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**Author** Keller, Carl

**Corporate Author**

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REPORT OF THE AOWG SCIENCE SUBPANEL

June 3, 1986

APPENDIX I

METHODOLOGY AND RESULTS OF PILOT TESTS FOR AGENT ORANGE EXPOSURE  
AMONG VIETNAM VETERANS

Prepared by

Carl Keller, Ph.D. and Richard Christian, C.R.M.

## SUMMARY OF RESULTS OF PILOT TESTS AMONG VIETNAM VETERANS

Military records were examined by the U.S. Army and Joint Services Environmental Support Group in order to estimate the amount of daily troop dispersion and the distribution of encounters with Agent Orange applications during the period from October 1, 1966 through March 31, 1969, in Corps Tactical Zone III, Vietnam. Procedures and results of these tests were as follows:

### Number of Encounters

Seven Battalions were selected for this test, each consisting of five companies, making 35 companies in all. The daily locations for each of these companies were determined from existing military records and matched against all known Agent Orange applications during the designated 30-month period of the test. Matching was done for encounters within three different time-distance combinations, including:

- 1) Within 500 meters on the day of application ("Wet" Encounters)
- 2) Within 2 kilometers and within 3 days of application
- 3) Within 2 kilometers and within 6 days of application.

A summary of the numbers of encounters among the 35 companies and within each of these time-distance combinations is shown in Table I. Data are included for ranch hand (Herbs) and perimeter (Services Herbs) as well as combined (either tape) and for the cumulative combined, e.g., 5 companies had 14 or more encounters within 2 kilometers and within 6 days of an Agent Orange application. Although 5 out of 35 is 14%, this may be an overestimate of what might be found among all companies in III Corps since the 7 Battalions were chosen from among those thought to be the most likely exposed to ranch hand applications.

Among approximately 5000 veterans known to have been assigned to these seven Battalions, the number of individuals with various numbers of encounters were determined as shown in Table II. Since there are some veterans who were assigned to one of these Battalions who have not yet been identified, it is estimated that some of the proportions of men with more than a few encounters will be greater than indicated in the Table, although how much is unknown.

A more detailed list of procedures and results of the number of encounters pilot tests follow Table II in this Appendix.

Troop Dispersion

Six companies, one from each of six of the Battalions used in the other pilot tests, and six days in 1967 and 1968 were selected at random. On each of the 36 company-day combinations (six companies times six days), the recorded location for each element of the company was plotted on the appropriate topographic map of Vietnam. The distance between various elements of the same company on the same day were measured from the maps. The maximum distance between any two elements of the same company on the same day were according to the following distribution:

<u>NUMBER OF OCCURRENCES</u>	<u>DISTANCE IN KILOMETERS</u>
17	0 (Company all in one location)
1	<2
5	2-4
4	5-9
5	10-19
4	20-29
<hr/> 36	<hr/> 6 (Average)

RESULTS OF PILOT TESTS FOR NUMBER OF ENCOUNTERS WITH AGENT ORANGE APPLICATIONS

TABLE I NUMBERS OF COMPANIES WITH VARIOUS NUMBERS OF ENCOUNTERS

# OF ENCOUNTERS	0	1	2	3	4	5	6	7	8	9	10	11	13	14	15+
<u>500 M / 1 DAY</u>															
*HERBS	33	1	1												
**SERVICES HERBS	33	2													
EITHER TAPE	31	3	1												
CUMULATIVE	35	4	1												
CUMULATIVE %	100%	11%	3%												
<u>2 KMS / 3 DAYS</u>															
HERBS	24	6	3	1		1									
SERVICES HERBS	17	2	7	7		1						1			
EITHER TAPE	14	5	4	3	3	4			1			1			
CUMULATIVE	35	21	16	12	9	6	2	2	2	1	1	1			
CUMULATIVE %	100%	60%	46%	34%	26%	17%	6%	6%	6%	3%	3%	3%			
<u>2 KMS / 6 DAYS</u>															
HERBS	21	5	1	4					1	1			2		
SERVICES HERBS	17	2	2	2	4	2	3	1			1				1
EITHER TAPE	14	3	3	1	4		1	1	2				1	1	4
CUMULATIVE	35	21	18	15	14	10	10	9	8	6	6	6	6	5	4
CUMULATIVE %	100%	60%	51%	43%	40%	29%	29%	26%	23%	17%	17%	17%	17%	14%	11%

TABLE II NUMBERS OF INDIVIDUALS WITH VARIOUS NUMBERS OF ENCOUNTERS

# OF ENCOUNTERS	0	1	2	3	4	5	6	7	8	9	10	11	12	13	15+
<u>500 M / 1 DAY</u>															
EITHER TAPE	<4834	104+	62												
CUMULATIVE	~5000	166+	62												
CUMULATIVE %	100%	3%+	1%												
<u>2 KMS / 3 DAYS</u>															
EITHER TAPE	~4360	268	157	69	47	31	27	1	3		35	2			
CUMULATIVE	~5000	640	372	215	146	99	68	41	40	37	37	2			
CUMULATIVE %	100%	13%	7%	4%	3%	2%	1%	1%	1%	1%	1%	0%			
<u>2 KMS / 6 DAYS</u>															
EITHER TAPE	~4277	252	33	38	154	57	11	72	30	6		28	1	4	37
CUMULATIVE	~5000	723	471	438	400	246	189	178	106	76	70	70	42	41	37
CUMULATIVE %	100%	14%	9%	9%	8%	5%	4%	4%	2%	2%	1%	1%	1%	1%	1%

\*HERBS (refers to Computer Listing of Ranch Hand Applications, Fixed-Winged and Helicopter)

\*\*SERVICES HERBS (Selected Fixed-Winged, ground applications not listed on HERBS)



**DEPARTMENT OF THE ARMY**  
**US ARMY & JOINT SERVICES ENVIRONMENTAL SUPPORT GROUP**  
1730 K STREET N.W. ROOM 210  
WASHINGTON, DC 20006

REPLY TO  
ATTENTION TO

April 10, 1986

DAAG-ESG

- ESG PILOT STUDY OF THE MAIN AGENT ORANGE EPIDEMIOLOGICAL STUDY

1. The Science Panel, Agent Orange Working Group tasked the Environmental Support Group to perform a Pilot Study for the Congressionally mandated Agent Orange Epidemiological study. ESG was given the mission due to the concerns expressed by the Centers for Disease Control and other scientific agencies that the study had not produced enough qualified heavily exposed personnel.

2. There are many detailed functions in which ESG will have to perform for the Agent Orange Epidemiological Pilot Study. Those functions are listed below.

a. CDC has provided ESG a list of Infantry Battalions that had the highest likelihood for exposure after being matched against the Ranch Hand Herbs Tape. ESG selected 6 of the units recommended by CDC and added one additional Artillery Battalion. ESG will identify the gaps and fill in the days in which no grid coordinates were previously reported on the 7 battalions for all companies covering the period 1 October 66 to 31 March 69. This will require a new tape (gap fillers) that must be integrated with the old CDC tape to establish a complete tape with all the tracking data.

b. When all the daily location data has been accomplished ESG will computer match the complete grid coordinate locations of each company by date against the Ranch Hand and Service Herbs Tapes to produce an exposure opportunities score using the below listed criteria.

- 2 kilometers, 3 days
- 2 kilometers, 6 days

c. ESG will produce a listing for each company documenting by date sequence each herbicide encounter and type of exposure (i.e. Ranch Hand, Perimeter, Abort, Ground Spray).

d. ESG will review morning reports to insure the veteran was in the unit and on duty in the field when a spray mission occurred. A veteran could have been in the hospital or on R & R in Bangkok, Thailand, when his unit experienced a herbicide encounter and hence would not have had an exposure opportunity.

e. Our goal is to identify and qualify every soldier assigned to each of the 7 battalions that were selected for the study. The qualification criteria used for the Pilot Study are listed below.

- Single tour enlistee
- E5 or below
- The veteran must have been in Vietnam sometime during or between 1 October 1966 to 31 March 1969 to qualify as a heavily exposed cohort.
- Served anytime in a tracked unit. Non-exposed personnel must have served their entire tour in a tracked unit.

3. To date, ESG has completed filling the location gaps on all 7 battalions. Extensive quality control functions were performed on the data and quality control was initiated on the existing location data that had previously been provided CDC. This information is keypunched and is almost ready to be matched against the spray mission tapes with respect to the aforementioned time and distance requirements.

4. ESG has requested approximately 2,500 military personnel files from the National Archives Records Administration in St. Louis, Missouri. Since ESG has already qualified 15,900 study subjects, 5,000 will be targeted for use in the pilot study. Once the records are obtained the records will be researched and personnel data elements abstracted on each qualified exposed and non-exposed study subject.



RICHARD S. CHRISTIAN, C.R.M.  
Director