# EVALUATION OF HERBICIDE OPERATIONS IN THE REPUBLIC OF VIETNAM (SEPTEMBER 1962-SEPTEMBER 1963)

Peter G. Olenchuk, et al

Military Assistance Command, Vietnam
APO San Francisco 96243

10 October 1963

AD277295

208054

Headquarters, United States Military Assistance Command Vietnam - APO 143 San Francisco, California

SUBMITTED 10 October 1963:

TASK FORCE SAIGON HERBICIDE EVALUATION TEAM

(6) Evaluation of Herbicide Operations In The Republic of Vietnam (September 1962 - September 1963)


PETER G. OLENCHUK
Lt Colonel, USA

ROBERT T. BURKE
Political Officer, AmEmb, Saigon

ORAN K. HENDERSON
Lt Colonel, USA

WAYNE E. DAVIS
Major, USAF




APPROVED:

I approve Recommendation in II, paragraph 1 & 2.

PAUL D. HARKINS
General, United States Army
Commander, United States Military Assistance Command, Viet Nam

HENRY CABOT LODGE
American Ambassador to the Republic of Viet Nam

# INDEX



**Preceding page blank**

INDEX (Continued)

## I. INTRODUCTION

### A. TERMINOLOGY

Herbicide operations for the purpose of this evaluation are treated in two parts: Chemical defoliation and chemical crop destruction. Chemical defoliation is the spray of chemicals (weed killers) on vegetation to remove foliage. Chemical crop destruction is the spray of similar chemicals on field crops. Herbicide operations are conducted by using spray devices from the ground (hand or mounted) or by air vehicle delivery means.

### B. BACKGROUND

#### Defoliation

In October 1961, CHMAAG Vietnam suggested to OSD the use of defoliation to clear border areas and Viet Cong (VC) strongholds in the Republic of Vietnam (RVN). A research and development test, and semi-operational program limited to certain key routes were approved by OSD and conducted from November 1961 through mid-February 1962. The results were evaluated and modifications were made by a special OSD team to improve the adequacy of defoliation techniques. COMUSMACV then recommended that the operational phase of the program be resumed. On 15 August 1962, JCS approved defoliation of six targets in the Ca Mau peninsula area. Defoliation of these targets was completed during September and October 1962. In late November 1962, COMUSMACV and the American Ambassador to RVN were authorized by the Departments of Defense and State to conduct defoliation operations subject to specific restrictions. Current policy guidelines were established on 7 May 1963 (Appendix 1).

#### Crop Destruction

Chemical crop destruction was suggested by CHMAAG Vietnam in October 1961 concurrent with defoliation recommendations. Approval was received in October 1962 to conduct a test operation in Phuoc Long Province. Subsequently, the Departments of State and Defense authorized chemical crop destruction in Thua Thien Province. Current policy requires U.S. joint State/Defense approval for each chemical crop destruction operation (Appendix 1).

AS NOTED IN THE NTIS ANNOUNCEMENT, THIS REPORT IS LESS THAN 50% LEGIBLE. HOWEVER, IT IS THE BEST REPRODUCTION AVAILABLE FROM THE COPY FURNISHED NTIS BY THE CONTRIBUTOR.

## II. TERMS OF REFERENCE

### A. AUTHORITY

A full report and evaluation of all 1963 herbicide operations were requested by the Departments of State and Defense for submission by early July 1963 as a basis for Joint State/Defense decision on whether to continue defoliation and chemical crop destruction in RVN (Joint State/Defense Message, CINCPAC 2055, 7 May 1963). The target date for the study was extended by the Departments of State and Defense (DEPTEL 147, 2 August 1963) at the request of Task Force (T/F) Saigon until 1 October (T/F Saigon Msg 151, 30 July 1963). On 4 September 1963, a T/F Saigon team was established by the Commander, United States Military Assistance Command, Vietnam to conduct the evaluation (Appendix 2).

### B. OBJECTIVES

The T/F Saigon team was organized and directed to evaluate the technical adequacy, military worth, psychological operations, civil affairs, policy, and procedural aspects of herbicide operations conducted in RVN since September 1962. This broader base period was selected to provide a sufficiency of data for evaluation since only two defoliation and one crop destruction operations have been conducted in 1963. The study includes ten defoliation targets and two crop destruction operations conducted in nine provinces throughout RVN (Appendix 3).

## III. METHODOLOGY

The evaluation was conducted in three phases:

### A. OBSERVATION PHASE

Members of the team and selected assistants overflew all segments of the defoliated target areas under study. Air observation was conducted from C-123 aircraft at altitudes of 75 to 150 feet. Systematic observations were made using standard evaluation techniques to assess vertical and horizontal visibility by comparison of defoliated areas with contiguous areas (Appendix 4). Observation of destroyed crop target areas was not made since conclusive data were available on the technical effectiveness of chemical spray.

### B. EVALUATION OF REPORTS

Formal reports on pertinent herbicide targets were assembled and evaluated. In addition, U.S. Senior Advisors to Army RVN (ARVN) Corps were requested to evaluate independently all herbicide operations in their areas of responsibility. These data were compared with RVN Armed Forces (RVNAF) formal reports and both were utilized for team evaluation.

### C. FIELD SURVEY

Team members and selected staff assistants visited each province in which herbicide operations had been conducted. Discussions were held with province officials and U.S. military and civilian advisors. Variances in reported data were resolved where possible (Appendix 5).

## IV. FINDINGS AND OBSERVATIONS

### A. TECHNICAL ADEQUACY

#### 1. MATERIEL

No major technical deficiencies were discovered in the effectiveness of existing material resources for the type targets attacked. Available resources provide for aerial and ground delivery although some of the ground spray items have not been employed operationally (Appendix 6). All resources are RVN property with the exception of the 3 USAF MC-1 spray equipped C-123 aircraft. Each target complex usually dictated the delivery system (fixed wing, helicopter, or ground) to be employed. Logistic problems were encountered initially in supporting the hand spray chemical crop destruction operations against isolated farm areas in the mountain regions (Target 2-2). Helicopters had been committed to higher priority tasks and the foot movement of hand spray equipment and chemical agent taxed the energies of the operators causing straggling and severe casualties. Subsequent operations used helicopter lift which solved this difficulty.

#### 2. DEFOLIATION

##### Visibility

The team assessed relative improvement of visibility in defoliated areas by comparison with contiguous areas. This method for determining the degree of visibility improvement was necessary since no accurate data were available on the degree of visibility within actual target areas before defoliation. The average percentage visibility over the range of the nine target contiguous areas was approximately 40% vertical (range 25-75%) and 30% horizontal (range 15-60%). The average percentage of visibility over the range of the corresponding nine defoliated areas was approximately 80% vertical (range 60-90%) and 75% horizontal (range 50-85%). These estimates were generally confirmed by independent RVNAF and U.S. Advisory ground and aerial observations and estimates in formal U.S. technical reports. The survey shows that, over the range of the nine major targets, vertical visibility was improved an average of 2.0 fold and horizontal visibility was improved an average of 2.5 fold. In all instances, visibility was improved significantly (Appendix 7).

Aerial Delivery

The chemical effectiveness, along lines of flight was degraded sometimes by the inability of the C-123 aircraft to fly precisely along severely curving and undulating roads, rivers, canals and the powerline. It is not fully accepted that 200 meters represents in all cases the optimum width, except that the integral characteristics of the C-123 delivery system provides a 100 meter swath during a single pass.

Delayed Effect and Regrowth

In general, defoliation of sprayed vegetation begins in approximately seven days but complete effects require approximately sixty days. This delay is not a limiting factor in RVN operations although more rapid effects would be desirable.

Reports and team observation on several target areas also reveal the regrowth or continued resistance of certain vegetation (generally undergrowth) after a single chemical mission attack. In some areas it is reported that some hardy plants have held their leaves, although they have changed color, and continue to restrict observation. Also, along the Da Nhim powerline, bamboo and some grasses were not affected by the chemical spray. The premature discharge of some mines and flares along the powerline complex is attributed, by Province Chiefs and U.S. Military Advisors, to grass and vine growth. Hand chemical spraying might assist in alleviating both of these problems.

3. CROP DESTRUCTION

Only two target complexes have been attacked with chemical spray. The crop destruction targets were not observed by the team on the ground or from the air. However, conclusive reports, verified by data obtained in the field survey, indicate that the chemically sprayed crops were essentially 100% destroyed. There are some unconfirmed indications of partial Viet Cong reclamation of root crops which were sprayed at a mature stage of growth but the amount is not significant.

Available crop destruction chemicals are limited to use at appropriate stages of crop growth. This limitation is not so restrictive as to preclude effective use of the systems. However, similar chemicals which would kill rapidly a wide variety of crops over the total time span of field growth would facilitate greater flexibility of military use.

B. MILITARY WORTH

1. DEFOLIATION

Increased Visibility

Vertical and horizontal visibility was increased by varying degrees in all operational target areas evaluated. This improved visibility has facilitated the problem of security in defoliated areas in that now aerial surveillance is conducted much more effectively, and ground security forces have been reduced substantially in some areas. In Long Khanh Province, ground security of the powerline was reduced to squads of security forces where platoons were required to cover the same area prior to defoliation. Increased visibility resulting from effective defoliation also provides an increase in field of fire. It is accepted that the improved fields of fire offer an advantage to the Viet Cong (VC) as well as RVNAF forces; however, in view of the respective tactics and the VC reluctance to use defoliated areas, it appears that the greater advantage accrues to RVNAF forces.

Improved Lines of Communication

Defoliation projects accomplished in the Ca Mau peninsula area of RVN have resulted in very little vegetation remaining along the banks of the rivers and canals in the defoliated areas. This denies ambush cover to the Viet Cong within the defoliated area at close range and aids in safe passage of civil and military transportation. The highway target (Target 20-6) in Binh Dinh Province, following defoliation and clearing of the dead trees and underbrush, is free for normal traffic and no longer requires armed escort. Prior to defoliation, the VC reportedly used this area frequently for terroristic acts and ambush of supply vehicles. Conclusive data is not available to state that this improved condition is solely the result of defoliation but there is no doubt that defoliation contributed.

VC Incidents

Province officials, of all areas where defoliation has been accomplished, report that since the areas were sprayed there have been fewer VC initiated incidents. An independent analysis of VC incidents from MACV tabulated data confirms this finding (Appendix E).

In Binh Dinh Province, prior to defoliation, 20 incidents had occurred along the road, with one major ambush in a six month period. These involved principally the ambush of vehicles, primarily as a source for VC supply. Since defoliation there have been no VC incidents along the road. The Bien Hoa Province Chief stated that prior to defoliation of powerline targets in his province, 3 towers were destroyed and the construction time table set back two months. Since defoliation no VC initiated incidents have occurred; however, it must be recognized that there have been no incidents since January 1963 along the powerline and defoliation was not accomplished until July. Thus, the specific role of defoliation cannot be assessed except that security operations have been facilitated along the powerline because of defoliation.

In AN XUYEN province along the Song Ong Doc River-canal complex, where the north and south portions have been defoliated, there have been no significant VC initiated incidents since defoliation. However, along the remaining non-defoliated section, VC initiated incidents continue to occur (Appendix 9).

Cost Effectiveness

Cost comparison factors of the various means to clear desired areas of vegetation are difficult to assess. Cost of manual clearing depends upon availability and expense of labor, need for military force to search and secure the area to be cleared, and the requirement for a continuous program to keep the area clear. The requirement for military forces to protect personnel clearing an area detracts from their primary task of fighting and destroying the VC. Chemical defoliation from aircraft and ground systems is rapid, effective, and relatively inexpensive, especially where large areas are required to be defoliated. A detailed cost effectiveness analysis of alternative clearing methods, although of some import, is beyond the scope of the study. However, a cursory evaluation indicates that chemical defoliation is less expensive and more rapid.

2. [illegible]

The denial of a ready food supply to the VC imposes serious problems in his operations. It aggravates his logistical problems, forces him to expose himself in search of food, may cause relocation

of his base and create discontent within his ranks. Manual crop destruction in VC areas is a normal RVNAF procedure during combat operations. These operations require the use of many soldiers in a slow and laborious task and again detract from the primary mission. A chemical crop destruction operation against VC crops was accomplished in Thua Thien province (Target 2-2) in February, May and June 1963. In the early phase, only nine hours was required by a team of 23 soldiers to disseminate 880 liters of herbicide to destroy 12 hectares of enemy crops. For manual destruction, a continuation of the same combat operation with similar types of crops, required 40 men an average of one day (8-10 hours) to destroy one hectare. Thus, combat manpower for manual destruction could have been reduced substantially (approximately 90%) by using chemical spray. In this operation a total of 763 hectares of field crops were destroyed.

Food denial is an established military objective in Phase II of the RVN National Campaign Plan. Provincial food control coupled with the establishment of strategic hamlets are the basic techniques for preventing VC acquisition of stored food sources. In I and II Corps, there are intelligence indications that food shortage is hampering VC operations. In III Corps, VC food availability, while not as critical, is becoming a significant factor as strategic hamlets and food control are constituted. However, in IV Corps, food abundance and the relative indistinguishability between VC and friendly crops makes crop destruction of limited value at this time.

As a result, the manual destruction of VC grown field crops has become an important facet of RVNAF search and clear operations in VC safe haven areas. For example, in May, June, and July, III Corps alone destroyed 541 hectares of VC field crops manually by cutting, pulling, burning, and other inefficient non-chemical means (Appendix 10). The question, therefore, is not whether crop destruction will be carried out but by what means.

3. GENERAL

Without exception, all RVNAF officials interviewed strongly supported the need for additional chemical defoliation and/or chemical crop destruction in military operations. Numerous requests were made by RVNAF officials for more herbicide operations and the need for more rapid response to their official requests.

Thus far in 1963, 104 kilometers (km) have been defoliated and 79 hectares of field crops have been destroyed by chemical attack. Four defoliation target requests (totalling approximately 250 km) are being processed in MACV headquarters and the American Embassy, Saigon. Also, numerous additional requests (approximately 465 km) are being reviewed by JGS/RVNAF. In the chemical crop destruction area, formal requests from Provinces and Divisions totalling 12,100 hectares are being processed by JGS/RVNAF.

C. CIVIL AFFAIRS

1. GENERAL

There is a lack of specific survey data concerning the reaction of local population to herbicide operations. Provincial officials generally stated that, with the exception of compensation, the local populace was unaffected by the spray. U.S. advisors tended to corroborate these estimates although most (with the exception of the U.S. Consul in Hue) had little first hand knowledge of local reactions to such operations. The greatest problem area in the civil affairs field is the question of reimbursement. It is difficult to differentiate between the civil affairs and psychological operations aspects of herbicide operations. Therefore, these sections should be considered jointly.

2. REIMBURSEMENT

The problem of reimbursement did not arise with respect to the two chemical crop destruction operations reviewed since the crops destroyed were positively identified to be in VC areas prior to the operations. One crop destruction target was in a VC area of Zone D (Phuoc Long Province); the second, in Thua Thien Province, was in a VC area which had been designated as a free bombing area by RVNAF. No friendly claims were expected or received as a result of these chemical crop destruction operations.

Although there were a number of instances in which it was established that friendly crops were damaged as a result of defoliation, the team found no instance in which monetary restitution had as yet been made. Because of the reimbursement problem, the civil affairs aspect has become more critical in defoliation operations than in chemical crop destruction.

In Long Khanh, the Province Chief reported that an estimated 5 million piasters of claims were submitted for alleged damage to friendly crops (rice, rubber trees and corn). A provincial committee formed to investigate the validity of these claims reduced the figure to 1,179,600 piasters. The Province Chief stated he had requested funds from a Presidency and Ministry of Interior fund and that money to pay the claims would be made available. First, however, the Provincial Committee would have to check the claims again. He estimated two months would be required before actual payment would be made, and noted that the delay in payment had an adverse effect on those waiting.

In Bien Hoa a committee consisting of the District Chief, Chief of Agriculture Services, the Sector S-4 and S-5, and the Village Chief had established the crop damage (rice, fruit trees, beans, manioc) totalling 124 hectares (valued at 327,970 piasters) and rubber trees damage involving 149 hectares, the value of which had not yet been assessed. The Province Chief stated that the Province did not have the money to pay these claims. He had visited parts of the damaged areas and requested funds through military channels. He added that such claims had been programmed for in the civil affairs estimate of the military budget. The Province Chief has distributed 400 bags of bulgar wheat to the claimants in the interim.

In Phu Yen Province 12 small claims on damage to primarily coconut trees (about 30% damage to 10 hectares; USOM representatives confirmed damaged) had, according to the Province Chief, been processed, and money to pay them is available in the Province budget. He asserted that the people would be paid soon and that they were satisfied. No payments had as yet been made however.

In Lam Dong Province the Province Chief reported that an estimated 230,000 piasters damage was caused to some fruit trees and garden crops (U.S. Advisors think the amount of damage ascribed may be exaggerated). The Province Chief stated that a committee of district and provincial officials had been formed to investigate these claims but that they would wait until after the rainy season to see the extent of crop recovery before payment.

The An Xuyen Province Chief states that some of the rice or plantation crops near the defoliated areas had changed color after the spraying but had since recovered and could be used. He also reported that some fruit trees had been permanently damaged as a result of the spray. He said no claim for any damage from defoliation had been received. The U.S. Sector Advisor confirmed these statements. He explained that most of the defoliation was done outside the areas under provincial control, which would make the submission of claims to the province difficult. He expressed the view that the Province Chief was interested in fair treatment of anyone suffering damage. The Sector Advisor, who is also USOM Representative for the Province, said he would support the payment of any legitimate defoliation damage claim from USOM (provincial rehabilitation) funds.

Team research in Saigon revealed that a total of 5 million piasters were budgeted in CY 1963 as part of the RVNAF Military Civic Action Plan for indemnification of claims arising out of military operations, including herbicide damage. To date, only a small amount has been paid from this fund, none for herbicide damage.

3. RELOCATION

The local population (montagnards) in both areas of chemical crop destruction were considered to be for the most part either hard core VC or VC sympathizers by both U.S. and provincial officials. It was considered unlikely that many of them would voluntarily seek to join the GVN side. The team learned of no movement of such local population to join the government side as a direct result of chemical crop destruction. In Phuoc Long, however, 15 or 20 Montagnard families had been resettled as a result of the search and clear operation of which the crop destruction was a part. According to U.S. advisors these families were moved into strategic hamlets and were provided with sufficient food. U.S. advisors also state that additional resettlement could have been accommodated in this fashion.

An example of the success possible from the intelligent handling of refugees resulting from the destruction of crops was seen in Quang Tin Province, where crops were destroyed manually as part of "Operation Grasshopper." 3260 Montagnards were resettled in February - July 1963 as a result of this operation; the movement of 810 of these

was principally attributed to lack of food. U.S. advisors to the First Division reported that the resettlement was handled expeditiously and efficiently by province officials. Only eight Montagnards have since returned to the VC. Apparently destruction of crops by the GVN had no lingering adverse effect on the resettlees.

The team learned of no resettlement of local population as a result of defoliation. The team noted that the defoliated areas were generally in remote areas with sparse population. In the case of the defoliation of Highway 1 in Binh Dinh, provincial officials stated that, before defoliation, VC activity had forced many woodcutters out of the area but that since security had improved these woodcutters had returned.

4. BENEFICIAL EFFECTS

The team was informed of several beneficial effects in strengthening the relationship between the local population and the government which could be at least partially attributed to defoliation:

a. The increased safety of woodcutters along Route 1 has been cited above.

b. There was some evidence of increased commerical and passenger traffic along roads and increased commercial and passenger boat traffic along rivers as a result of defoliation. U.S. advisors state that such traffic moved with greater safety and less chance of delay or loss.

c. The psywar leaflets dropped prior to the powerline defoliation described the benefits which would be brought by the powerline. Although the powerline is not yet in operation it will not only provide power to Saigon but comparatively inexpensive electricity for local use in the provinces through which it passes. This can be expected to have a most favorable effect on the local population.

D. PSYCHOLOGICAL OPERATIONS

1. GENERAL

Psychological operations have been executed by RVNAF in support of all herbicide operations within the scope of the study. The

programs conducted for the two chemical crop destruction operations were planned in detail and effectively executed. There impact is essentially indistinguishable from psy ops used for the overall RVNAF manual crop destruction programs. For example, thousands of chemical spray leaflets were disseminated in the Target 2-2 operations. It is estimated that 810 personnel were resettled because of the total crop destruction operation with no distinction between chemical and manual destruction causes. Of this number, only six possessed chemical spray leaflets. In chemical crop destruction the primary aim of the psychological operations effect is to inform any potential friendly population which might be affected, of the reason for the operation and of the opportunity to come over to the RVN side. With respect to the two crop destruction operations considered by the team, however, it was the opinion of both VN and U.S. advisors, that the targets were so located (in known VC areas) that few, if any friendly people were involved. Actually, friendly populations apparently have little knowledge of such operations. Defoliation on the other hand, because of its use in mixed VC-friendly areas has required greater attention to psy ops particularly because of the requirement to apprise local friendly inhabitants of the value of defoliation, of the non-injurious effect to their health and welfare, and to counter any VC propaganda pertaining to accidental damage to friendly crops and the associated reimbursement aspects. Therefore, the subsequent discussion is concerned primarily with defoliation operations.

## 2. PLANNING PHASE

From the beginning of the operational phase of the RVN defoliation program, psychological operations (psy ops) support has been an essential facet of planning and execution phases. Annexes have been a required part of every RVNAF request. Difficulties have been encountered in inculcating RVNAF planners with the U.S. viewpoint that this is a vital part of each herbicide operation. However, there has been continuing improvement so that, with minor exception, psy ops planning is considered satisfactory. In planning, the U.S. requirement for psy ops has been stylized consistently to the demand for leaflets and loudspeaker broadcasts with supplementary ground psy ops teams. The requirement for such pre-attack psy ops in hostile areas has been deleted where it was apparent that such action would jeopardize flight aircraft. Nonetheless, the general lack of application of psy ops to the practical realities of the local situations has tended to nurture a justifiable disenchantment with psy ops in RVN official planning and execution.

3. EXECUTION PHASE

In execution of some of the psy ops support programs there have been logistical failures which reduced psy ops effectiveness. Also, at times, psy ops have not been executed enthusiastically. In those instances where the province officials have felt the need, excellent programs at province level have been reported by Province Chiefs. The latter activities were not part of prepared plans but spontaneous provincial actions based on need. The presence of RVNAF troops in the spray area during and after spray operations has been most effective in countering VC "poison gas" charges. Also, the fact that personal injury is not sustained from the spray by the people has lessened the significance of VC propaganda.

4. REVIEW OF PSY OPS STUDY

The team did not attempt to assess the total psy ops impact of RVN herbicide operations from all external and internal influences. A detailed CINCPAC study (Reference: Letter, CINCPAC to JCS, CINCPAC 3410 Ser: 00278, 22 March 1962, subject: Report Concerning the Psychological Aspects of the Use of Defoliants in the Republic of Vietnam (C), with inclosure, subject: Evaluation of Psychological Aspects of the Use of Defoliants as a Counterinsurgency Weapon in Vietnam) was reviewed. An attempt was made to determine from interviews and available data any significant variances or differences from the findings of the report.

5. PSYCHOLOGICAL EFFECT (VIET CONG)

There is evidence that the Viet Cong avoid defoliated areas. There are two possible explanations:

(1) The greater visibility by air and ground increases their vulnerability.

(2) Their own propaganda about its poisonous effects may have a "boomerang" effect on VC personnel, i.e., VC may fear entering the areas or may avoid entering the area so as not to refute their own propaganda to the local people.

(3) It is the preponderant opinion of those queried that visibility is the primary reason; however, captured VC documents indicate positive instructions to personnel for defense against chemical

attack. Additional data are needed before the "poisonous fear by VC" aspect can be clarified. This facet is being studied by MACV personnel.

## E. POLICIES AND PROCESURES

### 1. CURRENT PROCEDURES

All RVN herbicide requests originate at sub-sector level. RVNAF directives require the submission of detailed plans through territorial command channels. The formulation of initial plans is done by the Sector Commander (generally also the Provinces Chief) and submitted through Division and Corps for submission to JGS/RVNAF. Consolidation of RVNAF requests at Corps was encouraged by U.S. planners in the early phases of RVN herbicide operations so as to obtain a complete package of requests by April of each year. It was envisioned that this would permit early review and approval to capitalize on the susceptible period of vegetation and crop growth for maximum effect. RVNAF has attempted to follow this procedure and Corps exercises a major intermediate role in reviewing and modifying requests. After review, Corps submits target requests to JGS/RVNAF. The procedures provided for the integration of Psy Ops, and Civil Affairs planning at all levels.

The review function at JGS/RVNAF is vested in a "202 Committee", chaired by the J-3 with representatives from appropriate staff agencies. Review by the 202 Committee culminates in a final coordination visit to the Sector Commander before submission by JGS/RVNAF to COMUSMACV for approval. At MACV, the Asst Coff, J-3 is responsible for U.S. coordination of all target planning. This is accomplished by a 203 Committee, chaired by the Chief, Chemical Section, J-3. The committee includes appropriate MACV staff representatives and a member from the staff of the American Ambassador to RVN. Each request is reviewed, coordinated, and submitted for approval to the American Ambassador and COMUSMACV, and for chemical crop destruction to the Departments of State and Defense for joint State/Defense approval. Upon approval, MACV notifies JGS/RVNAF and the herbicide mission is executed. For approved USAF C-123 defoliation targets, Second Air Division, MACV is directed by COMUSMACV to execute the mission in coordination with JGS/RVNAF.

With few exceptions, the approval mechanism does not provide for special consideration for urgent or priority targets but relies on essentially co-equal review to assess priorities. Also, all herbicide requests for small area (outpost, minefields, administrative areas) defoliation, hand spray, and aerial spray must conform to the same general review procedures.

2. EVALUATION OF REVIEW AND APPROVAL MECHANISMS

The reaction time from field requests (Province or Division) to execution is extremely slow with few exceptions (3 months to 1 year). It was also noted that initiating headquarters seldom had information regarding the status of their requests and were not informed when target requests were withdrawn by a higher headquarters. Part of this inertia is caused by RVNAF procedures in collating requests on a Corps area basis. As of 15 September, only one Corps consolidated plan had been received at JGS/RVNAF (submitted 10 September 1963). However, numerous separate province plans are being processed to overcome the consolidation bottleneck. Also, the U.S. policies requiring stringent attention to Psy Ops and Civil Affairs planning and the consonant difficulties initially encountered by RVNAF staffs in meeting U.S. standards have contributed to delay. Additional time is taken within MACV and the American Embassy to review these requests and resolve any problems. Additional time is also taken in crop destruction requests because joint U.S. State/Defense approval must be obtained for each target area proposed.

Approval procedures for herbicide operations, by design, are highly centralized for maximum control because of U.S. policy restrictions. The team recognizes that U.S. control procedures were instituted initially because of the possible adverse psychological and propaganda effects that could occur from the use of herbicide chemicals in RVN. However, the team observed no significant adverse local psychological effects which could be exploited at the local or international level. Accordingly, the team feels that a degree of decentralization of herbicide operations could be accomplished without adverse psychological effect while enhancing operational responsiveness.

JGS/RVNAF has requested (early 1963) decentralization authority from COMUSMACV for greater responsiveness but the request was denied because of U.S. policy. The constraint on RVNAF for U.S.

review and approval of all herbicide operations is by unwritten agreement but RVN has adhered meticulously to the tacit U.S. requirement for approval control and has published procedures which reflect this agreement. The chemicals manual spray equipment, and helicopter spray devices are RVNAF property. The three USAF C-123 spray aircraft are U.S. controlled and operated (Tactical Air Command Detachment, Assigned TDY to Cmdr, 2d Air Division; 13 personnel; code name RANCH HAND). With the exception of the C-123 defoliation capability, RVNAF has the capability and the knowledge to conduct herbicide operations without U.S. approval should they so desire, although their defoliation capability would be severely reduced without USAF C-123 spray system support.

3. EVALUATION OF DECENTRALIZATION OF LEVELS OF CONTROL

Defoliation

Decentralization of defoliation approval to U.S. advisors at ARVN Corps or Division level would facilitate responsiveness to field requests. It should also engender more responsible attention to planning requirements. U.S. control could be exercised by requiring U.S. Senior Advisor approval at Division or Corps level for each RVNAF request. After action reports could be used by JCS/RVNAF and MACV for monitoring. For hand spraying defoliation operations, the danger of accidental drift is minimal and would not create much of a "friendly crop damage" problem. Aerial spray, however, poses a different problem because of the source of support, magnitude of spray area, and potential for friendly crop damage. Therefore, centralized high level control appears more necessary in aerial spray but hand spray operations could be decentralized to Divisions.

Chemical Crop Destruction

In crop destruction, decentralization of final approval authority to the Ambassador and COMUSMACV appears desirable. Also, it appears that chemical hand spraying for crop destruction can be profitably decentralized to Corps or Divisions. Again, aerial spraying should more logically be controlled at JCS/MACV/AmEmb level. Decentralization of hand spray operations is further dictated by the fact that small VC crop plots are often targets of opportunity in a normal military operation.

One of the most critical non-technical facets of chemical crop destruction planning is positive identification of crops as VC crops. This is neither greater than nor less than the problem of identifying VC crops for manual destruction. The current centralization of control precludes striking crop targets of opportunity in such operations with chemical spray because of the time delay for approval. The current approval procedures compel pre-planning of chemical crop destruction well in advance of other military operations because of this delay. This is unrealistic and hampers maximum use of chemical crop destruction in support of the military operation. Manual destruction which is less efficient requires no specific approval and is a normal part of the military effort.

Therefore, decentralization of approval authority for hand spray defoliation and crop destruction to Corps or Division level would improve response time and release combat troops to their primary mission.

4. U.S. ADVISORY PARTICIPATION

U.S. Advisory assistance in herbicide operational planning is available at each echelon and lower level participation in planning has been encouraged recently. However, most of the U.S. participation has been at MACV Headquarters. At Division level, U.S. Chemical Military Advisors are available for this function but have not, with few exceptions, participated actively. Part of this lack of participation is caused by the fact that the greater majority of herbicide requests begin at Province level which is in the Sector Advisors area of responsibility. Also, Sector Advisors have small overworked staffs and have not been kept informed systematically of planned targets by either U.S. or Province officials. U.S. agricultural experts (USAID and IVS) are also located in various areas of RVN but their utilization in herbicide planning has been sporadic. Continuous U.S. advisory participation in planning at all levels appears to be essential for maximum effectiveness of herbicide operations.

5. OPERATING PROCEDURES

Control of Accidental Crop Damage

In the execution phase of aerial defoliation of the Da Nhim

powerline, accidental damage occurred to friendly crops because of wind drift. Some damage could probably have been avoided had adequate wind direction and windspeed data over the target area been available. Such data has been used in some prior missions. Simple meteorological methods e.g., smoke grenades and/or anemometers, should be used consistently by air drop or cooperating ground forces in aerial spray execution. Also, safety margins could be established for varying meteorological conditions to avoid accidental wind drift damage.

Follow-up Attacks

Past technical study recommended respray of defoliated areas at 6 months intervals for regrowth control. Survey of those targets which have aged for over 6 months to 12 months showed no marked degradation. However, respray in some areas is desirable. Also, respray of targets after lesser periods could improve those target areas which have dense growth. This has not been done and procedures for such action should be included in initial approval action to permit follow-up respray if further visibility improvement is considered desirable.

Also, while significant visibility improvement can be attained by effective defoliation, follow-up handcutting and burning after the vegetation has died, provides major improvement. Such selective after-defoliation clearing has proven extremely effective in the Target 20-8 defoliated area. For small areas such clearing appears feasible if complete visibility is necessary.

Target Identification

RVNAF target requests are supported with maps, overlays and/or photographs and contain considerable detail. Provinces and Divisions delimit target areas and specify types of vegetation and desired period of attack. Review of target requests indicated that some target descriptions did not properly assess types of vegetation nor fully consider the time of attack in relation to plant susceptibility to the chemicals.

Intelligence Evaluation

The impact on VC activities from herbicide operations could better be assessed if intelligence evaluations were attempted

more vigorously. The team could not find any thorough, up-to-date evaluations of VC incident rates in defoliated targets. Such an evaluation was made during the study. There are some indications that VC avoid defoliated areas for psychological reasons but hard intelligence estimates are lacking. However, initial action has been taken to assess this aspect through issuance of a special directive. Follow-up intelligence action on a systematic and comparative basis in herbicide operations could clarify and provide a basis for continuing evaluation of these systems.

## V. CONCLUSIONS

### A. TECHNICAL ADEQUACY

1. Chemical spray has been essentially 100% effective in the physical destruction of crops.

2. Defoliation has improved visibility significantly over the range of targets evaluated. The average percentage visibility before defoliation was 40% (vertical) and 30% (horizontal). After defoliation, visibility increased to an average of 80% (vertical) and 75% (horizontal).

3. For current operations in RVN, existing and programmed herbicide materiel resources are technically adequate and logistically sufficient to support current and projected operational requirements for the time being. However, considerable acceleration, beyond the 1963 rate of use of these systems to date, is necessary to achieve optimum utilization of these resources in RVN military operations.

4. The requirement for defoliation generally to a width of 200 meters on each side of lines of communication appears to be based only on personal judgements made at the initiation of the program. A definitive study is needed to determine optimum defoliation widths for varying situations.

5. Available chemicals for crop destruction are generally limited in use to the early stages of crop growth. Development of more effective chemicals would provide greater flexibility in military use; however, it is considered that this requirement is more applicable to U.S. future needs.

6. For the longer range period, more effective chemicals would be useful for defoliation resistant vegetation and producing defoliation in a shorter time period. However, it is considered that this requirement is more applicable to U.S. future needs.

### B. MILITARY WORTH

#### General

1. Defoliation and chemical crop destruction have a direct and continuing favorable impact on military and civil activities in RVN.

2. The use of herbicides forces the Viet Cong to adopt alternatives which complicate and make more difficult his operations.

3. Herbicide operations improve the morale of RVNAF.

4. RVNAF officials endorse strongly the employement of herbicide systems in support of military operations but feel that more rapid responsiveness to herbicide requests is needed.

5. Herbicide operations in RVN have been few in number, limited in scope, and could be accelerated considerably within existing and programmed capabilities to gain maximum military advantage.

6. Military materiel resources (chemicals and delivery systems) are adequate for the types of targets which have been attacked.

Defoliation

7. Improved visibility, as a result of defoliation, has reduced the numbers of security forces required for guard, patrol and escort operations.

8. Defoliation has facilitated target identification and produced improved fields of fire.

9. In the aggregate, defoliation has contributed to a reduction in the number of Viet Cong initiated incidents in areas in which defoliants have been employed.

10. Defoliation, by clearing lines of communications, has facilitated GVN control of outposts and populace by permitting increased access of GVN civil and military forces into areas previously denied to GVN, except when escorted by sizeable military escort.

11. Defoliation has assisted materially in opening and maintaining supply lines of communication and has also limited Viet Cong utilization of these lines for his resupply.

12. All targets, defoliated to date, have been along lines of communication. A single target request for defoliation of a strong

VC held area in Vinh Binh Province is currently being processed. The team concludes that the potential range of defoliation employment in counterinsurgency situations in RVN has not been fully explored.

Chemical Crop Destruction

13. The use of chemical spray in Viet Cong areas has assisted in the reduction of VC food resources and caused some VC relocation.

14. The use of chemicals for crop destruction has contributed to the food denial program.

15. The use of chemicals reduces the manpower requirement for manual crop destruction and releases combat forces for their primary mission.

16. The continuing presence of many small VC crop fields, in remote, often inaccessible and hostile areas, requires the development of an unsophisticated system which would permit accurate delivery of herbicides by aerial vehicles.

C. CIVIL AFFAIRS

1. There is a lack of specific survey data concerning the reaction of the local population to either chemical crop destruction or defoliation operations. Nevertheless, based on the opinions of provincial officials and corroboration by U.S. Advisors, no significant lasting adverse reaction (with the exception of reimbursement for accidental damage) was experienced among the local population as a result of herbicide operations.

2. In no instance has monetary restitution been made for accidental damage as a result of defoliation, although most provinces had processed claims and forwarded them to the GVN. The amount of accidental damage was not excessive in comparison to the areas sprayed.

3. There was no displacement of local population as a result of defoliation.

4. No relocation of population could be attributed directly to chemical crop destruction. Procedures for the movement of population due to manual hand crop destruction during search and clear operations, however, was adequate and no lingering adverse effects occurred.

5. There are a number of effects of defoliation, such as increased use of lines of communications, less harassment by the VC and future provision of electricity, which can be expected to be identified by the population as favorable results of RVN governmental presence.

D. PSYCHOLOGICAL OPERATIONS

1. Within the scope of the evaluation, the data obtained support the following conclusions of the report on psychological operations submitted by CINCPAC to JCS on 22 March 1963:

"a. The overall RVN psychological operations effort in support of defoliation has been adequate. RVN propaganda support generally has been well planned but sometimes executed with little enthusiasm.

b. There is no evidence that internally or externally generated Communist propaganda on defoliation/crop destruction operations have had any real impact on the Vietnamese population."

2. Psychological operations in support of herbicide activities have not been applied selectively.

3. In those areas where defoliation operations were conducted, RVN Province Chiefs have carried out programs of propaganda on their own initiative to explain the benefits of defoliation and to counter VC propaganda. No evidence was uncovered which would indicate that these programs have not been effective.

E. PROCEDURES AND POLICIES

1. Present U.S. and RVN military and political administrative procedures are lengthy and involved. These procedures hinder and, at times, deny the tactical utilization of chemical herbicidal operations to maximum advantage. The nature of herbicide operations, i.e., the technical necessity for spraying vegetation at the appropriate stages of growth for maximum effort, requires prompt response to requests.

2. The degree of control, particularly on the psychological operations and civil affairs aspects of herbicide operations, is not enchanced by current procedures which rely primarily on higher echelon review.

3. There are no gradations of approval level consonant with the degree of control necessary for responsive use of herbicide systems in support of RVN military operations. All requests, regardless of size, purpose, scope, method of delivery, and priority follow the same general procedure.

4. Approval of hand spray herbicide requests can be decentralized to Division level. This would facilitate responsive employment of the systems while permitting effective control. Aerial herbicide operations require centralized approval control at the JGS/RVNAF, COMUSMACV and American Ambassador levels.

5. U.S. Advisors have not been utilized sufficiently at the lower levels in the planning and follow-up evaluation of herbicide operations. Also, in-country agricultural technical advisors have not been used fully to assess the susceptibility of vegetation in the target complexes.

6. A continuous system of information flow on herbicide actions within RVN and U.S. Advisory lower echelon channels have been lacking.

7. The execution phase of aerial defoliation requires additional refinement. Crop damage adjacent to defoliated targets could be reduced by effective use of meteorological data and precise target delineation.

8. Approval procedures do not provide for follow-up respray of defoliated targets, if needed. Also, the possible use of follow-up improvement techniques, i.e., hand cutting and burning, are not systematically considered in the planning or execution phases of defoliation operations.

9. There is a lack of aggressive and systematic intelligence evaluation following defoliation or crop destruction operations to determine the overall effect on VC and friendly operations.

VI. RECOMMENDATIONS

It is recommended that:

1. Herbicide operations in RVN be continued within the following guidelines:

a. Defoliation operations along roads, rivers, canals, railroads and powerlines will normally be undertaken only (1) where terrain and vegetation peculiarly favor the use of defoliants; (2) in areas remote from population; and (3) when hand-cutting and burning are impractical. High priority projects may, however, be undertaken in populated areas after specific authority has been granted when the military advantage is very clear and hand-cutting and burning are not feasible.

b. Crop destruction will be confined to remote areas known to be occupied by the Viet Cong. Further, it will not be carried out in areas where the Viet Cong are intermingled with native inhabitants and the latter cannot escape and receive food of a type acceptable to them. Finally, it will be limited to areas where the Viet Cong either do not have nearby alternative sources of food or to areas in which there is an overall food deficit, e.g., the High Plateau and Zone D.

c. Neither defoliation nor crop destruction operations will be undertaken until it is clear that adequate measures are assured to warn the friendly population and to compensate and provide relief to those who need such compensation and relief and who are not on the side of the Viet Cong. Where feasible, hand-spray operations will be used in lieu of air spraying.

2. Authority be delegated to the American Ambassador and COMUSMACV to approve chemical crop destruction.

3. All hand spray herbicide operations be decentralized to RVNAF Divisions with the provision that Senior U.S. Division Advisors approve all requests using suitable control procedures to be established by COMUSMACV in coordination with the American Ambassador.

4. Action be taken by Task Force Saigon to follow-up on previous recommendations to the RVN government that a prompt system of monetary restitution be established for accidental damage to friendly crops resulting from herbicide operations.

5. JGS/RVNAF be encouraged to place greater selective emphasis on the psychological operations and civil affairs execution aspect of herbicide operations. Similarly, U.S. Advisors at all echelons should be thoroughly apprised of psychological operations and civil affairs considerations in herbicide operational planning and execution so as to be able to provide accurate and effective advice.

6. U.S. Advisors at all echelons and particularly U.S. Military Chemical Advisors at Division level, be directed to participate more actively in herbicide operational planning at their advisory level to achieve maximum RVNAF effectiveness.

7. Existing procedures be revised to:

a. Permit follow-up aerial respray of previously executed defoliation missions using appropriate control procedures upon approval by COMUSMACV.

b. Ensure simultaneous formal notification of U.S. Senior Corps Advisors upon U.S. approval of JGS/RVNAF herbicide mission requests. This information should, subsequently and promptly, be provided to subordinate U.S. echelons, particularly U.S. Sector Advisors.

c. Provide for an effective system for collating VC incidents and reactions and other data which relate to herbicide operations.

d. Institute more effective meteorological support and target delimiting procedures in aerial defoliation operations to minimize accidental damage to friendly crops.

8. A study be conducted to determine optimum widths for maximum effectiveness of defoliation along lines of communication.

9. A study be undertaken to determine targets, other than lines of communication, which if defoliated would contribute significantly to combat operations in counterinsurgency operations, e.g., international borders, VC safe areas, helicopter landing zones, and strategic hamlet areas are suggested as possible additional targets having direct military payoff.

10. A system be developed promptly which would provide accurate delivery of herbicides by aerial vehicles so as to attack small VC field crops in remote, often inaccessible, and hostile areas.

11. Longer range research and development be conducted to provide improved herbicides and delivery systems for more rapid and flexible use in counterinsurgency operations. However, this recommendation is more applicable to U.S. future needs.

APPENDIX 1

JOINT STATE/DEFENSE HERBICIDE POLICIES

(Extract from Department of State, Joint State/Defense Message, DEPTEL No. 1055, 7 May 1963, classified SECRET)

OMITTED BECAUSE OF LIMITED DISTRIBUTION

SECURITY CLASSIFICATION

APPENDIX 2

TASK FORCE SAIGON EVALUATION TEAM

a. The following were members of the Task Forces Saigon Evaluation Team:

CHAIRMAN, Peter G. Olenchuk, Lt Col, USA, J-3 Division, Hqs, MACV.

MEMBER, Robert T. Burke, Political Section, American Embassy, Saigon.

MEMBER, Oran K. Henderson, Lt Col, USA, Joint Operations Evaluation Group-Vietnam, Hqs, MACV.

MEMBER, Wayne E. Davis, Major, USAF, Hqs, 2d Air Division, MACV.

b. The following staff assistants were selected to participate as required in specialised areas:

Joseph C. Lumen, Political Section, American Embassy, Saigon.

Charles G. Kaigler, Lt Col, USA, J-2 Division, Hqs, MACV.

Norval J. Richardson, Major, USA, Psychological Warfare Section, J-3 Division, Hqs, MACV.

Edward E. Hildreth, Jr., Captain, USA, Civil Affairs Division, Hqs, MACV.

APPENDIX 3

HERBICIDE TARGET AREAS

A. DEFOLIATION:

| TARGET NUMBER | LOCATION | DESCRIPTION AND SIZE OF AREA | DATE SPRAYED |
|---|---|---|---|
| 20-1 | AN XUYEN Province (VQ808980-VR970028) | Along Song Ong Doc Rivers; 19 km x 400 meters | 3-7 Sept 1962 |
| 20-2 | AN XUYEN Province (WQ003690-WQ034770) | Canal between Cua Lon & Bay Hap Rivers; 9 km x 400 meters | 20-21 Sept 1962 |
| 20-3 | AN XUYEN Province (WQ093715-WQ064805) | Canal between Cau Lon & Bay Hap Rivers; 9 km x 400 meters | 24 Sept & 4 Oct 1962 |
| 20-4 | AN XUYEN Province (WQ220720-WQ310760) | Cau Lon & Dam Dai Rivers; 12 km x 400 m; 6 km x 400 m | 30 Sept, 1 Oct, & 3 Oct 1962 |
| 20-5 | AN XUYEN Province (VR844520-VR990386) | Along Tieu Dua Canal; 19 km x 400 meters | 8-11 Oct 1962 |
| 20-6 | VINH BINH Province (XR718693-XR665710) | Road West of Ba Dong; 5 km x 400 meters | 27 Sept 1962 |
| 20-7 | PHU YEN Province (CQ254276-270215) | East Side of Rd/rway 1 South of Tuy Hoa; 8 km x 400 meters | 14 December 1962 |

(NOTE: Target 20-7 spray flight was aborted after 2 seconds of spray because C-123 aircraft could not maneuver over the rough terrain. Therefore, it has not been included in the study except for comparative control purposes.)

| TARGET NUMBER | LOCATION | DESCRIPTION AND SIZE OF AREA | DATE SPRAYED |
|---|---|---|---|
| 20-8 | BINH DINH Province (CBD)0130-055090) | Highway 1 south of Qui Nhon: 4 km x 400 metere | 18 & 24 Dec 1962 |
| 20-9 | AN XUYEN Province (VQ824613 985665; WQ190700-270645) | Along Cua Lon and Cua Bo De Rivers; 46 km x 400 metere | 6-9 June 1963 |
| 20-10 | BIEN HOA, LONG KHANH, and LAM DONG Provinces; (11 Sub Targets) intermittently between YT085087-AN948860) | Along Da Nhim Power-line; 58 km x 400 m | 3-27 July 1963 |

B. CHEMICAL CROP DESTRUCTION

| | | | |
|---|---|---|---|
| 2-1 | PHUOC LONG Province (YT61088C; YT530810; YT580810) | 3 Crop field clusters; approx 300 hectares | Helicopter MIDAL Spray; 1 to 23 Nov 1962 |
| 2-2 | THUA THIEN Province (YU4722-YU2724-IC8088 to Pt of LAOS & Prov borders) | Scattered crop fields; Feb-12 hectares, May & Jun-67 hectares | Back Pack hand spray; Intermittently during 13 27 Feb 63, and 1 May-17 Jun 63 |

APPENDIX A

VISIBILITY EVALUATION METHOD

Air observation to estimate vertical and horizontal visibility in the target areas was conducted from C-123 aircraft at altitudes of 75 to 150 feet and airspeeds of 125 to 150 miles/hour. Observers were stationed at the rearmost safe positions in the aircraft with the rear upper loading door open to permit optimum viewing. A minimum of five observers (team members and assistants) was used for each target area visibility estimate.

Prior to observation of target areas, procedures were tested by overflying a non-defoliated area (17 separate areas, totalling 130 kilometers) to assess correlation of observer visibility estimates. Close correlation was obtained and the method was standardized for team visibility estimates of the target areas. Observers used a standard form (Inclosure 1) to make independent visibility estimates. Each segment of the target areas was overflown to obtain individual observer average estimates. These were then averaged by sub-target and target. Data on percentages of visibility in the target areas before defoliation had not been recorded. Therefore, it was necessary to estimate visibility in non-defoliated areas contiguous with each defoliated target area.

In the procedure used, vertical visibility estimates represent the percentage of the ground that could be seen from the air. Horizontal estimates portray the percentage of unblocked horizontal vision over a representative span of the area observed. The latter observations were based primarily on viewing the edges (internal and external) of the target areas. Horizontal estimates were facilitated by the low level of flight and the clear water areas in all target areas, i.e., roads, canals, rivers, and the powerline. All percentage estimates, including averages, were limited to 5% accuracy. Observer estimates were averaged for each target and target sub-segment, and compared with available independent ground and aerial visibility estimates of U.S. Advisors, RVNAF estimates, and previous U.S. technical reports. These showed close correlation.

As an additional check, Target 30-7 was used as a control. This target had been sprayed for only two seconds before the flight was aborted because of the inability of C-123 aircraft to safely clear the rugged terrain. Previous technical reports had indicated

only a browning effect on the leaves of part of the target area with no improvement in visibility. The evaluation team observers independently and unanimously made the same observation. Also, U.S. Advisors in the area reported identical findings based on air and ground observations.

INCLOSURE 1 t.. ..PPENDIX 4

DEFOLIATION AERIAL VISIBILITY ESTIMATES

Observer: _____ Target No. _____

Date: _____ Time: _____ Sub Targets #'s _____ thru _____

Type Aircraft: _____ Page _____ of _____ Pages

Observation Altitude _____

Sub Target #

Type of Vegetation:

Canopy:

Undergrowth:

Visibility:

Vertical _____%

Horizontal _____%

Crops: 0 1 2 3 4 5

6 7 8 9 10

Comments:

Sub Target #

Type of Vegetation:

Canopy:

Undergrowth:

Visibility:

Vertical: _____%

Horizontal: _____%

Crops: 0 1 2 3 4 5

6 7 8 9 10

Comments:

Sub Target #

Type of Vegetation:

Canopy:

Undergrowth:

Visibility:

Vertical _____%

Horizontal _____%

Crops: 0 1 2 3 4 5

6 7 8 9 10

Comments:

Sub Target #

Type of Vegetation:

Canopy:

Undergrowth:

Visibility:

Vertical _____%

Horizontal _____%

Crops: 0 1 2 3 4 5

6 7 8 9 10

Comments:

## APPENDIX 5

### FIELD SURVEY

| DATE | PROVINCE (CITY) | KEY RVN PERSONNEL INTERVIEWED | KEY U.S. PERSONNEL INTERVIEWED |
|---|---|---|---|
| 16 Sep 63 | Thua Thien (Hue) | Major Nguyen-Phu, Deputy Province Chief<br>Capt Minh, G-2 1st ARVN Div | Mr. Helble, U.S. Consul, Hue<br>Lt O'Connell, Deputy Senior U.S. Advisor, 1st Division<br>Maj Bell, Chemical Advisor, 1st Division |
| 16 Sep 63 | Binh Dinh (Qui Nhon) | Capt Trang Ngoc Dien, Sector S-2 | Lt Col Cain, Deputy Senior U.S. Advisor, 9th Division |
| 17 Sep 63 | Phuoc Long (Phuoc Long) | Lt Col Do Van Dien, Province Chief & Sector Cmdr (Phuoc Long & Phuoc Thanh Provinces), Cmdr, PBT Zone. | Maj Bartel, U.S. Sector Advisor |
| 17 Sep 63 | Phu Yen (Tuy Hoa) | Capt Do Van Xu, Deputy Province Chief | Maj Monge, U.S. Sector Advisor |
| 17 Sep 63 | Lam Dong (Blao) | Major Nguyen Van Tai, Province Chief & Sector Cmdr | Maj Allen, U.S. Sector Advisor |
| 18 Sep 63 | Long Khanh (Xuan Loc) | Major Huynh Van Du, Province Chief & Sector Cmdr | Maj Grinnel, U.S. Sector Advisor<br>Capt Dickey, U.S. Sector S-2 Advisor |
| 20 Sep 63 | Bien Hoa (Bien Hoa) | Major Tran Van Dinh, Province Chief & Sector Cmdr | Maj Darmang, U.S. Sector Advisor |
| 20 Sep 63 | Vinh Binh (Tra Vinh) | Capt Nguyen Hoa Bang, Sector Chief of Staff | Maj Flynn, U.S. Sector Advisor |
| 24 Sep 63 | An Xuyen (Ca Mau) | Col Bui Huu Nhon, 21st ARVN Div Cmdr<br>Maj Nguyen Thanh Hoang Province Chief & Sector Cmdr, Capt Ngu-Van-An, Deputy Province Chief for Security. | Lt Col Cramer, U.S. G-4 Advisor, IV Corps<br>Maj Andrews, U.S. Sector Advisor |

ANNEX 6

[redacted]

(as of 31 August 1963)



1. [redacted] (In Country)

a. CHEMICALS (On hand and stored in RVNAF depots)

(1) For defoliation

[redacted] - (mixture of esters of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid) - 223,900 gallons.

(2) For crop destruction

[redacted]-(also called [redacted] or [redacted]) (mixture of esters of 2,4,5-trichlorophenoxyacetic acid) 92,600 gallons.

[redacted]-(primarily cacodylic acid) 9,700 pounds.

b. CHEMICALS (Programmed receipts in FY64)

25,000 gals of [redacted]/month at $6.25/gallon.

6,500 lbs/of [redacted]/month at $1.50/pound.

c. SPRAY EQUIPMENT (U.S. Furnished)

5 - MIBAL Spray Devices (for use with H-34 Helicopters).

4 - Buffalo Turbines (ground use) - not yet used operationally.

2 - Hardy Sprayers (ground use) - not yet used operationally.

300 - Back-Pack garden hand type sprayers (9 liter capacity).

2. [redacted] (assigned to 2d Air Division, U.S. Military Assistance Command-Vietnam)

a. 3 USAF C-123 aircraft equipped with modified MC-1 (Hourglass) spray equipment.

1

1.C.

b. Chemicals - None (PURPLE for use in defoliation is obtained from RVNAF Depots as needed for approved missions).

3. CHEMICAL CAPABILITIES

a. PURPLE - Approximately 400 gallons will defoliate 1 km to a width of 400 meters. Can also be used against crops at 7.5 gallons/hectare.

b. GREEN, PINK, or WHITE - Approximately 7.5 gallons/hectare against root crops.

c. BLUE - Approximately 3.9 pounds/acre against rice crops.

APPENDIX 7

EVALUATION TEAM VISIBILITY ESTIMATES OF DEFOLIATED TARGETS

| TARGET NR | DATE SPRAYED METHOD | DATE OBSERVED & METHOD | PERIOD AFTER SPRAY (AVG) | EVALUATION TEAM VISIBILITY EST CONTIGUOUS | DEFOLIATED | INCREASE |
|---|---|---|---|---|---|---|
| 20-1 | 3-7 Sep 62 C-123, MC-1 Spray Equip | 15 Sep 63 Aerial (C-123) 75-150 ft alt. | 374 days | (V) 50% | (V) 90% | 1.8 |
| | | | | (H) 40% | (H) 85% | 2.1 |
| 20-2 | 20-21 Sep 62 Same as above | 15 Sep 63 Same as above | 360 days | (V) 35% | (V) 85% | 2.4 |
| | | | | (H) 25% | (H) 85% | 3.4 |
| 20-3 | 24 Sep 4 Oct Same as above | 15 Sep 63 Same as above | 351 days | (V) 35% | (V) 75% | 2.1 |
| | | | | (H) 25% | (H) 70% | 2.8 |
| 20-4 | 30 Sep-1&3 Oct 62, Same as above | 15 Sep 63 Same as above | 350 days | (V) 25% | (V) 85% | 3.4 |
| | | | | (H) 15% | (H) 80% | 5.3 |
| 20-5 | 8-11 Oct 62 Same as above | 15 Sep 63 Same as above | 341 days | (V) 75% | (V) 90% | 1.2 |
| | | | | (H) 60% | (H) 65% | 1.1 |
| 20-6 | 27 Sep 62 Same as above | 15 Sep 63 Same as above | 353 days | (V) 55% | (V) 90% | 1.8 |
| | | | | (H) 55% | (H) 85% | 1.5 |
| 20-7* | 14 Dec 62 Same as above | 12 Sep 63 Same as above | 302 days | (V) 15% | (V) 15% | 0 |
| | | | | (H) 10% | (H) 10% | 0 |
| 20-8 | 18 & 24 Dec 62 Same as above | 12 Sep 63 Same as above | 295 days | (V) 35% | (V) 85% | 2.4 |
| | | | | (H) 30% | (H) 85% | 2.8 |
| 20-9 | 6-9 Jun 63 Same as above | 15 Sep 63 Same as above | 100 days | | | |
| Sub - Target 20-9-1 | | | | (V) 25% | (V) 65% | |
| | | | | (H) 20% | (H) 55% | |
| Sub Target 20-9-2 | | (NOTE: Cancelled and not sprayed) | | | | |
| Sub - Target 20-9-3 | | | | (V) 25% | (V) 75% | |
| | | | | (H) 15% | (H) 65% | |
| (AVG) 20-9 | | | | (V) 25% | (V) 70% | 2.4 |
| | | | | (H) 15% | (H) 60% | 4.0 |

| TARGET NR | DATE SPRAYED METHOD | DATE OBSERVED & METHOD | PERIOD AFTER SPRAY (AVG) | EVALUATION TEAM VISIBILITY EST CONTIGUOUS | DEFOLIATED | INCREASE |
|---|---|---|---|---|---|---|
| 20-10 | 3-27 Jul 63 | 12 Sep 63 C-123 at 75-150 ft alt. | (Avg for total 20-10) 59 days | | | |
| Sub-Target 20-10-1 | H34 HIDAL Spray Equip | Same as above | | (V) 35%<br>(H) 25% | (V) 65%<br>(H) 50% | |
| Sub-Target 20-10-2 | Same as above | Same as above | | (V) 35%<br>(H) | (V) 65%<br>(H) 50% | |
| Sub-Target 20-10-3 | Same as above | Same as above | | (V) 25%<br>(H) 55% | (V) 65%<br>(H) 55% | |
| Sub-Target 20-10-4 | 3-27 Jul 63 C-123, MC-1 Spray Equip | Same as above | | (V) 25%<br>(H) 20% | (V) 50%<br>(H) 35% | |
| Sub-Target 20-10-5 | Same as above | Same as above | | (V) 20%<br>(H) 15% | (V) 60%<br>(H) 45% | |
| Sub-Target 20-10-6 | Same as above | Same as above | | (V) 15%<br>(H) 10% | (V) 55%<br>(H) 40% | |
| Sub-Target 20-10-7 | Same as above | Same as above | | (V) 15%<br>(H) 10% | (V) 45%<br>(H) 35% | |
| Sub-Target 20-10-8 | Same as above | Same as above | | (V) 10%<br>(H) 10% | (V) 55%<br>(H) 40% | |
| Sub-Target 20-10-9 | Same as above | Same as above | | (V) 20%<br>(H) 15% | (V) 70%<br>(H) 60% | |
| Sub-Target 20-10-10 | Same as above | Same as above | | (V) 30%<br>(H) 15% | (V) 80%<br>(H) 60% | |
| Sub-Target 20-10-11 | Same as above | Same as above | | (V) 40%<br>(H) 30% | (V) 75%<br>(H) 65% | |
| AVG 20-10 | | | | (V) 25%<br>(H) 15% | (V) 60%<br>(H) 50% | 2.4<br>3.3 |
| Total Average | *20-7 not included in average (mission aborted) | | | (V) 40%<br>(H) 30% | (V) 80%<br>(H) 75% | 2.0<br>2.5 |

APPENDIX 8

ANALYSIS OF VC INITIATED INCIDENT STATISTICS

Two general target complexes in AN XUYEN (Southern Ca Mau Peninsula) province were analyzed in some detail to determine the effect of defoliation on VC activity. Detailed VC incidents were documented, in so far as possible, for the period 9 June 1962 - 1 October 1963; this period provided information prior to, and following, the conduct of defoliation operations in these areas. While gaps may exist because of changes in reporting procedures, the data are considered adequate for supporting a valid comparison. However, data prior to 9 June 1962 are not available. Therefore, comparison of the before and after periods are unequal and would generally require an upward revision of before-defoliation incidents. Even without such adjustment, the data appear conclusive.

Two general areas were studied. One was the Song Ong Doc - Tieu Dua Canal complex which had been sprayed in September - October 1962 (Targets 20-1 and 20-5). The second complex, which was handled as an entity, included the network of canals in southern AN XUYEN, which had been defoliated as Targets 20-2, 20-3 and 20-4 in September - October 1962, and the Cua Lon - Bo De Rivers (Target 20-9 attacked in May 1963).

The Song Ong Doc River - Tieu Dua Canal target complex is of particular interest since it provides not only a comparison of incidents in two areas i.e., before and after defoliation, but also allows comparison with a contiguous area which was not defoliated. Table 1A, attached, summarizes the incident data, by type, from the Song Ong Doc River (southern) portion of this complex; table 1B, the data from that center portion of the river and canal which has not been defoliated; and table 1C, the data pertaining to the northern portion of the canal which had been sprayed. Based on these data, it appears that, following defoliation, the attack rate experienced within the area decreased; however, harassing fire increased. This is probably a result of VC inability to position themselves in the defoliated area due to improved visibility provided to ARVN troops. The VC, due undoubtedly to this increased visibility with resulting ARVN efficiency, are forced to remain in concealed places. This postulate tends to support the decrease in sighting. It should also be noted that a significant difference in incident rates exists between the segments which were defoliated and that which had not. In essentially equivalent areas manned by the same type troops, 50% more incidents occur in, or in the vicinity of, the river where it passes through the undefoliated area. This comparison is as important as the comparison on a before/after basis.

The same trend toward decrease of attacks is also evidenced by the incident data, table 2, pertaining to the southern Cau Mau peninsula; again, the decrease in attacks is accompanied by an increase in ambushes, in the vicinity of the defoliated area, and harassing fire as well as a decrease in sightings.

Table 3 summarizes the total number of incidents of all types which have occurred in the areas analyzed. The overall consistency of the data demonstrates clearly that although defoliation, in and of itself, is not a panacea, it is a valuable tool which does contribute to the overall success of the tactical mission. It is evident that it does assist in the reduction of attacks on friendly forces. These chemical operations apparently force the VC deeper into the woods thereby decreasing their overall reaction capability and confining their efforts essentially to ambush in the vicinity of defoliated areas, and harassment activities. As indicated, attacks have been reduced by 50% and the total incident rate by approximately 47% in the defoliated areas.

Table 1A (APPENDIX 8)
Song Ong Doc - Tieu Dum Canal
(Defoliated Segment 1)

VC INCIDENT OCCURRENCE

| Type Incident | Within Defoliated Area | | | Non-Defoliated Area (In Vicinity of Defoliated Area) | | |
|---|---|---|---|---|---|---|
| | Before(1) | After(2) | Gain/Loss | Before(1) | After(2) | Gain/Loss |
| Attack | 2 | 0 | -2 | 5 | 2 | -3 |
| Canal Activity | | | | 1 | 0 | -1 |
| Harassing Fire | 0 | 1 | +1 | 1 | 2 | +1 |
| Obstacle | | | | 1 | 0 | -1 |
| Sighting | — | — | — | 3 | 2 | -1 |
| | 2 | 1 | -1 | 11 | 6 | -5 |

(1) Period of 9 June through 7 September 1962.

(2) Period of 8 September 1962 to 1 October 1963.

Table 13 (APPENDIX 8)
Song Ong Doc - Tien Dua Canal
(Undefoliated Segment 2)

VC INCIDENT OCCURRENCE

(12 October 1962 to 1 October 1963)

| Type Incident | Within 200m of River | In Vicinity |
|---|---|---|
| Ambush | 2 | 5 |
| Attack | 2 | 11 |
| Harassing Fire | | 3 |
| Kidnapping | 1 | 1 |
| Sighting | — | 1 |
| | 5 | 21 |

Table 1C (APPENDIX 8)
Song Ong Doc - Tieu Dua Canal
(Defoliated Segment 3 Target 20-5)

VC INCIDENT OCCURRENCE

| Type Incident | Within Defoliated Area | | | Non-Defoliated Area (In Vicinity of Defoliated Area) | | |
|---|---|---|---|---|---|---|
| | Before(1) | After(2) | Gain/Loss | Before(1) | After(2) | Gain/Loss |
| Attack | | | | | 3 | +3 |
| Harassing Fire | | 1 | +1 | | 1 | +1 |
| Kidnapping | | | | 1 | - | -1 |
| Obstacle | 1 | - | -1 | | | |
| Sabotage | — | — | — | — | 1 | +1 |
| | 1 | 1 | 0 | 1 | 5 | +4 |

(1) Period of 9 June through 11 October 1962

(2) Period of 12 October 1962 to 1 October 1963

Table 2 (APPENDIX B)

TOTAL VC INCIDENTS IN SOUTHERN CAU MAU PENINSULA DEFOLIATED AREA COMPLEX

| Type Incident | Within Defoliated Area | | | Non-Defoliated Area (In Vicinity of Defoliated Area) | | |
|---|---|---|---|---|---|---|
| | Before | After | Gain/Loss | Before | After | Gain/Loss |
| Ambush | | | | 1 | 4 | +3 |
| Attack | 6 | 2 | -4 | 5 | 2 | -3 |
| Harassing Fire | 0 | 1 | +1 | | | |
| Mine | 1 | 0 | -1 | | | |
| Obstacle | | | | 1 | 0 | -1 |
| Sighting | — | — | — | 2 | 0 | -2 |
| Total | 7 | 3 | -4 | 9 | 6 | -3 |

NOTE: Complex composed of Targets 20-2, 20-3, 20-4, and 20-9. Time intervals of Before/After Incidents are:

| Target | Before | After |
|---|---|---|
| 20-2 | 9 June - 21 Sep 62 | 22 Sep 62 - 1 Oct 63 |
| 20-3 | 9 June - 4 Oct 62 | 5 Oct 62 - 1 Oct 63 |
| 20-4 | 9 June - 3 Oct 62 | 4 Oct 62 - 1 Oct 63 |
| 20-9 | 9 June - 9 June 63 | 10 June 63 - 1 Oct 63 |

