4	22	17	21	32	64	42	48	24	21	12	2
Stillborn	8	3.9%	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	1	2	1	0	0	0	0
Stillborn History	1	0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Miscarriage (3)	40	19.7%	0	0	0	0	1	0	0	1	1	0	1	0	0	1	6	1	3	5	4	4	6	3	1	2	0
Child Disabled (4)	38	18.7%	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	3	1	5	8	6	7	2	2	1	0
Child Death	2	1.0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0

Note 1: No veterans were born for the years 1926-1928 and 1939.

Note 2: Children born prior/after indicates total children born to that year group.

Note 3: Reflects percent of veterans reporting at least one (1) miscarriage. Some veterans reported multiple miscarriages.

Note 4: Reflects percent of veterans with disabled children, where 8.5 percent of total children born to entire group were disabled.

Appendix B: