SUMMARY OF ESSG STUDY "HERBICIDES AND MILITARY OPERATIONS"*

1. In February 1972 the U.S. Army Engineer Strategic Studies Group (ESSG) published an evaluation of the military utility of herbicides based on experience in Vietnam. Herbicides had two uses in Vietnam: crop destruction and defoliation. ESSG approached the problem of evaluation in three ways:

a) Combat statistics: An analysis was done of the numbers of military incidents and numbers of friendly and enemy personnel killed in action in sprayed areas before and after spraying.

b) Survey of opinions of combat officers: A study was made of written responses to a detailed opinion survey of several hundred officers who conducted missions where herbicides were used.

c) Review of previous evaluations.

2. Regarding crop destruction, ESSG's overall conclusion is:

> "Herbicides destroyed enemy crops, but the enemy was able to compensate and overcome localized food supply shortages. At most, the crop destruction program harassed the enemy." (Volume I, page 16.)

This conclusion is based on the opinion survey and on the review of previous evaluations. In its analysis of combat statistics, ESSG did not attempt to separate crop destruction operations from the much larger number of defoliation operations.

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* Office of the Chief of Engineers, Department of the Army, Engineer Strategic Studies Group, February 1972.

3. Regarding defoliation, ESSG in its overall summary concludes that herbicides contributed to the securing of friendly fixed installations, to area denial programs in enemy infiltration and base areas, and to the prevention of ambush on lines of communication. (Volume I, page 16.) However, consideration of the data presented in the text of the ESSG study raises important questions regarding the validity of these conclusions as regards the utility of herbicides in the latter two applications. These questions are discussed in sections 5 and 6 below.

In deciding what herbicide capabilities and options we wish to maintain for future contingencies, we need to determine not only whether herbicides are useful but to what degree. The ESSG opinion survey and the ESSG analysis of combat statistics provide several quantitative measures for doing this.

4. The most general question in the opinion survey was "Considering the contributions of herbicides to accomplishment of your mission in the RVN, do you see a need for these agents in future contingency operations?" The responses were:

TABLE I

OPINION ABOUT FUTURE NEED FOR HERBICIDES

| | YES | PERHAPS | NO |
|---|---|---|---|
| Army Chemical Officers | 28 | 5 | 0 |
| Army and Marine Officers | 238 | 83 | 20 |
| Air Force and Marine Air Officers | 145 | 116 | 38 |
| Navy Officers | 107 | 35 | 9 |
| Total Respondents | 518 | 239 | 67 |
| | 63% | 29% | 8% |

Thus when the question was posed most broadly, nearly two-thirds of the officers polled considered herbicides potentially useful in future contingencies; even so, more than a third were not convinced.

Responses to more detailed questions of the survey showed that many officers considered that the most effective use of herbicides in Vietnam was the spraying of perimeters of fixed friendly installations.

ESSG commented that "Much of the personal experience favorable to herbicides probably derives from an accumulation of confidence in being able to see better whether or not there is anything to see... the officers' favorable impressions seem to be out of proportion to favorable specifics." (Volume I, page 9.) In other words, a qualification in interpreting these responses is that they are conditioned not only by the effect of herbicides in defeating or neutralizing the enemy but also by the psychological reactions of the respondents just to being able to see farther.

5. The ESSG analysis of combat statistics provides quantitative information on the changes in military actions after spraying.

To calculate the change associated with the use of herbicides, the "expected" number of incidents or KIA in sprayed areas during the six months after spraying is subtracted from the observed number. The "expected" number includes a correction for province-wide changes in the pace of the war: it is calculated by multiplying the number of incidents or KIA observed in the sprayed area during the six months before spraying by the ratio of the number observed in the rest of the province in the six months after the spraying to the number observed in the six months before. Mutliplication by this ratio is done in order to correct for province-wide changes in combat activity not caused by herbicides. In point of fact, in the categories summarized in Table 2 below, there is in no case

a change of more than ten percent in the number of incidents or KIA outside of the sprayed areas.

ESSG defined sprayed areas to include not just the terrain receiving herbicide but also the area, usually much larger, in which the spraying was intended to affect local military operations. They chose a six-month period because improvement in visibility after spraying in most cases lasts four to six months. They used the words "associated with" instead of "responsible for" in evaluating the connection between spraying and the calculated changes in military events for the obvious reason that herbicides are not the only factor that could have caused the differences between expected and actual numbers. This is so even though the data are averaged over many targets and many military encounters. Nevertheless, in a field where quantitative measures of success or failure are hard to come by, ESSG's approach is probably the best available.