Table 3 (APPENDIX 8)

TOTAL VC INCIDENTS IN DEFOLIATED AND ADJACENT AREAS (AN XUYEN PROVINCE)

| Incident | Before | After | Gain/Loss |
|---|---|---|---|
| Ambush | 1 | 4 | +3 |
| Attack | 18 | 9 | -9 |
| Canal Activity | 1 | 0 | -1 |
| Harassing Fire | 1 | 2 | +1 |
| Kidnapping | 0 | 1 | +1 |
| Mine | 2 | 0 | -2 |
| Obstacle | 3 | 0 | -3 |
| Sabotage | 0 | 1 | +1 |
| Sighting | 5 | 0 | -5 |
| TOTAL | 31 | 17 | -14 |

APPENDIX 9

SUMMARY OF INTERVIEWS AT PROVINCES ON MILITARY MATTERS

| A. DEFOLIATION | RVN COMMENTS | U.S. ADVISORY COMMENTS |
|---|---|---|
| Target Nr. 20-1, 20-2, 20-3, 20-4, 20-5, 20-9 (These targets were discussed as a group) | Target 20-1 is an excellent example of effectiveness of defoliation (Canal-river is defoliated at NKS exit portions-about 2/5 of total). Before defoliation (1961-1962) numerous VC ambushes (Province Chief & District Chief killed). Since defoliation no VC incidents; VC incidents continue along portion not defoliated. Feel strongly that defoliation is a military necessity to maintain military supply routes to RVN outposts and has clearly proven its worth. Have requested numerous additional defoliation missions but crop destruction not feasible because of non-distinguishability of VC friendly crops and VC food abundance. | G2 Advisor-IV Corps confirmed post-defoliation incident data. U.S. Sector Advisor concurs in RVN views. Points out pure civilian traffic permitted by VC (with tax) but constant attacks of military convoys. Also, canals-rivers are only source of supply for many RVN areas in AnXuyen; without supplies certain villages cannot survive. "Defoliation will positively-absolutely help"; "makes a tremendous difference"; "Gov't control on the west coast cannot be established without defoliation". |
| 20-6 | Defoliation was requested because VC stopped busses along road and other VC incidents occurred along the road. Defoliation is very good because it stops VC activities and saves soldiers lives. Defoliant had good effect but was too narrow; however, troops could be maintained along the road. Stated urgent request for 4 other targets which he has submitted. Most urgent is in Cang Long district and is VC controlled, but has potential friendly population; cannot obtain air strikes for this reason; has lost 85 men since beginning of 1963 trying to clear this area; "would rather have this area defoliated than be given an additional company". Feel VC fear effects of defoliation because they cannot hide, but do not fear the chemicals themselves. Considered crop destruction not | Personnel had no first hand knowledge of situation prior to or immediately after defoliation. Appeared indifferent to military worth of defoliation. Had viewed area on the ground and considered area defoliated too narrow (only 50 to 150 meters on each side). Feel 200 meters is minimum since lesser widths serve only to increase fields of fire for possible ambushes. Large scale ambushes were no longer a problem along defoliated road but enough casualties were sustained from harassing fire to cause cessation of ground movement & require helicopter supply of outposts before evacuation of area. |

| | | |
|---|---|---|
| | feasible since cannot tell VC from friendly crops and because of food abundance. | |
| | NOTE: RVN & U.S. personnel advised that the road was initially defoliated to facilitate planned RVNAF military operations to clear that portion of the province. At that time, posts along the road existed only by VC acquiescence. One bridge along road was blown by VC in 1958; second bridge blown by VC one month after defoliation. RVNAF forces were too few to clear the area; RVNAF posts have since been withdrawn and VC control the road area. | |
| 20-7 | Both groups agreed that the few seconds of spray produced no change in visibility but produced minor browning of the canopy. No noticeable change in VC activity in the area. | |
| 20-8 | 20 incidents (1 major ambush) over 6 months before defoliation. 1 Co. of security required for the road before defoliation. Since defoliation (follow-up cutting of trees & burning of brush accomplished also) there have been no incidents and security force no longer required. Before defoliation, VC lived in areas around road and used the road for hijacking supplies. Have now moved out of area and their connection with VC in BINH DINH Province severed. Believe VC fear visibility aspect of defoliation. | Confirm no incidents after defoliation and that no security forces required along road. Have no data available for time before defoliation; J2 MACV confirms Province data. Feel that military operations have also contributed to reduction in incident rate and cannot separately attribute to defoliation alone. |
| 20-10 | BINH DINH Province | |
| (Sub-targets 20-10-1 20-10-2 20-10-3) | VC incidents before defoliation- 3 towers wrecked and construction timetable set back 3 months. Since defoliation - no incidents. Plan to complete clearing thru chemical hand spray (remaining 25% not affected) and by cutting. (NOTE: Corps records 20 incidents from Nov 62-Jan 63). Defoliation is useful because it improves visibility and facilitates security of powerline. | Confirm RVN comments. |

| | | |
|---|---|---|
| 20-10<br>(Sub-targets<br>20-10-4<br>20-10-5<br>20-10-6<br>20-10-7<br>20-10-8) | LONG KHANH Province<br><br>No incidents on powerline before or after; mission was requested for preventive purposes. 3 Cos of security forces used before and after defoliation. However, each Co now able to cover 3 times their previous area. Based on this Province Chief plans to send 2 Cos off for training which he has been unable to do previously. Feels that defoliation helps "beaucoup". Has 3 requests awaiting approval for 2 months. Considers railroad area 1st priority. Feels that VC fear defoliated areas because exposed; does not think they fear psychologically but has informer reports that indicate serious concern about chemical crop destruction. | Confirm RVN comments. Feel that defoliation aids visibility, appreciably, particularly air-patrolling. Cited fact that can now determine from aerial observation whether barbed wire apron enclosures around the powerline are intact; previously unable to do except by ground reconnaissance. |
| 20-10<br><br>(Sub-targets<br>20-10-9<br>20-10-10<br>20-10-11) | LAM DONG Province<br><br>Defoliation was requested as a preventive measure. No incidents before or after defoliation. Feel it has helped security forces to operate and that VC in general area of the powerline have moved to a deeper location. Feel VC actually fear the chemical spray (based on informer reports.) | Confirm RVN views on visibility improvement, incidents, and security operations improvement. Feels views on VC movement and VC fear of chemical spray are just guesses. State province Chief has not been to defoliated area but bases view on subordinate's estimates. |
| B. CHEMICAL CROP DESTRUCTION | | |
| 2-1 | Essentially 100% of crop target destroyed; very small amount of cassava in late stage of growth may have been salvaged. Very enthusiastic about chemical spray use but deplores lack of rapid response to current request (4 months since formally requested). Feels that VC in PDT Zone have had a sufficiency of food but there is an increasing shortage (based on intelligence reports). Establishment of strategic hamlets & province rice control programs are denying | U.S. Advisors concur wholeheartedly in RVN views and stressed need for prompt action on Province Chiefs requests for chemical crop destruction. |

| | | |
|---|---|---|
| | deny VC food sources. VC have three alternatives (1) grown own food (doing this now), (2) obtain food from VC sources in Delta (estimates would take 20 days out of each month for VC forces to accomplish) and/or (3) attack strategic hamlets in force to obtain food (Province Chief desires they do this since makes VC vulnerable to his ranger strike forces). | |
| 2-2 | Approx 760 hectares of field crops destroyed by 1st Div in May & Jun 1963 (only 67 by chemical hand spray). Total estimated to be equivalent to 1.76 million kilos of dry food which would feed 1000 VC for one year period (based on approximately 500 grams of rice/man/day). Estimate 3000 VC operate in the affected area. VC vigourously opposed chemical spray operation (18 spray operators KIA) in Feb 63 phase; modified tactics to helo lift in May-Jun operations with no spray operator casualties. Chemical hand spray essentially 100% effective (some late stage crops-80% mature-considered only 10 to 30% effective after 5 days-but only small amount). In chemical operation; 40 men hand sprayed average of 1 hectare in 20 min; manual destruction required 40 men for 8-10 hours/hectare. Felt tied up manpower unnecessarily (opn required 2 Regts for Manual destruction for approximately 2 months). | Concur in RVN comments; from ground observation feel chemically sprayed crops were 100% destroyed but observation of effect on tubers of root crops not done because of lack of time in area. Feel need aerial delivery system of chemical attack against relatively inaccessible small VC farms deep in mountain jungle. Feel hand cutting as compared to chemical spray wastes combat manpower. Also, areas for VC crop destruction clearly delineated and, therefore, no problem, of distinguishibility from friendly crops. |

APPENDIX 10

FIELD CROPS DESTROYED MANUALLY IN III CORPS

DURING MAY, JUNE & JULY 1963 OPERATIONS

| PROVINCE | HECTARES |
|---|---|
| BINH THUAN | 24 |
| MINH THUAN | 2 |
| KHANH HOA | 327 |
| DARLAC | 70 |
| QUANG DUC | 22 |
| LAM DONG | 35 |
| BIEN HOA | 9 |
| BINH DUONG | 2 |
| PHUOC TUY | 19 |
| TAY NINH | 10 |
| BINH TUY | 6 |
| PHUOT-BINH-THANH (PBT) ZONE (PHUOC LONG, BINH LONG & PHUOC THANH PROVINCES) | 15 |
| TOTAL..... | 541 |