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I. INTRODUCTION

In the interim report dated February 1985 the Agent Orange Projects (AOP) presented information on four modifications to the original study design.

1. Battalions rather than companies would form the basis of cohort selection and unit location. The decision to use battalion level location information was based on the lack of information concerning the location of company-sized units.

2. Ranking of unit exposure would not determine selection of study participants. This decision was based on the inability to obtain enough data concerning location information to select the sample on the basis on ranking unit likelihoods for exposure. The decision also resulted from pretests that suggested that there might be high rates of transfer among units.

3. Individual military personnel records, as well as unit morning reports would be used to indentify veterans' period of service in Vietnam. A pretest has shown that tracking of men using only the morning reports would not provide information on a large enough number of men.

4. The study would be restricted to men serving in infantry or artillery units. There were two reasons for this decision: First, we believe that the dispersion among infantry and artillery units might be less than for cavalry, armor, and engineering units, and second, we believe men from these units will resemble each other more closely in terms of baseline characteristics and general military experience than they would resemble men from cavalry, armor, and engineering battalions.

Additionally, the February 1985 report suggested that a true quantitative assessment of exposure was impossible to derive, but that a qualitative assessment of the likelihood of exposure could be attained by using various mathematical models. The report also presented data on some possible mathematical models and discussed the general problem of misclassification of exposure likelihood. Comments and suggestions were sought.

Reviewers responses included:

1. Concern over using battalion level locations to place men since this approach is less informative than locating the companies in which the men served.

The Army and Joint Services Environmental Support Group (ESG) abstracts battalion level and higher reports to obtain battalion locations. After AOP reported that there was insufficient data to locate companies ESG suggested that additional documents exist establishing the location of company (battery) level units on a daily basis. Company sized units filed daily reports, known as morning reports, that contained information on the location of the unit for the day of the report and these reports can be used to provide locations for companies on days for which information was previously unavailable.

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The Army and Joint Services Environmental Support Group (ESG) abstracts battalion level and higher reports to obtain battalion locations. After AOP reported that there was insufficient data to locate companies ESG suggested that additional documents exist establishing the location of company (battery) level units on a daily basis. Company sized units filed daily reports, known as morning reports, that contained information on the location of the unit for the day of the report and these reports can be used to provide locations for companies on days for which information was previously unavailable.

In this report we examine the possibility that company morning reports may be used to supply additional location information and conclude that this information presents locations which are inconsistent with information derived from more reliable sources.

We report an algorithm which will be used to derive company level locations for each day during 1967 and 1968 using the information available from the research of battalion- and higher-level documents.

2. Some reviewers requested a demonstration that some units had a likelihood for exposure and that there was a differential oportunity for exposure among these units. We demonstrate this in Section III of this report and note that the present sampling procedures should insure that men with a high likelihood of exposure are included in the sample.

3. No reviewer questioned our decision to include only men from infantry and artillery battalions in the study. However, our exposure analysis suggests that one of the battalions that had a high likelihood of exposure was a calvary battalion. This battalion will be included in the sample.

A. Agent Orange encounters among battalions.

We define an encounter with Agent Orange to be any occurence of a reported unit location within a specified distance and time from a known application of the herbicide. For this analysis no attempt was made to summarize the locations of companies. We matched all known locations to the data on Agent Orange applications and used various time and distance criteria to define an encounter. We note that this analysis allows a single location to contribute to several different encounters and also allows a single spray to contribute to several different encounters.

We present data on three different analyses using the following definitions of encounters:

1. Applications within 1 day and 5 km of the location.

2. Applications within 5 days and 10 km of the location.

3. Applications on the same day and within 1 km of the location.

The results of these analyses are presented in Tables 5-7. These analysis suggest that battalions 1-3,6,20,24, and 44 were most likely to have been exposed to Agent Orange.

B. Variation of exposure likelihood over time.

We next examined whether for a battalion the demonstrated high likelihood for exposure was due to a uniform likelihood of exposure throughout the period 1967 and 1968. If the high likelihood for exposure was uniform over the entire period it is imperative to select men from both units with a high and a low likelihood of exposure. On the other hand, if the high likelihood for exposure is due to a limited time then a better method of selection of men would be to chose only men who served in units with a high likelihood of exposure since in this case the units would yield men in both the high and low likelihood of exposure categories.

Table 5
Number of herbicide encounters within 1 day and 5 km.
by battalion and company.

	Company				
Battn:	A	B	C	D	Total
1	1	14	4	0	52
2	29	9	24	0	84
3	16	7	1	0	25
5	1	0	0	0	4
6	94	0	21	2	119
7	2	2	0	3	7
8	0	2	0	0	2
9	4	0	0	0	10
10	1	0	0	0	1
13	0	0	0	1	1
14	0	2	0	0	2
15	0	0	0	0	6
16	0	0	4	0	4
20	113	0	95	0	223
22	2	2	5	6	21
23	4	1	1	1	16
24	11	0	10	7	37
31	1	2	0	0	8
32	2	4	1	1	16
33	0	1	1	0	2
34	6	8	3	0	27
37	0	0	0	0	10
38	8	0	0	0	8
43	0	0	2	2	4
44	32	20	11	0	69

Note: Total column is number of herbicide encounters for any unit in the specified battalion
Only known locations are included in this tabulation.

Table 6
Number of herbicide encounters within 5 days and 10 km. by battalion and company.

Battn:	Company A	B	C	D	Total
1	63	95	88	23	497
2	278	239	200	4	1012
3	383	361	54	9	873
4	29	13	0	0	55
5	6	0	0	0	29
6	421	7	79	24	549
7	22	27	1	44	118
8	6	6	3	2	18
9	32	7	6	0	64
10	4	17	0	5	26
11	26	11	1	0	47
12	3	2	7	0	
13	16	12	6	22	78
14	6	8	5	3	35
15	0	0	0	0	22
16	0	0	9	0	9
20	501	28	445	5	1067
21	54	25	28	1	136
22	26	49	59	36	247
23	49	43	110	23	303
24	131	63	169	50	595
26	0	1	0	1	7
31	9	12	5	1	48
32	12	8	13	15	99
33	7	8	16	0	36
34	119	118	154	8	471
36	0	2	0	0	2
37	9	1	3	0	70
38	28	21	12	0	72
39	11	1	28	24	77
42	44	34	40	4	125
43	90	96	75	43	423
44	207	219	171	1	661

Note: Total column is number of herbicide encounters for any unit in the specified battalion
Only known locations are included in this tabulation.

Table 7
Number of herbicide encounters within 1 km on the same day.
by battalion and company

Battn:	Company A	B	C	D	Total
2	0	1	1	0	2
3	0	1	0	0	1
6	12	0	0	0	12
9	0	0	0	0	3
20	28	0	9	0	49
24	2	0	0	2	5
34	3	4	0	0	7

Note: Total column is number of herbicide encounters for any unit in the specified battalion
Only known locations are included in this tabulation.

Table 7
Number of herbicide encounters within 1 km on the same day. by battalion and company.

	Company				
Battn:	A	B	C	D	Total
2	0	1	1	0	2
3	0	1	0	0	1
6	12	0	0	0	12
9	0	0	0	0	3
20	28	0	9	0	49
24	2	0	0	2	5
34	3	4	0	0	7

Note: Total column is number of herbicide encounters for any unit in the specified battalion
Only known locations are included in this tabulation.

No examples
Incomplete report

II. OBTAINING UNIT LOCATION INFORMATION.

Our goal has been to obtain information on the location of combat companies serving in III Corps for each day during the period January 1, 1967, to December 31, 1968, in order to place individual veterans to determine their possible exposure to Agent Orange. A veteran's military personnel file (201 file) tells us to which company he was assigned for each day during his tour in Vietnam. Once we know the location of the companies and where and when herbicides were applied, we can assess the likelihood of the individual's exposure to Agent Orange. We discussed the available data on herbicide applications in detail in the February 1985 report.

For every combat company, some days occur for which location information is lacking using the various documents presently researched by ESG (Table 1). Despite their best efforts, it appears that gaps will remain in our ability to determine the company-level locations. We originally thought that company level morning reports would provide additional information but for various reasons discussed below this is not the case.

Only if MR's are not issued

Can't wait to read this!

In this section we describe the methods presently employed by ESG to examine military documents for recorded location information. Since these documents do not inform us of the location of every company for each day of the period of the study, we describe an algorithm used to impute a location for those days for which we lack information.

A. Data available from battalion- and higher-level documents.

As previously reported, the algorithm used by ESG to abstract battalion- and higher-level documents involves a hierarchical search of available military records for location information. The abstractor records all place names and map coordinates describing the locations of the units of a battalion, the dates for which these coordinates or place names are entered into the military record, the size of the unit to which the coordinates or place names are attached, and the type of document from which the information is abstracted. ESG is currently tracing the daily locations of 65 U.S. Army battalions that served in III Corps for at least 18 months during 1967 and 1968. AOP has received data for 35 of these battalions.

38 completed to date

The map coordinates gleaned from these records are in the Universal Transverse Mercator (UTM) system which uses a two letter and six digit designation of location. The letters refer to a 100 km by 100 km grid on the map of Vietnam. The first three and the last three digits divide the east-west and north-south directions, respectively, into 0.1 km grids.

Each battalion maintained several types of documents describing its activities: daily journals, situation reports (SITREPS), Operational Reports-Lessons Learned (OR-LLs), Combat Operation After Action Reports (COAARs), and other documents. A battalion also reported on its daily activities to its brigade and division, and these activities were incorporated into daily journals by these units. The brigade and division also maintained daily journals of intelligence activities and operations, along with SITREPS, OR-LLs, and COAARs.

Daily journals were required at battalion, brigade and division levels. They include the place names or map coordinates of the unit's troops, the number of wounded and killed in action, battle descriptions, locations of enemy camps, and general information. Battalion daily journals provide the most accurate location information since they describe the units activities, first hand, on a daily basis.

SITREPS also were required at battalion, brigade, and division levels. These situation reports are summaries of the major combat activities of the units. They contain coordinates and military acronyms with very little explanation. Situation reports are used when attached to the daily journals or when the journals are incomplete.

The intelligence summaries provide specific map coordinates for US, Army of the Republic of Vietnam, and Viet Cong troop movements. They are used when both the daily journals and the situation reports are incomplete. These reports sometimes were required at the battalion and brigade levels, but usually are found at the division level.

OR-LLs were completed quarterly, sometimes at the battalion level, but usually at the division level. They are narrative in style and describe areas of operation and specific grid coordinates. They also contain descriptions of battles and construction projects and general administrative information.

COARs provide general information but contain few coordinates, so are seldom used. These records were required when the units were involved in major combat operations.

The higher the level of the document within the military organizational structure from battalion to division, the less specific the location information found there. When searching for company locations, the battalion records are read first because they contain the most detailed information and are a first hand account. When information is missing from the battalion records, the brigade- and division-level records are used. The following algorithm describes the specific sequence used by ESG to review records:

1. Battalion
    a. Daily journal
    b. Situation reports

2. Brigade
    a. Daily journal
    b. Situation reports

3. Division

a. Daily journals for intelligence activity and for operations

b. Situation reports

SOP

4. Other

a. Information from other brigades

b. Brigade and Division ORLLs, COARRs, etc.

Table 1 shows the number of days for which at least one location was obtained from the abstraction process. The table presents the number of days by battalion and by company within battalion, and the column headed "Battalion" reports the number of days for which at least one location is recorded for the entire battalion. Unfortunately, the algorithm does not provide a location for company-sized units for all days between 1/1/67 and 12/31/68.

Because of the lack of information - Description or incomplete information.

Table 1

Number of Days for which at Least One Location is Recorded for Infantry and Artillery Battalions

Battalion	Company						
	A	B	C	D	E	H	Battalion
Infantry							
1	293	325	291	233	0	29	527
2	324	415	450	46	22	275	438
3	485	499	494	238	347	505	78
4	578	590	558	80	2	86	416
11	622	589	603	307	517	135	481
12	517	531	517	359	1	11	425
13	484	484	499	292	0	11	618
14	500	462	486	266	379	10	672
21	477	479	452	332	7	9	716
22	359	333	365	216	0	2	358
23	332	335	293	210	0	0	652
24	381	293	343	245	0	6	474
31	418	441	473	17	1	44	507
32	357	331	389	282	0	0	542
33	480	487	498	13	0	0	541
34	351	348	392	194	0	6	685
42	383	380	375	298	2	10	510
43	252	202	263	176	0	4	575
44	412	382	384	194	1	11	665
49	295	346	324	163	4	8	456
median	398	398	421	202	1	10	519
Artillery							
6	719	665	679	572	2	364	2 ← Bad unit
7	163	137	20	122	5	416	44
8	42	28	48	25	1	12	220
9	284	292	288	72	1	17	704
16	284	290	296	0	0	217	341
18	29	60	80	0	0	0	306
26	71	47	59	59	0	42	726
36	109	78	58	0	1	2	725
37	43	50	42	8	7	3	603
38	593	596	586	0	0	54	678
39	403	383	379	91	1	256	718
median	163	137	80	25	1	54	603

B. Possible additional data from company morning reports.

After the OTA staff expressed concern about the ability to obtain company-level location information, the ESG claimed that additional documents exist that might help place companies on a daily basis. The suggested documents were company morning reports completed daily at the company level and containing information about company activities. AOP has been computerizing the location information from morning reports since June 1985, and, unfortunately, a detailed analysis of their contents leads us to conclude that they do not offer useful additional information.

The morning reports ideally contain two entries that should help establish the daily location of the company: Item 10 states the company's permanent station or location, and Item 11 states the present station or location. Figures 1 through 6 provide examples of completed morning reports.

Items 10 and 11 of the morning reports may contain three different pieces of location information in various combination: a UTM grid coordinate, an Army Post Office (APO), and a place name. For example, Figure 1 contains all three pieces of information:

an APO--96225, a place name--Cu Chi, and a UTM coordinate--XT646162. Cu Chi was a division level basecamp northwest of Saigon and was the headquarters of the 25th Infantry Division for the entire period being studied. The coordinate listed is consistent with the known location of Cu Chi which was approximately 25 km in diameter. We have no way of knowing, however, whether the coordinate refers to the company, the battalion, the brigade, or even the division location and few of the morning reports contain the three pieces of information found in this example.

When a place name occurs alone in the morning reports, we refer to a gazetteer and employ our prior knowledge of the unit's location to assign a coordinate. The gazetteer provides an alphabetical listing of location names in Vietnam and their associated coordinates. Often, however, the same name refers to several geographic locations, and informed opinion is required to determine which of multiple entries in the gazetteer should be associated with the particular place name.

This must be pointed out that every piece of evidence is in fact Cu Chi

This is a company document

true

true

CDC is not qualified!

When an APO is the only information available, we use a station list to find the place name associated with it and the unit being tracked. The Army published station lists monthly containing the geographic locations of the battalions serving in Vietnam. We then assign coordinates to the place names on the station lists using the same procedure descibed above. Since a single APO can refer to different geographic locations depending on the unit to which it was attached, we must use APOs in conjunction with the station lists and the specific unit.

C. The morning report algorithm.

AOP began using the morning reports in June 1985 to create a computerized location file that contains each company's location obtained from the morning report for each day during 1967 and 1968. The morning reports exist on microfilm which ESG sends to AOP in batches. The file contains all information available from the morning reports: APOs, place names, grid coordinates. AOP discovered, however, that morning reports do not exist for every company for each day during 1967 and 1968 and that often only an APO is given on the morning report. However there are normally 10 to 18 reports throughout the month.

1. A description of the algorithm.

ESG suggests an algorithm to examine all information from the morning reports and to assign a single daily location to each company for which a location was not available from higher level documents. The algorithm requires that we derive a UTM coordinate for every day based on the information obtained from the morning report and that we assign this coordinate to any day for which information is lacking. Have we said this!

We can make that determination

Unfortunately, we have not been able to determine what the locations listed in the morning reports represent. We do not know whether they refer to the basecamps of the company's brigade, or division or whether they refer to the fire support bases from which the battalions operated while in the field. A division in Vietnam consisted of three brigades and a brigade consisted of three battalions. Battalions contained four line companies instead of the usual three so that one could be kept in support of the battalion fire base. — We have stated it differently. We never said that's why there is 4 companies.

This can be substantiated by using MR's with battalion daily journal

The term "basecamp" had a particular meaning in Vietnam. It referred to an installation containing the headquarters for a unit above the battalion level either at the brigade or division level (Major General David Ewing Ott: Vietnam Studies: Field Artillery 1954-1973, pg. 73, published by the Department of the Army, 1975). Division basecamps were large semi-permanent installations such as that constructed at Cu Chi mentioned above. Generally, one of the three brigades of the division was dedicated to the support and defense of the basecamp with the brigade commander being appointed as the base commander (Lieutenant General John H. Hay Jr.: Vietnam Studies: Tactical and Materiel Innovations, pp 148-61, published by the Department of the Army, 1974).

Battalions and companies tended to operate from fire support bases while in the field. Fire support bases were smaller, temporary installations that usually contained an infantry battalion's headquarters and an artillery battery for direct support of the battalion. The area of operations for the battalion was around the fire base but within the effective firing range of its artillery support. The effective firing range of the 105 mm Howitzer (the cannon most often used in a direct support role) was about 7 km. Typically, the three brigades composing a division rotated through the division headquarters, and the three

battalions composing a brigade rotated through the brigade headquarters.? Therefore we are presented with four combat companies A-D in a battalion, three battalions in a brigade, and three brigades in a division. At any point in time there were 12 companies at the division basecamp, 8 companies at the two brigade basecamps and 16 companies operating out of the four battalion firebases.? These different locations were not necessarily in close proximity to one another and it is not known to which of these locations the morning reports refer.

True / False ? Where did this come from

Table 2 summarizes some of the data collected from morning reports by AOP thus far. On many days and for many units there is only an APO available in the morning reports: true

Table 2
Number of Morning Reports Abstracted by Type of Information Available.

Battalion	Company	Grid Coord	Place Name	APO	None	No Report
1	A	172	0	482	0	77
	B	177	0	457	0	97
	C	178	0	438	0	115
	D	0	0	370	0	361
	E	0	0	156	0	575
	H	173	0	453	0	105
2	A	146	0	464	0	121
	B	172	0	276	2	281
	C	181	0	159	0	391
	H	167	0	176	0	388
3	A	0	0	652	0	79
	B	0	0	612	0	119
	C	0	0	644	0	87
	D	0	0	313	0	418
	E	0	0	504	0	227
	H	0	0	656	0	75
4	A	700	0	0	1	30
	B	709	0	0	0	22
	C	717	0	0	0	14
	D	128	0	0	0	603
	H	709	0	0	0	22
12	A	323	0	0	0	408
	B	329	0	0	0	402
	C	320	0	0	0	411
	D	123	0	0	0	608
	E	15	0	0	0	716
	H	357	0	0	0	374
13	A	0	340	0	0	391
	B	128	396	0	0	207
	C	63	493	79	0	96
	D	106	274	1	0	350
	E	47	82	0	0	602
	H	133	560	0	0	38
14	A	0	0	351	0	380
	B	0	0	350	0	381
	C	0	0	348	0	383
	E	0	0	322	0	409

Table 2 (Continued)

21	A	680	0	0	0	51
	B	661	0	0	0	70
	C	698	0	0	0	33
	D	476	0	0	0	255
	E	123	7	0	0	601
	H	693	1	0	0	37
22	A	651	0	0	0	80
	B	658	0	0	0	73
	C	663	0	0	0	68
	D	396	0	3	0	332
	E	254	0	0	0	477
	H	682	0	0	8	41
23	A	0	140	465	0	126
	B	0	0	664	0	67
	C	0	35	549	0	147
	D	0	0	381	0	350
	E	0	0	381	0	350
	H	0	137	184	0	410
24	A	0	0	616	0	115
	B	15	0	555	1	160
	C	0	0	516	0	215
	D	0	0	318	0	413
	E	0	0	231	0	500
	H	0	0	491	0	240
31	A	0	336	0	0	395
	B	0	281	0	0	450
	C	0	263	0	0	468
	D	0	113	0	0	618
	H	0	333	0	0	398
34	A	163	0	151	0	417
	B	170	0	115	0	446
	C	140	0	140	0	451
	D	0	0	100	0	631
	E	0	0	34	0	697
	H	163	0	184	0	384
44	A	349	0	0	0	382
	B	308	0	0	0	423
	C	176	0	166	0	389
	D	0	0	107	0	624
	E	0	0	34	0	697
	H	58	0	0	0	673

Table 2 (Continued)

49	A	181	0	484	0	66
	B	179	0	456	0	96
	C	175	0	501	0	55
	D	0	0	404	0	327
	E	3	0	234	1	493
	H	180	0	500	0	51
ARTILLERY						
6	A	0	0	251	0	480
	B	0	0	250	0	481
	C	0	0	252	0	479
	D	0	0	245	0	486
	H	0	0	359	0	372
7	A	149	0	340	0	242
	B	163	0	375	0	193
	D	134	0	310	0	287
	H	150	0	373	0	208
8	A	21	0	408	0	302
	B	0	0	554	0	177
	C	0	0	516	0	215
	D	0	0	529	0	212
	H	0	0	529	0	262
9	A	0	0	581	0	150
	B	0	0	369	0	362
	C	0	0	260	0	471
	H	0	0	334	0	397
16	A	496	0	0	1	234
	B	472	0	0	0	259
	C	510	0	0	0	221
	H	555	0	0	0	176
17	A	0	0	390	0	341
	B	0	0	357	0	374
	C	0	0	225	0	506
	H	0	0	201	0	530
18	A	0	566	0	0	165
	B	0	517	0	0	214
	C	0	252	0	0	479
	H	0	320	0	0	411

Table 2 (Continued)

19	A	0	0	369	0	362
	B	0	0	421	1	309
	C	0	0	298	0	433
	H	0	0	438	2	291
26	A	248	0	0	0	483
	B	256	0	0	0	475
	C	300	0	0	0	431
	D	259	0	0	0	472
	H	84	0	0	0	647
27	H	0	0	148	0	583
29	A	0	0	162	0	569
	B	0	0	406	1	324
	C	0	0	292	0	439
	H	0	0	447	0	284
36	A	0	0	146	0	585
	B	0	0	271	0	460
	C	0	0	169	0	562
	H	0	0	208	0	523
39	A	0	0	203	0	528
	B	0	0	216	0	515
	C	0	0	177	0	554
	H	0	0	122	0	609
46	A	0	320	0	0	411
	B	0	325	0	0	406
	C	0	319	0	0	412
	H	0	347	0	0	384

2. Statistical analysis of the morning report algorithm.

To examine the accuracy of the morning report algorithm, we checked the distances from the locations noted in the morning reports to the known locations of the company obtained from the abstraction of higher level documents for days when both locations are noted. Table 3 presents the averages of these distances. The table also presents the 25th percentile, the median, the 75th percentile, and the 90th percentile. For example, the average distance between the two locations for A company 1st battalion, 2nd infantry (battalion number 1 on the AOP master list of combat battalions) was 35 km. Twenty-five percent of the distances were 14 km or less, 50% were 38 km or less, 75% were 47 km or less, and 90% were 81 km or less. It does not appear from this analysis that the locations obtained from the algorithm using morning report information are accurate enough for use on days when no location is obtained from the abstraction of higher level documents. AOP plans no further work on the abstraction or summarization of morning report information and does not plan to use the information obtained from this source in any further work on exposure assessment.

19-AT

Table 3
Distribution of distance from morning report locations to those obtained from other documents.

		N	Mean	SD	25%	50%	75%	90%
1	a	62	35	25	14	38	47	81
	b	65	41	24	17	42	48	89
	c	58	35	26	12	38	47	88
2	a	112	20	21	3	14	29	62
	b	127	20	20	6	13	25	65
	c	125	18	19	5	11	23	62
4	a	563	13	18	0	8	20	24
	b	577	12	16	0	8	19	24
	c	553	10	12	0	10	17	23
	d	71	1	3	0	0	0	1
7	a	86	8	15	0	0	8	37
	d	76	7	15	0	0	4	29
12	a	227	21	11	11	22	26	37
	b	238	20	11	11	20	25	40
	c	229	19	10	11	18	22	36
	d	93	16	13	7	11	19	42
13	b	106	42	27	24	51	54	73
	c	57	34	30	4	39	54	69
	d	73	48	24	40	52	54	69
16	a	210	25	20	13	17	34	53
	b	204	25	28	10	18	20	80
	c	228	19	17	8	19	24	24
21	a	249	51	27	17	59	68	87
	b	223	47	27	16	53	68	83
	c	226	55	25	42	60	70	83
	d	246	57	23	44	63	70	82
22	a	321	34	26	18	25	36	83
	b	308	34	26	18	25	36	83
	c	336	32	27	13	24	33	83
	d	174	25	17	12	25	29	38

25% ↔ 50% ↔ 75% ↔ 90%

You can only compute 100% this compute to 240% What am I doing wrong

D. Information available from other units.

Although there are many days when there is missing information on the location of companies within a battalion, there is at least one point available from some unit within the battalion on most days (Table 1). This data may be used to impute a location for a company on days when no location is presently available. As explained above, the units from an infantry battalion tended to operate as a unit, while those from an artillery battalion did not. Thus the use of information on other units from an infantry battalion may be appropriate for imputation. Because of the manner in which the artillery operated, this is probably not the case for artillery batteries. The discussion presented pertains more to infantry units, artillery units will be discussed in section E.

I can go with this if OTH does not, MR's are the best source document.

If data on the location of a particular company is missing then there may be information available from each of the following:

1. The other line companies (Companies A-D).
2. Company E (This was a support company which was not present for all battalions).
3. The battalion headquarters company.
4. The entire battalion. For some coordinates received the unit associated with them was the battalion. This information was always available when the information was taken from the battalion daily journal. The battalion daily journal had a standard reference at the top of the journal to the location of the battalion.

The above information could be available in any combination.

Table 4 presents the number of days on which a location is known for a line company (A-D) and the number of days on which a location is known for any unit in the battalion (i.e., a line company, company E, the headquarters company, the entire battalion, or a unit of unknown size.) On most days at least one location exists for most battalions and for the majority of these days the location is associated with a line company.

Table 4
Number of days on which battalion locations are reported.

Battalion	Any Line Company	Any unit
1	532	666
2	613	721
3	681	728
4	663	721
5	249	645
6	723	723
7	300	615
8	100	312
9	368	715
10	671	727
11	706	722
12	648	691
13	637	702
14	619	722
15	18	723
16	417	548
18	100	313
20	615	693
21	618	728
22	600	690
23	539	683
24	600	713
26	156	728
31	597	669
32	554	660
33	640	695
34	585	723
36	155	725
37	114	635
38	632	727
39	445	720
42	611	709
43	525	703
44	607	711
49	558	682

E. An imputation algorithm.

There is much more information for infantry battalions than for artillery battalions. Also, artillery batteries operated differently than other types of units. For these reasons two different algorithms have been developed, one for infantry and a different one for artillery. The infantry algorithm will be applied to calvary and engineering battalions.

The infantry algorithm will be as follows:

X 1. If location information is available from the research of higher level documents this information will be used. If not then

This is fine unless we have to research Bde and Div records again since we use higher level documents to fill in gaps.

2. If location information is available on the other companies of the same battalion this information will be used. If not then

3. If information is available for the units other than the line companies, e.g., the entire battalion, or the headquarters company this information will be used. If not then

This is already extracted CDC can help punch

I have no problem with this if OTA agrees if MR's are not to be used

4. For the remaining days, the last known locations and the next known locations will be assigned to the days with no information available.

We believe this algorithm is justifiable because it makes use of the best possible information available at each step.

The artillery algorithm will be as follows:

1. If location information is available from the research of higher level documents this information will be used. If not then

2. ESG will be asked to research the battalion using a contextual algorithm rather than a mechanical algorithm. That is, they will be requested to provide an informed opinion as to where the artillery battery was on each day for which information is missing. Since artillery batteries were less mobile than infantry companies, this research should be somewhat less involved than the research required to locate an infantry company and the information acquired in this fashion should be more accurate than if this method were used for infantry companies.

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F. Estimating the precision of location information.

The algorithm devised by ESG and AOP for research of military documents is a "mechanical" algorithm in that the abstractors are not asked to make inferences based on the content of the military records, but only to take explicit entries which mention either an UTM coordinate or a place name. There is sometimes additional information available which would allow a trained researcher to infer the probable location of a unit. To test the accuracy of the data, we have begun creating an independent location file on a subset of the data. This file is being created independently by a military historian employed by the AOP for this purpose.

Who is the military historian

1. Description of the process.

AOP recently employed Shelby L. Stanton as a consultant with AOP on matters of military history and operations. Mr. Stanton is an expert on the military history of the Vietnam War and of the documents available for researching the war. He is a Vietnam combat veteran and military historian who has written two books about the Vietnam war, <u>The Order of Battle</u>, and <u>The Rise and Fall of an American Army</u>. A third book on the history of the Special Forces Units in Vietnam is in press. <u>The Order of Battle</u> is the book from which the initial listing of

This is not true or accurate ORLL's and station [illegible] MACV [illegible]!

battalions on the AOP masterlist of battalions was obtained and is the source document for all previous attempts at locating units which served in Vietnam.

Mr. Stanton has agreed to research eight different battalions from the AOP masterlist for one month during 1967-1968. The months were selected to cover the entire period, each battalion being researched for a different month. He will create a location (or set of locations) for each company for every day of the period. He will use whatever documents he feels necessary in order to obtain an informed opinion as to location of the company. He plans to complete this research by May 1, 1986, delivering the data on each battalion as it is completed.

Self proclaimed expert

Ha! Ha! Ha! No criteria No qualification Just a blanket guess

2. Use of the file.

While we are convinced based on our analyses to date that we have achieved the most accurate data that is possible using the methods and records available, there is still uncertainty with regards to how accurate the process is.

The file created by Mr. Stanton will be compared to the data

from the same dates using the standard research algorithm and imputation algorithms described above. The purpose of this comparison will not be to judge the correctness of procedures but rather to place reasonable bounds on the accuracy of the data.

IV. VARIATION IN OPORTUNITY FOR EXPOSURE.

The design of the Agent Orange Study requires that we obtain men from combat units who had a high likelihood of exposure and also men from combat units who had a low likelihood of exposure. In this section we demonstrate that there was variability in the likelihood of exposure between the units and that in those units that were most likely to have been exposed, the exposure was occurred in a limited time period. Thus, by selecting men from the battalions which were most likely to be exposed we should insure that both men who were highly likely to have been exposed and men who were much less likely to have been exposed are included in the study.