The herbicide records used in the analysis cover 12,526 sorties by C-123 aircraft and 119 different herbicide targets in 35 of the 44 provinces, accounting for nearly two-thirds of all herbicide spraying done in the RVN in the years 1963-1970. The combat statistics cover a total of 175,444 military encounters in which 435,139 personnel were killed in action. For all of the data including all types of herbicide targets the results are:

TABLE 2

CHANGES IN MILITARY ACTION IN SPRAYED AREAS

| Type of Change | Total Change | Percent Change |
|---|---|---|
| Friendly-initiated actions | -154 | -2.7 |
| Friendly killed in action | -896 | -20.9 |
| Enemy killed in action | -9391 | -33.3 |
| Enemy-initiated actions | -345 | -2.9 |
| Friendly killed in action | -127 | -3.4 |
| Enemy killed in action | +354 | +9.3 |
| All Actions | | |
| Friendly killed in action | -1023 | -12.8 |
| Enemy killed in action | -9037 | -28.2 |

As presented by ESSG (Volume I, page 13.), the changes in military actions and KIA are difficult to assess because they appear only as percentages of the expected values in the sprayed areas. Therefore, Table 2 above presents in addition the changes themselves, so as to give some idea of the magnitude of the numbers at issue.

As seen in Table 2, the main results are that herbicide operations were associated with:

a) Only a very small change (less than 3 percent) in the frequency of military engagements, both those initiated by the enemy and those initiated by friendly forces.

b) A total reduction of 1023 in friendly killed in action, a result favorable to herbicides. (Friendly KIA are defined as friendly military KIA plus all civilian KIA.)

c) A total reduction of 9037 in enemy killed in action. This result is unfavorable to herbicides unless it is outweighed by a reduction in enemy presence or operations in the sprayed areas. However, the smallness of the decline in enemy-initiated actions (2.9%) argues against any major effect of herbicides in reducing enemy presence or operations.

A crude but vivid summary of these changes is that on the average each C-123 sortie is associated with a reduction of 1/12 of a friendly KIA and a reduction of 7/10 of an enemy KIA.

6. A surprising point emerges when one considers only the data for herbicides used for counter-ambush purposes along friendly lines of communication. This is an application which was generally rated as successful in the opinion survey. For example, Army and Marine respondents indicated a reduction in casualties along friendly roads nearly evenly divided between "significant" and "slight". (Volume II, page C-1-11.)

The analysis of combat statistics leads to a contrary conclusion, although this is not brought out in the overall ESSG summary (Volume I, page 16.). ESSG separated herbicide records according to three categories of herbicide targets: known enemy, friendly security/counterambush, and mixed. The second category consists almost entirely of friendly lines of communication (LOC's) along roads and waterways. The herbicide records include approximately 1,000 herbic sorties in this category, for which ESSG finds the following changes in combat statistics:

TABLE 3

CHANGES IN MILITARY ACTION ALONG SPRAYED LINES OF COMMUNICATION IN FRIENDLY AREAS

| Type of Change | Total Change | Percent Change |
|---|---|---|
| Friendly-initiated actions | +217 | +68 |
| Friendly killed in action | +215 | +192 |
| Enemy killed in action | +232 | +16 |
| Enemy-initiated actions | +216 | +32 |
| Friendly killed in action | +72 | +24 |
| Enemy killed in action | +207 | +247 |
| All actions | | |
| Friendly killed in action | +287 | +70 |
| Enemy killed in action | +439 | +28 |

Overall, there were more actions and more killed in action- both friendly and enemy- than expected if herbicides had not been used. The percentage increase in KIA was greater for friendly personnel than for the enemy. There was a 32% <u>increase</u> in actions initiated by the enemy along these lines of communication.

These increases cannot easily be explained. They could possibly be a reflection of marked changes in LOC usage, a question not addressed by ESSG. Alternatively, one may ask if sprayed areas invite more enemy activity and enemy weapons of greater range and fire power. Does the partial clearing produced by spraying induce overconfidence and inadequate caution among friendly personnel? As pointed out by ESSG, "Bare tree trunks or limbs and fallen foliage are not necessarily insignificant obstacles to sight. In general, any asserted net military effect dependent on improved visibility from point A to point B must include allowances for improved visibility from B to A." (Volume I, page 4.) Consideration of factors such as these makes it all too apparent how difficult it is to evaluate a weapon which, after all, exerts its only direct effects upon the vegetation, not upon the enemy.

7. In sum, ESSG finds: a majority of officers familiar with the use of herbicides in Vietnam felt that they were useful in specific situations especially on perimeters of fixed installations; some of the opinions favorable to herbicides appeared to be a psychological response to seeing the vegetation reduced rather than a judgment based on actual military consequences; the analysis of combat statistics provides mixed indications, some favorable to herbicides and some unfavorable; there is only a slight change (less than 3 percent) in the frequency of enemy initiated military engagements; overall, there is a reduction in friendly KIA (friendly military plus all civilians) of about a thousand and a reduction of enemy KIA of about nine thousand associated with the 12,526 herbicide spraying sorties analysed; surprisingly, herbicide missions along friendly lines of communication are associated with sharply increased numbers of enemy initiated actions and of friendly killed in action.

Finally, as the ESSG study makes clear, any decision on whether or not to maintain an herbicide capability - and if so what kind - depends not only on whether or not herbicides are useful, and to

what degree, but also on the effectiveness of alternative systems for reducing vegetation, such as plowing, burning, or manual removal.

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